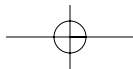
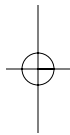
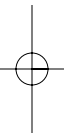
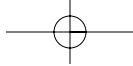

PART ONE

UNDERSTANDING THE NUMBERS



1 USING FINANCIAL STATEMENTS

John Leslie Livingstone

WHAT ARE FINANCIAL STATEMENTS? A CASE STUDY

Pat was applying for a bank loan to start her new business, Nutrivite, a retail store selling nutritional supplements, vitamins, and herbal remedies. She described her concept to Kim, a loan officer at the bank.

Kim: How much money will you need to get started?

Pat: I estimate \$80,000 for the beginning inventory, plus \$36,000 for store signs, shelves, fixtures, counters, and cash registers, plus \$24,000 working capital to cover operating expenses for about two months. That's a total of \$140,000 for the startup.

Kim: How are you planning to finance the investment of the \$140,000?

Pat: I can put in \$100,000 from my savings, and I'd like to borrow the remaining \$40,000 from the bank.

Kim: Suppose the bank lends you \$40,000 on a one-year note, at 15% interest, secured by a lien on the inventory. Let's put together projected financial statements from the figures you gave me. Your beginning balance sheet would look like what you see on my computer screen:

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Nutrivite

Projected Balance Sheet as of January 1, 200X

Assets		Liabilities and Equity	
Cash	\$ 24,000	Bank loan	\$ 40,000
Inventory	80,000		
Current assets	104,000	Current liabilities	40,000
Fixed assets:		Equity:	
Equipment	36,000	Owner capital	100,000
Total assets	<u>\$140,000</u>	Liabilities and equity	<u>\$140,000</u>

The left side shows Nutrivite's investment in assets. It classifies the assets into "current" (which means turning into cash in a year or less) and "noncurrent" (not turning into cash within a year). The right side shows how the assets are to be financed: partly by the bank loan and partly by your equity as the owner.

Pat: Now I see why it's called a "balance sheet." The money invested in assets must equal the financing available—it's like the two sides of a coin. Also, I see why the assets and liabilities are classified as "current" and "noncurrent"—the bank wants to see if the assets turning into cash in a year or less will provide enough cash to repay the one-year bank loan. Well, in a year there should be cash of \$104,000. That's enough cash to pay off more than twice the \$40,000 amount of the loan. I guess that guarantees approval of my loan!

Kim: We're not quite there yet. We need some more information. First, tell me, how much do you expect your operating expenses will be?

Pat: For year 1, I estimate as follows:

Store rent	\$36,000	
Phone and utilities	14,400	
Assistants' salaries	40,000	
Interest on the loan	6,000	(15% on \$40,000)
Total	<u>\$96,400</u>	

Kim: We also have to consider depreciation on the store equipment. It probably has a useful life of 10 years. So each year it depreciates by 10% of its cost of \$36,000. That's \$3,600 a year for depreciation. So operating expenses must be increased by \$3,600 a year, from \$96,400 to \$100,000. Now, moving on, how much do you think your sales will be this year?

Pat: I'm confident that sales will be \$720,000 or even a little better. The wholesale cost of the items sold will be \$480,000, giving a markup of \$240,000—which is 33⅓% on the projected sales of \$720,000.

Kim: Excellent! Let's organize this information into a projected income statement. We start with the sales, then deduct the cost of the items sold to arrive at the gross profit. From the gross profit we deduct your operating expenses, giving us the income before taxes. Finally we deduct the income tax expense in order to get the famous "bottom line," which is the net income. Here is the projected income statement shown on my computer screen:

Nutrivite		
<i>Projected Income Statement for the Year Ending December 31, 200X</i>		
Sales		\$720,000
Less cost of goods sold		<u>480,000</u>
Gross profit		240,000
Less expenses		
Salaries	\$ 40,000	
Rent	36,000	
Phone and utilities	14,400	
Depreciation	3,600	
Interest	<u>6,000</u>	<u>100,000</u>
Income before taxes		140,000
Income tax expense (40%)		<u>56,000</u>
Net income		<u><u>\$ 84,000</u></u>

Pat, this looks very good for your first year in a new business. Many business startups find it difficult to earn income in their first year. They do well just to limit their losses and stay in business. Of course, I'll need to carefully review all your sales and expense projections with you, in order to make sure that they are realistic. But first, do you have any questions about the projected income statement?

Pat: I understand the general idea. But what does "gross profit" mean?

Kim: It's the usual accounting term for sales less the amount that your suppliers charged you for the goods that you sold to your customers. In other words, it represents your markup from the wholesale cost you paid for goods and the price for which you sold those goods to your customers. It is called "gross profit" because your operating expenses have to be deducted from it. In accounting, the word *gross* means "before deductions." For example "gross sales" means sales before deducting goods returned by customers. Sales after deducting goods returned by customers are referred to as "net sales." In accounting, the word *net* means "after deductions." So "gross profit" means income before deducting operating expenses. By the same token, "net income" means income after deducting operating expenses and income taxes. Now, moving along, we are ready to figure out your projected balance sheet at the

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end of your first year in business. But first I need to ask you how much cash you plan to draw out of the business as your compensation?

Pat: My present job pays \$76,000 a year. I'd like to keep the same standard of compensation in my new business this coming year.

Kim: Let's see how that works out after we've completed the projected balance sheet at the end of year 1. Here it is on my computer screen:

Nutrivite

Projected Balance Sheet as of December 31, 200X

Assets		Liabilities and Equity	
Cash	\$ 35,600	Bank loan	\$ 40,000
Inventory	80,000		
Current assets	115,600	Current liabilities	40,000
Fixed assets:		Equity:	
Equipment	\$36,000	Capital: Jan 1	100,000
Less depreciation	3,600	Add net income	84,000
Net equipment	<u>\$32,400</u>	Less drawings	(76,000)
	32,400	Capital: Dec 31	<u>108,000</u>
Total assets	<u>\$148,000</u>	Liabilities and equity	<u>\$148,000</u>

Let's go over this balance sheet together, Pat. It has changed compared to the balance sheet as of January 1. On the Liabilities and Equity side of the balance sheet, the Net Income of \$84,000 has increased Capital to \$184,000 (because earning income adds to the owner's Capital), and deducting Drawings of \$76,000 has reduced Capital to \$108,000 (because Drawings take Capital out of the business). On the asset side, notice that the Equipment now has a year of depreciation deducted, which writes it down from the original \$36,000 to a net (there's that word *net* again) \$32,400 after depreciation. The Equipment had an expected useful life of 10 years, now reduced to a remaining life of 9 years. Last but not least, notice that the Cash has increased by \$11,600 from \$24,000 at the beginning of the year to \$35,600 at year-end. This leads to a problem: The Bank Loan of \$40,000 is due for repayment on December 31. But there is only \$35,600 in Cash available on December 31. How can the Loan be paid off when there is not enough Cash to do so?

Pat: I see the problem. But I think it's bigger than just paying off the loan. The business will also need to keep about \$25,000 cash on hand to cover two months operating expenses and income taxes. So, with \$40,000 to repay the loan plus \$25,000 for operating expenses, the cash requirements add up to \$65,000. But there is only \$35,600 cash on hand. This leaves a cash shortage of almost \$30,000 (\$65,000 less \$35,600). Do you think that will force me to

cut down my drawings by \$30,000, from \$76,000 to \$45,000? Here I am opening my own business, and it looks as if I have to go back to what I was earning five years ago!

Kim: That's one way to do it. But here's another way that you might like better. After your suppliers get to know you and do business with you for a few months, you can ask them to open credit accounts for Nutrivite. If you get the customary 30-day credit terms, then your suppliers will be financing one month's inventory. That amounts to one-twelfth of your \$480,000 annual cost of goods sold, or \$40,000. This \$40,000 will more than cover the cash shortage of \$30,000.

