Finance and Accounting for the Non-Financial Manager, Part I

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Finance and Accounting for the Non-Financial Manager

Part I

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COURSE GUIDE

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Before coming to Boston University, Professor Schwartz was assistant dean and associate professor of management at the Wharton School of the University of Pennsylvania. Prior to that, he had fifteen years of program management experience with Sperry Rand, Westinghouse Electric, and Thiokol Chemical Corporation, and he was credited with six U.S. patents.

Professor Schwartz has been a consultant to many U.S. and foreign companies and government organizations, and is a director of five companies. He also served a number of times as a receiver in bankruptcy for the Federal District Court. Most recently, he brought a consumer finance company successfully through Chapter 11 proceeding. He is a trustee of Tiffin University, which awarded him an honorary doctorate. He previously served as director of an investment banking firm and Governor of the Boston Stock Exchange. He is a member of the Financial Executives Institute, the American Society of Mechanical Engineers, the Army and Navy Club of Washington, and the Harvard Clubs of New York and Boston.

Professor Schwartz's research interests include business policy, technological innovation, and corporate finance. He has conducted executive programs in management policy and finance throughout the United States, Europe, and Asia. His book *Corporate Policy* was published by Prentice Hall. In 1985 he was awarded Boston University's Metcalf Prize for distinguished teaching.

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Finance and Accounting for the Non-Financial Manager

Finance and Accounting for the Non-Financial Manager

Scope:

The purpose of this program is to give you a manager's perspective of both accounting and corporate finance. You will learn: (1) a working vocabulary; (2) an understanding of financial statements and their limitations; (3) the use of performance measures to control an organization; (4) techniques for making financial decisions; and (5) how to develop strategic options from financial data.

Lecture One
Balance Sheet: Assets

Scope: This first lecture will deal with the assets of the firm, that is, what it owns that has value. We will look at the problems arising from trying to put dollar values on these diverse holdings. We will also look at the life-span of these assets. The firm invests in assets in the expectation that it will convert them into more cash during their useful lives than they originally cost.

Outline

I. The first financial statement you will examine is the balance sheet, or statement of condition.

- **A.** This is a snapshot of what the company owns, its assets, and an explanation of where the funds came from to buy these assets.
- **B.** The sources of these funds are debt (liabilities) and equity (net worth), contributed by lenders and shareholders respectively. The balance sheet equation is:

(1) TOTAL ASSETS = DEBT + EQUITY.

II. Format for Reporting Assets

- **A.** Assets are valued at historic cost, or market, whichever is less.
- **B.** Assets are listed in order of how soon they will be converted back into cash.
- **C.** Current Assets are those that will convert to cash within the normal one-year accounting period.

III. What do we need cash for?

- **A.** To make change
- **B.** To pay debts
- **C.** To pay dividends
- **D.** To repurchase shares
- **E.** What to do with temporary surpluses?

IV. Accounts receivable are money owed to us by our customers.

- **A.** Will we collect all of our receivables?
- **B.** How long will it take to collect them?

$$(2)\ \text{DAYS OF RECEIVABLES} = \frac{\text{ACCOUNTS RECEIVABLES}}{\text{SALES}} \times 360$$

C. Reserving for bad debt.

D. How to accelerate collections.

E. Factoring receivables.

V. Inventories are things we plan to sell. They include:

A. Finished Goods.

B. Work in process.

C. Raw material.

D. There are several ways to value inventories:

1. First In-First Out (FIFO)

2. Last In-First Out (LIFO)

3. Average

4. LIFO liquidations

5. A firm's method of valuing inventory impacts its income and its taxes.

6. Keeping more than one set of books.

7. How many days of inventory are on hand?

$$(3)\ \text{DAYS INVENTORY} = \left(\frac{\text{INVENTORY}}{\text{COSTS OF GOODS SOLD}}\right) \times 360$$

VI. Other Current Assets

A. Prepaid Expenses

B. Accrued interest income

VII. Fixed Assets

A. Plant and Equipment

1. Depreciation- recouping the investment

2. Straight-line depreciation

$$(4)\ \text{ANNUAL DEPRECIATION CHARGE} = \frac{\text{HISTORIC COST} - \text{SALVAGE}}{\text{EST. LIFE}}$$

3. Accelerated depreciation

4. A firm's choice of depreciation method impacts its income and taxes.

5. Keeping more than one set of books
6. Depletion

B. Other fixed assets include:

1. Goodwill- tax problems and ways around them
2. Patents and other intellectual property

QUESTIONS

Refer to Appendix A

1. What was XYZ's days of receivables at year-end 1994?
2. Name one negative reason for the change from 1994 to 1995.
3. Name one positive reason for the change from 1994 to 1995.
4. If a competitor's days of inventories increases year-over-year, what reasons might explain the change?
5. A portion of your finished goods inventory has become obsolete. What should you do?

ANSWERS

1. AR's/Sales X 360 = (7/60) X 360 = 32 days.
2. Customers are paying slower; collections are poorly managed; payment terms do not produce an incentive, given interest rates.
3. The sales department was able to pick up several new customers by granting more generous credit terms.
4. He's offering just-in-time delivery and has to carry sufficient inventory to be credible. He was too optimistic in his sales forecast. He is stocking up in anticipation of a price increase by a raw material supplier.
5. You must write this inventory down to the disposal value.

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, eighth edition, 1994, pp 24-29, 152-158.
2. Van Horn, James C. *Financial Management and Policy*, Prentice Hall, fifth edition, 1980.
3. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, second edition Wiley, 1997, pp57-58, 46-51.

Lecture Two
Balance Sheet: Liabilities and Equity

Scope: This lecture deals with the sources of investment funds open to a company. One choice is to borrow the money; debts so incurred are also called liabilities. The other choice is to convince shareholders to invest in the business; their investment is called equity or net worth. You will discover that are both advantages and disadvantages to both forms of financing. Matching the time that the funds will be available to the firm to the life of the assets to be purchased is essential, since the use of these assets should generate the cash necessary to return any borrowed money as the debt comes due.

Outline

I. Format for Reporting Liabilities and Equity

- **A.** Liabilities and equity are reported as the historic value of the contribution.
- **B.** They are listed in order of how soon they must be repaid, if ever.
- **C.** Current liabilities are those that must be paid within the normal one-year accounting period.

II. Wages and Salaries Payable

- **A.** Because employees work before the get paid, they are effectively creditors to their employer.
- **B.** Blue collar workers are usually paid weekly, so they lend funds for an average of 3.5 days.
- **C.** Salaried workers may be paid as seldom as once a month, so they may be creditors for as long as 15 days.
- **D.** While none of the employees demand interest, it may be that it's reflected in their compensation.

III. Accounts Payable

- **A.** Suppliers lend the company money by giving it time to pay for goods or services after they are delivered.
- **B.** The account payable of the buyer is an account receivable to the supplier.
- **C.** To encourage prompt payment, suppliers often offer discounts.
- **D.** A buyer makes a tradeoff between the discount for prompt payment and the cost for alternative sources of funds.

E. The days that a company takes to pay its accounts payable can be estimated by the following formula:

$$(5)\ \text{DAYS OF PAYABLES} = \frac{\text{ACCOUNTS PAYABLE}}{\text{PURCHASES}} \times 360$$

F. Where purchases are not known, COST OF GOODS SOLD can be substituted; but estimated labor costs should first be deducted from this figure

IV. Taxes Payable

A. Estimated income taxes are normally paid quarterly.

B. There is no interest charge when the payment is timely.

V. Current Portion of the Long-Term Debt

A. If any part of the long-term debt is due this year, it's considered a current liability.

B. Companies rarely pay off their debt, opting instead to issue new debt. Rolling over debt will be discussed later.

VI. Current Liabilities

A. The sum of wages and taxes payable, accounts payable, taxes payable, other payables, and the current portion of the long-term debt is due this year.

B. Failure to pay current debt is an act of bankruptcy.

C. Late payment affects the ability of the firm to borrow economically.

VII. Long-Term Debt

A. Long-term debt can take the form of bank borrowings or bonded indebtedness.

B. Interest rates depend on the market, the maturity, priority, and security offered.

C. Bonds sold to the public through underwriters without specific security are called debentures.

D. Some firms offer convertible debentures.

E. Long-term debt is normally refinanced as it comes due by selling new bonds.

F. Terms of indebtedness are spelled out in the indenture contract. Violating the terms of the indenture can result in acceleration of the principal due date.

G. Failure to pay interest, usually semi-annually, or principal is an act of bankruptcy.

H. Most indentures provide for a sinking fund that pays off a portion of the long-term debt over several years.

VIII. Deferred Income Taxes

A. If this item shows on the balance sheet, the firm is keeping more than one set of books.

B. Using FIFO inventory reporting for financial statements and LIFO for tax returns.

C. Using straight-line depreciation for financial statements and accelerated depreciation for tax returns.

IX. Equity or Net Worth Accounts

A. Shareholders invest in one of three ways:

1. Common Stock: initial offering price or par valuation.

2. Paid-In Surplus: excess paid to the company for shares offered after initial offering or in excess of par value.

3. Retained Earnings:

a. Retained earnings are the portion of earnings not paid out as dividends, as determined by the Board of Directors

b. If the company loses money, the loss is deducted from the retained earnings account.

c. This account can be a negative figure, particularly for start-up businesses.

d. Decisions to repurchase company shares are reflected in a reduction of this account.

B. Some firms issue classes of preferred shares that pay a fixed dividend, if earned.

QUESTIONS

1. A company wishes to purchase a new piece of equipment with an expected useful life of ten years. Would it be appropriate to finance the purchase with short-term borrowing?

2. A company sells 1000 shares of new stock at a price of $100 per share. Its initial public offering was at $10 per share. Make the appropriate adjustments to the balance sheet.

3. XYZ Corporation earned $4000 in the first quarter of 1996. Its Board elected to pay out $1000 in dividends. What is the appropriate treatment for the retained earnings account?

4. XYZ Corporation borrowed $25000 long-term from its bank. $5000 was used to pay the current portion of its long-term debt. Make the appropriate entries on the balance sheet.

5. A company fails to pay the dividend on its preferred shares. Is it insolvent?

ANSWERS

1. No. The asset is a long-term one and should be with either long-term debt or equity.

2. Add the proceeds from the sale, $100,000 to the cash account on the asset side of the balance sheet. $10 X 1000, or $10000 should be added to the capital stock account; the remainder, ($100-10) X 1000, or $90000 should be added to the Paid-In Surplus account.

3. Add the difference between the quarterly earnings and the dividend paid to the Retained Earnings account, $3000 = $4000 - $1000.

4. The best approach, to avoid confusion, is to first add $25000 to both the Cash and Long-Term Debt accounts; then subtract $5000 from the Cash account and from the Current Portion of the Long-Term Debt account. The net result is an increase of $20000 in Cash, an increase of $25000 in Long-Term Debt, and a decrease of $5000 in the Current Portion of the Long-Term Debt accounts.

