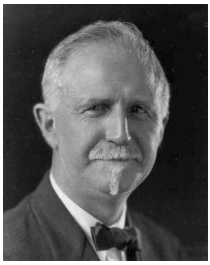
CHAPTER 7
Fundamental Analysis for Equity Securities

Roger Bason on Fundamental Analysis



"From the investor's point of view, comparative statistics include all particulars concerning the bonded debt, the earnings, and the general physical and financial condition of the properties. Such statistics are very necessary to bankers and investors for comparing similar securities of different companies, or different securities of the same company. If such data is always up to date, such comparative statistics are very valuable for enabling one to select safe securities, either for permanent investment or for buying and selling again... It should be clearly understood , however, that such statistics are worthless for determining the general course of the entire market or for serving as Barometric Indices of the condition of trade".

Roger Babson,
"Barometric Conditions of the Condition of Trade" (1910)

7.1 What is Fundamental Analysis?

7.1.1 *Fundamental Analysis and Investment Philosophy*

Philosophy has dedicated considerable effort to developing the implications of how language is used.[1] From semantics to rhetoric, words have content that extend well beyond simple definitions. The use of the expression 'fundamental analysis' provides a useful illustration of the basic point at hand. As used in academic Finance, fundamental analysis is interpreted in terms of a core theoretical proposition: the efficient markets hypothesis (EMH). As commonly presented, the EMH is developed by applying the hypothesis to specific information sets denoted as weak form, semi-strong form and strong form. Whereas the weak form relates to the information set used in 'technical analysis', ***the semi-strong form*** relates to the information set applicable to 'fundamental analysis'. Under the EMH, if the market is semi-strong form efficient then it is not possible to earn abnormal returns by exploiting the information set used in 'fundamental analysis', i.e., market prices fully and accurately reflect the relevant fundamental information. Based on this type of language, it would appear that if markets are semi-strong form efficient then there is little to be gained from doing fundamental analysis.

In modern Finance, fundamental analysis is defined relative to the core theory. The rejection of fundamental analysis is achieved by considering specific types of 'publicly available' information such as announcements of earnings and dividends, disclosures of merger plans, changes in accounting practices and the like. Academic studies stretching back at least to Ball and Brown (1968) and Fama *et al.* (1969) have demonstrated that a wide range of publicly available information is "rapidly and accurately reflected in the price of the stock", e.g., Giammarino *et al.* (1996, p. 293).[2] By defining

[1]Perhaps the most important 20th century philosopher emphasizing the importance of language was Ludwig Wittgenstein (1889–1951). For Wittgenstein, the aim of philosophy is to clear up muddle and confusion. The philosopher's proper concern is with what is conceivable. This depends on how concepts fit together using language. What is conceivable and what is not, what makes sense and what does not, depends on the grammatical rules of language. For example, in *Philosophical Investigations* Wittgenstein says: "Our investigation is a grammatical one. Such an investigation sheds light on our problem by clearing misunderstandings away. Misunderstandings concerning the use of words, caused, among other things, by certain analogies between the forms of expression in different regions of language".

[2]The progression of the core theory of modern Finance has moved away from the largely indefensible position about the impact of fundamental information on security prices. At least since Fama and French (1995) it has become popular in modern Finance to

fundamental analysis in this fashion, language is being used in a confusing and misleading way. An important, complicated and diverse approach to the evaluation of securities is reduced to a statistical examination of how prices of specific securities, usually common stocks, react to changes in some type of publicly available information. The sometimes sophisticated methods and intensive procedures involved in taking a body of fundamental information and translating that information into an evaluation of whether a stock is correctly valued does not correspond to whether, on average, changes in a particular type of information are rapidly translated into prices. Though there is some relationship, the connection between fundamental analysis and tests of semi-strong from efficiency is weak at best and misleading at worst.

