CHAPTER ONE

1

Basic Concepts*

CHAPTER 1 **TAKEAWAYS**

- There are only two business reasons to own or invest in a company. One is because the company will grow its earnings and therefore value. The other is to receive dividends from the cash flow. In practice, it is often a combination of both.
- Management teams perform better if they are measured against some set of criteria. One of the criteria that is of interest to investors is the return provided by funds invested in the business. A measurement of this is Return on Capital Employed (ROCE).
- In a general sense, managers are tasked with two key objectives: (1) Find attractive investments, and (2) deliver attractive returns. Since ROCE compares what management delivers (Net Operating Profit after Tax) to what has been invested in the company (Capital Employed), it is a good measure of management's effectiveness.
- In some instances, a decline in cash flow can be avoided by cutting costs. In fact, management can increase cash flow by disinvesting in the business. However, in today's business climate, increasing cash flow by expense control doesn't work for very long. Eventually cost cutting is a dead end and the only remaining road to increasing shareholder value is growth. Growth opportunities don't just come along. A company has to be committed to investing for growth in order to get it and even then success is highly uncertain. Unlike sustaining investments, investments focused on growth inherently involve more risk. The upside is, of course, the possibility of a better return.
- Making a choice between sustaining or growth investments or investing for both is not simply a matter of money. In practice it (money) frequently turns out to be the least important resource. Investments directed at growth require

(continued)

*The reader may notice minor discrepancies in the calculations in this chapter. When this occurs, it is the result of rounding.

ideas and sometimes new technologies. Furthermore, it's not very often that a management team that is outstanding when it comes to cost control and optimizing the productive level of sustaining investments is also good at managing a company for growth. While managing the process and resources associated with putting a company on a growth track can be learned, it takes time—often lots of time and many lessons learned. In practice, most companies make both sustaining and growth investments at the same time. Successful companies have learned that each category of investment has its own prerequisites and culture and therefore staff and manage accordingly.

- The key drivers of Cash Flow are Net Income, Investments, and Return on Capital Employed.
- Without Net Income, a company doesn't generate any cash from operations.
- The first thing that one should notice when examining a Cash Flow Statement is that "Cash" is missing. The reason for this is when it comes to the Cash Flow Statement the "Change in Cash" is what the statement determines.
- When considering the impact that Working Capital has on the Cash Flow Statement, it's the changes (Δ) in the various accounts that are important.

INTRODUCTION

The underlying assumption for the preparation of the material in this chapter is that the reader has limited comfort and experience with the financial statements and the language of business. The chapter begins the education process by creating a general expression for Net Income (NI), followed by a discussion of Earnings before Interest and Taxes (EBIT) and Earnings before Interest, Taxes and Depreciation (EBITDA).

Next the Balance Sheet is used to define Capital Employed (CE) and Return on Capital Employed (ROCE) and then to combine these expressions with the equation(s) developed for Net Income (NI). After a brief discussion of the kinds of Investments a company makes, the Cash Flow Statement is introduced to help define cash flow in terms of Cash Flow from Operating Activities (CFfOA), Cash Flow after Investing Activities (CFaIA), and Cash Generated/Used (CGU).[1] Finally the Income Statement is worked backward, so to speak, where an expression is developed that describes the Required Revenue necessary to generate a given level of Net Income using the various components of the Income Statement.

FINANCIAL STATEMENTS

When one opens a financial report or a set of financial statements, the first statement encountered is usually the Income Statement, followed by a Balance Sheet and Cash Flow Statement. There isn't anything sacrosanct about this order of presentation. In fact they could be presented in any order. One of the reasons the presentation conventions have evolved in this manner is by doing so they present the financial affairs in a logical order. Stated simply, the Income Statement presents how a business has done during a period

[1]Other terminology used includes: CFF (cash flow from financing), CFI (cash flow from investing), and CFO (cash flow from operations).

of time (usually the most recent period, i.e., month, quarter, or year). The Balance Sheet is a presentation of the Company's capital structure and ability to make investments. The Cash Flow Statement shows where the business generated cash and what it did with it and is developed from the accounts in the Income Statement and Balance Sheet. In the discussion that follows, the definitions implied by the simplified financial statements shown in Tables 1-1, 1-3, and 1-5 will be used.[2]

As its title implies, this chapter deals with basic concepts. The intent is to quickly move through the basic concepts associated with financial statements such as the Income Statement, Balance Sheet, and Cash Flow Statement and give the reader an overview. An in-depth discussion of this material and more will be provided in the chapters that follow.

THE INCOME STATEMENT

By inspecting Table 1-1, it's apparent that the Net Income (NI) can be expressed as

$$\begin{aligned} \textit{Net Income} = \textit{Revenue} &- \textit{Cost of Goods Sold} - \textit{Operating Expenses} \\ &- \textit{Depreciation \& Amortization} + \textit{Interest Income} \\ &- \textit{Interest Expense} - \textit{Taxes Paid} \end{aligned} \quad [1\text{-}1][3]$$

or

$$NI = Rev - COGS - OpExp - D\ \&\ A \pm NetInt - TaxesPaid \quad [1\text{-}2]$$

where:

± *NetInt* is a short form way of expressing "+ *Interest Income* – *Interest Expense*"

TABLE 1-1 Basic Income Statement

Period Ending DD/MM/YYYY $(000)'s	
Revenues (Rev)	100,000
Cost of Goods Sold (COGS)	(40,000)
Gross Margin (GM)	60,000
Operating Expenses (OpExp)	(43,500)
Earnings before Interest, Taxes, and D&A (EBITDA)	16,500
Depreciation and Amortization (D&A)	(5,000)
Earnings before Interest and Taxes (EBIT)	11,500
Net Interest Income/Expense (NetInt)	0
Earnings before Tax (EBT)	11,500
Taxes Paid (TaxesPaid) @ 40%	(4,600)
Net Income (NI)	6,900

[2]The numbers used in Tables 1-1, 1-3, and 1-5 are illustrative only and not intended to represent a typical company.

[3]Revenue (Rev) and Net Revenues (NetRev) will be used interchangeably throughout this book.

While Equation [1-2] is a solid definition of Net Income, it is often more useful to break it into its various constituents such as Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA), Earnings before Interest and Taxes (EBIT), Earnings before Taxes (EBT), and Net Income (NI).

The EBITDA, EBIT, EBT, and Net Income Relationships

Again referring to Table 1-1, it should be clear that the Gross Margin (GM) can be defined in terms of the Revenues (Rev) and the Cost of Goods Sold (COGS).

Revenues represent the dollar amount the Company has charged its customers for its deliverable. The Cost of Goods Sold is the cost the company incurred producing the deliverable, and Gross Margin is what the Company has left over to cover Operating Expenses, Depreciation, Amortization, Interest, Taxes, and Profit.

$$GM = Rev - COGS \quad [1\text{-}3]$$

In addition to the cost incurred to produce the deliverable, the Company also incurred costs such as Sales, Marketing, Research and Development, and Administration. These costs are known as Operating Expenses. The difference between the GM and OpExp is called Earnings before Interest, Taxes, and Depreciation and Amortization (EBITDA).

$$EBITDA = GM - OpExp \quad [1\text{-}4]$$

Depreciation represents a charge to the Income Statement for Property, Plant and Equipment (PP&E) that has been purchased and is being expensed over its useful life. Amortization is similar except that it pertains to Intangible Assets the Company may have purchased such as patents, which, like PP&E, are expensed over their useful life. The difference between EBITDA and Depreciation and Amortization is the Earnings before Interest and Taxes (EBIT).[4]

$$EBIT = EBITDA - D\ \&\ A \quad [1\text{-}5]$$

Then allowing for the impact of Net Interest[5] (NetInt) on Earnings before Interest and Taxes provides Earnings before Taxes (EBT).

$$EBT = EBIT \pm NetInt \quad [1\text{-}6]$$

[4]For an explanation of how Depreciation and Amortization are calculated and treated refer to the section in this chapter that deals with the Balance Sheet.

[5]There are two types of interest. Interest Income (interest earned on cash and investments) and Interest Expense (interest paid on debt). Net Interest can be either positive (interest income > interest expense) or negative (interest expense > interest income), hence the term ± NetInt.

Subtracting Taxes Paid[6] (TaxesPaid) from the Earnings before Taxes yields the Company's Net Income (NI).

$$NI = EBT - TaxesPaid \quad [1\text{-}7]$$

Since Taxes Paid are a function of the Earnings before Tax and the Tax Rate (TR), then

$$TaxesPaid = (EBT)(TR) \quad [1\text{-}8]$$

Substituting in Equation [1-7],

$$NI = EBT - (EBT)(TR) \quad [1\text{-}9]$$

Simplifying,

$$NI = (EBT)(1 - TR) \quad [1\text{-}10]$$

NI can be expressed in terms of EBIT or EBITDA. Substituting the results of Equation [1-6] for EBT in Equation [1-10] gives an expression for NI in terms of EBIT.

$$NI = (EBIT \pm NetInt)(1 - TR) \quad [1\text{-}11]$$

To get an NI expression in terms of EBITDA it is necessary to once again refer to Table 1-1 and Equation [1-5] and then substitute for EBIT in Equation [1-11].

$$EBIT = EBITDA - D\ \&\ A \quad [1\text{-}5]$$

$$NI = (EBITDA - D\ \&\ A \pm NetInt)(1 - TR) \quad [1\text{-}12]$$

Equation [1-12] says that for any given EBITDA, a company's Net Income is a function of the Depreciation and Amortization associated with investments made in prior periods, any interest paid or received and taxes.