5. No. The dividend on either the common or preferred shares of a firm is not a debt until it is actually declared by the Board of Directors. If sufficient earnings were generated during the most recent accounting period to pay the preferred dividend, it is due to these shareholders. If the company fails to pay, they can sue for a judgment. If there were insufficient earnings, the preferred shareholders have no recourse. If the preferred is a cumulative one, no dividends can be paid on the common until the preferred arrears is satisfied.

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis, Irwin*, eighth edition, 1994, pp.24-29, 353-355.

2. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, Wiley, 1982 pp. 36-42, 180-194.

3. Van Horn, James C. *Financial Management and Policy*, Prentice-Hall, fifth edition, 1980, pp. 605-632.

Lecture Three
Income Statement: The Nature of Costs

Scope: This lecture will deal with the income statement, a report on the profit results for the accounting period. You will have an opportunity to examine how the nature of costs influences both results and financial decisions. You will also learn how the accountant deals with the problem of matching costs that may be incurred in an earlier accounting period with the revenues they help to generate in the present period.

Outline

I. Format of the Income Statement

- **A.** Unlike the balance sheet that depicted the condition of the firm at one point in time, the income statement covers a period of time, usually a quarter or a year.
- **B.** Managers with access to the internal reports can even generate weekly or monthly income reports.
- **C.** The format of the statement lists sales, also called revenues (and by the British, turnover), then deducts the costs that were incurred to produce those sales.
- **D.** Some costs are directly attributable to sales, while others such as management salaries may be allocated as overhead charges.
- **E.** Most companies prepare separate internal reports for each product line, and in some cases for each geographical division.

II. Billing Sales

- **A.** Unless they are disputed by the customer, sales are usually journaled to the income statement when the goods are shipped or as the services are provided.
- **B.** This entry generates an account receivable that may actually be collected in another accounting period.
- **C.** Sales are net of discounts for prompt payment.

III. Cost of Goods Sold (or Services Provided)

- **A.** Costs generally include raw materials, direct labor, sales commissions, energy used in the production process, and in some cases, depreciation charges for the fixed assets used to produce the product.
- **B.** These costs, with the exception of depreciation, are often called variable costs because they vary directly with the level of production.

IV. Other Costs, or Expenses

A. Costs that do not vary directly with the production rate are termed fixed costs.

B. Fixed costs are not unchanging; they simply depend on other things.

C. Salaries of corporate officials are fixed, even though they may be tied to profits.

D. Rent is a fixed cost, unless it is the percentage rent sometimes charged to stores in a shopping center.

E. Interest is a fixed expense, determined by the interest rate, amount borrowed, and duration of the loan.

F. Depreciation is a fixed expense allocated in the manner we discussed in Lecture One.

G. Depletion and some amortization charges are taken in accordance with tax laws.

V. Profit before Tax

A. Pre-tax profit is calculated as the difference between the sale and all of the costs listed above. A generalized formula for profit before tax is:

(6) PROFIT BEFORE TAX = VOLUME X (UNIT PRICE - UNIT VAR. COST) - FIXED COSTS

B. Volume times unit price is sales.

C. Volume times unit variable cost is total variable cost.

D. The difference between unit price and unit variable cost is the unit contribution, or the amount each unit sold contributes to cover fixed costs. Total contribution in excess of fixed costs is profit before tax

E. Because there are fixed costs, profit changes faster on a percentage basis than either volume or sales does.

F. Management feels pressure to sell additional units at any price over variable cost to generate additional contribution.

VI. Break-even

A. Break-even is defined as the volume that results in zero profit before tax.

B. Setting PROFIT BEFORE TAX in formula (6) to zero, and solving for BREAK-EVEN VOLUME results in the following formula:

$$(7)\quad \text{BREAK} - \text{EVEN VOLUME} = \frac{\text{FIXED COST}}{\text{UNIT CONTRIBUTION}}$$

VII. Investment costs and learning effects will be covered in later lectures.

QUESTIONS

Refer to Appendix A

1. Assuming XYZ Corporation has sufficient capacity to make and sell 10 percent more product, calculate its pretax profit for 1996.

2. Estimate the break-even sales level for XYZ Corporation.

3. Sixty percent of XYZ's cost of goods sold in 1995 was raw material cost. If it had experienced a 10 percent increase in raw material prices in 1995, what would have been realized in profit before taxes?

4. The Federal Reserve, satisfied that inflation was under control in 1995, allowed interest rates to drop an average of one percentage point for the year. How did this impact XYZ's performance pre-tax?

5. If management achieves a 15 percent reduction in fixed costs for its company, how much does the break-even volume drop?

ANSWERS

1. Sales increase 10 percent to 110. COGS also increase 10 percent to 66. Gross margin increases to 44. Assuming S&A, Depreciation and Interest expenses are indeed fixed, Profit before Tax would be 44 - 16 = 28. A purist might also argue that some short-term financing would be required to finance the higher level of accounts receivable and inventories needed and that this would result in a somewhat higher interest expense.

2. Since the gross margin on sales is 40%, (40 / 100), each dollar of sales contributes $0.40 toward covering the total of $16000 of fixed costs. Thus FIXED COST / CONTRIBUTION = 16000 / 0.40 = $40000, the firm's break-even sales level.

3. Raw material costs, before the price increase were 0.6 X 60000 = 36000. A ten percent increase in raw material prices would increase COGS by 0.1 X 36000 = 3600, so pre-tax profits would fall to 24000 - 3600 = $21400. A more sophisticated approach would take into account that the firm had total inventories of $5000 on hand at the end of 1994, that is the beginning of 1995, and that part of these inventories were raw materials purchased at the old price. Given access to the records of XYZ it would be possible to estimate how much of this lower-priced inventory might have been depleted to support the 1995 sales. Use of the lower-priced inventory could have resulted in a slightly lower drop in pre-tax profit.

4. XYZ had interest-bearing debt of $48000 outstanding at yearend 95 (LTD + Curr Port LTD) and $43000 outstanding at yearend 94. So its average interest-bearing debt was $45500 for the year 1995. It paid $4000 in interest on this debt . A one percentage point decrease in interest rates had saved it 0.01 X 45500 = $455. Pre-tax profit had increased by this amount.

5. Since the break-even formula (7) states that break-even volume and sales are directly proportional to fixed costs, a 15 percent drop in fixed costs would drop the break-even volume by the same percentage.

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, Eighth Edition, 1994, pp. 218-232.

2. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, Wiley, 1977, pp. 42-46, 138-145.

3. Van Horn, James C. *Financial Management and Policy*, fifth edition, Prentice-Hall 1980.

Lecture Four
Economies of Scale and Cash Flow

Scope: This lecture will deal with an important goal of every business: maximizing the amount of cash it generates relative to the amount it has invested. We will also develop an understanding of the significance of operating near capacity in order to increase profit margins. In addition, we will examine the role that plant size plays in return on investment.

Outline

I. Cash Flow

A. Add back non-cash expenses to profit after tax to calculate cash flow:

(8) CASH FLOW = PROFIT AFTER TAX + NON-CASH EXPENSES

B. Non-cash expenses include depreciation, depletion, and amortization of goodwill.

C. Non-cash expenses can sometimes include write-offs of losses that were previously reserved for.

D. Another common non-cash expense is a provision for restructuring, when a company plans to down-size.

E. Free cash flow includes profits, non-cash expenses, plus new financing, less investments in additional assets.

F. Free cash flow is available to pay dividends, repurchase shares, do research and development, and acquire new businesses.

II. Economies of Scale

A. In Lecture Three we learned that increasing volume is a way of spreading fixed costs over more units of production, thus reducing unit cost:

$$(9)\ \text{TOTAL UNIT COST} = \frac{\text{UNIT VARIABLE COST} + \text{FIXED COST}}{\text{UNIT VOLUME}}$$

B. When economists speak of economies of scale, they simply refer to the lower total unit cost, resulting from operating near capacity and spreading fixed costs as shown in Formula (9).

C. Few firms can operate efficiently as they approach maximum capacity.

1. How good is the service in a restaurant when it's very busy?

2. When business is too good, the company has to rely on less experienced workers.

3. When business is too good, it's often impossible to do necessary maintenance on equipment.

III. Scale Economies from Efficient Use of By-Products
   A. Most process industries produce by-products while trying to produce their principal products.
   B. Petroleum refineries produce gasoline, heating oil, and kerosene, but they also produce methane and other light gases.
      1. Burning these by-products for energy is normally a poor usage.
      2. Ideally, other plants might use these products as their feedstocks.
      3. To operate effectively, by-product plants are generally large and so demand that the refineries that provide the feedstocks be large enough to produce sufficient supply.
      4. This helps to explain the very-large scale of petroleum refining operations.
   C. Other examples include the production of sulfur, while refining copper ore.

IV. Economies from Duplicating Equipment
   A. Highly capital-intensive plants, like paper mills, often run several lines in parallel.
      1. This helps to keep expensive, highly skilled maintenance people busy.
      2. It permits the mill to use materials-handling equipment, like large cranes, efficiently serving several lines.
   B. Other examples include aluminum mills, and even garment sewing lines.

V. An Introduction to U.S. Steel's Annual Report

QUESTIONS

1. A production facility has fixed costs of $1,000,000. The variable cost to produce each unit is $10. The present level of production is 500,000 units. Calculate the percentage decrease in total unit cost if volume increases by 10 percent.

2. XYZ Corporation uses straight-line depreciation . If it switched to accelerated depreciation and charged off $10000, instead of $7000, in 1995, what would its profit after tax and cash flow be for the year?

3. In the long run, would the switch to accelerated depreciation suggested in question 2 change cumulative profits?

4. Should a company regard the cost of maintenance on its equipment as fixed or variable?

5. A major U.S. airline has reported positive cash flows every year for the last decade; is it reasonable to conclude that has been consistently profitable?

ANSWERS

1. The total unit cost at present is:

TOTAL UNIT COST = UNIT VARIABLE COST + FIXED COST / UNIT VOLUME
= 10 + 1000000 / 500000
= $12 per unit

If volume increased by 10 percent, from 500000 units to 550000,
TOTAL UNIT COST = 10 + 1000000 / 550000
= $11.82 per unit, a reduction of 1.5 percent

2. Profit before tax would drop by $3000, the increase in the depreciation charge. With an effective tax rate of 41.7 percent (= INCOME TAX / PROFIT before TAX = 10 /24), after-tax profit would fall to $12,200, (24 - 3) X (1-.417) X 1000. Cash flow, on the other hand would increase, since, with straight-line depreciation, cash flow is $21,000 (Profit after Tax + Depreciation, or 24000+ 7000). With accelerated depreciation, cash flow is $22,200 (12200 + 10000).

3. Yes, cumulative profits should increase slightly, since XYZ would have the use of funds for a while that it would otherwise have paid in taxes. In the long run, it would have to pay these taxes, but the deferral gives it the opportunity to earn money on the deferred taxes

4. The answer depends. Preventative maintenance, often done on a time schedule, is mostly a fixed cost, while unscheduled maintenance is usually correlated to the use of the equipment to produce product, so it is essentially a variable cost.