In *Financial Statement Analysis and Security Valuation*, Penman (2001, p. 3) states: "Investors typically invest in a firm by buying equity shares or the firm's debt. Their primary concern is the amount to pay — the value of the shares or the debt. The analysis of information that focuses on valuation is called ***valuation analysis, fundamental analysis***, or, when securities like stocks and bonds are involved, ***security analysis***". Penman (2001) "develops the principles of fundamental analysis" and "shows how financial statement analysis is used in fundamental analysis". Penman focuses on ***the accounting aspects of fundamental analysis***, covering the techniques involved in translating the information presented in accounting statements into estimates of the appropriate market value of specific securities. As such, Penman is providing a natural development on the traditional approach taken in accounting to the subject of financial statement analysis, e.g., Bernstein (1989). Casual inspection of Penman (2001) or Bernstein (1989) or any of a number of excellent texts in this area, e.g., Fridson and Alvarez (2002) and Foster (1986), reveals that the assessment and analytical manipulation of information in financial statements for purposes of valuing equity securities is considerably more complicated than determining if, say, an adverse or positive earnings announcement is rapidly reflected in common stock prices.

In contrast to those emphasizing the importance of financial statement analysis, there are other fundamental analysts that emphasize ***the importance of economic analysis*** in determining security values. A key aspect typically considered in the economic analysis are industry factors, such as

incorporate additional (fundamental) "factors" to the traditional single-factor market model, with price-to-book and firm size being the most popular.

the level of competition, barriers to entry and the regulatory environment. Also important are the macroeconomic factors such as the general level of the financial markets, interest rates and exchange rates. There are also qualitative economic factors about the firm not reflected in the financial statements, such as the depth and quality of management. Though the economic analysis will, almost always, be combined with various types of financial statement information to arrive at an assessment of the equity security value, the process by which this is done will vary across analysts. Evidence that, say, changes in money supply numbers announced by the Federal Reserve are 'rapidly reflected' in prices has only ambiguous implications for fundamental analysis, other than to demonstrate that security prices may or may not react to the release of this type of information. Such evidence would seem to have more implications for theories of 'noise trading' rather than for fundamental analysis.

Though there is a general methodological approach that characterizes fundamental analysis, it is not a homogeneous doctrine. The techniques of fundamental analysis are aimed at determining the value of a security or capital asset using a range of economic and accounting information. Selection of specific aspects for analysis and interpretation depends on ***the 'investment style' or 'investment philosophy'*** of the analyst. Put differently, the fundamental analyst specifies a valuation model, such as the discounted cash flow model, and then assembles and evaluates the analyst-specific economic and accounting information needed to forecast the variables used in the model. Though it is a popular and widely recommended valuation model for fundamental analysts, the discounted cash flow model is neither a necessary nor sufficient condition for fundamental analysis. While modern Finance presents fundamental analysis as being, somehow, homogenous, fundamental analysis is, at best, a loose-knit collection of somewhat different techniques. Perhaps more importantly, the application of the techniques is participant-dependent.

To see this point, consider the question: is the P/E ratio for stock A 'too high' to justify the purchase of the stock? The P/E ratio is a measure that is widely used in fundamental analysis. However, not all fundamental analysts give much consideration to the P/E ratio in deciding whether a stock is under-valued. Growth stock proponents such as Philip Fisher, for example, subordinate the P/E ratio to the characteristics of the business. Growth stocks can justify much higher P/E ratios. Other analysts use the P/E ratio as an initial filter to indicate what other types of fundamental information to examine before making a decision. For example, a 'high'

P/E ratio could be due to a potential source of earnings that is expected to materialize in the near future or to the price being driven primarily by the market value of assets. Even if the fundamental analyst determines that the P/E ratio indicates the stock is under-valued, different analysts may have different criteria for determining when to purchase a security, i.e., there will be variation across analysts in the different degrees of underpricing at which purchase decisions are triggered. In effect, in fundamental analysis there is not a simple functional relationship between the P/E ratio and the valuation of common stocks.