This is not a book about taxes. So, other than going on record stating that management should employ the best professionals they can afford to help them minimize taxes there will be little more said on the subject.

Interest is of course a consequence of cash on hand or debt, which is a component of the company's capital structure (how the business is financed by the owners). Debt and its implications will be revisited when leverage is discussed in Chapter 9.

Depreciation and Amortization, as stated earlier, is a period expense that results from depreciating or amortizing assets over their useful life. Once money is spent on an investment, the investment is capitalized on the company's balance sheet and then written off by periodic charges to the D&A account on the Balance Sheet via the Income Statement over the asset's useful life. Successful management teams consistently make

[6]Taxes Paid consist primarily of federal and state income taxes. Taxes such as municipal, wage, property, and so on are normally included in Cost of Goods Sold or Operating Expenses.

investments that provide a recurring contribution to income greater than the associated periodic D & A.[7]

Special Case: Ignoring the Interest Component

While debt and associated costs must be thoughtfully managed, when it comes to creating value, management's prime responsibility is to focus on what happens to the money invested in the business. In fact well-managed private and public companies don't want their management teams spending a lot of time on financial engineering. As far as management is concerned capital structure need only be addressed periodically when the company needs funds to finance such things as a major acquisition. Investors want their team to concentrate on creating value, which is done by growing the top and bottom lines of the Income Statement. When it's appropriate to ignore the "Interest" component, then Equations [1-11] and [1-12] become Equations [1-13] and [1-14] respectively.[8]

$$NI = (EBIT)(1 - TR) \quad [1\text{-}13]$$

$$NI = (EBITDA - D\ \&\ A)(1 - TR) \quad [1\text{-}14]$$

Example 1-1: Calculating Net Income

Using the data in Table 1-1 and Equations [1-2], [1-11], and [1-12] show that the Net Income in each case is $6,900,000.

Applying Equation [1-2] and substituting values for each of the terms from Table 1-1 gives an NI of $6,900,000 as expected.

$$NI = Rev - COGS - OpExp - D\ \&\ A \pm NetInt - TaxesPaid \quad [1\text{-}2]$$

$$NI = 100{,}000{,}000 - 40{,}000{,}000 - 43{,}500{,}000 - 5{,}000{,}000 - 4{,}600{,}000 = \$6{,}900{,}000$$

Similarly, applying Equation [1-11] gives the same result.

$$NI = (EBIT \pm NetInt)(1 - TR) \quad [1\text{-}11]$$

$$NI = (11{,}500{,}000 - 0)(1 - 0.40) = (11{,}500{,}000)(0.60) = \$6{,}900{,}000$$

Finally, substituting in Equation [1-12] shows that all three equations yield the same amount for the Net Income.

$$NI = (EBITDA - D\ \&\ A \pm NetInt)(1 - TR) \quad [1\text{-}12]$$

$$NI = (16{,}500{,}000 - 5{,}000{,}000 - 0)(1 - 0.40) = (11{,}500{,}000)(0.60) = \$6{,}900{,}000$$

[7] Depreciation and Amortization are discussed in more detail in subsequent chapters.
[8] This assumption is almost always valid during the initial stages of the business planning process.

Why EBITDA?

The reader may have noticed that after analyzing the Income Statement in terms of various definitional equations the discussion seems to have settled on a couple of equations built around EBITDA. As will be seen later, it turns out that EBITDA is often an excellent proxy for a company's ability to generate cash flow.

There are only two business reasons to own or invest in a company. One is that the company will grow its earnings and therefore value. The other is to receive dividends from the cash flow. In practice, it is often a combination of both. In order to generate cash a company must be profitable and have Net Income.[9]

Furthermore, because of the correlation between EBITDA and Cash Flow, EBITDA can be used as a proxy for Cash Flow and therefore it is useful in valuing a business. The valuation of companies is the subject of Chapter 4. However, since Chapter 4 is several chapters away, the role that EBITDA plays in valuation is illustrated by Example 1-2. Before moving on to the example it's necessary to say a few words about something called an *industry multiple*.

Industry Multiple

Briefly, an industry multiple is an indication of the value investors assign to the industrial sector a particular company serves and the company's ability to create EBITDA and future cash flows. These multiples can vary over a wide range from near "1+" to "20+." For the purpose of this example the industry multiple is assumed to be nine (9).

Example 1-2: Using EBITDA to Value a Company

Companies can be valued in a number of ways, including the present value of cash flows and/or an appropriate industry multiple. When the applicable multiple is known, the value calculation is straightforward. There are instances where the multiple isn't readily available, nor for that matter are the cash flows. In instances such as this, an estimate of an industry multiple can be made by making use of historical and forecasted financial statements and using the Revenue and EBITDA growth rates to estimate a suitable multiple.

(a) Valuing a Company Using the Industry Multiple

In its simplest form a company can be valued by using the following relationship:

$$Value = (EBITDA)(Industry\ Multiple) - Debt + Excess\ Cash \qquad [1\text{-}15]$$

[9]Here the reference is to cash flow from operations. As will be seen later, cash can be generated from working capital by reducing accounts receivable and inventory and extending accounts payable. However, once working capital has been optimized, no further cash can be generated and in this sense this cash flow is nonrecurring.

In the interest of simplicity it is assumed that the cash shown on the balance sheet in the following and other examples is necessary for the day-to-day operations of the company and therefore the excess cash is zero and Equation [1-15] becomes Equation [1-16].

$$Value = (EBITDA)(Industry\ Multiple) - Debt \qquad [1\text{-}16]$$

The company represented by the Income Statement (Table 1-1) has an EBITDA of $16,500,000. According to the Balance Sheet (Table 1-3) the company doesn't have any Debt. Since the industry multiple is 9, an indication of the company's value is obtained by substituting in Equation [1-16].

$$Value = (16{,}500{,}000)(9) - 0 = \$148{,}500{,}000$$

If the company had $10,000,000 of debt, then the value would be

$$Value = (16{,}500{,}000)(9) - 10{,}000{,}000 = 148{,}500{,}000 - 10{,}000{,}000 = \$138{,}500{,}000$$

Why is debt subtracted? Consider the following. Assume someone purchased the company for $148,500,000 and rather than zero debt, it had $30,000,000 of debt. The buyer would be assuming responsibility for the $30,000,000 obligation. Since this debt ultimately has to be paid off, the total cost to the buyer would be $178,500,000. Now, one may note that the company has cash and it's reasonable to ask who gets the cash when a company is sold. The answer is, it all depends. Typically if the cash is necessary to fund the day-to-day operations (Working Capital), then it stays with the company. If there is excess cash, the seller normally keeps the excess.

(b) Valuing the Company If the Industry Multiple Isn't Known

The valuation in Part (a) of this example is only an indication of value. The correct way to value a business is to calculate the present value (PV) of future cash flows. However, since present value techniques are the subject of a future chapter, this method is not available at this time. So absent a PV valuation, other indications of value are the Revenue and EBITDA growth rates. The historical and projected Revenue and the EBITDAs for the Company with the Income Statement presented in Table 1-1 are shown in Table 1-2.

TABLE 1-2 Valuing a Company If the Industry Multiple Is Unknown

Historical and Projected Year Revenue and EBITDA in $(000)'s						
Year	***n* − 2**	***n* − 1**	***n***	***n* + 1**	***n* + 2**	***n* + 3**
Revenue	87,000	93,000	100,000	109,000	120,000	130,000
EBITDA	12,200	14,000	16,500	17,600	19,000	21,400

Assuming the forecast for Year *n* is accurate and using the data in Table 1-2, the Historical Compound Annual Growth Rate of Revenue, $CAGR_{HR}$, is calculated with the assistance of Equation [1-17]:[10]

$$CAGR_{HR} = \left[\left(\frac{Rev_n}{Rev_{n-2}}\right)^{1/years} - 1\right] \quad [1\text{-}17]$$

Substituting in Equation [1-17]

$$CAGR_{HR} = \left[\left(\frac{Rev_n}{Rev_{n-2}}\right)^{1/years} - 1\right] = \left[\left(\frac{100,000,000}{87,000,000}\right)^{1/2} - 1\right]$$

$$= \sqrt[2]{1.149} - 1 = 1.0721 - 1.0 = 0.0721$$

$$\%CAGR_{HR} = 7.2\%$$

Similarly, the Forecasted Compound Annual Growth Rate of Revenue ($CAGR_{FR}$) is calculated by using Equation [1-18].

$$CAGR_{FR} = \left[\left(\frac{Rev_{n+3}}{Rev_n}\right)^{1/years} - 1\right] \quad [1\text{-}18]$$

Substituting in Equation [1-18]

$$CAGR_{FR} = \left[\left(\frac{Rev_{n+3}}{Rev_n}\right)^{1/years} - 1\right] = \left[\left(\frac{130,000,000}{100,000,000}\right)^{1/3} - 1\right]$$

$$= \sqrt[3]{1.3} - 1 = 1.0914 - 1.0 = 0.0914$$

$$\%CAGR_{FR} = 9.1\%$$

Assuming the historical growth rate has been a steady 7.2% and the projected Revenue growth rate of 9.1% is credible, these growth rates can be helpful in estimating the Company's value to the extent they are reasonable proxies for an industry multiple. The historical growth rate is a fact. The question is: Is the projected growth rate believable? If it is forecasted to come about as a result of increased investment year by year in Sales and Marketing, Research and Development, Plant and Equipment, and Administration during the forecast period (implying that management intends to spur growth by investment) rather than grow Operating Expenses at a slower rate to increase the bottom line, then a growth rate of 9.1% is realistic. On the other hand, it does represent a healthy increase and a prudent buyer would take this into account. Be that as it may, given the information at hand, the only conclusion that can be reached by applying this methodology is to assume the growth rates are indicative of a suitable multiple and that the multiple range in this case can be said to be a range of 7 to 9.