Pat: That's a perfect solution! Now, can we see how the balance sheet would look in this case?

Kim: Sure. When you pay off the Bank Loan, it vanishes from the balance sheet. It is replaced by Accounts Payable of \$40,000. Then the balance sheet looks like this:

Nutrivite

Projected Balance Sheet as of December 31, 200X

Assets		Liabilities and Equity	
Cash	\$ 35,600	Accounts payable	\$ 40,000
Inventory	80,000		
Current assets	115,600	Current liabilities	40,000
Fixed assets:		Equity:	
Equipment	\$36,000	Capital: Jan 1	100,000
Less depreciation	3,600	Add net income	84,000
Net equipment	<u>\$32,400</u>	Less drawings	<u>(76,000)</u>
	32,400	Capital: Dec 31	<u>108,000</u>
Total assets	<u>\$148,000</u>	Liabilities and equity	<u>\$148,000</u>

Now the cash position looks a lot better. But it hasn't been entirely solved: There is still a gap between the Accounts Payable of \$40,000 and the Cash of \$35,600. So you will need to cut your drawings by about \$5,000 in year 1. But that's still much better than the cut of \$30,000 that had seemed necessary before. In year 2 the Bank Loan will be gone, so the interest expense of \$6,000 will be saved. Then you can use \$5,000 of this saving to restore your drawings back up to \$76,000 again.

Pat: That's good news. I'm beginning to see how useful projected financial statements are for business planning. Can we look at the revised projected balance sheet now?

Kim: Of course. Here it is:

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Nutrivite

Projected Balance Sheet as of December 31, 200X

Assets		Liabilities and Equity	
Cash	\$ 40,600	Accounts payable	\$ 40,000
Inventory	80,000		
Current assets	120,600	Current liabilities	40,000
Fixed assets:		Equity:	
Equipment	\$36,000	Capital: Jan 1	100,000
Less depreciation	3,600	Add net income	84,000
Net equipment	<u>\$32,400</u> 32,400	Less drawings	(71,000)
		Capital: Dec 31	<u>113,000</u>
Total assets	<u>\$153,000</u>	Liabilities and equity	<u>\$153,000</u>

As you can see, Cash is increased by \$5,000 to \$40,600—which is sufficient to pay the Accounts Payable of \$40,000. Drawings is decreased by \$5,000 to \$71,000, which provided the \$5,000 increase in Cash.

Pat: Thanks. That makes sense. I really appreciate everything you've taught me about financial statements.

Kim: I'm happy to help. But there is one more financial statement to discuss. Besides the balance sheet and income statement, a full set of financial statements also includes a cash flow statement. Here is the projected cash flow statement:

Nutrivite

Projected Cash Flow Statement for the Year Ending December 31, 200X

Sources of Cash			
<i>From Operations:</i>			
Net income		\$ 84,000	
Add depreciation		3,600	
Add increase in current liabilities		<u>40,000</u>	
Total cash from operations	(a)	<u>\$ 127,600</u>	
<i>From Financing:</i>			
Drawings		\$ (71,000)	Negative cash
Bank loan repaid		<u>(40,000)</u>	Negative cash
Net cash from financing	(b)	<u>(111,000)</u>	Negative cash
Total sources of cash	(a + b)	<u>\$ 16,600</u>	

Uses of Cash

<i>Total uses of cash</i>	0	
<i>Total sources less total uses of cash</i>	\$ 16,600	<i>Net cash increase</i>
Add cash at beginning of year	<u>24,000</u>	
Cash at end of year	<u>\$ 40,600</u>	

Pat, do you have any questions about this Cash Flow Statement?

Pat: Actually, it makes sense to me. I realize that there are only two sources that a business can tap in order to generate cash: internal (by earning income) and external (by obtaining cash from outside sources, such as bank loans). In our case the internal sources of cash are represented by the “Cash from Operations” section of the Cash Flow Statement, and the external sources are represented by the “Cash from Financing” section. It happens that the “Cash from Financing” is negative because no additional outside financing is received for the year 200X, but cash payments are incurred for Drawings and for repayment of the Bank Loan. I also understand that there are no “Uses of Cash” because no extra Equipment was acquired. In addition, I can see that the Total Sources of Cash less the Total Uses of Cash must equal the Increase in Cash, which in turn is the Cash at the end of the year less the Cash at the beginning of the year. But I am puzzled by the “Cash from Operations” section of the Cash Flow Statement. I can understand that earning income produces Cash. However why do we add back Depreciation to the Net Income in order to calculate Cash from Operations?

Kim: This can be confusing, so let me explain. Certainly Net Income increases Cash, but first an adjustment has to be made in order to convert Net Income to a cash basis. Depreciation was deducted as an expense in figuring Net Income. So adding back depreciation to Net Income just reverses the charge for depreciation expense. We back it out because depreciation is *not* a cash outflow. Remember that depreciation represents just one year’s use of the Equipment. The cash outflow for purchasing the Equipment was incurred back when the Equipment was first acquired and amounted to \$36,000. The Equipment cost of \$36,000 is spread out over the 10-year life of the Equipment at the rate of \$3,600 per year, which we call Depreciation expense. So it would be double counting to recognize the \$36,000 cash outflow for the Equipment when it was originally acquired and then to recognize it a second time when it shows up as Depreciation expense. We do not write a check to pay for Depreciation each year, because it is not a cash outflow.

Pat: Thanks. Now I understand that Depreciation is not a cash outflow. But I don’t see why we also added back the Increase in Current Liabilities to the Net Income to calculate Cash from Operations. Can you explain that?

Kim: Of course. The increase in Current Liabilities is caused by an increase in Accounts Payable. These Accounts Payable are amounts owed to our suppliers

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for our purchases of goods for resale in our business. Purchasing goods for resale from our suppliers on credit is not a cash outflow. The cash outflow only occurs when the goods are actually paid for by writing out checks to our suppliers. That is why we added back the Increase in Current Liabilities to the Net Income in order to calculate Cash from Operations. In the future, the Increase in Current Liabilities will, in fact, be paid in cash. But that will take place in the future and is not a cash outflow in this year. Going back to the Cash Flow Statement, notice that it ties in neatly with our balance sheet amount for Cash. It shows how the Cash at the beginning of the year plus the Net Cash Increase equals the Cash at the end of the year.

Pat: Now I get it. Am I right that you are going to review my projections and then I'll hear from you about my loan application?

Kim: Yes, I'll be back to you in a few days. By the way, would you like a print-out of the projected financial statements to take with you?

Pat: Yes, please. I really appreciate your putting them together and explaining them to me. I picked up some financial skills that will be very useful to me as an aspiring entrepreneur.

POINTS TO REMEMBER ABOUT FINANCIAL STATEMENTS

When Pat arrived home, she carefully reviewed the projected financial statements, then made notes about what she had learned.

1. The basic form of the balance sheet is $\text{Assets} = \text{Liabilities} + \text{Owner Equity}$.
2. Assets are the expenditures made for items, such as Inventory and Equipment, that are needed to operate the business. The Liabilities and Owner Equity reflect the funds that financed the expenditures for the Assets.
3. Balance sheets show the financial position of a business at a given moment in time.
4. Balance sheets change as transactions are recorded.
5. Every transaction is an exchange, and both sides of each transaction are recorded. For example, when a company obtains a bank loan, there is an increase in the asset cash that is matched by an increase in a liability entitled "Bank Loan." When the loan is repaid, there is a decrease in cash which is matched by a decrease in the Bank Loan liability. After every transaction, the balance sheet stays in balance.
6. Income increases Owner Equity, and Drawings decrease Owner Equity.
7. The income statement shows how income for the period was earned.
8. The basic form of the income statement is:
 - a. $\text{Sales} - \text{Cost of Goods Sold} = \text{Gross Income}$.
 - b. $\text{Gross Income} - \text{Expenses} = \text{Net Income}$.