The observation that the equity security valuation method and the investment selection strategy are intimately connected is not new. It has long been understood that the investment strategy used makes specific demands about the type of quantitative and qualitative information required and the way it is interpreted in the valuation process. In this vein, the observation that fundamental analysis is not a homogeneous subject applies directly to how industry and firm level information is used in the valuation process. It also applies to the use of macroeconomic information. Graham, Dodd and Cottle (1962, pp. 26, 27) explicitly attempt to deal with this point by introducing three general categories to describe distinct methods of common stock valuation: ***the anticipation approach***; ***the relative value approach***; and ***the intrinsic value approach*** also known as the absolute value approach.[3] Within each of these approaches to fundamental analysis there may be further differences in the 'investment style' and usage of valuation information. However, these differences in style and usage are small compared to the differences in equity security valuations implied by each of the approaches.

According to GDC, ***the anticipation approach*** is the first and oldest approach to security analysis of common stocks. This approach takes the current market price to be an appropriate measure of the current value and attempts to identify stocks that will outperform by 'anticipating' changes

[3]The GDC use of 'anticipation approach' to describe one of the three approaches is somewhat unfortunate as all three approaches involve 'anticipating' the future value of the stock by predicting specific variables. The key distinction between the three approaches is what variables are used to predict the future cash flows and how the estimation process is conducted. In this regard, the anticipation approach can also include the use, in whole or in part, of technical analysis, where variables that are used to 'anticipate' future stock prices lie within the set of variables examined in technical analysis. There is also differences in the implied length of the holding period with the anticipation approach being the shortest and the intrinsic value approach with the longest.

in current conditions. This usually involves detailed analysis of the business position and prospects of various companies. GDC observe:

> The anticipation approach is typified by the numerous published lists which suggest stocks which will "outperform" the market over some time span ... The function of the security analyst ... is to anticipate the new situation, to select the stocks that will benefit most therefrom, and to reject those that will fare badly ... This approach, clearly, does not involve seeking an answer to the question: What is the stock worth?

A typical equity valuation using the 'anticipation' approach examines the price history of the stock and attempts to heuristically determine how the price changed in response to past ***changes*** in key variables such as earnings, new product innovations, production technology, management composition, capital structure, capital expenditures, mergers and acquisitions and so on. Based on breadth and depth of knowledge, the analyst attempts to predict or 'anticipate' changes in key variables. As such, trading frequency would depend on the types of variables being predicted and the forecasting methodology. While forecasting horizons are typically short-term, an early advocate of the anticipation approach, Roger Babson, used relatively long prediction horizons.

Keynes (1936, p. 155) provides a useful perspective on the anticipation approach: "the professional investor is forced to concern himself with the anticipation of impending changes, in the news or in the atmosphere, of the kind by which experience shows the mass psychology of the market is most influenced". Keynes saw the negative macroeconomic implications of a market populated by professional investors driven by the anticipation approach. In a justly famous quote, Keynes (1936, pp. 155, 156) observes:

> This battle of wits to anticipate the basis of conventional valuation a few months hence, rather than the prospective yield of an investment over the long term of years, does not even require the gulls amongst the public to feed the maws of the professional — it can be played by professionals amongst themselves. Nor is it necessary that anyone should keep his simple faith in the conventional basis of valuation having any long-term validity. For it is, so to speak, a game of Snap, of Old Maid, of Musical Chairs — a pastime in which he is victor who says *Snap* neither too soon nor too late, who passes the Old Maid to his neighbour before the game is over, who secures a chair for himself when the music stops ... we have reached the third degree where we devote our intelligence to anticipating what average opinion expects the average opinion to be.

Given this, Keynes viewed the anticipation approach as implying an investment strategy aimed at trading over horizons of three months and less:

"it is not sensible to pay 25 for an investment of which you believe the prospective yield to justify a value of 30, if you also believe that the market will value it at 20 three months hence". Graham and Dodd (1934, p. 586) concluded about the anticipation approach: "A program of this character would have made far too heavy demands upon human fortitude."

The ***relative value approach*** is similar to the anticipation approach in taking the current market price to be an appropriate measure of the current value and attempts to identify the "relative" attractiveness of various stocks. GDC observe that the relative value analyst:

> derives the capitalization rate for an individual issue in terms of the rate at which earnings or dividends for a cross section of the market — such as the Dow-Jones Industrial Average — are being capitalized or from the capitalization rate for a specific industry or other group which typifies the market for an individual share he is seeking to evaluate. His efforts, therefore, are devoted fundamentally to appraising the *relative* attractiveness of individual issues in terms of the then existing level of stock prices and not to determining the fundamental worth of a stock.