The average EBITDA for the period $n-2$ to n is

$$Average\ EBITDA_H = \frac{(12,200,000 + 14,000,000 + 16,500,00)}{3} = \$14,233,000$$

[10] See Appendix C for the development of this relationship.

And for the period n to $n + 3$, EBITDA is

$$Average\ EDBITDA_F = \frac{(16,500,00 + 17,600,00 + 19,000,000 + 21,400,00)}{4}$$
$$= \$18,625,000$$

Recalling Equation [1-16],

$$Value = (EBITDA)(Industry\ Multiple) - Debt \qquad [1\text{-}16]$$

The company doesn't have any debt or excess cash, hence the implied value is

$$Value = (EBITDA)(7\ to\ 9) - 0 = (EBITDA)(7\ to\ 9)$$

The EBITDA to use can get a little complicated depending on the buyer and what they are comfortable with. One way of coming up with an EBITDA is to assume the average of the Historical and Forecasted EBITDAs. Since the EBITDA proposed is the average of the two averages, one might be tempted to use an average of the multiple range (8). However, this company is very profitable and has demonstrated it can grow, and grow consistently, hence there is a strong argument for using the high end of the range. Hence:

$$Value = (EBITDA)(9) = \left(\frac{(14,233,000 + 18,625,000)}{2}\right)(9) = (16,429,000)(9)$$
$$= \$147,861,000$$

or approximately $148 million using these assumptions.

However, as can be seen, the averaging method previously chosen yields an average EBITDA of $16,429,000, which is almost the same as the current year's EBITDA of $16,500,000, so one could argue that a value of $148 million is at the low end of the value range. If the average of the future EBITDAs were used and a multiple of 9 applied, the value would be closer to $168 million.

$$Value = (EBITDA)(9) = (18,625,000)(9) = \$167,625,000$$

THE BALANCE SHEET

The first thing to note about the Balance Sheet shown in Table 1-3 is by definition:

$$Total\ Assets = Total\ Liabilities + Total\ Shareholders'\ Equity\ (TSHE) \qquad [1\text{-}19]$$

or

$$Total\ Assets = Total\ Liabilities + TSHE \qquad [1\text{-}20]$$

TABLE 1-3 Basic Balance Sheet

DD/MM/YYYY $(000)'s			
Current Assets		**Current Liabilities**	
Cash	750	Accounts Payable	2,500
Accounts Receivable	6,250	Taxes Payable	0
Inventory	5,000	Short-Term Debt	0
Total Current Assets	12,000	**Total Current Liabilities**	2,500
Fixed Assets			
PP&E at Cost	30,000	**Long-Term Debt**	0
Less Accumulated Depreciation	5,000		
Net Fixed Assets	25,000	**Total Liabilities**	2,500
Intangible Assets		**Shareholders' Equity**	
Goodwill and Other Intangible Assets	0	Paid-in Capital	50,000
Less Accumulated Amortization	0	Retained Earnings	(15,500)
Net Intangible Assets	0	**Total Shareholders' Equity**	34,500
Total Assets	37,000	**Total Liabilities + TSHE**	37,000

If Equation [1-19] isn't satisfied, the Balance Sheet isn't balanced and there is something wrong with the numbers.

Following the model used when analyzing the Basic Income Statement, an inspection of the Balance Sheet in Table 1-3 results in a number of equations that describe the relationships between the various accounts.

$$\textit{Total Assets} = \textit{Total Current Liabilities} + \textit{Net Fixed Assets} + \textit{Net Intangible Assets} \quad [1\text{-}21]$$

Current Assets consists of Cash, Accounts Receivable (money customers owe the company), and Inventory. Therefore:

$$\textit{Current Assets} = \textit{Cash} + \textit{Accounts Receivable} + \textit{Inventory} \quad [1\text{-}22]$$

Similarly, Fixed Assets consists of Property, Plant, and Equipment (PP&E), which represent the fixed assets the Company needs to produce its deliverable, and Accumulated Depreciation, which represents how much of these assets have been expensed through the Income Statement as they wear out.

For example, if a hard asset is purchased for $5,000,000 and has an estimated useful life of 10 years, then the amount the asset would be depreciated each year would be $500,000 ($5,000,000/10)[11] and after two years the accumulated depreciation for this asset would be $1,000,000 ($500,000 * 2).

All of this can be expressed as

$$\textit{Net Fixed Assets} = \textit{PP\&E at Cost} - \textit{Accumulated Depreciation} \quad [1\text{-}23]$$

[11] This is known as the *straight line* method of depreciation. Others include the *declining balance* and *units of production* methods.

Intangible Assets includes such things as Goodwill, which is created when an Asset is purchased at a price in excess of its book value. Other Intangible Assets are such things as patents, non-competes, and customer lists if acquired as part of an M&A transaction.[12]

Again an example may be helpful. If a patent acquired as part of an acquisition of a company was valued at $3,000,000 and had 10 years remaining before expiring, it would be amortized at a rate of $300,000 ($3,000,000/10) per year for 10 years and at such time the accumulated amortization associated with the patent would be $3,000,000, leaving a net tangible value for this asset of zero.

Net Intangible Assets can be defined by Equation [1-24]:

$$\textit{Net Intangible Assets} = \textit{Goodwill \& Other Intangible Assets} - \textit{Accumulated Amortization} \quad [1\text{-}24]$$

Applying the same process to the Liability side of the Balance sheet:

$$\textit{Total Liabilities} + \textit{TSHE} = \textit{Total Current Liabilities} + \textit{Long-Term Debt} + \textit{Total Shareholders' Equity} \quad [1\text{-}25]$$

Current Liabilities consists of Accounts Payable,[13] which is money the company owes its suppliers, Taxes Payable, and Short-Term Debt, which is interest-bearing debt that has to be repaid in less than one year.

$$\textit{Total Current Liabilities} = \textit{Accounts Payable} + \textit{Taxes Payable} + \textit{Short-Term Debt} \quad [1\text{-}26]$$

Long-Term Debt is interest-bearing debt and has a tenor of more than one year before it has to be repaid or rolled over.

Total Shareholders' Equity is the sum of the money the company took in when it raised capital by selling shares in the Company to investors and Retained Earnings, which is the sum of all the profits and losses of the Company since inception minus any dividends that have been paid.

$$\textit{Total Shareholders' Equity} = \textit{Paid-in Capital} + \textit{Retained Earnings} \quad [1\text{-}27]$$

Return on Capital Employed

Management teams perform better if they are measured against some set of criteria. One of the criteria that is of interest to investors is the return provided by funds invested

[12] A lot has been said here about Fixed and Intangible Assets. Don't be concerned if it strikes you as being confusing. The purpose is to expose the reader to the terminology and nothing more. All of this will be discussed in more detail in subsequent chapters.

[13] Accrued Liabilities are assumed to be included in Accounts Payable to simplify the discussion.

in the business. A measurement of this is "Return on Capital Employed." The classical definition for Return on Capital Employed (ROCE) is:

$$ROCE = \frac{NOPAT}{CE} \quad [1\text{-}28]$$

where:

NOPAT = Net Operating Profit after Tax and *CE* = Capital Employed

Before Equation [1-28] can be used it's necessary to define NOPAT in terms of Income Statement terminology. The Income Statement in Table 1-1 has several line items such as EBITDA, EBIT, and EBT that state income at different levels. EBITDA and EBIT are clearly operations oriented. EBT is not, because it would include the impact of any interest expense or income. Interest is a result of capital structure (Debt the company takes on to its balance sheet) or interest income generated by any excess cash and isn't operating income per se. Therefore, the income classification that states the Operating Profit is EBIT. To comply with the definition it has to be tax affected, hence the expression for ROCE becomes

$$ROCE = \frac{EBIT - TaxesPaid}{\text{CE}} = \frac{EBIT - (EBIT)(TaxRate)}{CE}$$

$$ROCE = \frac{EBIT - (EBIT)(TR)}{CE} \quad [1\text{-}29]$$

or

$$ROCE = \frac{(EBIT)(1 - TR)}{CE} \quad [1\text{-}30]$$

In a general sense, managers are tasked with two key objectives: (1) Find attractive investments, and (2) deliver attractive returns. Since ROCE compares what management delivers (Net Operating Profit after Tax) to what has been invested in the company (Capital Employed), ROCE is a key measure of how well management is performing and is often used in the annual evaluation process of management teams.