9. The income statement is simply a detailed explanation of the increase in Owner Equity represented by Net Income. It shows how the Owner Equity increased from the beginning of the year to the end of the year because of the Net Income.
10. Net Income contributes to Cash from Operations after it has been adjusted to a cash basis.
11. Not all expenses are cash outflows—for instance, Depreciation.
12. Changes in Current Assets (except Cash) and Current Liabilities are not cash outflows nor inflows in the period under consideration. They represent future, not present, cash flows.
13. Cash can be generated internally by operations or externally from sources such as lenders or equity investors.
14. The Cash Flow Statement is simply a detailed explanation of how cash at the start developed into cash at the end by virtue of cash inflows, generated internally and externally, less cash outflows.
15. As previously noted:
 - a. The Income Statement is an elaboration of the change in Owner Equity in the Balance Sheet caused by earning income.
 - b. The Cash Flow Statement is an elaboration of the Balance-Sheet change in beginning and ending Cash.

Therefore, all three financial statements are interrelated or, to use the technical term, “articulated.” They are mutually consistent, and that is why they are referred to as a “set” of financial statements. The three-piece set consists of a balance sheet, income statement, and cash flow statement.
16. A set of financial statements can convey much valuable information about the enterprise to anyone who knows how to analyze them. This information goes to the core of the organization’s business strategy and the effectiveness of its management.

While Pat was making her notes, Kim was carefully analyzing the Nutrivite projected financial statements in order to make her recommendation to the bank’s loan committee about Nutrivite’s loan application. She paid special attention to the Cash Flow Statement, keeping handy the bank’s guidelines on cash flow analysis, which included the following issues:

- Is cash from operations positive? Is it growing over time? Is it keeping pace with growth in sales? If not, why not?
- Are cash withdrawals by owners only a small portion of cash from operations? If owners’ cash withdrawals are a large share of cash from operations, then the business is conceivably being milked of cash and may not be able to finance its future growth.

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- Of the total sources of cash, how much is being internally generated by operations versus obtained from outside sources? Normally wise businesses rely more on internally generated cash for growth than on external financing.
- Of the outside financing, how much is derived from equity investors and how much is borrowed? Normally, a business should rely more on equity than debt financing.
- What kind of assets is the company acquiring with the cash being expended? Are these asset expenditures likely to be profitable? How long will it take for these assets to repay their cost and then to earn a reasonable return?

Kim reflected carefully on these issues and then finalized her recommendation, which was to approve the loan. The bank's loan committee accepted Kim's recommendation and even went further. They authorized Kim to tell Pat that—if she met all her responsibilities in regard to the loan throughout the year—the bank would renew the loan at the end of the year and even increase the amount. Kim called Pat with the good news. Their conversation included the following dialogue:

Kim: To renew the loan, the bank will ask you for new projected financial statements for the subsequent year. Also, the loan agreement will require you to submit financial statements for the year just past—that is, not projected but actual financial statements. The bank will require that these actual financial statements be reviewed by an independent CPA before you submit them.

Pat: Let me be sure I understand: Projected financial statements are forward-looking, whereas actual financial statements are backward looking, is that correct?

Kim: Yes, that's right.

Pat: Next, what is an independent CPA?

Kim: As you probably know, a CPA is a certified public accountant, a professional trained in finance and accounting and licensed by the state. *Independent* means a CPA who is not an employee of yours or a relative. It means someone in public practice in a CPA firm, someone who will likely make an objective and unbiased evaluation of your financial statements.

Pat: And what does *reviewed* mean?

Kim: Good question. CPAs offer three levels of service relating to financial statements:

- An *audit* is a thorough, in-depth examination of the financial statements and test of the supporting records. The result is an audit report, which states whether the financial statements are free of material misstatements (whether caused by error or fraud). A “clean” audit report provides assurance that the financial statements are free of material misstatements. A “modified” report gives no such assurance and is cause

for concern. Financial professionals always read the auditor's report first, even before looking at any financial statement, to see if the report is clean. The auditor is a watchdog, and this watchdog barks by issuing a modified audit report. By law all companies that have publicly traded securities must have their financial statements audited as a protection to investors, creditors, and other financial statement users. Private companies are not required by law to have audits, but sometimes particular investors or creditors demand them. An audit provides the highest level of assurance that a CPA can provide and is the most expensive level of service. Less expensive and less thorough levels of service include the following.

- A *review* is a less extensive and less expensive level of financial statement inspection by a CPA. It provides a lower level of assurance that the financial statements are free of material misstatements.
- Finally, the lowest level of service is called a *compilation*, where the outside CPA puts together the financial statements from the client company's books and records without examining them in much depth. A compilation provides the least assurance and is the least expensive level of service.

So the bank is asking you for the middle level of assurance when it requires a review by an independent CPA. Banks usually require a review from borrowers that are smaller private businesses.

Pat: Thanks. That makes it very clear.

We now leave Pat and Kim to their successful loan transaction and move on.

FINANCIAL STATEMENTS: WHO USES THEM AND WHY

Here is a brief list of who uses financial statements and why. This list gives only a few examples and is by no means complete.

1. Existing equity investors and lenders, to monitor their investments and to evaluate the performance of management.
2. Prospective equity investors and lenders, to decide whether or not to invest.
3. Investment analysts, money managers, and stockbrokers, to make buy/sell/hold recommendations to their clients.
4. Rating agencies (such as Moody's, Standard & Poor's, and Dun & Bradstreet), to assign credit ratings.
5. Major customers and suppliers, to evaluate the financial strength and staying power of the company as a dependable resource for their business.

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6. Labor unions, to gauge how much of a pay increase a company is able to afford in upcoming labor negotiations.
7. Boards of directors, to review the performance of management.
8. Management, to assess its own performance.
9. Corporate raiders, to seek hidden value in companies with underpriced stock.
10. Competitors, to benchmark their own financial results.
11. Potential competitors, to assess how profitable it may be to enter an industry.
12. Government agencies responsible for taxing, regulating, or investigating the company.
13. Politicians, lobbyists, issue groups, consumer advocates, environmentalists, think tanks, foundations, media reporters, and others who are supporting or opposing any particular public issue the company's actions affect.
14. Actual or potential joint venture partners, franchisors or franchisees, and other business interests who need to know about the company and its financial situation.

This brief list shows how many people and institutions use financial statements for a large variety of business purposes and suggests how essential the ability to understand and analyze financial statements is to success in the business world.

FINANCIAL STATEMENT FORMAT

Financial statements have a standard format whether an enterprise is as small as Nutrivite or as large as a major corporation. For example, a recent set of financial statements for Microsoft Corporation can be summarized in millions of dollars as follows:

Income Statement			
Years Ended June 30	XXX1	XXX2	XXX3
Revenue	\$15,262	\$19,747	\$22,956
Cost of revenue	2,460	2,814	3,002
Research and development	2,601	2,970	3,775
Other expenses	3,787	4,035	5,242
Total expenses	\$ 8,848	\$ 9,819	\$12,019
Operating income	\$ 6,414	\$ 9,928	\$10,937
Investment income	703	1,963	3,338
Income before income taxes	7,117	11,891	14,275
Income taxes	2,627	4,106	4,854
Net income	\$ 4,490	\$ 7,785	\$ 9,421

Using Financial Statements **15****Cash Flow Statement**

Years Ended June 30	XXX1	XXX2	XXX3
<i>Operations</i>			
Net income	\$ 4,490	\$ 7,785	\$ 9,421
Adjustments to convert net income to cash basis	3,943	5,352	4,540
Cash from operations	<u>\$ 8,433</u>	<u>\$ 13,137</u>	<u>\$ 13,961</u>
<i>Financing</i>			
Stock repurchased, net	\$(1,509)	\$ (1,600)	\$ (2,651)
Stock warrants sold	538	766	472
Preferred stock dividends	(28)	(28)	(13)
Cash from financing	<u>\$ (999)</u>	<u>\$ (862)</u>	<u>\$ (2,192)</u>
<i>Investing</i>			
Additions to property and equipment	\$ (656)	\$ (583)	\$ (879)
Net additions to investments	(6,616)	(10,608)	(11,048)
Net cash invested	<u>\$(7,272)</u>	<u>\$ (11,191)</u>	<u>\$(11,927)</u>
Net change in cash	<u>162</u>	<u>1,084</u>	<u>(158)</u>