5. No. If depreciation charges are a major expense, as they are for an airline, it's possible to report negative earnings while generating positive cash flows. (This helps to explain why the cumulative earnings for all airlines, over the entire history of the industry, have been negative, and yet they survive.)

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, Eighth Edition, 1994, pp. 32-35,188-195.

2. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, second edition, Wiley, 1977, pp. 120-127.

3. Van Horne, James C. *Financial Management and Policy*, fifth edition, Prentice Hall, 1980.

Lecture Five
Financial Reports I

Scope: In the next two lectures we will examine in detail the 1972 Annual Report of the United States Steel Company. You will gain an understanding of the level of precision you can expect in such information and a measure of the degree of discretion management exercises in presenting information to its shareholders. This particular report was chosen because the management did a particularly good job of spelling out their decisions. An extract from the 1972 Annual Report is included as Appendix B to your outline. We will refer to it repeatedly; the page numbers called out in your outline refer to pages in this appendix. You will discover that we have annotated the report with circled numbers to which we will also refer. These numbers may also appear back in the footnotes to help you follow the effort to track a particular item

Outline

I. Background on the Firm

- **A.** The United States Steel Company is the largest steel company in the United States.
- **B.** Orders for steel are usually placed well in advance of delivery to ensure fulfillment— often 18 months early.
- **C.** For the last two years, the company had been recovering from an earlier drop in earnings.
- **D.** The company had reason to believe that the next year, 1973, would be a very good one, and it told the public that it was optimistic.

II. What Constitutes Good Results?

- **A.** The stock market likes earnings to rise.
- **B.** The market prefers smoothly rising earnings to irregular increases.
- **C.** The market does not like surprises, particularly bad news.
- **D.** Dividend cuts, for any reason, are received very badly.

III. Forensic Accounting—playing detective

- **A.** To get the maximum understanding from any report, go to it with a set of expectations.
- **B.** The difference between what you expect and what you find is often the most significant information.
- **C.** Even though it is boring, read the independent auditor's opinion on Page 8.
- **D.** Price Waterhouse rendered a clean opinion.
- **E.** Does management's actions seem to match the reported results? See Page 1.

F. Earnings for the year increased to $2.90 per share, but dividends were cut by 11 percent.

IV. Getting to the Details - Some Ideas to Start With

A. How were sales?

B. If sales were up, did earnings increase more than proportionately? Remember, leverage should be at work.

C. What happened to accounts receivable and to inventories?

D. What happened to reserves?

V. Start with the Income Statement—since that's what the market cares about- Page 1.

A. Our principal effort will be to make an estimate of the possible range of earnings management could have reported, using the discretion permitted under Generally Accepted Accounting Principles.

B. Sales increased by about 9 percent over last year.

C. Income, after tax, only increased by about 1 percent.

D. Dividends declared were cut from $97.5 to $86.7 million.

E. Circle No. 1

1. Income tax was only 22 percent of pre-tax income?

2. Footnote 11, on Pages 7-8, referenced by Circle 1, explains that management elected to repatriate earnings from overseas on which foreign taxes had already been paid, resulting in a credit toward its U.S. tax. Without this credit, after-tax profits would have been $15.1 million less.

F. Circle No. 2

1. Interest expense fell by $7.5 million.

2. Generally, interest costs drop because a firm has less debt or because interest rates have fallen during the period.

3. Page 2, Circle No. 2 - Long-term debt had increased. Not the answer.

4. Page 4, Circle No. 2 - This table lists the firm's bonds. Note that some low-interest rate debt had been reduced and replaced with higher-rate debt. Again, not the answer.

5. Page 8, Circle No. 2 - Footnote explains that the firm had profited from retiring low-interest-rate bonds, then selling at a discount, and partially offset the annual interest cost with this profit, reducing the cost by $14.5 million.

6. Without this discretionary retirement, interest costs would have been $14.5 million more before tax. Assuming a corporate tax rate of 40 percent, after-tax income would have been $8.7 million less.

G. Page 2, Circle No.3 - Marketable Securities

1. This item was down by about $26 million.
2. Marketable securities are carried at cost.
3. If some of these instruments showed a loss and some, a profit, which would you sell in 1972?

H. Page 2, Circle No.4 - Accounts Receivable

1. Receivables were up by about $140 million, or some 24 percent in the face of only a 9 percent increase in sales.
2. Days of receivables increased from 42 days last year to 48 days in 1972.
3. Conclusion - customers are paying slower and a greater reserve for bad debt might be justified.
4. Page 3, Circle No. 4 - The reserve actually decreased from $9.0 to $7.4 million.
5. At a minimum, one might justify an increase of 24 percent, to match the increase in accounts receivable, and perhaps a further increase to deal with the risks of slower payments.
6. If the reserve had been increased by 30 percent, it would have been $11.7 million, so the firm might be under-reserved by $4.3 million. Establishing the additional reserve would have result in $2.6 million less after-tax income.

I. Page 2, Circle No. 5 - Inventories

1. In view of the firm's expectation of good sales in 1973, they might decide to build inventories.
2. Inventories fell by some $50 million.
3. Page 6, Circle No. 5 - The firm values inventories on a LIFO basis. Inventories are carried at cost, but they are worth $600 million more than book, or about 1.7 times the book value.
4. We have witnessed a LIFO liquidation, resulting in the sale of at least $50 million of inventory at market price of perhaps $85 million. Without this additional pre-tax profit, after-tax income might have been $21 million less.

VI. So far we have uncovered discretionary decisions that added perhaps $47.4 million to reported after-tax income.

QUESTIONS

1. To which department of U. S. Steel would you credit each of the ideas that contributed the additional $47.4 million that we have so far estimated it reported in 1972?
2. If you were called upon to justify the lower reserve for bad debt in the accounts receivable item, what would you say?
3. Why does the value of a bond drop, if interest rates rise?

4. Show that U.S. Steel has both financial and operating leverage that is significant.

5. If U.S.Steel had valued its inventories on a FIFO basis, would the liquidation we identified have increased earnings for the year?

ANSWERS

1. Credit the repatriation of tax credits to accounting; interest-expense reduction to finance; accounts receivable reserve to collections; and inventory liquidation to operations. Everyone is contributing to making 1972 a good year!

2. We know that 1973 is going to be a very good year. If it's good for us, it must also be good for our customers. We can expect fewer dead-beats. Further, if customers want deliveries, they're going to have to pay what they owe us.

3. The market will value a bond with a fixed interest rate less, if a higher coupon is available on other similarly-rated instruments. For the lower-coupon bond to sell in the market, it will have to be offered at a lower price.

4. Leverage results from fixed costs, as we learned in Lecture 3. Financial leverage results from fixed costs such as interest expense or rents. The company had total interest-bearing debt of almost $2 billion and interest expense of at least $67 million, about 30 percent of its reported pre-tax income. Operational leverage is the result of fixed costs such as depreciation and amortization. The firm had net plant and equipment amounting to $4 billion, resulting in depreciation expense of $326 million, some 160 percent of reported pre-tax income.

5. Probably not, since it would have been selling product valued at recent prices.

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, Eighth Edition, 1994, pp. 152-154,120-121.

2. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, Wiley, second edition, 1997, pp. 51-53.

3. Van Horne, James C. *Financial Management and Policy*, Prentice Hall, Fifth Edition, 1980, p652, pp. 427-430.

Lecture Six
Financial Reports II

Scope: In this lecture we will continue our examination of the U.S. Steel Annual Report for 1972. Continue to refer to the extract in Appendix B to your outline. You will recall that we had already discovered about $47.4 million may have been added to earnings through discretionary decisions, all within Generally Accepted Accounting Principles.

Outline

I. Balance Sheet - More forensics

A. Page 2, Circle No. 6 - Investments in realty, leasing and other investments.

1. These investments increased during 1972.

2. Page 6, Circle No. 6 - In the table in the footnote numbered 2, the company explains that assets valued at only $4.9 million on its books actually generated $3.3 million in dividends during 1972. Clearly these assets were worth considerably more than their historic cost. If we assume a typical 3 percent dividend rate, the assets would be worth at least $110 million. If you were very anxious to generate some additional earnings in 1972, you might have also sold some of these holdings at a profit of up to $105 million.

B. Page 2, Circle No. 7 - Plant and Equipment, less depreciation increased during 1972.

Page 4, Circle No. 7 - A very small footnote under the plant and equipment table explains that the $326.6 million taken in 1972 was net of profits of $1.6 million, realized by selling some assets at greater than their depreciated value. Without this reduction in depreciation expense, after-tax income would have been $1.0 million less.

C. Page 2, Circle No.8 - Reserves

1. Page 6, Circle No. 8 - The company explains that it is self-insured; that is, it sets up reserves (an expense, when established) against losses, rather than paying premiums to an outside insurance company.

2. It is noteworthy that the firm estimated that it needed exactly $100,276,769 in insurance reserve for both 1971 and 1972. (I'm always a little awed by 9 significant figures in any estimate.)

3. Insurance is required against damage or theft of property. It is also needed for personal injuries, and product liability.

4. Insurable assets, including inventory, plant and equipment and parts and supplies as reported in the balance sheet, had increased slightly during 1972.
5. More importantly, sales, the best indicator of the activities that give rise to injuries and product liability, had risen by 9.4 percent for the year.
6. If the reserve had been increased by 9.4 percent to $110 million to reflect the increase in activity, the additional cost would be about $9.4 million and income after tax would be $5.6 million less.

II. The Footnotes - Still more sleuthing

A. Shareholders and security analysts rarely read footnotes, but some of the most interesting information can be found there.

B. Page 7, Circle No.9 - Under the footnote on pension funding, the firm tells us that it reviewed actuarial factors from to time to time (1972 was one of them!), had recognized favorable appreciation of the pension assets, and so had concluded that it could reduce its pension contributions by $19.2 million. Without this discovery, the after-tax income would have been $11.5 million less.

C. Page 8, Circle No.10 - A portion of the wages paid during 1972 were capitalized into the value of new construction, to be deducted as depreciation over the life of these assets. If these wages had been expensed during 1972, pre-tax income would have been reduced by $32.8 million ($2029.4 - 1996.6 million), and after-tax income would have been $19.7 million less.

D. Page 8, Circle No.11 - Maintenance and repairs for 1972 were $13.1 million less than the previous year. In the light of the greater investment in plant and equipment, the heavier load on the plant to produce 9.4 percent more sales, and the expectation of a very busy year in 1973, management could probably have justified an increase in maintenance activities during 1972. Given the 1.9 percent increase in plant and equipment investment and the increase in sales, they might have increased maintenance expense for 1972 by more than 11.5 percent over 1971 to perhaps $726, or $88 million more than actually incurred. If the firm had made this election, after-tax income would have been $52.5 million less.

III. We have now identified in this lecture an additional $90.3 million of discretionary items that increased 1972 earnings. In addition, we found several opportunities for future increases in income, if management had elected to take them. Coupled with the $47.4 million in contributions defined in Lecture Five, the total increase in after-tax income was $137.7 million. Since U.S. Steel reported after-tax income of only $157 million for the year, it might actually have elected to report a profit of only $20 million. Indeed, some other

adjustments might have resulted in a reported loss of about $11.7 million. The per-share earnings increase of $.05 on its 54 million shares outstanding might also have been a loss of about $.22 per share.