Capital Employed

Capital Employed (CE) can be defined with the assistance of the Balance Sheet (Table 1-3).

By definition, the Capital Employed in a business is the capital provided by equity holders and holders of equity-like instruments, earnings retained in the business, and interest-bearing debt (such as bank loans, bonds, private placements, and so on). Liabilities such as Accounts Payable and Taxes Payable and so forth are not considered as Capital Employed because they do not result in any financing cost to the company.

As can be seen by referring to Table 1-3, the capital provided by the equity holders is Total Shareholders' Equity plus the interest-bearing capital provided by debt holders (Short-Term Debt[14] and Long-Term Debt):

$$CE = Total\ Shareholders'\ Equity + Short\text{-}Term\ Debt + Long\text{-}Term\ Debt \quad [1\text{-}31]^{15}$$

or

$$CE = TSHE + STD + LTD \quad [1\text{-}32]$$

or

$$CE = TSHE + IBD \quad [1\text{-}33]$$

where:

TSHE = Total Shareholders' Equity, *STD* = Short-Term Debt, *LTD* = Long-Term Debt, and *IBD* = STD + LTD or Interest Bearing Debt

It is worthwhile to note that Accounts Payable and Taxes Payable (and other similar accounts) are also debt. They are excluded from Capital Employed because normally they are not interest bearing.

Example 1-3: Calculating ROCE

The Income Statement (Table 1-1) states the EBIT for year *n* is $11,500,000. The Balance Sheet (Table 1-3) shows that Total Shareholders' Equity is $34,500,000 and that the company is debt free.

Substituting in Equation [1-32] the Capital Employed is calculated to be

$$CE = TSHE + STD + LTD \quad [1\text{-}32]$$

$$CE = 34{,}500{,}000 + 0 + 0 = \$34{,}500{,}000$$

Substituting for EBIT, Tax Rate (TR), and CE in Equation [1-30],

$$ROCE = \frac{(EBIT)(1-TR)}{CE} \quad [1\text{-}30]$$

$$ROCE = \frac{(11{,}500{,}000)(1-0.40)}{34{,}500{,}000} = \frac{(11{,}500{,}000)(0.60)}{34{,}500{,}000} = 0.20^{16}$$

$$ROCE = 20\%$$

Drivers of Return on Capital Employed

If ROCE is to be used as a measurement of performance, then it seems logical that management would want to understand what drives ROCE. A more insightful understanding

[14] Debt due for repayment in one year or less.
[15] Capital Employed can also be defined as: CE = Total Assets – Current Liabilities + Short-Term Debt.
[16] An ROCE of this magnitude produced on a consistent basis would be attractive to many investors.

of the drivers of ROCE can be obtained by examining the relationships between ROCE and the Income Statement accounts.

Recall that Equation [1-30] defined ROCE as

$$ROCE = \frac{(EBIT)(1-TR)}{CE} \quad [1\text{-}30]$$

To introduce EBITDA it's necessary to recall Equation [1-5], which defined EBIT as

$$EBIT = EBITDA - D\ \&\ A \quad [1\text{-}5]$$

Substituting for EBIT in Equation [1-30] gives an expression for ROCE in terms of Income Statement variables and Capital Employed.

$$ROCE = \frac{(EBITDA - D\ \&\ A)(1-TR)}{CE} \quad [1\text{-}34]^{17}$$

Since

$$CE = TSHE + STD + LTD \quad [1\text{-}32]$$

then

$$ROCE = \frac{(EBITDA - D\ \&\ A)(1-TR)}{TSHE + STD + LTD} \quad [1\text{-}35]$$

Equation [1-34] defines the impact EBITDA, Depreciation and Amortization, Taxes, and Capital Employed have on the Return on Capital Employed. Managers have the ability to impact all of these variables. As mentioned earlier, tax minimization is best handled by getting good advice. Depreciation and Amortization is the price paid for making investments to drive Revenue, *EBIT*, and ultimately Net Income. The amount of Capital Employed is a consequence of the capital structure (combination of debt and equity) and how well management manages the company's balance sheet. Equation [1-35] clearly spells out how important it is for management to do its homework up front, select the best investment opportunities, and aggressively manage them and the balance sheet if they are to deliver returns in line with expectations.

Now that the groundwork for understanding the drivers of the Return on Capital Employed has been laid, it's appropriate to turn attention to cash flow and what drives it. However, before that is done another kind of capital needs to be discussed.

Working Capital

Working Capital (WC) is defined as

$$WC = Current\ Assets - Current\ Liabilities \quad [1\text{-}36]$$

[17] The reader can check the result of Equation [1-34] by entering the appropriate values for EBITDA, D&A, NetInt, TR, and CE from Tables 1-1 and 1-3.

It is the Capital that the Company works with on a daily basis to produce its deliverable, collect money, and pay its bills. Equation [1-22] defines Current Assets as consisting of Cash, Accounts Receivable (AR), and Inventory (Inv):

$$Current\ Assets = Cash + Accounts\ Receivable + Inventory \quad [1\text{-}22]$$

or

$$CA = Cash + AR + Inv \quad [1\text{-}37]$$

Similarly, Equation [1-26] defines Current Liabilities as consisting of Accounts Payable (AP), Taxes Payable (TP), and Short-Term Debt (STD):

$$Current\ Liabilities = Accounts\ Payable + Taxes\ Payable + Short\text{-}Term\ Debt \quad [1\text{-}26]$$

or

$$CL = AP + TP + STD \quad [1\text{-}38]$$

Substituting Equations [1-37] and [1-38] in Equation [1-36] creates an expression for WC in terms of its Balance Sheet accounts.

$$WC = (Cash + AR + Inv) - (AP + TP + STD) \quad [1\text{-}39]$$

Example 1-4: Calculating the Working Capital for a Company

The Working Capital for the Company represented by the Balance Sheet shown in Table 1-3 can be calculated by using Equation [1-39].

Substituting the values for Cash, Accounts Receivable, Inventory, Accounts Payable, Taxes Payable, and Short-Term Debt into Equation [1-39] gives a value of $9,500,000 for Working Capital.

$$WC = (Cash + AR + Inv) - (AP + TP + STD) \quad [1\text{-}39]$$

$$WC = (750{,}000 + 6{,}250{,}000 + 5{,}000{,}000) - (2{,}500{,}000 + 0 + 0)$$

$$WC = 12{,}000{,}000 - 2{,}500{,}000 = \$9{,}500{,}000$$

As can be seen from this, calculating the Working Capital employed in a company is a straightforward exercise. However, when it comes to the Cash Flow Statement, dealing with Working Capital is a little more complicated.[18] This will be illustrated in the following example.

[18] It's important to note that when calculating the Working Capital for a company from its Balance Sheet "Cash" is included. When it comes to the Cash Flow Statements the Changes in Working Capital do not include cash because one of the objectives of the Cash Flow Statement is to show the impact that changes in Working Capital have on "Cash."

TABLE 1-4 Calculating the Change in Working Capital

$(000)'s	Prior Year	Current Year	Change
Accounts Receivable	5,550	6,250	(700)
Inventory	4,350	5,000	(650)
Accounts Payable	2,400	2,500	100
Taxes Payable	0	0	0
Short-Term Debt	0	0	0
Change in Working Capital			(1,250)

Example 1-5: Calculating the Change in Working Capital

Table 1-4 shows the Working Capital accounts for the company represented by the Balance Sheet shown in Table 1-3 for the Current and Prior Years.

The first thing that one should notice is that "Cash" is missing. The reason for this is when it comes to the Cash Flow Statement the "Change in Cash" is what the statement determines, so there is no need to be concerned about it here. More on how this works later.

When considering the impact that Working Capital has on the Cash Flow Statement, it's the change (Δ) in the various accounts that is important. The usual procedure used to determine the impact of any change in the "Asset" Working Capital accounts is to subtract the "Current Year" from the "Prior Year" to get the correct sign. When this definition is applied to the Accounts Receivable, Equation [1-40] is obtained.

$$\Delta AR = AR_{(PriorYear)} - AR_{(CurrentYear)} \quad [1\text{-}40]$$

Substituting

$$\Delta AR = 5{,}550{,}000 - 6{,}250{,}000 = -\$700{,}000$$

Accounts Receivable increased by $700,000. This is $700,000 of Revenues the Company didn't collect during the period covered by the financial statements and represents a use of cash and hence the negative sign.[19] Similarly,

$$\Delta Inv = Inventory_{(PriorYear)} - Inventory_{(CurrentYear)} \quad [1\text{-}41]$$

and

$$\Delta Inv = 4{,}350{,}000 - 5{,}000{,}000 = -\$650{,}000$$

Here the story is the same except this time it's Inventory that increased by $650,000 from the Prior to the Current Year. Cash was used to accumulate the incremental inventory and so this represents another use of cash.

[19] Similarly, if prior and current year Accounts Receivable balances were the same, this would mean that Cash collections equaled Revenues during the year and the impact Accounts Receivable had on Cash would be neutral.