Balance Sheet

Years Ended June 30	XXX2	XXX3
<i>Current Assets</i>		
Cash and equivalents	\$ 4,975	\$ 4,846
Short-term investments	12,261	18,952
Accounts receivable	2,245	3,250
Other	2,221	3,260
Total current assets	<u>\$21,702</u>	<u>\$30,308</u>
Property and equipment, net	\$ 1,611	\$ 1,903
Investments	15,312	19,939
Total fixed assets	<u>\$16,923</u>	<u>\$21,842</u>
Total assets	<u>\$38,625</u>	<u>\$52,150</u>
<i>Current Liabilities</i>		
Accounts payable	\$ 874	\$ 1,083
Other	7,928	8,672
Total current liabilities	8,802	9,755
Noncurrent liabilities	1,385	1,027
Total liabilities	<u>\$10,187</u>	<u>\$10,782</u>
Preferred stock	\$ 980	
Common stock	13,844	\$23,195
Retained earnings	13,614	18,173
Total equity	<u>\$28,438</u>	<u>\$41,368</u>
Total liabilities and equity	<u>\$38,625</u>	<u>\$52,150</u>

Note: There are only two years of balance sheets but three years of income statements and cash flow statements. This is because the Microsoft financial statements above were obtained from filings with the U.S. Securities and Exchange Commission (SEC), and the SEC requirements for corporate annual report filings are two years of balance sheets, plus three years of income statements and cash flow statements.

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The Microsoft financial statements contain numbers very much greater than those for Nutrivite. But there is no difference in the general format of these two sets of financial statements.

HOW TO ANALYZE FINANCIAL STATEMENTS

Imagine that you are a nurse or a physician and you work in the emergency room of a busy hospital. Patients arrive with all kinds of serious injuries or illnesses, barely alive or perhaps even dead. Others arrive with less urgent injuries, minor complaints, or vaguely suspected ailments. Your training and experience have taught you to perform a quick triage, to prioritize the most endangered patients by their vital signs—respiration, pulse, blood pressure, temperature, and reflexes. A more detailed diagnosis follows based on more thorough medical tests.

We check the financial health of a company in much the same fashion by analyzing the financial statements. The vital signs are tested mostly by various financial ratios that are calculated from the financial statements. These vital signs can be classified into three main categories:

1. Short-term liquidity.
2. Long-term solvency.
3. Profitability.

We explain each of these three categories in turn.

SHORT-TERM LIQUIDITY

In the emergency room the first question is: Can this patient survive? Similarly, the first issue in analyzing financial statements is: Can this company survive? Business survival means being able to pay the bills, meet the payroll, and come up with the rent. In other words, is there enough liquidity to provide the cash needed to pay current financial commitments? “Yes” means survival. “No” means bankruptcy. The urgency of this question is why current assets (which are expected to turn into cash within a year) and current liabilities (which are expected to be paid in cash within a year) are shown separately on the balance sheet. Net current assets (current assets less current liabilities) is known as *working capital*. Because most businesses cannot operate without positive working capital, the question of whether current assets exceed current liabilities is crucial.

When current assets are greater than current liabilities, there is sufficient liquidity to enable the enterprise to survive. However, when current liabilities exceed current assets the enterprise may well be in immanent danger of bankruptcy. The financial ratio used to measure this risk is current assets divided

by current liabilities, and is known as the *current ratio*. It is expressed as “2.5 to 1” or “2.5:1” or just “2.5.” Keeping the current ratio from dropping below 1 is the bare minimum to indicate survival, but it lacks any margin of safety. A company must maintain a reasonable margin of safety, or cushion, because the current ratio, like all financial ratios, is only a rough approximation. For this reason, in most cases a current ratio of 2 or more just begins to provide credible evidence of liquidity.

An example of a current ratio can be found in the current sections of the balance sheets shown earlier in this chapter:

Nutrivite
Selected Sections of Projected Balance Sheet
as of December 31, 200X

Assets		Liabilities and Equity	
Cash	\$ 40,600	Accounts payable	<u>\$40,000</u>
Inventory	<u>80,000</u>		
Current assets	<u>\$120,600</u>	Current liabilities	<u>\$40,000</u>

The current ratio is 120,600/40,000, or 3. This is only a rough approximation for several reasons. First, a company can, quite legitimately, improve its current ratio. In the earlier case of Nutrivite, assume the business wanted its balance sheet to reflect a higher current ratio. One way to do so would be to pay off \$20,000 on the bank loan on December 31. This would reduce current assets to \$100,600 and current liabilities to \$20,000. Then the current ratio is changed to \$100,600/\$20,000, or 5. By perfectly legitimate means, the current ratio has been improved from 3 to 5. This technique is widely used by companies that want to put their best foot forward in the balance sheet, and it always works provided that the current ratio was greater than 1 to start with.

Current assets usually include:

- Cash and Cash Equivalents.
- Securities expected to become liquid by maturing or being sold within a year.
- Accounts Receivable (which Nutrivite did not have, because it did not sell to its customers on credit).
- Inventory.

Current liabilities usually include:

- Accounts Payable.
- Other current payables, such as taxes, wages, or insurance.
- The current portion of long-term debt.

Some items included in Current Assets need a further explanation. These are:

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- Cash Equivalents are near-cash securities such as U.S. Treasury bills maturing in three months or less.
- Accounts Receivable are amounts owed by customers and should be reported on the balance sheet at “realizable value,” which means “the amount reasonably expected to be collected in cash.” Any accounts whose collectibility is in doubt must be reduced to realizable value by deducting an allowance for doubtful debts.
- Inventories in some cases may not be liquid in a crisis (except at fire-sale prices). This condition is especially likely for goods of a perishable, seasonal, high-fashion, or trendy nature or items subject to technological obsolescence, such as computers. Since inventory can readily lose value, it must be reported on the balance sheet at the “lower of cost or market value,” or what the inventory cost to acquire (including freight and insurance), or the cost of replacement, or the expected selling price less costs of sale—whichever is lowest.

Despite these requirements designed to report inventory at a realistic amount, inventory is regarded as an asset subject to inherent liquidity risk, especially in difficult economic times and especially for items that are perishable, seasonal, high-fashion, trendy, or subject to obsolescence. For these reasons the current ratio is often modified by excluding inventory to get what is called the *quick ratio* or *acid test ratio*:

$$\text{Quick Ratio} = \left(\frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}} \right)$$

- In the case of Nutrivite, the quick ratio as of December 31 is \$40,600/\$40,000, or 1. This indicates that Nutrivite has a barely adequate quick ratio, with no margin of safety at all. It is a red flag or warning signal.

The current ratio and the quick ratio deal with all or most of the current assets and current liabilities. There are also short-term liquidity ratios that focus more narrowly on individual components of current assets and current liabilities. These are the *turnover ratios*, which consist of:

- Accounts Receivable Turnover.
- Inventory Turnover.
- Accounts Payable Turnover.

Turnover, which means “making liquid,” is a key factor in liquidity. Faster turnover allows a company to do more business without increasing assets. Increased turnover means that less cash is tied up in assets, and that improves liquidity. Moving to the other side of the balance sheet, slower turnover of liabilities conserves cash and thereby increases liquidity. Or more simply, achieving better turnover of working capital can significantly improve liquidity. Turnover ratios thus provide valuable information. The working capital turnover ratios are described next.