IV. Discretion under GAAP is great

- **A.** Management and shareholders are rewarded for reporting regularly increasing earnings.
- **B.** Any exercise of discretion that increases earnings in one accounting period will cause an equivalent decrease in another.
- **C.** All of the decisions made by management were endorsed by the independent auditors.
- **D.** Noteworthy was that discretion in all the items identified resulted in increases in earnings in a year when they were clearly needed.
- **E.** Few companies would have shown the integrity that U.S. Steel did in reporting so clearly what had been accomplished.
- **F.** It still takes a bit of analysis to understand well what is shown in any annual report.
- **G.** Short-term results are not to be accepted as valid. Longer-term results are more reliable.

QUESTIONS

1. Can a firm "bank" income for use in later accounting periods?
2. What figure on the Income Statement is most valid?
3. Does a clean opinion from the independent auditor mean that the income reported by the firm is correct?
4. To which departments would you credit each of the identified contributions to profits from Lecture 6?

ANSWERS

1. Yes. As we learned in Lectures 5 and 6, recognition of appreciation in assets and deferral of certain expenses are just two examples.
2. Probably the sales figure, although recognition of some sales can often be deferred and allowance for returns is discretionary also.
3. Correct doesn't mean anything in financial reporting. The auditor simply certifies that, given what it was told by management, supported by its own reasonable efforts to confirm some of these data, it concluded that the results were fairly represented in accordance with GAAP, consistently applied.
4. Credit the depreciation idea to accounting; the reserve decision to insurance; pension savings to human resources, wage capitalization to facilities

management; and maintenance decisions to plant engineering. There's credit enough to go around. When you're looking to increase earnings, talk to everyone.

Recommended Reading:

1. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, Eighth Edition, 1994, p26, pp. 40-48
2. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, Wiley, second edition, 1977, p. 46, p. 226.

Lecture Seven
Learning Curves and Cost Reduction

Scope: Unless a company has a monopoly on a product or service that is an absolute necessity, it must almost certainly control costs in order to be competitive. Even if it has the luxury of such a monopoly, it will be more profitable if it can lower its costs. In this lecture, we will examine some of the factors that influence costs. You will also learn about an interesting phenomenon called the learning, or experience, effect and how it can create strategic opportunities.

Outline

I. Review of Costs

A. Variable costs change with the volume of production. Examples of variable costs include:

1. Raw materials
2. Direct labor
3. Energy used in the production process
4. Commissions
5. Percentage rents
6. Unit royalties

B. Fixed costs can vary, but not with production volume. Examples of fixed costs include:

1. Salaries
2. Utilities
3. Interest
4. Depreciation
5. Depletion
6. Amortization
7. Rent
8. Percentage royalties
9. Research and development
10. Marketing costs

C. Costs can depend on where you are.

1. In large Japanese companies, labor may be a fixed cost.
2. Costs have an important impact on Japanese car pricing.

D. Cyclicality and seasonality influence levels of operational leverage.

1. Where demand can vary greatly, try to avoid fixed costs.
2. Where demand is steady and predictable, fixed costs can make sense.
3. Utilities try to provide a base load from capital-intensive plants. Peak loads are satisfied with less expensive systems.

E. Varying demand also influences appropriate levels of financial leverage.
   1. Where demand varies greatly, try to avoid debt.
   2. Where demand is steady and predictable, debt makes sense.

F. Operational and financial leverage usually go together.
   1. Fixed assets are typically long-lived.
   2. Such assets can often be financed with debt.

II. Cost tradeoffs

A. Lower prices generate more volume .
   1. Volume spreads fixed costs.
   2. Volume justifies automation and specialized equipment.
   3. Volume permits specialization of labor—more people can do limited tasks, so the labor pool is bigger and wages are lower.

B. Higher wages may keep out unions. They offer the following advantages:
   1. Greater flexibility in work assignments.
   2. Ease in changing processes.
   3. Fewer work stoppages.

III. Learning Effects (also called Experience)

A. As a process is repeated, the cost of each cycle comes down.

B. Studies show that the cost of a more labor-intensive process drops the most.

C. The percentage drop is highly predictable.
   1. Each doubling of total volume produced to date results in a constant percentage drop in the average cost of all units produced to date.
   2. On a logarithmic scale, this is a straight-line relationship.
   3. Average cost can never get to zero.
   4. The big savings come early.
   5. Each increment of saving requires much more volume.
   6. The effect does not seem time-dependent.
   7. The slope of the curve is typically 15 - 25 percent.

IV. Explaining the Learning Effect

A. Workers claim that they work more efficiently.

B. Process improvement
   1. Specialization reduces costs
   2. Automation

C. Economies of scale

D. Eli Whitney's contribution
   1. Interchangeable parts
   2. Go-No-Go gages

E. Rationalization of the quality control effort
   1. Costs ten times as much to correct something downstream

2. Inspect continuously

F. Robust design
   1. KISS Principle
   2. Good design reduces rejects

V. Learning Effects Create Strategic Opportunities
   A. Buy your way down the learning curve.
   B. When you get ahead of the competition, drop your price and go for market share.
   C. Go for largest scale, when possible.
   D. Buy cheaper.
   E. Seize shelf space.

VI. Tax Costs
   A. Location and taxes are often related; the tax collector knows when you have a good thing.
   B. Transfer pricing can affect taxes.

QUESTIONS

1. Should a petroleum refinery be designed to be labor, or capital, intensive?

2. Integrated circuit chips usually exhibit a 20 percent learning curve. (When measured on cost per transistor device,, these devices have actually shown a 40 percent rate over the history of the industry.) If the Pentium was produced at $250 per unit when total production had reached one million units, what would the average unit cost have been after 4 million units had been made?

3. What arguments can you make to support General Motors' decision to make some of a particular part for its best selling Chevrolet model and buying the rest?

4. City Line Avenue is one of the boundaries of Philadelphia. The city has a wage tax and Montgomery County, on the other side of the street, has none. On which side of the street would you locate a Merrill Lynch brokerage office?

5. ABC Company produces brown construction paper in Country A and ships it to Country B, where it is made into corrugated boxes. Income taxes are much higher in the Country B than in Country A. Should ABC price the paper sold to its plant in the Country B very high, so all of the profit is made in Country A?

ANSWERS

1. Actually, there is little choice; it must be capital intensive. Liquid-processing plants have little need for labor. World-scale design of the plant makes it extremely competitive; so it must and will run very near capacity and spread its fixed costs. Petroleum refiners usually use less debt than most capital intensive industries, perhaps to somewhat limit financial leverage.

2. Total volume to date would have doubled twice to reach a total of 4 million units. The first doubling would bring the average cost for all units produced down by 20 percent to $200. Doubling total production a second time should bring down the average cost of all units to $160. Notice that the most recent units must have made a lower cost than $160, which helps to explain why the industry leader is able to reduce its price so quickly.

3. The make or buy decision for many auto parts results in a mixed decision for several reasons. (1) Part of the unpredictability of demand can be passed off to suppliers. (2) GM can avoid some capital investment. (3) The supplier can be tapped for new ideas. (4) It helps to keep GM's own production facilities honest in their pricing. (4) Freight costs may be less, using multiple sourcing and shipping to nearby assembly plants.

4. Given this situation, it would seem that it makes no difference, since landlords will rent space on the Montgomery side of the street at a higher price than the Philadelphia side. However, landlords don't like empty real estate, given the fixed cost nature of their investment; so it's very probable that Merrill Lynch will be able to negotiate better terms when its lease comes up for renewal. Where will it be more successful: negotiating a better lease, or bargaining with the City for a special tax concession?

5. While it seems like a fine idea to transfer at prices that put all the profit in Country A, with its lower tax rate, Country B's tax collectors may not allow this gambit. Punitive tariffs can be applied to discourage abuse of the system. ABC must walk a fine line in deciding how much of its profits can be retained in Country A without attracting attention.

Recommended Reading:

1. Spiro, Herbert T. *Finance for the Nonfinancial Manager*, Wiley, second edition, 1977, pp 117-119,194-198.

2. Van Horne, James C. *Financial Management and Policy*, Prentice Hall, Fifth Edition, 1980, pp.262-278.

3. Helfert, Erich A. *Techniques of Financial Analysis*, Irwin, Eighth Edition, 1994, pp. 254-258; 218-237.

Lecture Eight
Scale and Transportation Effects

Scope: In this lecture you will learn about two other cost factors that significantly affect the decisions of a company: scale and transportation (or freight) costs. Just how large should a plant be? What are the tradeoffs? How important is transportation expense in the final cost of a product? Does it matter where production functions are done relative to the final market where the product will be sold?

Outline

I. Lang Effect

A. Studies by Lang on the construction costs of chemical facilities demonstrated that these costs do not increase as fast as plant capacity.

1. Henderson, the late CEO of the Boston Consulting Group, confirmed that the same relationships apply to almost all production facilities.

2. Capital requirements for plant and equipment seem to go up as only the 2/3 power of plant capacity. This is illustrated in the following formula and table:

$$(10)\quad \left(\frac{\text{INVESTMENT 2}}{\text{INVESTMENT 1}}\right)=\left(\frac{\text{CAPACITY 2}}{\text{CAPACITY 1}}\right)^{2/3}$$

Plant & Equipment Capacity Relative Investment Requirement

1 1
8 4
27 9
64 16

3. This formula may be the result of the relationship between volume and area that governs many processes. Volume increases as the cube of dimension and area as the square. Notice that the capacity of a building goes up with its volume, but the land required, only increases as the square.

B. Conclusion—Build as Big as You Can

1. Then why aren't all the cars in the United States built in one huge facility in Kansas?

2. Transportation costs to assemble all the factors of production go up as plant size increases.

3. Transportation costs to move the product to market also increase with plant size.
4. Risk increases as you put all your eggs in one basket. Factors that increase risk include:
   a. Catastrophic occurrences
   b. Captivity to the local tax collector
   c. More incentive to organize the labor force
5. Will the transportation infrastructure support the shipping requirements?

II. Transportation Costs

A. How important are they in the final cost of the product?

B. The best single measure seems to be the product's bulk value.
   1. Bulk value is the value per cubic foot of the product.
   2. Goods are usually shipped on a volume basis: truck-loads, boxcar-loads, etc.
   3. Cube-out can limit volume shipped and raise costs.
   4. Diamond prices include little transportation cost.
   5. Empty containers are costly to move.

C. Conclusion: ship product when its bulk value is highest.
   1. If a process increases bulk value, do it before you ship; e.g. copper ore refining.
   2. If a process decreases bulk value, do it as close to the market as possible; e.g. manufacturing blow-molded bottles for carbonated drinks.
   3. One of Kimberly-Clark's most valuable patents is the process of drawing a vacuum on a Kleenex box. Why?
   4. How can you reduce the cost to ship empty corrugated containers?