When it comes to changes in the "Liability" Working Capital Accounts the convention is to subtract "Prior Year" from the "Current Year" in order to get the sign correct. The Change in Accounts Payable is calculated with the use of Equation [1-42],

$$\Delta AP = AP_{(CurrentYear)} - AP_{(PriorYear)} \quad [1\text{-}42]$$

and

$$\Delta AP = 2{,}500{,}000 - 2{,}400{,}000 = +\$100{,}000$$

Accounts Payable increased by $100,000. This happened because the Company didn't pay some vendors. By not paying vendors, the Company saved $100,000 in cash.

There is no change in the Taxes Payable or Short-Term Debt, so they don't have any impact on Cash. If there had been a change, the analysis would be the same as for the other Working Capital Accounts.

When calculating The Cash Generated or Used by Working Capital, there is need for a convention. A use of Cash (in this case Accounts Receivable and Inventory) is preceded by a negative sign and a Source of Cash is preceded by a plus sign. Applying the proper sign to each term the ΔWC is simply the algebraic sum of all of the Δ's as shown in Equation [1-43].

$$\Delta WC = \pm \Delta AR \pm \Delta Inv \pm \Delta AP \quad [1\text{-}43]$$

Substituting the calculated values with the appropriate sign in Equation [1-43] gives the Change in Working Capital.

$$\Delta WC = -700{,}000 - 650{,}000 + 100{,}000 = -\$1{,}250{,}000$$

This result agrees with the Change in Working Capital shown in the Cash Flow Statement (Table 1-5).

THE CASH FLOW STATEMENT

Of the three financial statements, the one that seems to trouble managers the most is the Cash Flow Statement. In the section that follows, a very basic statement is introduced. The purpose is to begin a process that will ultimately result in the reader achieving a high level of comfort with this statement. The reader shouldn't be concerned if everything about the statement isn't crystal clear. It will become increasingly so as the reader progresses through this book.

What Drives Cash Flow and Value?

In the chapters that follow, considerable time is devoted to showing why and how "value" is driven by cash flow and how to quantify it using the discounted cash flow

TABLE 1-5 Basic Cash Flow Statement

Period Ending DD/MM/YYYY $(000)'s	
Operating Activities	
Operations	
Net Income (Loss) (NI)	6,900
Depreciation and Amortization (D&A)	5,000
Net Cash Flow from Operations	11,900
Working Capital Accounts	
Change in Current Assets (ΔCA)	(1,350)
Change in Current Liabilities (ΔCL)	100
Net Change in Working Capital	(1,250)
Cash Flow from Operating Activities (CFfOA)	10,650
Investing Activities	
Fixed Asset Additions	(10,000)
Cash Flow after Investing Activities (CFaIA)	**650**
Financing Activities	
Increase (Decrease) in Long-Term Debt	0
Proceeds Purchase) of Common Stock	0
Dividends Paid (DP)	0
Cash Generated (Used) (CGU)	650

methodology.[20] Therefore, if cash flow drives value, the logical question is: What drives cash flow? More importantly, what can a manager do to increase cash flow and thereby increase value?

A careful examination of the Cash Flow Statement shown in Table 1-5 indicates that without Net Income a company doesn't generate any cash from operations other than the cash that can be squeezed out of working capital. Hence it is clear that Net Income drives Cash Flow. Also, since one of management's key tasks is to make investments that result in a future increase in earnings, it would seem logical to add investments to the list of Cash Flow drivers. However, as Table 1-5 indicates, there are other activities that impact cash flow (i.e., changes in working capital, changes in long-term debt, proceeds from the sale of equity, buybacks of equity, and dividends). A better understanding of how all of these activities impact cash flow is facilitated by a careful inspection of Table 1-5.

The next section deals with quantifying these drivers in terms of their relationship to the Income, Balance Sheet, and Cash Flow Statements and this point is intended to briefly expose the reader to the concept of Cash Flow. Everything discussed in the

[20] The discounted cash flow method (explained in detail later in this book) is one of the most widely used methods for valuing a business and considered by many to be the theoretically correct methodology.

following section is developed in more detail in the chapters that follow, so the reader shouldn't be concerned if some of the concepts aren't crystal clear.

Defining Cash Flow

Inspection of the Cash Flow Statement (Table 1-5) indicates that Cash Flow from Operations (CFfO) is a function of Net Income, Depreciation and Amortization, whereas Cash Flow from Operating Activities (CFfOA) is comprised of Cash Flow from Operations and Changes in Current Assets and Current Liabilities. These relationships are expressed in Equations [1-44] and [1-45]:

$$CFfO = NI + D\ \&\ A \qquad [1\text{-}44]$$

$$CFfOA = NI + D\ \&\ A \pm \Delta CA \pm \Delta CL \qquad [1\text{-}45]$$

or

$$CFfOA = NI + D\ \&\ A \pm \Delta WC \qquad [1\text{-}46]$$

where:

$$\Delta WC = \text{Change in Working Capital} = \pm \Delta CA \pm \Delta CL$$

Since NI is the ultimate driver of Cash Flow, all Cash Flow Statements start with the current period's Net Income and then make adjustments for the impact other factors have had on the period's Cash Flow from Operations. The first step in adjusting Net Income for non-cash charges is to add back the Depreciation and Amortization that was incorporated into the Income Statement for the current period.

The reason for this is: D&A represents Depreciation and Amortization of assets purchased and paid for during a prior period and that therefore don't have any current cash impact. It should be noted that even if the asset being depreciated or amortized was purchased during the current year and still not paid for, it's D or A would still be treated as a non-cash item because the amount the Company owes the supplier is accounted for in Accounts Payable and the cash has not left the company.

The role the change in Working Capital plays in CFfOA may not be so obvious. Recall that Working Capital is defined as Current Assets – Current Liabilities, and, as shown in the preceding section, when calculating Cash Flow it is the Change in the Working Capital (ΔWC) accounts (excluding cash) between the current and prior period that is of interest. The discussion on Working Capital showed that when the Change in Current Assets increases between the Current and Prior Year this represents a use of cash and this amount has to be subtracted from CFfOA. Conversely, when the Change in Current Liabilities increases from one year to the next this represents a source of cash and this amount has to be added back to properly reflect the impact this source of cash has on the Cash Flow from Operating Activities.[21]

[21] Of the three financial statements, the Cash Flow Statement can be the most difficult to understand. Considerable time is spent in Chapter 10 on preparing financial statements for a company and explaining the concepts that have been covered here and subsequent chapters in more detail.

Table 1-5 also suggests that CFfOA is available for making investments in the business (Investments), "Financing Activities" (servicing/repaying debt), and paying dividends to shareholders (Dividends Paid). The following relationships can be deduced by working down the Cash Flow Statement.

Cash Flow after Investing Activities (CFaIA):

$$CFaIA = CFfOA - Investments \quad [1\text{-}47]$$

Cash Flow after Financing Activities (CFaFA):

$$CFaFA = CFaIA \pm Financing\ Activities \quad [1\text{-}48]$$

Cash Flow after Dividends Paid:

$$CFaDP = CFaFA - Dividends\ Paid \quad [1\text{-}49]$$

At the end of the day managers and investors alike are interested in whether the business generates or uses cash, hence the interest in the "Cash Generated (Used)" by the business, which can be expressed as:

$$Cash\ Generated\ (Used) = CFfOA - Investments \pm Financing - Dividends\ Paid \quad [1\text{-}50]$$

Another way to think about this is to look at the uses of Cash Flow from Operating Activities. The uses can be expressed as follows:

$$CFfOA = (CF\ for\ Investments)\ \&\ (CF\ for\ Debt\ Holders)\ \&\ (CF\ for\ Shareholders) \quad [1\text{-}51]$$

Equation [1-51] says that the Cash Flow from Operating Activities caters to two constituencies. The first is shareholders. The shareholders (by virtue of the board of directors) decide how much is invested in the business to generate future cash flows, and how much, if any, is paid out in dividends. The board also decides on the capital structure of the business (debt vs. equity) and thereby obliges the company to make interest payments on debt and repay money the company has borrowed from the second constituency, the debt holders.

Investments and Cash Flow after Investing Activities

While there are numerous kinds of investments made by all companies, they broadly fall into two categories:

1. *Sustaining investments:* These are investments necessary to sustain or improve the company's productive asset base as part of an effort to maintain the existing stream of Net Income and Cash Flow.

2. *Growth investments:* Unlike the sustaining investments, growth investments are investments in new capacity, business areas, or technologies and are directed at increasing the company's rate of Revenue, Net Income, and Cash Flow growth.

Every company needs to make "sustaining investments" to stay alive. Those that don't will go into a period of decline. While it may take many years, decline, if unchecked, is ultimately terminal. Unfortunately, while sustaining investments are necessary, they usually aren't sufficient. This is because growth will ultimately slow down and demand in the company's niche or market will sooner or later stabilize or decline as the market matures. In terms of a company's value, decline is a disaster. As far as investors are concerned, when market growth or sales decline, this is quickly seen in the value of the Company's shares.