Accounts Receivable Turnover

The equation is:

$$\text{Accounts Receivable Turnover} = \frac{\text{Credit Sales}}{\text{Accounts Receivable}}$$

So, if Credit Sales are \$120,000 and Accounts Receivable are \$30,000, then

$$\text{Accounts Receivable Turnover} = \frac{\$120,000}{\$30,000} = 4$$

On average, Accounts Receivable turn over 4 times a year, or every 91 days.

The 91-day turnover period is found by dividing a year, 365 days, by the Accounts Receivable Turnover ratio of 4. This average of 91 days is how long it takes to collect Accounts Receivable. That is fine if our credit terms call for payment 90 days from invoice but not fine if credit terms are 60 days, and it is alarming if credit terms are 30 days.

Accounts Receivable, unlike vintage wines or antiques, do not improve with age. Accounts Receivable Turnover should be in line with credit terms; turnover sliding out of line with credit terms signals increasing danger to liquidity.

Inventory Turnover

Inventory turnover is computed as follows:

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Inventory}}$$

If Cost of Goods Sold is \$100,000 and Inventory is \$20,000, then

$$\text{Inventory Turnover} = \frac{\$100,000}{\$20,000} = 5 \text{ times a year}$$

or about 70 days. Note that the numerator for calculating Accounts Receivable Turnover is Credit Sales but for Inventory Turnover is Cost of Goods Sold. The reason is that both Accounts Receivable and Sales are measured in terms of the selling price of the goods involved. That makes Accounts Receivable Turnover a consistent ratio, where the numerator and denominator are both expressed at selling prices in an “apples-to-apples” manner. Inventory Turnover is also an “apples-to-apples” comparison in that both numerator, Cost of Goods Sold, and denominator, Inventory, are expressed in terms of the cost, not the selling price, of the goods.

In our example, the Inventory Turnover was 5, or about 70 days. Whether this is good or bad depends on industry standards. Companies in the auto-retailing or the furniture-manufacturing industry would accept this ratio. In the supermarket business or in gasoline retailing, however, 5 would fall far

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below their norm of about 25 times a year, or roughly every 2 weeks. As with Accounts Receivable Turnover, an Inventory Turnover that is out of line is a red flag.

Accounts Payable Turnover

This measure's equation is:

$$\text{Accounts Payable Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Accounts Payable}}$$

If Cost of Goods Sold is \$100,000 and Accounts Payable is \$16,600, then

$$\text{Accounts Payable Turnover} = \frac{\$100,000}{\$16,600}$$

which is about 6, or around 60 days. Again, note the consistency of the numerator and denominator, both stated at the cost of the goods purchased. Accounts Payable Turnover is evaluated by comparison with industry norms. An Accounts Payable Turnover that is appreciably faster than the industry norm is fine, if liquidity is satisfactory, because prompt payments to suppliers usually earn cash discounts, which in turn lower the Cost of Goods Sold and thus lead to higher income. However, such faster-than-normal Accounts Payable Turnover does diminish liquidity and is therefore unwise when liquidity is tight. Accounts Payable Turnover that is slower than the industry norm enhances liquidity and is therefore wise when liquidity is tight but inadvisable when liquidity is fine, because it sacrifices cash discounts from suppliers and thus reduces income.

This concludes our survey of the ratios relating to short-term liquidity—the current ratio; quick, or acid test, ratio; Accounts Receivable Turnover; Inventory Turnover; and Accounts Payable Turnover.

If these ratios are seriously deficient, our diagnosis may be complete. The subject business may be almost defunct, and even desperate measures may be insufficient to revive it. If these ratios are favorable, then short-term liquidity does not appear to be a threat and the financial doctor should proceed to the next set of tests, which measure long-term solvency.

It is worth noting, however, that there are some rare exceptions to these guidelines. For example, large gas and electric utilities typically have current ratios less than 1 and quick ratios less than 0.5. This is due to utilities' exceptional characteristics:

- They usually require deposits before providing service to customers, and they can shut off service to customers who do not pay on time. Customers are reluctant to go without necessities such as gas and electricity and therefore tend to pay their utility bills ahead of most other bills. These factors sharply reduce the risk of uncollectible accounts receivable for gas and electric utility companies.

- Inventories of gas and electric utility companies are not subject to much risk from changing fashion trends, deterioration, or obsolescence.
- Under regulation, gas and electric utility companies are stable, low-risk businesses, largely free from competition and consistently profitable.

This reduced risk and increased predictability of gas and electric utility companies make short-term liquidity and safety margins less crucial. In turn, the ratios indicating short-term liquidity become less important, because short-term survival is not a significant concern for these businesses.

LONG-TERM SOLVENCY

Long-term solvency focuses on a firm's ability to pay the interest and principal on its long-term debt. There are two commonly used ratios relating to servicing long-term debt. One measures ability to pay interest, the other the ability to repay the principal. The ratio for interest compares the amount of income available for paying interest with the amount of the interest expense. This ratio is called Interest Coverage or Times Interest Earned.

The amount of income available for paying interest is simply earnings before interest and before income taxes. (Business interest expense is deductible for income tax purposes; therefore, income taxes are based on earnings after interest, otherwise known as earnings before income taxes.) Earnings before interest and taxes is known as EBIT. The ratio for Interest Coverage or Times Interest Earned is EBIT/Interest Expense. For instance, assume that EBIT is \$120,000 and interest expense is \$60,000. Then:

$$\text{Interest Coverage or Times Interest Earned} = \frac{\$120,000}{\$60,000} = 2$$

This shows that the business has EBIT sufficient to cover 2 times its interest expense. The cushion, or margin of safety, is therefore quite substantial. Whether a given interest coverage ratio is acceptable depends on the industry. Different industries have different degrees of year-to-year fluctuations in EBIT. Interest coverage of 2 times may be satisfactory for a steady and mature firm in an industry with stable earnings, such as regulated gas and electricity supply. However, when the same industry experiences the uncertain forces of deregulation, earnings may become volatile, and interest coverage of 2 may prove to be inadequate. In more-turbulent industries, such as movie studios and Internet retailers, an interest coverage of 2 may be regarded as insufficient.

The long-term solvency ratio that reflects a firm's ability to repay principal on long-term debt is the "Debt to Equity" ratio. The long-term capital structure of a firm is made up principally of two types of financing: (1) long-term debt and (2) owner equity. Some hybrid forms of financing mix characteristics of debt and equity but usually can be classified as mainly debt or equity in nature. Therefore the distinction between debt and equity is normally clear.

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If long-term debt is \$150,000 and equity is \$300,000, then the debt-equity relationship is usually measured as:

$$\begin{aligned}\text{Debt to Equity Ratio} &= \frac{\text{Long-Term Debt}}{\text{Long-Term Debt} + \text{Equity}} \\ &= \frac{\$150,000}{(\$150,000 + \$300,000)} \\ &= 33 \frac{1}{3} \%\end{aligned}$$

Long-term debt is frequently secured by liens on property and has priority on payment of periodic interest and repayment of principal. There is no priority for equity, however, for dividend payments or return of capital to owners. Holders of long-term debt thus have a high degree of security in receiving full and punctual payments of interest and principal. But, in good times or bad, whether income is high or low, long-term creditors are entitled to receive no more than these fixed amounts. They have reduced their risk of gain or loss in exchange for more certainty. By contrast, owners of equity enjoy no such certainty. They are entitled to nothing except dividends, if declared, and, in the case of bankruptcy, whatever funds might be left over after all obligations have been paid. Theirs is a totally at-risk investment. They prosper in good times and suffer in bad times. They accept these risks in the hope that in the long run gains will substantially exceed losses.