D. The mode of transportation affects cost. The key variables include:
   1. The quantity to be transported.
   2. Flexibility in choice of both pickup and delivery sites.

III. Tradeoffs between the Lang Effect and Transportation Cost

A. Depreciation and interest expense are dependent on the size of the plant you build, since investment goes up as only the 2/3 power of capacity.

B. The combination of fixed costs (just cited) and transportation costs tends to divide geographic areas up into different markets.

C. Capacity decisions are a key element in strategy, a way of preempting one's competitors.

QUESTIONS

1. Estimate the bulk value of Pentium IC's, if they sell for $200 each.
2. Would you produce Pentium chips in a few very large plants or many small ones, given the global market for the product?
3. If excess capital-intensive production capacity for a high bulk-value product exists in an industry and you want to enter the market, consider the tradeoffs in building a new large-capacity plant to capture the Lang effect.
4. What factors determine the siting of an automobile assembly plant in the United States?

ANSWERS

1. Assume the chip is 1.5 X 0.75 X 0.25 inches. Each one occupies about 0.28 cubic inches. There are 1728 cubic inches in a cubic foot, so you can pack about 6000 chips in a cubic foot (1728 / 0.28). At $200 per chip, the bulk value is $1.2 million per cubic foot.
2. Transportation costs for this product are clearly negligible. Given the technical and cost advantages Intel has with this product, and the low labor-cost per unit, it's doubtful any country would erect tariff barriers. Concentrate production in a few very large plants in politically-safe areas.
3. You should be able to buy additional output from any plant with excess capacity at just over variable cost. This would eliminate the need to make any capital investment during your startup period. Multiple sourcing should make your suppliers more price competitive and supply more reliable; but little will be gained in transportation economies. If the introduction goes well and the market seems to be growing, you could later consider building capacity.
4. Assembly increases the value of an automobile by at least the value of the labor required. On the other hand, it also increases the space the product occupies. It's reasonable to assume that bulk value falls, since even the Japanese are choosing to assemble in the U.S., despite the labor-intensive nature of the process and their aversion to American unions. Further, the product becomes more vulnerable to damage in transport after it's assembled. This suggests that assembly plants should be located as near their markets as possible. (Japan is also assembling in the U.S. to claim as much American content as possible, in order to mitigate political issues over balance of payments.)

Recommended Reading:

Alderfer, Evan Benner and H.E. Michl. *The Economics of American Industry*, McGraw-Hill, 1957. Parts II and III.

Appendix A

XYZ CORPORATION
Income Statement, January 1 - December 31, 19__
$ Thousands

	1995	1994	1993
Sales	100	80	70
Cost of Goods Sold	60	50	45
Gross Margin	40	30	25
Sales & Admin Expense	5	4	3
Depreciation	7	6	6
Interest Expense	4	3	4
Profit before Taxes	24	17	12
Income Taxes	10	7	5
Profit after Taxes	14	10	7
Dividends Paid	6	3	2
Addition to Retained Earnings	8	7	5

XYZ CORPORATION
Consolidated Balance Sheet, as of December 31, 19__
$ Thousands

ASSETS	1995	1994	1993
Cash & Mkt Sec	5	4	4
Accts Receivable	10	7	6
Inventories	6	5	5
Other Current Assets	4	4	3
TOTAL CURRENT ASSETS	25	20	18
Net Plant & Equipment	100	90	88
Other Fixed Assets	10	8	7
TOTAL ASSETS	135	118	113

LIABILITES	1995	1994	1993
Wages & Salary Payable	1	1	1
Accounts Payable	4	3	3
Taxes Payable	4	2	1
Curr Portion LTD	5	5	4
TOTAL CURRENT LIAB	14	11	9
Long-Term Debt	43	38	43
Deffered Inc Taxes	10	9	8
TOTAL LIABILITES	67	58	60
EQUITY			
Common Stock	5	5	5
Paid-In Surplus	10	10	10
Retained Earnings	53	45	38
TOTAL EQUITY	68	60	53
LIABILITES + EQUITY	135	118	113

Consolidated Statement of Income

	1972	1971
PRODUCTS AND SERVICES SOLD	$5,428,940,533	$4,963,175,479
COSTS		
Employment costs		
Wages and salaries	1,996,611,382	1,835,061,152
Employe benefits *(Note 9)*	400,687,779	356,181,762
	2,397,299,161	2,191,242,914
Products and services bought	2,283,170,659	2,102,880,037
Wear and exhaustion of facilities	326,617,416	290,111,256
Interest and other costs on debt	67,357,153	74,945,969
State, local and miscellaneous taxes	153,508,543	149,479,549
Total costs other than United States and foreign taxes on income	5,227,952,932	4,808,659,725
	200,987,601	154,515,754

① Provision for estimated United States and foreign taxes on income *(Note 11)*		
Currently payable	59,100,000	52,900,000
Timing differences	(15,100,000)	(52,900,000)
	44,000,000	—
INCOME	156,987,601	154,515,754
Income Per Common Share	$2.90	$2.85
DIVIDENDS DECLARED		
On common stock *($1.60 per share for 1972, $1.80 per share for 1971)*	86,668,380	97,501,927
INCOME REINVESTED IN BUSINESS	$ 70,319,221	$ 57,013,827

Consolidated Statement of Financial Position

	Dec. 31, 1972	Dec. 31, 1971
CURRENT ASSETS		
Cash	$ 213,511,153	$ 218,531,673
Marketable securities, at cost (approximates market)	28,411,092 (3)	54,977,259
Receivables, less estimated bad debts	720,193,659 (4)	580,487,511
Inventories *(see page 22 and Note 4 on page 25)*	790,959,687 (5)	840,774,573
Total	1,753,075,591	1,694,771,016
Less		
CURRENT LIABILITIES		
Notes and accounts payable	437,322,277	357,206,363
Employment costs (except social security taxes)	425,373,328	428,576,508
Accrued taxes	299,400,400	264,617,949
Dividend payable	21,667,095	21,667,095
Long-term debt due within one year	12,873,954	53,796,999
Total	1,196,637,054	1,125,864,914

WORKING CAPITAL	556,438,537		568,906,102
Marketable securities, at cost (approximates market), set aside for plant and equipment additions and replacements	255,000,000		255,000,000
Investments in realty, leasing and finance operations	72,151,485	(6)	63,500,443
Long-term receivables and other investments, less estimated losses	209,448,296		179,726,420
Plant and equipment, less depreciation *(details on page 23)*	4,156,210,034	(7)	4,077,929,561
Operating parts and supplies	56,504,302		58,290,299
Costs applicable to future periods	67,619,422		53,552,626
TOTAL ASSETS LESS CURRENT LIABILITIES	5,373,372,076		5,256,905,451
Deduct			
Long-term debt, less unamortized discount *(details on page 23)*	1,515,566,095	(2)	1,418,181,762
Reserves *(details on page 22)*	100,276,769	(8)	100,276,769
Deferred taxes on income	180,046,388		231,283,317
EXCESS OF ASSETS OVER LIABILITIES AND RESERVES	$3,577,482,824		$3,507,163,603
OWNERSHIP EVIDENCED BY			
Common stock (authorized 90,000,000 shares; outstanding 54,169,462 shares) Par value $30 per share	$1,625,083,860		$1,625,083,860
Income reinvested in business *(see page 20 for addition of $70,319,221 in 1972 and $57,013,827 in 1971)*	1,952,398,964		1,882,079,743
Total	$3,577,482,824		$3,507,163,603

Summary of Financial Operations

	1972	1971
ADDITIONS TO WORKING CAPITAL		
Income	$ 156,987,601	$ 154,515,754
Add—Wear and exhaustion of facilities	326,617,416	290,111,256
Deferred taxes on income	(51,236,929)	(57,920,444)
	432,368,088	386,706,566
Proceeds from sales and salvage of plant and equipment	10,865,688	8,363,560
Increases in long-term debt due after one year	181,070,400	163,349,062
Total additions	624,304,176	558,419,188
DEDUCTIONS FROM WORKING CAPITAL		
Expended for plant and equipment	412,790,366	452,008,561
Increases in investments and long-term receivables	38,372,918	8,809,083
Dividends declared on common stock	86,668,380	97,501,927
Decreases in long-term debt due after one year	83,686,067	116,143,814
Miscellaneous deductions	15,254,010	12,205,508
Total deductions	636,771,741	686,668,893
INCREASE (DECREASE) IN WORKING CAPITAL	$ (12,467,565)	$ (128,249,705)

ANALYSIS OF CHANGES IN WORKING CAPITAL

WORKING CAPITAL AT BEGINNING OF YEAR	$ 568,906,102	$ 697,155,807
Cash and marketable securities	(31,586,687)	44,293,237
Receivables, less estimated bad debts	139,706,148	(36,717,430)
Inventories	(49,814,886)	(82,683,583)
Notes and accounts payable	(80,115,914)	(1,200,968)
Employment costs (except social security taxes)	3,203,180	(30,589,777)
Other payables	6,140,594	(21,351,184)
INCREASE (DECREASE) IN WORKING CAPITAL	(12,467,565)	(128,249,705)
WORKING CAPITAL AT END OF YEAR	$ 556,438,537	$ 568,906,102

Details of Selected Items (dollars in millions)

(5)

INVENTORIES	Raw materials	Semi-finished products	Finished products	Supplies and sundry items	Total inventories
December 31, 1971	$200.8	$263.0	$260.9	$116.1	$840.8
December 31, 1972	132.7	270.9	260.0	127.4	791.0

(4)

RESERVES	Deducted from:		Other			
	Current receivables	Other investments	Reserve for insurance	Reserve for contingencies	Accident and hospital	Total other
Balance December 31, 1971	$9.0	$8.0	$50.0	$40.8	$ 9.4	$100.2
Additions	2.1	1.4	2.2	—	33.8	36.0
Deductions	3.7	—	2.2	—	33.8	36.0
Balance December 31, 1972	$7.4	$9.4	$50.0	$40.8	$ 9.4	$100.2

Details of Selected Items (continued)

PLANT AND EQUIPMENT	Facilities (at cost)				Less depreciation and depletion			Net
	Land	Plant	Transportation	Total	Plant	Transportation	Total	
Balance December 31, 1971	$121.2	$8,794.9	$866.2	$ 9,782.3	$5,256.9	$447.5	$5,704.4	$4,077.9
Additions	6.3	389.7	16.8	412.8	309.2	19.0	328.2†	84.6
Deductions	3.2	93.8	14.1	111.1	92.3	12.5	104.8	6.3‡
Balance December 31, 1972	$124.3	$9,090.8	$868.9	$10,084.0	$5,473.8	$454.0	$5,927.8	$4,156.2

(7) †Wear and exhaustion of $326.6 million shown in the Consolidated Statement of Income comprises depreciation and depletion of $328.2 million, less profit of $1.6 million resulting from sales.

‡Includes $10.9 million proceeds from sales and salvage of plant and equipment.