In some instances, a decline in cash flow can be avoided by cutting costs. In fact, management can increase cash flow by disinvesting in the business. However, in today's business climate, increasing cash flow by expense control doesn't work for very long. Eventually cost cutting is a dead end and the only remaining road to increasing shareholder value is growth. Growth opportunities don't just come along. A company has to be committed to investing for growth in order to get it and even then success is highly uncertain. Unlike sustaining investments, investments focused on growth inherently involve more risk. The upside is, of course, the possibility of a better return.

Making a choice between sustaining or growth investments or investing for both is not simply a matter of money. In practice it (money) frequently turns out to be the least important resource. Investments directed at growth require ideas and sometimes new technologies. Furthermore, it's not very often that a management team that is outstanding when it comes to cost control and optimizing the productive level of sustaining investments is also good at managing a company for growth. While managing the process and resources associated with putting a company on a growth track can be learned, it takes time—often lots of time and many lessons learned. In practice, most companies make both sustaining and growth investments at the same time. Successful companies have learned that each category of investment has its own prerequisites and culture and therefore staff and manage accordingly.

As far as the Cash Flow Statement is concerned there isn't any need to be concerned with the kind or category of investment but rather how investments are treated financially and the impact investments have on Cash Flow after Investing Activities (CFaIA).

Recalling that earlier in this chapter Equation [1-46] defined Cash Flow from Operating Activities (CFfOA) as:

$$CFfOA = NI + D\ \&\ A \pm \Delta WC \qquad [1\text{-}46]$$

and that Cash Flow after Investing Activities (CFaIA) can be expressed as:

$$CFaIA = CFfOA - Investments \qquad [1\text{-}47]$$

substituting [1-46] for CFfOA in [1-47] produces an equation for CFaIA expressed in terms of operating cash flows and investments.

$$CFaIA = NI + D\ \&\ A \pm \Delta WC - Investments \quad [1\text{-}52]$$

Example 1-6: Calculating CFaIA and CGU

Cash Flow after Investing Activities for the company represented by the Cash Flow Statement (Table 1-5) in Year *n* can be determined by substituting the values for NI, D&A, ΔWC, and Investments in Equation [1-52].

$$CFaIA = 6{,}900{,}000 + 5{,}000{,}000 - 1{,}250{,}000 - 10{,}000{,}000 = \$650{,}000$$

The CGU is calculated with the use of Equation [1-50]

$$Cash\ Generated\ (Used) = CFfOA - Investments \pm Financing - Dividends\ Paid \quad [1\text{-}50]$$

Substituting values from Table 1-5 for CFfOA, Investments, Financing, and Dividends Paid the CGU is calculated to be:

$$Cash\ Generated\ (Used) = 10{,}650{,}000 - 10{,}000{,}000 \pm 0 - 0 = \$650{,}000$$

It may be helpful to look at the Cash Generated/Used from another perspective. Recall that

$$CFaIA = CFfOA - Investments \quad [1\text{-}47]$$

Rearranging,

$$CFfOA = CFaIA + Investments \quad [1\text{-}53]$$

Substituting the results of Equation [1-53] for CfaOA in Equation [1-50] yields

$$Cash\ Generated\ (Used) = CFaOA + Investments - Investments \pm Financing - Dividends\ Paid \quad [1\text{-}54]$$

or

$$Cash\ Generated\ (Used) = CFaIA \pm Financing - Dividends\ Paid \quad [1\text{-}55]$$

Substituting,

$$Cash\ Generated\ (Used) = 650{,}000 \pm 0 - 0 = \$650{,}000$$

It is worthwhile to note that since no Equity was sold to investors and no dividends were paid, the CGU is the same as the Cash Flow after Investing Activities.

So if $650,000 of Cash was generated during this period, the question is: How much cash will the company have at the end of the period? If you assume the Balance Sheet shown in Table 1-3 is the balance sheet at the end of a month (January), then the

TABLE 1-6 Period Cash Balances $(000)'s

Beginning Cash Balance	750
Cash Generated/(Used)	650
Ending Cash Balance	1,400

cash balance at the beginning of the next month (February) will be the same as the cash balance at the end of January, or $750,000. Then if the Cash Flow Statement shown in Table 1-5 is the statement for the month of February, the Cash Generated during February will be $650,000 and the cash balance at the end of February would be as shown in Table 1-6.[22]

REQUIRED REVENUE FOR A GIVEN LEVEL OF NET INCOME[23]

So far the primary focus has been on Net Income and Cash Flow and what drives them. One issue that hasn't been addressed is the role Revenue plays in covering all the expenses incurred by a business. For example, for any given level of Net Income the Revenue must be adequate to cover the Cost of Goods Sold, Operating Expenses, Depreciation and Amortization, Net Interest, and Taxes. In this section, instead of starting with Revenue, the Income Statement will be worked backward, so to speak, and start with Net Income and end up with the Required Revenue to support the Net Income.

The analysis of Required Revenue begins by referring to Table 1-7 and then letting "RR" represent the Required Revenue to drive a level of Net Income.

By inspection:

$$NI = Rev - COGS - OpExp - D\ \&\ A \pm NetInt - TaxesPaid \qquad [1\text{-}56]$$

or

$$NI = Rev - (COGSRatio)(Rev) - (OpExpRatio)(Rev) - D\ \&\ A \pm NetInt - TaxesPaid \qquad [1\text{-}57]$$

where:

$$COGS = (COGSRatio)(Rev) \text{ and } OpExp = (OpExpRatio)(Rev)$$

If Rev is the Required Revenue (RR) to deliver Net Income NI, then

$$NI = RR - (COGSRatio)(RR) - (OpExpRatio)(RR) - D\ \&\ A \pm NetInt - TaxesPaid \qquad [1\text{-}58]$$

[22] Table 1-6 is actually known as the "Cash Flow Proof" and usually appended to Cash Flow Statements as will be shown in Chapter 10.

[23] T. E. Copeland, T. Koller, and J. Murrin, *Valuation: Measuring and Managing the Value of Companies*, 2nd ed. (New York: John Wiley & Sons, 1995), 166, "ROIC Tree."

TABLE 1-7 Income Statement for Calculating Required Revenue

Period Ending DD/MM/YYYY $(000's)	$	Ratio
Revenues (Rev)	100,000	1.000
Cost of Goods Sold (COGS)	(40,000)	–0.400
Gross Margin (GM)	60,000	0.600
Operating Expenses (OpExp)	(43,500)	–0.435
Earnings Before Interest, Taxes, and D&A (EBITDA)	16,500	0.165
Depreciation and Amortization (D&A)	(5,000)	–0.050
Earnings Before Interest and Taxes (EBIT)	11,500	0.115
Interest Income/(Expense) (NetInt)	0	0.000
Earnings Before Tax (EBT)	11,500	0.115
Taxes Paid (TaxesPaid) @ 40%	(4,600)	–0.046
Net Income (NI)	6,900	0.069

Factoring,

$$NI = (RR)(1 - COGSRatio - OpExpRatio) - D\ \&\ A \pm NetInt - TaxesPaid \quad [1\text{-}59]$$

Rearranging,

$$RR(1 - COGS\ Ratio - OpExpRatio) = NI + D\ \&\ A \pm NetInt + TaxesPaid \quad [1\text{-}60]$$

Dividing both sides of [1-60] by (1 – COGSRatio – OpExpRatio),

$$RR = \frac{NI + D\ \&\ A \pm NetInt + TaxesPaid}{(1 - COGSRatio - OpExpRatio)} \quad [1\text{-}61]$$

Again by inspection of Table 1-7 it can be seen that

$$(1 - COGSRatio - OpExpRatio) = EBITDARatio \quad [1\text{-}62]$$

Substituting [1-62] in Equation [1-61], the revenue required (Required Revenue) to support a given level of Net Income is obtained:

$$RR = \frac{NI + D\ \&\ A \pm NetInt + TaxesPaid}{EBITDARatio} \quad [1\text{-}63]$$

or

$$RR = \frac{NI}{EBITDARatio} + \frac{D\ \&\ A}{EBITDARatio} \pm \frac{NetInt}{EBITDARatio} + \frac{TaxesPaid}{EBITDARatio} \quad [1\text{-}64]$$

Equation [1-64] tells an interesting story. It says that for a given level of financial performance the Revenue must be sufficient to cover the expected Net Income, Depreciation and Amortization, any Interest Expense, and Taxes Paid.[24]

Also, since

$$TaxesPaid = (EBT)(TR) \quad [1\text{-}8]$$

then another form of Equation [1-64] is

$$RR = \frac{NI}{EBITDARatio} + \frac{D\&A}{EBITDARatio} \pm \frac{NetInt}{EBITDARatio} + \frac{(EBT)(TR)}{EBITDARatio} \quad [1\text{-}65]$$

Example 1-7: Calculating Required Revenue

Del Rey Corporation has a budgeted Net Income of $2,495,000 in Year 1 of its operating plan with an EBITDA of 11.5%. If Depreciation and Amortization, Net Interest, and Taxes Paid are $1,735,000, $0, and $1,828,000 respectively, calculate the Required Revenue for each term in Equation [1-65] and the Total Required Revenue for Year 1 of the operating plan (Table 1-8).