From the firm's point of view, long-term debt obligations are a burden that must be carried whether income is low, absent, or even negative. But long-term debt obligations are a blessing when income is lush since they receive no more than their fixed payments, even if incomes soar. The greater the proportion of long-term debt and smaller the proportion of equity in the capital structure, the more the incomes of the equity holders will fluctuate according to how good or bad times are. The proportion of long-term debt to equity is known as leverage. The greater the proportion of long-term debt to equity, the more leveraged the firm is considered to be. The more leveraged the firm is, the more equity holders prosper in good times and the worse they fare in bad times. Because increased leverage leads to increased volatility of incomes, increased leverage is regarded as an indicator of increased risk, though a moderate degree of leverage is thus considered desirable. The debt-to-equity ratio is evaluated according to industry standards and each industry's customary volatility of earnings. For example, a debt-to-equity ratio of 80% would be considered conservative in banking (where leverage is customarily above 80% and earnings are relatively stable) but would be regarded as extremely risky for toy manufacturing or designer apparel (where earnings are more volatile). The well-known junk bonds are an example of long-term debt securities where leverage is considered too high in relation to earnings volatility. The increased risk associated with junk bonds explains their higher interest yields. This illustrates the general financial principle that the greater the risk, the higher the expected return.

In summary, the ratios used to assess long-term solvency are Interest Coverage and Long-Term Debt to Equity.

Next, we consider the ratios for analyzing profitability.

PROFITABILITY

Profitability is the lifeblood of a business. Businesses that earn incomes can survive, grow, and prosper. Businesses that incur losses cannot stay in operation, and will last only until their cash runs out. Therefore, in order to assess business viability, it is important to analyze profitability.

When analyzing profitability, it is usually done in two phases, which are:

1. Profitability in relation to sales.
2. Profitability in relation to investment.

Profitability in Relation to Sales

The analysis of profitability in relation to sales recognizes the fact that:

$$\text{Income} = \text{Sales} - \text{Expenses}$$

or, rearranging terms:

$$\text{Sales} = \text{Expenses} + \text{Income}$$

Therefore, Expenses and Income are measured in relation to their sum, which is Sales. The expenses, in turn, may be broken down by line item. As an example, we use the Nutrivite Income Statement for the first three years of operation.

**Income Statements for the
Years Ending December 31**

	Year 1	Year 2	Year 3
Sales	\$720,000	\$800,000	\$900,000
Less cost of goods sold	<u>480,000</u>	<u>530,000</u>	<u>600,000</u>
Gross profit	<u>\$240,000</u>	<u>\$270,000</u>	<u>\$300,000</u>
Less expenses			
Salaries	\$ 40,000	\$ 49,600	\$ 69,000
Rent	36,000	49,400	54,400
Phone and utilities	14,400	19,400	26,000
Depreciation	3,600	3,600	3,600
Interest	<u>6,000</u>	<u>6,000</u>	<u>6,000</u>
Total expenses	<u>\$100,000</u>	<u>\$128,000</u>	<u>\$159,000</u>
Income before taxes	\$140,000	\$142,000	\$141,000
Income tax expense (40%)	<u>56,000</u>	<u>56,800</u>	<u>56,400</u>
Net income	<u>\$ 84,000</u>	<u>\$ 85,200</u>	<u>\$ 84,600</u>

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These income statements show a steady increase in Sales and Gross Profits each year. Despite this favorable result, the Net Income has remained virtually unchanged at about \$84,000 for each year. To learn why this is the case, we need to convert expenses and income to percentages of sales. The income statements converted to percentages of sales are known as “common size” income statements and look like the following:

**Common Size Income Statements for the
Years Ending December 31**

	Year 1	Year 2	Year 3	<i>Change Years 1–3</i>
Sales	100.0%	100.0%	100.0%	0.0%
Less cost of goods sold	66.7	66.2	66.7	0.0
Gross profit	<u>33.3%</u>	<u>33.8%</u>	<u>33.3%</u>	<u>0.0%</u>
Less expenses				
Salaries	5.6%	6.2%	7.7%	2.1%
Rent	5.0	6.2	6.0	1.0
Phone and utilities	2.0	2.4	2.9	0.9
Depreciation	0.5	0.4	0.4	–0.1
Interest	0.8	0.8	0.7	–0.1
Total expenses	<u>13.9%</u>	<u>16.0%</u>	<u>17.7%</u>	<u>3.8%</u>
Income before taxes	19.4%	17.8%	15.6%	–3.8%
Income tax expense (40%)	7.8	7.2	6.2	–1.6
Net income	<u>11.6%</u>	<u>10.6%</u>	<u>9.4%</u>	<u>–2.2%</u>

From the percentage figures above it is easy to see why the Net Income failed to increase, despite the substantial growth in Sales and Gross Profit. Total Expenses rose by 3.8 percentage points, from 13.9% of Sales in Year 1 to 17.7% of Sales in Year 3. In particular, the increase in Total Expenses relative to Sales was driven mainly by increases in Salaries (2.1 percentage points), Rent (1 percentage point) and Phone and Utilities (0.9 percentage point). As a result, Income before Taxes relative to Sales fell by 3.8 percentage points from Year 1 to Year 3. The good news is that the drop in Income before Taxes caused a reduction of Income Tax Expense relative to Sales of 1.6 percentage points from Year 1 to Year 3. The net effect was a drop in Net Income, relative to Sales, of 2.2 percentage points from Year 1 to Year 3.

This useful information shows that:

1. The profit stagnation is not related to Sales or Gross Profit.
2. It is entirely due to the disproportionate increase in Total Expenses.
3. Specific causes are the expenses for Salaries, Rent, and Phone and Utilities.
4. Action to correct the profit slump requires analyzing these particular expense categories.

The use of percent-of-sales ratios is a simple but powerful technique for analyzing profitability. Generally used ratios include:

- Gross Profit.
- Operating Expenses:
 - a. In total.
 - b. Individually.
- Selling, General, and Administrative Expenses (often called SG&A).
- Operating Income.
- Income before Taxes.
- Net Income.

The second category of profitability ratios is profitability in relation to investment.

Profitability in Relation to Investment

To earn profits, usually a firm must invest capital in items such as plant, equipment, inventory, and/or research and development. Up to this point we have analyzed profitability without considering invested capital. That was a useful simplification in the beginning, but, since profitability is highly dependent on the investment of capital, it is now time to bring invested capital into the analysis.

We start with the balance sheet. Recall that Working Capital is Current Assets less Current Liabilities. So we can simplify the balance sheet by including a single category for Working Capital in place of the separate categories for Current Assets and Current Liabilities. An example of a simplified balance sheet follows:

Example Company

Simplified Balance Sheet as of December 31, 200X

Assets		Liabilities and Equity	
Working capital	\$ 40,000	Long-term debt	\$ 30,000
Fixed assets, net	<u>80,000</u>	Equity	<u>90,000</u>
Total assets	<u><u>\$120,000</u></u>	Liabilities and equity	<u><u>\$120,000</u></u>

A simplified Income Statement for Example Company for the year 200X is summarized below:

Income before interest and taxes (EBIT)	\$36,000
Less interest expense	<u>3,000</u>
Income before income taxes	33,000
Less income taxes (40%)	<u>13,200</u>
Net income	<u><u>\$19,800</u></u>

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The first ratio we will consider is EBIT (also known as Operating Profit) to Total Assets. This ratio is often referred to as Return on Total Assets (ROTA), and it can be expressed as either before tax (more usual) or after tax. From the Example Company, the calculations are as follows:

Return on Total Assets	Before Tax	After Tax
EBIT/total assets = \$36,000/\$120,000	30%	
EBIT/total assets = \$21,600/\$120,000		18%

This ratio indicates the raw (or basic) earning power of the business. Raw earning power is independent of whether assets are financed by equity or debt. This independence exists because:

1. The numerator (EBIT) is free of interest expense.
2. The denominator, Total Assets, is equal to total capital regardless of how much capital is equity and how much is debt.

Independence allows the ratio to be measured and compared:

- For any business, from one period to another.
- For any period, from one business to another.

These comparisons remain valid, even if the debt to equity ratio may vary from one period to the next and from one business to another.