LONG-TERM DEBT	Interest rates	Years of maturity	Outstanding		Change in the Year	
			Dec. 31, 1972	Dec. 31, 1971	Increases	(Decreases)
United States Steel Corporation						
Sinking Fund Debentures (Callable)	4	1983	$ 135.0	$ 160.7	$ —	$ (25.7)
Sinking Fund Debentures (Callable)	4 1/2	1986	165.0	189.0	—	(24.0)
Sinking Fund Debentures (Callable)	7 3/4	2001	150.0	150.0	—	— (2)
Subordinated Debentures (Callable)	4 5/8	1996	610.3	622.8	—	(12.5)
Notes payable to banks	†	1975	140.0	170.0	—	(30.0)
Long-term lease obligations relating to Industrial Development Revenue Bonds	3.20–5 3/8	1973–1988	95.4	100.0	—	(4.6)

Installment purchase obligation relating to Environmental Improvement Revenue Bonds	3.30–5¼	1974–1997	27.5	—	27.5	—
Mortgages and purchase money obligations	–	–	9.5	8.6	3.7	(2.8)
Consolidated Subsidiaries						
Railroads First Mortgage Bonds (Callable)	2⅞–3	1973–1996	8.8	9.6	—	(.8)
Notes payable to banks‡	4½–8¼	1973–1985	157.5	76.0	108.8	(27.3)
Notes payable to others	7¾	1981–1985	10.4	10.4	—	—
Swiss franc Bonds	5½	1983–1987	26.2	—	26.2	—
Mortgages and purchase money obligations	–	–	16.9	.8	16.1	—
Total			1,552.5	1,497.9	182.3	(127.7)
Less unamortized discount*			24.1	25.9	.2	(2.0)
			1,528.4	1,472.0	182.1	(125.7)
Less amount due within one year			12.8	53.8	1.0	(42.0)
Long-term debt due after one year			$1,515.6	$1,418.2	$181.1	$ (83.7)

Exclusive of debt of realty, leasing and finance companies–see Note 2.

†Issued pursuant to an agreement providing a revolving credit of up to $250 million. The rate varies with prime commercial rate and at December 31, 1972 and December 31, 1971 was 5¾% and 5¼%, respectively. This debt may be converted at the option of the Corporation in 1975 into a four year term loan.

‡In August 1972, Quebec Cartier Mining Company entered into an agreement with a group of U.S. banks providing a revolving credit of up to $100 million of which $56.5 million has been borrowed. The rate varies with prime commercial rate and at December 31, 1972 was 6%. This debt may be converted at the option of the Company in 1975 into a four and one-half year term loan.

*Principally related to 4⅝% Subordinated Debentures. In 1972, unamortized discount which was previously carried as costs applicable to future periods was reclassified to long-term debt on the various schedules affected for all years.

Notes to Financial Statements

1. **SUMMARY OF PRINCIPAL ACCOUNTING POLICIES**

a. *Principles applied in consolidation*—Majority owned subsidiaries are consolidated, except those which are not considered material and realty, leasing and finance companies.

b. *Investments*—Investments in realty, leasing and finance operations are carried at U. S. Steel's equity in the net assets and advances to such operations. Significant investments which represent 20% or more ownership in other companies are also carried on the equity basis. Other investments are carried at cost.

c. *Inventories*—For the most part, inventories are carried at cost as determined under the last-in, first-out (LIFO) method which is below market. The remainder is carried at cost or market, whichever is lower. The LIFO method was first adopted in 1941 and extended in 1942 and 1947.

pairs and maintenance are charged to operations when and as incurred.

g. *Mineral exploration*—Exploration costs are expensed currently. When a potential mineral property has been determined to be a commercially feasible project, most expenditures to develop it are capitalized as part of the cost of the property.

h. *Research and development and start-up of facilities*—Research and development and facility start-up costs are expensed when incurred.

i. *Pensions*—Pension costs are determined by an independent actuary, based upon various actuarial factors and an actuarial method under which both current and past service costs are funded over the future on a combined basis by payment into pension trusts. A portion of

d. *Income recognition*—Revenues from products and services and related costs are included in income when goods are shipped or services are rendered to the customer, except those related to construction projects which are accounted for on the completed contract method.

e. *Wear and exhaustion of facilities*—For the most part, depreciation is related to U. S. Steel's rate of operations and is computed on the straight-line method based on procedures established in 1962 by the Internal Revenue Service. Proceeds from sales of facilities covered by such procedures are credited to income and the cost of the assets is charged to the reserve for depreciation. Assets retired are charged to the reserve for depreciation.

Depletion of the cost of mineral properties is computed on the unit of production method based on estimated mineral reserves of the particular property.

f. *Facility improvements and maintenance*—Expenditures for renewals and betterments are charged to plant and equipment. Costs of re-

the appreciation in the market value of the assets of the pension trusts is taken into account in a systematic manner. From time to time actuarial factors are adjusted in the light of actual experience.

j. *Timing differences related to income taxes*—Certain items of income and expense are recognized in different years for income tax and for financial accounting purposes. These timing differences result in the provision for taxes on income for financial reporting being more than or less than the taxes currently payable.

k. *Investment credit*—For 1968 and thereafter, U. S. Steel has employed the flow-through method of accounting for investment tax credits, recognizing them in income in the year the related assets are placed in service. Deferred investment credits for 1967 and prior years are being amortized.

l. *Income per share*—Income per share is calculated based on the weighted average number of shares outstanding.

2. INVESTMENTS

Investments in realty, leasing and finance operations are carried in the consolidated statements at U. S. Steel's equity in the net assets and advances to such operations summarized as follows:

	(In millions) December 31	
	1972	1971
Realty, leasing and finance companies		
Cash, receivables and inventory	$225.1	$172.3
Plant and equipment, less depreciation	2.8	.3
Investments and other assets	17.3	7.7
Total assets	245.2	180.3
Less liabilities:		
Current notes and accounts payable	191.1	138.3
Debt due after one year	20.8	13.8
	33.3	28.2
Other realty operations	38.8	35.3
Total	$ 72.1	$ 63.5

Long-term receivables and other investments, less estimated losses, include investments also carried on the equity basis of $140.1 million and $98.2 million at December 31, 1972 and December 31, 1971, respectively.

4. INVENTORIES

As noted in the summary of principal accounting policies, for the most part, inventories are carried at cost as determined under the last-in, first-out (LIFO) method. Under that method, the current acquisition costs are estimated to exceed the inventory value at December 31, 1972 as shown in the Consolidated Statement of Financial Position by approximately $600 million. However, it would be incorrect to assume that this before-tax amount can be realized since as a going concern a relatively constant quantity of inventory must be maintained for operations.

5. SECURITIES SET ASIDE FOR PLANT AND EQUIPMENT ADDITIONS AND REPLACEMENTS

At December 31, 1972 and December 31, 1971, completion of authorized additions to and replacements of facilities required an estimated further expenditure of $710 million and $850 million, respectively. At the end of 1972, $255 million of marketable securities had been set aside to cover in part such authorized expenditures, the same as at the end of 1971.

Guarantees by U. S. Steel of the liabilities of realty, leasing and finance companies were $77.6 million and $79.5 million at December 31, 1972 and December 31, 1971, respectively. Guarantees of liabilities related to other investments carried on an equity basis were $23.5 million and $26.8 million at December 31, 1972 and December 31, 1971, respectively. In addition, U. S. Steel jointly and severally with others has guaranteed $86.0 million and $71.0 million at December 31, 1972 and December 31, 1971, respectively, of interim financing on a realty project nearing completion. Permanent financing by a mortgage on the property, and involving no guarantee, will replace this interim arrangement before December 1973.

U. S. Steel's equity in 1972 and 1971 net income of investments carried on an equity basis amounted to $4.9 million and $4.8 million, respectively, which is included in consolidated income as part of interest, dividends and other income. Dividends received from these investments amounted to $3.3 million and $3.2 million in 1972 and 1971, respectively.

3. CASH

Included in cash are short-term time deposits of $69.9 million and $71.9 million at December 31, 1972 and December 31, 1971, respectively.

6. RESERVES

U. S. Steel is, for the most part, a self-insurer of its assets against fire, windstorm, marine and related losses. The insurance reserve of $50 million is held available for absorbing possible losses of this character, and is considered adequate for this purpose.

The reserves for contingencies and accident and hospital expenses of $50.2 million, provided mainly in previous years by charges to operations, are held for exceptional unanticipated losses other than those covered by the insurance reserve.

7. STOCK OPTION INCENTIVE PLAN

The Stock Option Incentive Plan approved by stockholders in 1964 authorized the option and sale of up to 1,500,000 shares of common stock to key management employes. The option period begins on the date the option is granted and ends five years thereafter, except in cases of death, retirement or other earlier termination. The granting of options terminated in 1969, thus no more than 533,800 shares have been or can be issued.

In 1972 and 1971 no shares were purchased. At December 31, 1972, 217 optionees held options to purchase 501,375 shares, some at $39.625 and some at $48.00 per share, for a total of $20.0 million.

8. PREFERRED STOCK

U. S. Steel is authorized to issue 20,000,000 shares of preferred stock, without par value. At December 31, 1972, none of this stock had been issued.

9. EMPLOYE BENEFITS

The details of employe benefits are summarized as follows:

	(In millions) 1972	1971
Pension costs	$ 73.5	$ 62.1
Social security taxes	100.3	88.2
Insurance costs	130.5	123.1
Supplemental unemployment and extended vacation benefit costs*	27.1	22.9
Savings fund costs	15.3	15.0
Payments to industry welfare and retirement funds and other employe benefit costs	54.0	44.9
Total cost of employe benefits	$400.7	$356.2

*Excludes $32.1 million and $35.8 million in 1972 and 1971, respectively, for extended vacation benefits which are included as wages and salaries.

10. PENSION FUNDING

U. S. Steel's pension plan covers substantially all its employes. Increased non-contributory pension adjusted in the light of actual experience. No change was made in 1972 in these actuarial factors except that, beginning August 1, additional recognition was given to the appreciation existing in the value of the trust assets. This reduction in pension costs amounting to $19.2 million is more than offset by the increased cost of improved pension benefits made effective during the year so that pension costs were some $11.4 million higher than for 1971.

11. TAXES

Total taxes payable for the years shown are detailed as follows:

	(In millions) 1972	1971
Income taxes payable on earnings of current year		
United States	$ 43.0	$ 13.2
Foreign governments	35.9	44.7
	78.9	57.9
Investment credit deductible	19.8	5.0
Currently payable	59.1	52.9
Social security taxes	100.3	88.2
Property taxes	113.1	107.5
Other state, local and miscellaneous taxes	40.4	42.0
Total payable	$312.9	$290.6

benefits were provided effective August 1, 1972 to certain covered employes retiring on or after July 31, 1971. The minimum benefit for such retirees was increased on the average by approximately 35% and for those qualified for pensions greater than the minimum, by approximately 12%. Most pensions were increased $15 per month for those retired before July 31, 1971. The benefits to those covered by the August 1, 1972 revisions also included expansion of deferred vesting to include a participant who quits after attaining age 40 with 15 years of service. Other continuing provisions include: early retirement after 30 years' service at the employe's option with immediate full pension; various provisions for pensions for employes retired early because of job elimination or disability; and survivor spouse provisions. Contributory pension benefits for present and future retirees, except for sole option, were also increased during 1972 by over 9%.