The Required Revenue to support the Net Income NI_1 of $2,495,000 is

$$RR_{(NI_1)} = \frac{NI_1}{EBITDARatio_1} = \frac{2,495,000}{0.115} = \$21,696,000$$

Repeating this process, the Required Revenue for D&A, NetInt, and TaxPaid can be calculated.

$$RR_{(D\&A_1)} = \frac{D\&A_1}{EBITDARatio_1} = \frac{1,735,000}{0.115} = \$15,087,000$$

$$RR_{(NetInt_1)} = \frac{NetInt_1}{EBITDARatio_1} = \frac{0}{0.115} = \$0$$

$$RR_{(TaxPaid_1)} = \frac{TaxesPaid_1}{EBITDARatio_1} = \frac{1,828,000}{0.115} = \$15,896,000$$

TABLE 1-8 Condensed Income Statement for Del Rey Corporation

Year 1 ($'s and %)	
Net Income	2,495,000
EBITDA	11.50%
EBITDA Ratio	0.115
Depreciation and Amortization	1,735,000
Net Interest	0
Taxes Paid	1,828,000

[24] It can actually get a little more complicated. If the company in question has interest-bearing cash or investments, the associated interest income would give the Required Revenue some assistance and actually reduce the Revenue required to support a given level of Net Income.

Substituting in Equation [1-65] gives the Required Revenue in Year 1.

$$RR_1 = 21{,}696{,}000 + 15{,}087{,}000 + 0 + 15{,}896{,}000$$

$$RR_1 = \$52{,}679{,}000$$

As can be seen from the example, approximately $15 million and $16 million of Revenue are required to cover Depreciation and Amortization and Taxes respectively, whereas roughly $21,700,000 of revenue is required to deliver the Year 1 Net Income in the operating plan.[25]

CASE STUDY: ADVANCED SOLAR SYSTEMS CORPORATION

Ms. Engel has just returned from completing an Executive Management Program at the University of Pennsylvania's Wharton School. In keeping with the school's reputation the program had an emphasis on developing quantitative skills, which wasn't a problem for Ms. Engel since she had a degree in electrical engineering. The assignment from the Professor of Finance who conducted the concluding session was for all participants to do an analysis of their company's financial statements using the skills they had just developed when they returned to their offices.

Ms. Engel's employer is Advanced Solar Systems Corporation. As the name would suggest, the Company specializes in systems that utilize solar technology to build power sources for the military and aerospace industries. One of the things that was stressed by the professors conducting the program was that while all students should have a solid grasp of the relationships they were taught that defined the financial statements, they should also remember that the statements are logical, and with a little practice they can be analyzed by running some simple calculations based on inspection rather than rigorous mathematical treatment. With this in mind and after scanning the Solar Systems Income Statement, Ms. Engel did a comparative analysis of the actual results for the Prior Year and the forecast for the Current Year. The Income Statement including the analysis is shown in Table CS 1-1.

After looking at the Comparative Analysis, Ms Engel concluded:

- Revenue increased 12% on a year-over-year basis driven by the demand for the company's products, what one expects of a growth company.
- The Cost of Goods Sold (COGS) had increased by 100 basis points (1%) from 56% to 57%. While this is a movement in the wrong direction, it was not unexpected given the startup costs associated with the products that had been released to production at the end of the Prior Year.
- As a result of the deterioration in the COGS, the Gross Margin (GM) decreased to 43%.
- Operating Expense decreased from 27% to 24.5% but in absolute terms increased slightly to $307,632,000. The reduction in percentage terms was to be expected given the Revenue Growth. The modest increase was made possible by the reduction

[25] The reader may wish to refer to the "Takeaways" section at the beginning of this chapter before proceeding to the next chapter.

TABLE CS 1-1 Advanced Solar Systems Comparative Income Statement

Period Ending DD/MM/YYYY $(000)'s				
Year	**PriYr % Rev**	**Prior**	**Current**	**CurYr % Rev**
Revenues (Rev)		1,121,108	1,255,641	12.00%
Cost of Goods Sold (COGS)	–56.00%	(627,820)	(715,715)	–57.00%
Gross Margin (GM)	44.00%	493,288	539,926	43.00%
Operating Expenses (OpExp)	–27.00%	(302,699)	(307,632)	–24.50%
Earnings Before Interest, Taxes, and D&A (EBITDA)	17.00%	190,588	232,294	18.50%
Depreciation and Amortization (D&A)	–3.00%	(33,633)	(40,181)	–3.20%
Earnings Before Interest and Taxes (EBIT)	14.00%	156,955	192,113	15.30%
Interest Income/(Expense) (NetInt)	0.02%	227	455	0.04%
Earnings Before Tax (EBT)	14.02%	157,183	192,568	15.34%
Taxes Paid (TaxesPaid) @	–37.00%	(58,158)	(67,399)	–35.00%
Net Income (NI)	8.83%	99,025	125,169	9.97%

in R&D expenses associated with the new products that were released to production at the end of Prior Year.

- Driven by the Revenue and OpExp the EBITDA increased 150 basis points (1.5%) to 18.5%, which is in keeping with the operating leverage obtained by managing the Operating Expenses while increasing Revenue.
- Depreciation increased from 3% to 3.2% of Revenue as the company continued to invest to keep up with demand and technology.
- Since the company was debt-free there was no interest expense. Management preferred to remain very liquid, so all cash on hand was invested in money market funds. The outcome of this was that very little interest was earned from the available cash.
- As expected (driven by Revenue and Operating Expenses), the Earnings before Taxes increased from 14.02% to 15.34% of Revenue.
- For the last two years the company's CFO and VP of Tax had been working on a program to reduce the company's taxes. This effort is expected to pay off in the Current Year and contribute substantially to the company's Net Income, which is forecasted to grow to nearly 10% of Revenue.

After thinking about the Income Statement Analysis she just finished, Ms. Engel concluded that overall the company had a great year and management should continue to focus on growing Revenue, reducing the Cost of Goods Sold, and carefully managing Operating Expenses.

She then moved on to the Balance Sheet. She knew from her Wharton Program that the preferred way to think about Working Capital was in terms of Days Outstanding, Inventory Turns, and so forth. However, given that she was primarily interested in what was happening directionally with Working Capital, she thought this was an unnecessary complication, and made some annotations using percentages of revenue. The result of her work is included in the Balance Sheet, Table CS 1-2.

TABLE CS 1-2 Advanced Solar Systems Comparative Balance Sheet

DD/MM/YYYY $(000)'s								
	PriYr % Rev	Prior	Current	CurYr % Rev		PriYr % Rev	Prior	Current	CurYr % Rev
Current Assets					**Current Liabilities**				
Cash		45,479	130,865		Accounts Payable	**14%**	156,955	182,673	**16%**
Accounts Receivable	**21%**	230,613	263,685	**24%**	Taxes Payable		0	0	
Inventory	**14%**	156,955	174,565	**16%**	Short-Term Debt (STD)		0	0	
Total Current Assets		433,047	569,115		**Total Current Liabilities**		156,955	182,673	
Fixed Assets									
At Cost		637,889	692,889		**Long-Term Debt (LTD)**		0	0	
Less Depreciation	**–19%**	(216,892)	(257,073)	**–23%**					
Net Fixed Assets		420,997	435,816						
					Shareholder's Equity (TSHE)				
Other Assets					Paid-in Capital		150,000	150,000	
Goodwill net of Amortization		0	0		Retained Earnings		547,089	672,258	
Net Other Assets		0	0		**Total Shareholders' Equity**		697,089	822,258	
Total Assets		854,044	1,004,931		**Total Liabilities + TSHE**		854,044	1,004,931	

- Her first observation was that Advanced Solar's Balance Sheet was expanding rapidly.
- Her second observation was that Cash was building and if this continued, the company would be in a position to finance a major new program, do an acquisition, and pay a dividend or some combination thereof.
- Accounts Receivable needed attention, having increased from 21% to 24% of Revenue.
- The same could also be true for inventory, which had increased from 14% to 16% of Revenue. Given her experience in engineering and manufacturing she knew that if this was a result of a deterioration in inventory management as opposed to a temporary build associated with the new products, a major write-off could be in the offing since in Advanced Solar's business product enhancements and obsolescence were a way of life.
- Depreciation also increased as a percentage of Revenue driven by investments in plant and equipment. After some thought she concluded that this was not a concern because the spike could be a result of the timing associated with purchases and useful life assumptions but primarily because Depreciation as a percentage of Revenue was fairly stable in the range of 3%.
- Since the company didn't have any Short-Term or Long-Term Debt, the only thing of note on the Liabilities and Total Shareholders' Equity side was the Accounts Payable, which had increased as a percentage of Revenue to16 percent.

The take-home value from her analysis of the Balance Sheet was: Management needed to understand why Receivables and Inventory were increasing and take appropriate action. As for Accounts Payable, they needed to make sure they were paying suppliers on a timely basis since they fed Solar's manufacturing plant and played a huge role in product quality, product cost, and delivery performance.

Next, and primarily out of curiosity, she decided to take a closer look at Working Capital and the impact the changes had on the company's Cash Flow. The results are tabulated in Table CS 1-3.