Now that we have measured basic earning power regardless of the debt to equity ratio, our next step is to take the debt to equity ratio into consideration. First, it is important to note that long-term debt is normally a less expensive form of financing than equity because:

1. Whereas Dividends paid to stockholders are not a tax deduction for the paying company, Interest Expense paid on Long-Term Debt is. Therefore the net after-tax cost of Interest is reduced by the related tax deduction. This is not the case for Dividends, which are not deductible.
2. Debt is senior to equity, which means that debt obligations for interest and principal must be paid in full before making any payments on equity, such as dividends. This makes debt less risky than equity to the investors, and so debt holders are willing to accept a lower rate of return than holders of the riskier equity securities.

This contrast can be seen from the simplified financial statements of Example Company above. The interest of \$3,000 on the Long-Term Debt of \$30,000 is 10% before tax. But after the 40% tax deduction the interest after tax is only \$1,800 (\$3,000 – 40% tax on \$3,000), and this \$1,800 represents an after-tax interest rate of 6% on the Long-Term Debt of \$30,000. For comparison let us turn to the rate of return on the Equity. The Net Income, \$19,800, represents a 22% rate of return on the Equity of \$90,000. This 22% rate of return is a financial ratio known as Return on Equity, sometimes abbreviated *ROE*. Return on Equity is an important and widely used financial ratio.

There is much more to be said about Return on Equity, but first it may be helpful to recap briefly the main points we have covered about profitability in relation to investment.

The EBIT of \$36,000 represented a 30% return on total assets, before income tax, and this \$36,000 was shared by three parties, as follows:

1. Long-Term Debt holders received Interest of \$3,000, representing an interest cost of 10% before income tax, and 6% after income tax.
2. City, state, and/or federal governments were paid Income Taxes of \$13,200.
3. Stockholder Equity increased by the Net Income of \$19,800, which represented a 22% Return on Equity.

If there had been no Long-Term Debt, there would have been no Interest Expense. The EBIT of \$36,000 less income tax at 40% would provide a Net Income of \$21,600, which is larger than the prior Net Income of \$19,800 by \$1,800. This \$1,800 equals the \$3,000 amount of Interest before tax less the 40% tax, which is \$1,200. In the absence of Long-Term Debt, the Total Assets would have been funded entirely by equity, which would have required equity to be \$120,000. In turn, with Net Income of \$21,600, the revised Return on Equity would be

$$\frac{\text{Net Income}}{\text{Equity}} = \frac{\$21,600}{\$120,000} = 18\%$$

The increase in the Return on Equity, from this 18% to 22% was attributable to the use of Long-Term Debt. The Long-Term Debt had a cost after taxes of only 6% versus the Return on Assets after tax of 18%. When a business earns 18% after tax, it is profitable to borrow at 6% after tax. This in turn improves the Return on Equity from 18% to 22%, which illustrates the advantage of leverage: A business earning 18% on assets can, with a little leverage, earn 22% on equity.

But what if EBIT is only \$3,000? The entire \$3,000 would be used up to pay the interest of \$3,000 on the Long-Term Debt. The Net Income would be \$0, resulting in a 0% Return on Equity. This illustrates the disadvantage of leverage. Without Long-Term Debt, the EBIT of \$3,000 less 40% tax would result in Net Income of \$1,800. Return on Equity would be \$1,800 divided by equity of \$120,000, which is 1.5%. A Return on Equity of 1.5% may not be impressive, but it is certainly better than the 0% that resulted with Long-Term Debt.

Leverage is a fair-weather friend: It boosts Return on Equity when earnings are robust but depresses ROE when earnings are poor. Leverage makes the good times better but the bad times worse. Therefore, it should be used in moderation and in businesses with stable earnings. In businesses with volatile earnings, leverage should be used sparingly and cautiously.

We have now described all of the main financial ratios, and they are summarized in Exhibit 1.1.

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EXHIBIT 1.1 Summary of main financial ratios.

Ratio	Numerator	Denominator
<i>Short-Term Liquidity</i>		
Current ratio	Current assets	Current liabilities
Quick ratio (acid test)	Current assets (excluding inventory)	Current liabilities
Receivables turnover	Credit sales	Accounts receivable
Inventory turnover	Cost of sales	Inventory
Payables turnover	Cost of sales	Accounts payable
<i>Long-Term Solvency</i>		
Interest coverage	EBIT	Interest on L/T debt
Debt to capital	Long-term debt	L/T debt + equity
<i>Profitability on Sales</i>		
Gross profit ratio	Gross profit	Sales
Operating expense ratio	Operating expenses	Sales
SG&A expense ratio	SG&A expenses	Sales
EBIT ratio	EBIT	Sales
Pretax income ratio	Pretax income	Sales
Net income ratio	Net income	Sales
<i>Profitability on Investment</i>		
Return on total assets:		
Before tax	EBIT	Total assets ^a
After tax	EBIT times (1-tax rate)	Total assets ^a
Return on equity	Net income: Common ^b	Common equity

^a Total Assets = Fixed Assets + Working Capital (Current Assets less Current Liabilities)

^b Net Income less Preferred Dividends

USING FINANCIAL RATIOS

Some important points to keep in mind when using financial ratios are:

- Whereas all balance sheet numbers are end-of-period numbers, all income statement numbers relate to the entire period. For example, when calculating the ratio for Accounts Receivable Turnover, we use a numerator of Credit Sales, which is an entire-period number from the income statement, and a denominator of Accounts Receivable, which is an end-of-period number from the balance sheet. To make this an apples-to-apples ratio, the Accounts Receivable can be represented by an average of the beginning-of-year and end-of-year figures for Accounts Receivable. This average is closer to a mid-year estimate of Accounts Receivable and therefore is more comparable to the entire-period numerator, Credit Sales. Because using averages of the beginning-of-year and end-of-year figures for balance sheet numbers helps to make ratios more of an apples-to-apples

comparison, averages should be used for all balance sheet numbers when calculating financial ratios.

- Financial ratios can be no more reliable than the data with which the ratios were calculated. The most reliable data is from audited financial statements, if the audit reports are clean and unqualified.
- Financial ratios cannot be fully considered without yardsticks of comparison. The simplest yardsticks are comparisons of an enterprise's current financial ratios with those from previous periods. Companies often provide this type of information in their financial reporting. For example, Apple Computer Inc., recently disclosed the following financial quarterly information, in millions of dollars:

Quarter	4	3	2	1
Net sales	\$1,870	\$1,825	\$1,945	\$2,343
Gross margin	\$1,122	\$1,016	\$1,043	\$1,377
Gross margin	25%	30%	28%	28%
Operating costs	\$ 383	\$ 375	\$ 379	\$ 409
Operating income	\$ 64	\$ 168	\$ 170	\$ 100
Operating income	4%	9%	9%	4%

This table compares four successive quarters of information, which makes it possible to see the latest trends in such important items as Sales, and Gross Margin and Operating Income percentages. Other types of comparisons of financial ratios include:

1. *Comparisons with competitors.* For example, the financial ratios of Apple Computer could be compared with those of Compaq, Dell, or Gateway.
2. *Comparisons with industry composites.* Industry composite ratios can be found from a number of sources, such as:
 - a. The *Almanac of Business and Industrial Financial Ratios*, authored by Leo Troy and published annually by Prentice-Hall (Paramus, NJ). This publication uses Internal Revenue Service data for 4.6 million U.S. corporations, classified into 179 industries and divided into categories by firm size, and reporting 50 different financial ratios.
 - b. Risk Management Associates: Annual Statement Studies. This is a database compiled by bank loan officers from the financial statements of more than 150,000 commercial borrowers, representing more than 600 industries, classified by business size, and reporting 16 different financial ratios. It is available on the Internet at www.rmahq.org.
 - c. Financial ratios can also be obtained from other firms who specialize in financial information, such as Dun & Bradstreet, Moody's, and Standard & Poor's.