Pension costs are determined by an independent actuary, based upon various actuarial factors and an actuarial method under which both current and past service costs are funded over the future on a combined basis by payment into pension trusts. Trust assets exceed pension benefits vested under the plan.

From time to time actuarial factors have been

The provision for estimated United States and foreign taxes on income differs from the taxes currently payable as shown above because certain items of income and expense are recognized in different years for income tax and for financial accounting purposes as explained in item j. of Note 1.

The provision for estimated United States and foreign taxes on income is as follows:

	(In millions)	
	1972	1971
Income taxes currently payable (see above)	$59.1	$52.9
Timing differences		
United States	(17.3)	(57.7)
Foreign	2.2	4.8
Total	(15.1)	(52.9)
Provision for estimated taxes on income	$44.0	$—

The provisions for taxes on income in both years have been reduced by statutory deductions associated with mineral production.

The investment credits earned each year on facilities completed during the year and the $6.8 million amortization of the pre-1968 investment credit reduced the provisions for taxes on income by $23.5 million in each year 1972 and 1971.

The principal timing difference in 1971 resulted from the repatriation in December 1971 of accumulated earnings of certain foreign subsidiaries for which financial provision for the taxes thereon

Notes to Financial Statements (continued)

had been made in the years in which earned. Because of credits available in 1971 for foreign taxes paid, such provision was in excess of the United States income tax actually determined to be payable.

12. TAX LITIGATION

In 1971 an unfavorable lower court decision relating to a $28 million claim for refund of 1950 excess profits tax and interest was reversed by the U. S. Court of Appeals, Second Circuit, and remanded to the District Court for trial. The Government's petition to the U. S. Supreme Court for a review of the Court of Appeals decision was denied in February 1972. A final decision in this case may affect two other years involving Internal Revenue claims for a maximum remaining tax of $90 million and approximately $100 million of interest.

The financial statements of U. S. Steel for 1972 and prior years properly reflect its financial position, including provision for any tax liability which ultimately may be assessed.

were included in costs of products and services sold and the balances were charged to construction.

Products and services bought reflects the changes during each year in inventories and deferred costs. These items decreased approximately $38 million and $72 million during 1972 and 1971, respectively.

If the total of wages and salaries and of products and services bought were reclassified as costs of products and services sold and as general administrative and selling expenses, the amounts thereof would be $4,037.7 million and $242.1 million in 1972 and $3,705.5 million and $232.4 million in 1971, respectively.

Maintenance and repairs of plant and equipment totaled $637.7 million in 1972 and $651.1 million in 1971.

Interest and other costs on debt is net of gains of $14.5 million in 1972 and $3.5 million in 1971, principally on repurchases of U. S. Steel's debentures.

13. OTHER ITEMS

Products and Services Sold—Products and services sold includes interest, dividends and other income of $27.2 million in 1972 and $34.9 million in 1971.

(10) *Costs*—Wages and salaries totaled $2,029.4 million in 1972 and $1,866.7 million in 1971 of which $1,996.6 million and $1,835.1 million, respectively,

Rental expense covering ore ships, office space and other properties totaled $87 million in 1972 and $88 million in 1971 of which $56 million in each year was applicable to non-cancelable charters and leases. In 1972 minimum rentals totaled $49 million and for the years 1973 through 1977 are $41 million, $28 million, $23 million, $20 million and $18 million, respectively.

Price Waterhouse & Co.

SIXTY BROAD STREET. NEW YORK. NEW YORK 10004 212-422-6000

To the Stockholders of
United States Steel Corporation:

February 13, 1973

In our opinion, the accompanying Consolidated Statement of Financial Position and related Statement of Income and Summary of Financial Operations present fairly the position of United States Steel Corporation and subsidiaries at December 31, 1972 and December 31, 1971 and the results of operations and changes in working capital for each year, in conformity with generally accepted accounting principles applied on a consistent basis. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Price Waterhouse & Co.

16 Year Story
U. S. Steel's Operating and Financial Story 1957-1972

SUMMARY OF OPERATING DATA (net tons in millions)

Year	Total ores mined	Total coal mined	Total coke produced	Total iron produced	Raw steel produced	Steel products shipped	Employment statistics			
							No. of employes	Weekly hours	Hourly earnings	Hourly employment cost
1957	57.9	23.5	22.3	26.4	33.7	23.4	271,037	36.3	$3.19	$3.71
1958	39.8	16.8	15.1	18.1	23.8	17.0	223,490	34.2	3.50	3.87
1959	36.4	15.0	14.8	18.6	24.4	18.1	200,329	35.1	3.78	4.39
1960	50.2	18.0	16.6	21.2	27.3	18.7	225,081	34.8	3.68	4.30
1961	35.8	15.2	14.2	19.3	25.2	16.8	199,243	35.1	3.89	4.57
1962	37.7	13.5	13.1	18.9	25.4	17.8	194,044	35.0	4.01	4.62
1963	37.0	14.5	13.5	20.9	27.6	18.9	187,721	35.9	4.04	4.68
1964	44.9	17.0	15.6	25.2	32.4	21.2	199,979	36.8	4.08	4.74
1965	46.8	18.0	17.4	25.1	32.6	22.5	208,838	36.1	4.21	4.81
1966	48.1	18.0	17.7	25.7	32.8	21.6	205,544	36.3	4.29	5.01
1967	45.0	19.0	17.8	24.3	30.9	19.8	197,643	35.7	4.41	5.19
1968	44.2	18.0	17.5	25.3	32.4	22.5	201,017	35.8	4.69	5.57
1969	49.9	18.1	17.3	27.3	34.7	22.4	204,723	36.5	4.84	5.72
1970	55.1	19.6	17.6	25.8	31.4	21.0	200,734	35.8	5.05	6.11
1971	49.3	16.6	15.0	22.8	27.2	19.3	183,940	34.9	5.58	6.66
1972	45.8	16.5	16.2	24.8	30.7	20.8	176,486	36.0	6.11	7.34

Production data, which are grouped in broad product classifications, include all production of the materials by the operating divisions and subsidiaries and exclude all materials purchased. The average weekly hours shown are based on the average monthly number of employes receiving pay. Hourly employment cost includes hourly earnings, social security taxes, pensions, insurance and other employe benefit costs.

SUMMARY OF FINANCIAL OPERATIONS (change in working capital in millions of dollars)

	Additions					Deductions					
						For plant & equipment					Increase in working capital
Year	Income as reported	Wear and exhaustion of facilities	Deferred taxes on income	Increases in long-term debt	All other additions	Total expenditures	Securities set aside	Decreases in long-term debt	Total dividends declared	All other deductions	
1957	419.4	276.0	—	—	9.4	514.9	(110.0)	28.5	186.5	9.0	75.9
1958	301.5	204.9	—	301.4	11.1	448.1	115.0	29.0	186.6	23.5	16.7
1959	254.5	189.9	—	.2	26.0	366.1	(35.0)	33.3	187.0	—	(80.8)
1960	304.2	208.4	—	—	11.2	492.4	(195.0)	31.8	187.2	14.8	(7.4)
1961	190.2	210.5	—	500.5	8.4	326.8	—	32.1	187.5	23.8	339.4
1962	163.7	265.9	—	.1	14.2	200.6	—	60.1	160.5	6.9	15.8
1963	203.5	307.8	—	—	13.4	244.7	30.0	62.8	133.4	5.5	48.3
1964	236.8	335.8	—	21.2	20.9	292.6	325.0	46.2	133.5	2.6	(185.2)
1965	275.5	324.5	—	1.8	22.4	353.6	—	42.1	133.5	30.8	64.2
1966	249.2	344.3	—	.3	28.7	440.7	—	73.6	119.1	55.7	(66.6)
1967	172.5	354.7	—	3.0	59.0	574.7	—	53.3	129.9	—	(168.7)
1968	253.7	253.1	172.2	433.7	8.5	697.4	—	61.4	129.9	12.4	220.1
1969	217.2	289.6	20.9	21.3	42.8	601.8	—	156.0	129.8	45.9	(341.7)
1970	147.5	296.5	28.1	37.0	11.5	514.5	(400.0)	71.5	130.0	41.1	163.5
1971	154.5	290.1	(57.9)	163.3	8.4	452.0	—	116.1	97.5	21.0	(128.2)
1972	157.0	326.6	(51.2)	181.1	10.8	412.8	—	83.7	86.7	53.6	(12.5)

CONSOLIDATED STATEMENT OF INCOME (dollars in millions)

Year	Products & services sold	Employment costs (1)	Products & services bought	Wear and exhaustion of facilities	Interest & other costs on debt	Income & other taxes (2)	Income			Total dividends declared (3)	Reinvested in business
							Amount	% of sales	Per common share		
1957	4,413.8	1,862.0	1,324.2	276.0	7.0	525.2	419.4	9.5	7.33	186.5	232.9
1958	3,472.1	1,488.5	1,085.6	204.9	11.5	380.1	301.5	8.7	5.13	186.6	114.9
1959	3,643.0	1,576.2	1,278.2	189.9	17.6	326.6	254.5	7.0	4.25	187.0	67.5
1960	3,698.5	1,700.0	1,091.2	208.4	16.9	377.8	304.2	8.2	5.16	187.2	117.0
1961	3,336.5	1,622.7	1,022.4	210.5	29.9	260.8	190.2	5.7	3.05	187.5	2.7
1962	3,501.0	1,608.3	1,192.4	265.9	37.5	233.2	163.7	4.7	2.56	160.5	3.2
1963	3,637.2	1,611.5	1,211.0	307.8	35.6	267.8	203.5	5.6	3.30	133.4	70.1
1964	4,129.4	1,795.0	1,404.8	335.8	34.4	322.6	236.8	5.7	3.91	133.5	103.3
1965	4,465.0	1,863.8	1,624.8	324.5	30.9	345.5	275.5	6.2	4.62	133.5	142.0
1966	4,434.7	1,916.0	1,559.0	344.3	56.6	309.6	249.2	5.6	4.60	119.1	130.1
1967	4,067.2	1,871.6	1,431.8	354.7	54.4	182.2	172.5	4.2	3.19	129.9	42.6
1968	4,609.2	2,055.9	1,766.1	253.1	67.1	213.3	253.7	5.5	4.69	129.9	123.8
1969	4,825.1	2,184.7	1,870.0	289.6	70.6	193.0	217.2	4.5	4.01	129.8	87.4
1970	4,883.2	2,250.5	1,969.1	296.5	66.5	153.1	147.5	3.0	2.72	130.0	17.5
1971	4,963.2	2,191.3	2,102.9	290.1	74.9	149.5	154.5	3.1	2.85	97.5	57.0
1972	5,428.9	2,397.3	2,283.2	326.6	67.3	197.5	157.0	2.9	2.90	86.7	70.3

(1) Employment costs include pensions, social security taxes, insurance and other employe benefit costs.

(2) Excludes social security taxes which are included in employment costs.