After studying Table CS 1-3 Ms. Engel observed the following:

- Accounts Receivable increased by $33,072,000 and since this was cash the company had not collected, the impact on the company's Cash was negative or a "Use of Cash."
- Inventory increased by $17,610,000 and this inventory build had to be paid for. So like Accounts Receivable the impact on Cash was negative and also a "Use of Cash."

TABLE CS 1-3 Working Capital Analysis $(000)'s

Year	Prior	Current	Change	CashEffect
Accounts Receivable	230,613	263,685	33,072	(33,072)
Inventory	156,955	174,565	17,610	(17,610)
Accounts Payable	156,955	182,673	25,718	25,718
Taxes Payable	0	0	0	0
Short-Term Debt	0	0	0	0
Change in Working Capital (ΔWC)				(24,963)

- Accounts Payable was a different matter. They increased by $25,718,000 and this indicated the company had made purchases that they hadn't paid for and in a sense was using their suppliers to finance their operations. From an accounting perspective the Cash impact was a positive $25,718,000 and a "Source of Cash."
- The company's practice was to pay all taxes by year-end. Hence, there was no change from one year to the next, so there wasn't any Taxes Payable impact on Working Capital.
- The impact of Short-Term Debt on the change in Working Capital is zero since the company didn't expect to have debt of any kind on its Balance Sheet at the end of either year.
- The net Cash impact of the changes in the company's Working Capital was a negative $24,963,000.

Ms. Engel recalled that of the three financial statements, the one that caused the most difficulty for many of the managers who attended the training program was the Cash Flow Statement. So she decided to see if she could work her way through Solar's Current Year Cash Flow Statement[26] that was part of the management reporting package (Table CS 1-4).

When it came to cash flow from operations, the first entry was Net Income ($125,169,000). This was logical because Net Income is what the company earned during the year and the major source of Cash Flow from Operating Activities. Depreciation ($40,181,000) was added back since it represented a charge in the Income Statement for assets that were being depleted and, since they were paid for in a prior period, didn't have any Cash impact. Interest Income ($455,000) was a different matter. It was a Source of Cash but since it wasn't generated from operations it had to be deducted. The Change in Working Capital ($24,963,000, according to the analysis she had completed and tabulated in Table CS 1-3) was a use of cash so it should be deducted when determining the Cash Flow from Operating Activities.

TABLE CS 1-4 Advanced Solar Systems Cash Flow Statement $(000)'s

Year	Current
Net Income (NI)	125,169
Depreciation and Amortization (D&A)	40,181
Interest Income (Expense) (NetInt)	(455)
Change in Working Capital (ΔWC)	(24,963)
Cash Flow from Operating Activities (CFfOA)	139,932
Investments (Investments)	(55,000)
Cash Flow after Investing Activities (CFaIA)	84,932
Dividends Paid to Shareholders	0
Interest Income (Expense)	455
Increase (Decrease) in Long-Term Debt	0
Shareholders' Contribution	0
Cash Generated (Used) (CGU)	85,386

[26] She wasn't able to do the Cash Flow Statement for the Prior Year because data for the year before the Prior Year was not at hand.

In summary, the Cash Flow from Operating Activities ($139,932,000) was obtained by starting with the Net Income, adding back the Depreciation, subtracting the Interest Income, and deducting the Change in Working Capital.

Ms. Engel then proceeded to the Investment section of the Cash Flow Statement. Initially she was puzzled by where the $55,000,000 of "Investments" came from. After thinking about it she concluded that since it was most probably an investment in assets, it had to be on the Balance Sheet. Sure enough, after subtracting the "Fixed Assets at Cost" at the end of the Prior Year from the forecasted "Fixed Assets at Cost" at the end of the Current Year ($692,889,000 – 637,889,000 = $55,000,000) she found the source of the $55,000,000 entry.

With this information the Cash Flow after Investing Activities ($84,932,000) was easily obtained by subtracting the $55,000,000 investment in Fixed Assets from the Cash Flow from Operating Activities ($139,932,000).

Since Solar didn't pay any dividends there wasn't any impact on Cash Flow.

When it came to Financing, Ms. Engel was fine with no impact from Debt or Shareholders' Contributions on the Cash Flow Statement since the company didn't borrow any money during the year or raise any capital from shareholders. However, she was puzzled for a moment to see the $455,000 of Interest Income entered in this section of the Cash Flow Statement. Then she realized that since it had been deducted in the operating section of the statement because it wasn't a source of operating cash it was a source of cash and had to be added back to obtain the Cash Generated ($85,386,000) during the period.

Having worked her way through the financial statements she was now at a point where she could finish her analysis by calculating the Return on Capital Employed (ROCE) and the Required Revenue (RR).

After checking her notes she recalled that the ROCE could be calculated by applying Equations [1-30] and [1-32].

$$ROCE = \frac{(EBIT)(1-TR)}{CE} \qquad [1\text{-}30]$$

where

$$CE = TSHE + STD + LTD \qquad [1\text{-}32]$$

Substituting values from Tables CS 1-1 and CS 1-2 the ROCE's for Prior and Current Years were obtained:

$$ROCE_{PriorYear} = \frac{156{,}955{,}000 * (1-0.37)}{(697{,}089{,}000 + 0 + 0)} = \frac{156{,}955{,}000 * (0.63)}{697{,}089{,}000} = \frac{98{,}882{,}000}{697{,}089{,}000}$$

$$= 0.1418$$

$$ROCE_{PriorYear} = 14.2\%$$

or

$$ROCE_{CurrentYear} = \frac{192{,}113{,}000 * (1-0.35)}{(822{,}258{,}000 + 0 + 0)} = \frac{192{,}113{,}000 * (0.65)}{822{,}258{,}000} = \frac{124{,}874{,}000}{822{,}258{,}000}$$

$$= 0.152$$

$$ROCE_{CurrentYear} = 15.2\%$$

Ms. Engel noted that the ROCE was moving in the right direction, but she wasn't sure how these returns compared to other companies in the industry. Given the company's profitability she intuitively expected them to be higher. Also she noted that since the company was beginning to accumulate cash it could drastically increase the ROCE by paying a dividend to decrease the Total Shareholders' Equity, and concluded that maybe she should begin to purchase shares in the company as and when she had excess cash.

To deal with the question of Required Revenue she once again consulted her notes to refresh her memory. The result was the Required Revenue equation, Equation [1-65].

$$RR = \frac{NI}{EBITDARatio} + \frac{D\,\&\,A}{EBITDARatio} \pm \frac{NetInt}{EBITDARatio} + \frac{(EBT)(TR)}{EBITDARatio} \qquad [1\text{-}65]$$

Since she planned to use the material she was preparing in a training program for her staff, she decided to only deal with the Current Year and prepared Table CS 1-5 because she felt it would simplify the process associated with applying the Required Revenue equation.

She then proceeded to use this data and calculated each of the terms.

$$RR_{NICurrentYr} = \frac{NI}{EBITDARatio} = \frac{125{,}169{,}000}{0.185} = \$676{,}589{,}000$$

$$RR_{D\&ACurrentYr} = \frac{D\,\&\,A}{EBITDARatio} = \frac{40{,}181{,}000}{0.185} = \$217{,}195{,}000$$

$$RR_{NetIntCurrentYr} = \frac{NetInt}{EBITDARatio} = \frac{455{,}000}{0.185} = \$2{,}459{,}000$$

$$RR_{TaxesPaidCurYr} = \frac{(EBT)(TR)}{EBITDARatio} = \frac{192{,}568{,}000 * 0.35}{0.185} = \frac{67{,}399{,}000}{0.185} = \$364{,}318{,}000$$

TABLE CS 1-5 Required Revenue $'s and %

Year	Prior	Current
Net Income	99,025	125,169
EBITDA	17.00%	18.50%
EBITDA Ratio	0.1700	0.1850
Depreciation and Amortization	(33,633)	(40,181)
Net Interest	227	455
Taxes Paid	(58,158)	(67,399)

Ms. Engel then substituted the calculated values for each of the terms in Equation [1-65], which gave her a Required Revenue for the Current Year of $1,260,561,000, which didn't agree with the Revenue shown for the Current Year in the Income Statement ($1,255,643,000).

$$\begin{aligned} RR_{CurrentYear} &= 676{,}589{,}000 + 217{,}195{,}000 + 2{,}459{,}000 + 364{,}318{,}000 \\ &= \$1{,}260{,}558{,}000 \end{aligned}$$

She quickly realized her mistake. The Interest Income of $455,000 actually reduced the Revenue required to cover the Net Income, Depreciation, and Taxes Paid. The correct answer was then obtained by changing the sign on the NetInt term in the Required Revenue expression.

$$\begin{aligned} RR_{CurrentYear} &= 676{,}589{,}000 + 217{,}195{,}000 - 2{,}459{,}000 + 364{,}318{,}000 \\ &= \$1{,}255{,}643{,}000 \end{aligned}$$

While staring at the result of applying the Required Revenue equation she was struck by the fact that in order to create $125 million of Net Income, the company had to generate $364 million of Revenue to pay the taxes and $217 million of Revenue to cover Depreciation and Amortization, and only after $581 million of Revenue had been produced did the next dollar of Revenue contribute to profit.