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COMBINING FINANCIAL RATIOS

Up to this point we have considered financial ratios one at a time. However, there is a useful method for combining financial ratios known as Dupont¹ analysis. To explain it, we first need to define some financial ratios, together with their abbreviations, as follows:

Ratio	Calculation	Abbreviation
Profit margin ²	Net income/sales	NI/S
Asset turnover	Sales/total assets	S/TA
Return on assets ³	Net income/total assets	NI/TA
Leverage	Total assets/common equity	TA/CE
Return on equity	Net income/common equity	NI/CE

Now, these financial ratios can be combined in the following manner:

$$\text{Profit Margin} \times \text{Asset Turnover} = \text{Return on Assets}$$

$$\frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} = \frac{\text{Net Income}}{\text{Total Assets}}$$

and

$$\text{Return on Assets} \times \text{Leverage} = \text{Return on Equity}$$

$$\frac{\text{Net Income}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Common Equity}} = \frac{\text{Net Income}}{\text{Common Equity}}$$

In summary:

$$\frac{\text{NI}}{\text{S}} \times \frac{\text{S}}{\text{TA}} \times \frac{\text{TA}}{\text{CE}} = \frac{\text{NI}}{\text{CE}}$$

This equation says that Profit Margin $\times$ Asset Turnover $\times$ Leverage = Return on Equity.

Also, this equation provides a financial approach to business strategy. It recognizes that the ultimate goal of business strategy is to maximize stockholder value, that is, the market price of the common stock. This goal requires maximizing the return on common equity. The Dupont equation above breaks the return on common equity into its three component parts: Profit Margin (Net Income/Sales), Asset Turnover (Sales/Total Assets), and Leverage (Total Assets/Common Equity). If any one of these three ratios can be improved (without harm to either or both of the remaining two ratios), then the return on common equity will increase. A firm thus has specific strategic targets:

- Profit Margin improvement can be pursued in a number of ways. On the one hand, revenues might be increased or costs decreased by:

1. Raising prices perhaps by improving product quality or offering extra services. Makers of luxury cars have done this successfully by providing free roadside assistance and loaner cars when customer cars are being serviced.
 2. Maintaining prices but reducing the quantity of product in the package. Candy bar manufacturers and other makers of packaged foods often use this method.
 3. Initiating or increasing charges for ancillary goods or services. For example, banks have substantially increased their charges to stop checks and for checks written with insufficient funds. Distributors of computers and software have instituted fees for providing technical assistance on their help lines and for restocking returned items.
 4. Improving the productivity and efficiency of operations.
 5. Cutting costs in a variety of ways.
- Asset Turnover may be improved in ways such as:
 1. Speeding up the collection of accounts receivable.
 2. Increasing inventory turnover, perhaps by adopting “just in time” inventory methods.
 3. Slowing down payments to suppliers, thus increasing accounts payable.
 4. Reducing idle capacity of plant and equipment.
 - Leverage may be increased, within prudent limits, by means such as:
 1. Using long-term debt rather than equity to fund additions to plant, property, and equipment.
 2. Repurchasing previously issued common stock in the open market.

The chief advantage of using the Dupont formula is to focus attention on specific initiatives that will improve return on equity by means of enhancing profit margins, increasing asset turnover, or employing greater financial leverage within prudent limits.

In addition to the Dupont formula, there is another way to combine financial ratios, one that serves another useful purpose—predicting solvency or bankruptcy for a given enterprise. It uses what is known as the z score.

THE Z SCORE

Financial ratios are useful not only to assess the past or present condition of an enterprise, but also to reliably predict its future solvency or bankruptcy. This type of information is of critical importance to present and potential creditors and investors. There are several different methods of analysis for obtaining this predictive information. The best-known and most time-tested is the z score, developed for publicly traded manufacturing firms by Professor

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Edward Altman of New York University. Its reliability can be expressed in terms of the two types of errors to which all predictive methods are vulnerable, namely:

1. Type I error: predicting solvency when in fact a firm becomes bankrupt (a false positive).
2. Type II error: predicting bankruptcy when in fact a firm remains solvent (a false negative).

The predictive error rates for the Altman z score have been found to be as follows:

Years Prior to Bankruptcy	% False Positives	% False Negatives
1	6	3
2	18	6

Given the inherent difficulty of predicting future events, these error rates are relatively low, and therefore the Altman z score is generally regarded as a reasonably reliable bankruptcy predictor. The z score is calculated from financial ratios in the following manner:

$$z = 1.2 \times \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \times \frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3 \times \frac{\text{EBIT}}{\text{Total Assets}} + 0.6 \times \frac{\text{Equity at Market Value}}{\text{Debt}} + 1.0 \times \frac{\text{Sales}}{\text{Total Assets}}$$

A z score above 2.99 predicts solvency; a z score below 1.81 predicts bankruptcy; z scores between 1.81 and 2.99 are in a gray area, with scores above 2.675 suggesting solvency and scores below 2.675 suggesting bankruptcy.

Since the z score uses equity at market value, it is not applicable to private firms, which do not issue marketable securities. A variation of the z score for private firms, known as the z' score, has been developed that uses the book value of equity rather than the market value. Because of this modification, the multipliers in the formula have changed from those in the original z score, as have the scores that indicate solvency, bankruptcy, or the gray area. For non-manufacturing service-sector firms, a further variation in the formula has been developed. It omits the variable for asset turnover and is known as the z'' score. Once again, the multipliers in the formula have changed from those in the z' score, and so have the scores that indicate solvency, bankruptcy, or the gray area.

Professor Altman later developed a bankruptcy predictor more refined than the z score and named it ZETA. ZETA uses financial ratios for times interest earned, return on assets (the average and the standard deviation), and debt to equity. Other details of ZETA have not been made public. ZETA is proprietary and is made available to users for a fee.

SUMMARY AND CONCLUSIONS

Financial statements contain critical business information and are used for many different purposes by many different parties inside and outside the business. Clearly all successful businesspeople should have a good basic understanding of financial statements and of the main financial ratios. For further information and explanations about financial statements, see the following chapters in this book:

Chapter 2: Analyzing Business Earnings

Chapter 6: Forecasts and Budgets

Chapter 15: The Board of Directors

Chapter 18: Business Valuation

INTERNET LINKS

Some useful Internet links on financial statements and financial ratios are:

www.aicpa.org	Web site for the American Institute of Certified Public Accountants.
www.freedgar.com	This site lets users download financial statements and other key financial information filed with the SEC and maintained in Edgar (the name of its database) for all corporations with securities that are publicly traded in the United States. This service is free of charge. Another Web site, Spredgar.com, displays financial ratios calculated from freedgar.com.
www.10k.com	Provides free downloads of annual reports (which include financial statements) filed with the SEC for all corporations with securities that are publicly traded in the United States.
www.rmahq.org	Web site of the Risk Management Association (RMA) that contains financial ratios classified by size of firm for more than 600 industries.
www.cpaclass.com	Information and instruction on many finance and accounting topics.
www.financeprofessor.com	Information and instruction on many finance and accounting topics.
www.smallbusiness.org	Information and instruction from public television on many finance and accounting topics.

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www.wmw.com

The World Market Watch (wmw) provides business research information, including financial ratios, for many companies and 74 different industries.

FOR FURTHER READING

- Anthony, Robert N., *Essentials of Accounting*, 6th ed. (Boston, MA: Addison-Wesley, 1996).
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- Financial Studies of the Small Business* (Winter Haven, FL: Financial Research Associates, Annual).
- Industry Norms and Key Business Ratios* (New York: Dun & Bradstreet, Annual).
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- Standard and Poor's Industry Surveys* (New York: Standard & Poor's, Quarterly).

NOTES

1. The name comes from its original use at the Dupont Corporation.
2. After income taxes.
3. Ibid.