(3) Includes $25.2 million on 7% cumulative preferred stock in each year through 1965.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION (dollars in millions)

Dec. 31	Working capital: Cash and securities	Working capital: Receivables and inventories	Working capital: Less—current liabilities	Working capital: Total working capital	Securities set aside for plant & equipment	Plant & equipment less depreciation	Other non-current assets (1)	Total assets less current liabilities	Long-term debt due after one year	Reserves & deferred taxes on income	Ownership (Stocks and income reinvested) (2)
1957	526.3	906.7	753.4	679.6	415.0	2,109.6	116.4	3,320.6	216.5	106.3	2,997.8
1958	507.5	915.6	726.8	696.3	530.0	2,345.1	140.0	3,711.4	488.9	108.5	3,114.0
1959	515.4	908.3	808.2	615.5	495.0	2,511.9	129.8	3,752.2	455.8	112.7	3,183.7
1960	451.7	944.1	787.7	608.1	300.0	2,787.6	144.6	3,840.3	424.0	114.4	3,301.9
1961	642.2	1,060.9	755.6	947.5	300.0	2,899.5	168.4	4,315.4	892.4	117.1	3,305.9
1962	691.3	995.3	723.3	963.3	300.0	2,820.1	175.2	4,258.6	832.4	117.1	3,309.1
1963	857.4	920.8	766.6	1,011.6	330.0	2,743.6	180.7	4,265.9	769.6	117.1	3,379.2
1964	583.0	1,090.9	847.5	826.4	655.0	2,693.0	183.3	4,357.7	744.6	130.4	3,482.7
1965	764.2	986.4	860.0	890.6	655.0	2,714.1	212.6	4,472.3	704.3	143.1	3,624.9
1966	787.9	1,105.7	1,069.6	824.0	655.0	2,798.4	260.7	4,538.1	1,218.2	141.9	3,178.0
1967	430.7	1,241.3	1,016.8	655.2	655.0	3,010.3	236.2	4,556.7	1,167.9	168.1	3,220.7
1968	729.8	1,280.7	1,135.2	875.3	655.0	3,446.0	248.7	5,225.0	1,540.2	340.3	3,344.5
1969	349.0	1,516.2	1,331.6	533.6	655.0	3,721.9	288.9	5,199.4	1,405.5	361.3	3,432.6
1970	229.2	1,540.7	1,072.7	697.2	255.0	3,923.0	335.4	5,210.6	1,371.0	389.5	3,450.1
1971	273.5	1,421.3	1,125.9	568.9	255.0	4,077.9	355.1	5,256.9	1,418.2	331.5	3,507.2
1972	241.9	1,511.1	1,196.6	556.4	255.0	4,156.2	405.8	5,373.4	1,515.6	280.3	3,577.5

(1) Includes investments, operating parts and supplies and costs applicable to future periods.

(2) Ownership in 1966 and subsequent years is applicable only to common stock; in prior years it also includes $360.3 million par value of 7% cumulative preferred stock.

Glossary

Accounts Payable

What is owed to suppliers who have delivered goods and deferred payment. The account payable of the buyer is an account receivable to the supplier.

$$\text{DAYS OF PAYABLES} = (\text{ACCOUNTS PAYABLE/PURCHASES}) \times 360$$

Accounts Receivable

Money owed to us by our customers. A receivable for us is a liability for the firm which owes us money.

$$\text{(2) DAYS OF RECEIVABLES} \quad \frac{\text{ACCOUNTS RECEIVABLES}}{\text{SALES}} \times 360$$

Assets

What a firm owns that has value, such as cash, accounts receivable, inventory, and fixed assets.

Balance Sheet Overview

A snapshot of what the company owns, its assets, and an explanation of where the funds came from to buy these assets. The sources of these funds are debt (liabilities) and equity (net worth), contributed by lenders and shareholders respectively. The balance sheet equation is:

TOTAL ASSETS = DEBT + EQUITY

Break-even

The volume that results in zero profit before tax.

$$\text{BREAK - EVEN VOLUME} = \frac{\text{FIXED COST}}{\text{UNIT CONTRIBUTION}}$$

Bulk Value

The value per cubic foot of the product. Used in evaluating the cost feasibility of transportation options.

Capital Intensiveness

Percent of assets invested in plant and equipment. A higher plant and equipment investment percentage indicates higher capital intensiveness.

Cash Flow Statement

A financial statement that shows cash receipts and cash payments during a period. To calculate cash flow, add back non-cash expenses to profit after tax:

CASH FLOW = PROFIT AFTER TAX + NON CASH EXPENSES

Copyrights

A right granted by the federal government allowing the owner to reproduce and market an artistic work. Usually granted for life of the author plus 50 years

Cost of Goods Sold (or Services Provided)

The total cost of the merchandise sold during a period. Includes raw materials, direct labor, sales commissions, energy used in the production process, and in some cases, depreciation charges for the fixed assets. These costs, with exception of depreciation, are often called variable costs because they vary directly with the level of production

Costs of Capital

The weighted average costs of what a firm must pay for the use of the funds provided to it by its creditors and its shareholders. The cost of financing and venture is its cost of capital.

Current Ratio

$$\text{CURRENT RATIO} = \frac{\text{CURRENT ASSETS}}{\text{CURRENT LIABILITIES}}$$

Deferred Income Taxes

Taxes deferred because of differences between accounting income and taxable income. If this item shows on the balance sheet, the firm is keeping more than one set of books

Depreciation

The process of allocating the cost of an asset to expense over its useful life. Can be accelerated or straight-line. With accelerated deprecation, depreciation is expensed more in early years than in later years. With straight-line depreciation, depreciation is expensed equally for each year over the useful life of the asset.

DuPont Formula

A mathematical expression which breaks Return on Equity into operating efficiency, asset use efficiency, and financial leverage.

$$\text{ROE} = \frac{\text{NET INCOME}}{\text{SALES}} \times \frac{\text{SALES}}{\text{ASSETS}} \times \frac{\text{ASSETS}}{\text{EQUITY}}$$

Economies of Scale

When economists speak of economies of scale, they simply refer to the lower total unit cost, resulting from operating near capacity and spreading fixed costs over a large volume of product.

$$\text{TOTAL UNIT COST} - \text{UNIT VARIABLE COST} \div \frac{\text{FIXED COST}}{\text{UNIT VOLUME}}$$

Fixed Costs

Costs that do not vary directly with the production rate are termed fixed costs. Fixed costs may vary but not directly with the level of production.

Foreign Corrupt Practices Act

American law regarding corrupt business practices follows both the firm and its representatives, no matter where they go. Basically, you can't bribe foreign officials to influence their decisions with respect to your company. If you do and are convicted back in the U.S., you can go to jail.

Generally Accepted Accounting Principles (GAAP)

A common set of guidelines that indicate how to report economic events. Rules set by accountants.

Income Statement

A report on the profit results for an accounting period of time, usually a quarter or a year. Format of the statement lists sales, also called revenues (and by the British, turnover), then deducts the costs that were incurred to produce those sales, leaving income.

Internal Rate of Return (IRR)

A single rate of return that summarizes the merits of a project. It is the discount rate that causes NPV to be zero

Inventories

Assets which a firm plans to sell. Can take the form of finished goods, work in process, or raw material.

$$\text{DAYS OF INVENTORY} = \frac{\text{INVENTORY}}{\text{COSTS OF GOODS SOLD}} \times 360$$

Labor Productivity

Measured by economics definition: sales per employee; notice that this measure is inflation sensitive

Lang Effect

Named after the chemical engineer who identified the effect. Capital requirements for plant and equipment seem to go up as only the 2/3 power of plant capacity. All other things being equal, Lang tells us that building bigger plants and equipment is better. This is illustrated in the following formula and table:

$$\left(\frac{\text{CAPACITY 1}}{\text{CAPACITY 2}}\right) = \left(\frac{\text{INVESTMENT 1}}{\text{INVESTMENT 2}}\right)^{2/3}$$

Learning Effects (also called Experience)

As a process is repeated, the cost of each cycle comes down because people and machines become more specialized and efficient at their functions.

Leverage

Measured by Assets / Equity. Indicates the degree to which assets are financed with debt. A high leverage ratio indicates high debt relative to equity.

Liabilities

Obligations to transfer assets or services from one firm to another arising from past transactions.

Liquidity

Indicates how quickly a company's assets can be converted to cash. Measured by Current Ratio: Current Assets/Current Liabilities.

Net Present Value (NPV)

Future cash flows which have been discounted to account for the time we must wait to get them. Money later is worth less than money now.

$$\text{PRESENT VALUE} = \frac{\text{FUTURE VALUE}}{(1 + \text{DISCOUNT RATE})^{(\text{YEARS})}}$$

For your convenience, the appendix contains a table of discount factors for various discount rates and times to payment. PRESENT VALUE = FUTURE VALUE X DISCOUNT FACTOR (from table) Net Present Value is simply the Present Value less the investment.

Patent

An exclusive right granted by the federal government to an inventor to manufacture, sell, and control his or her invention, usually for 17 years from the date of the grant. Unlike most of the rest of the world, the patent goes to the person who invents first, not the one who files first

Payback

The time it takes for an investment to return the amount invested in the project. For uniform cash flows the question can be answered by the following formula:

$$\text{PAYBACK (IN YEARS)} = \frac{\text{INVESTMENT REQUIRED}}{\text{ANNUAL CASH FLOW}}$$

Quick Ratio

$$\text{QUICK RATIO} = \frac{\text{CASH + ACCOUNTS RECEIVABLE}}{\text{CURRENT LIABILITIES}}$$

Return on Assets

ROA = RETURN ON SALES X TURNOVER

Return on Sales

Return on sales is often called profit, or sales, margin, or sometimes, just margin. Don't confuse turnover, asset turns, with the British term for sales

$$\text{ROS} = \frac{\text{NET INCOME}}{\text{SALES}}$$

Robinson-Patman Act

Governs price discrimination in selling to customers that compete, including discounts and cooperative advertising. Defenses include: meeting competition, cost justification, available to all, going out of a business.

Sherman Act

Imposes severe penalties on anti-competitive agreements. Declares all contracts, combinations and conspiracies that seek to restrain trade to be illegal. Reciprocity and tie-ins are generally illegal

Trademarks (Lanham Act)

A word, phrase, jingle, or symbol that identifies a particular product or enterprise. Trademarks must be filed with the federal government to be included in the Principal Register or Supplemental Register (less valuable). They have indefinite life.

Turnover

$$\text{TURNOVER} = \frac{\text{COST OF GOODS SOLD}}{\text{AVERAGE INVENTORY}}$$

Indicates how many times a company has sold off it's entire inventory in a period. Measures how efficiency management is managing inventory.

Variable Costs

Costs that vary directly with the level of production. Examples include direct materials, direct labor, and manufacturing overhead.

NOTES

NOTES

Finance and Accounting for the Non-Financial Manager

Part I

Lecture 1: Balance Sheet: Assets
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Lecture 7: Learning Curves and Cost Reduction
Lecture 8: Scale and Transportation Effects

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