The relative value approach is, by default, the approach of necessity for a fund that is fully invested in equities. The precise method used to determine relative value will differ from analyst to analyst, though the GDC reference to "capitalization rates" is consistent with the market practice of comparing P/E ratios. The relative value approach could also contain elements of either the anticipation or intrinsic value approaches to rank prospects. Ultimately, however, the buy or sell decision would be based on a relative ranking.

As illustrated by Hooke (1998, chap. 13), the relative value approach to security analysis is the most favored approach in the modern ***"Wall Street" approach*** to equity security analysis. Being at the core of day-to-day trading of common stocks, the financial community of investment bankers, securities firms, institutional fund managers and the like that compose 'Wall Street' are, in aggregate, not unlike a fund that is fully invested in equities. Observing that professional security analysts seldom refer to intrinsic value, Hooke (1998, p. 232) provides the following description of the relative value approach used on Wall Street:

> Morgan Stanley analyst, Madhav Dhar, suggests there's no such thing as the "intrinsic value" of a stock. "You have to figure out where you are relative to everybody else", he says. "It's an investment decision overlaid by game theory". With many institutions sharing this view, practitioners increasingly turn to relative values to price companies. Instead of a fair price based on discounted cash flows, practitioners use "relative value" analysis where the positive and negative aspects of a stock are

evaluated against those characteristics of similar stocks falling in the same industry category. Value parameters are then compared and contrasted, resulting in statements such as "Kroger is undervalued relative to Safeway, because Kroger's growth rate is higher, yet its P/E is lower". Other popular comparators include the Price/Book, Price/Sales, (Price + Debt)/EBITDA, and (Price + Debt)/EBIT ratios.

For many in the investment industry, *DCF* models involve too many variables to estimate, leading to interminable debates over this projection vs. that projection. In the marketing of stocks, it is easier to take the industry or sector multiple as given, and then to argue over the relative values of stocks in the sector using widely recognized valuation ratios such as P/E and P/BV. This is also consistent with the 'Wall Street' practice of organizing research analysts along industry/sector lines and working with top-down fund management strategies.

Though not without limitations, e.g., Durand (1957), ***the intrinsic value approach*** has been widely described, analyzed and recommended. Though Graham and Dodd (1934, p. 14) explicitly recognize that the intrinsic value approach has a much longer history, modern observers usually credit Graham and Dodd with originating the approach which is typically, though not always, referred to as 'value investing'. GDC (1962, p. 27) observe that the intrinsic value approach "attempts to value a stock independently of its current market price. If the value found is substantially above or below its current price, the analyst concludes that the issue should be bought or disposed of". The essence of this approach revolves around the definition of intrinsic value. Graham and Dodd (1934, p. 17) recognize the difficulties in providing a precise definition: "intrinsic value is an elusive concept. In general terms, it is understood to be that value which is justified by the facts, e.g., the assets, earnings, dividends, definite prospects, as distinct, let us say, from market quotations established by artificial manipulation or distorted by psychological excesses". For Keynes (1936), the intrinsic value was determined by "the prospective yield of an investment over a long term of years".

Both Keynes (1936) and Graham and Dodd (1934) were profoundly influenced by the financial and economic collapse associated with the Great Depression. Both recognized the significance of the intrinsic value approach. Yet, both came to dissimilar conclusions about the prospects for this approach. Keynes (1936, p. 157) maintained that: "Investment based on genuine long-term expectation is so difficult to-day as to be scarcely practicable. He who attempts it must surely lead much more laborious days

and run greater risks than he who tries to guess better than the crowd how the crowd will behave; and, given equal intelligence, he may make more disastrous mistakes". Keynes generally views the anticipation approach as the most widely practiced and potentially the most profitable. Graham and Dodd (1934, p. 22) cautiously take a different tack:

> The field of [security analysis] may be said to rest upon a twofold assumption: first, that the market price is frequently out of line with the true value; and, second, that there is an inherent tendency for these disparities to correct themselves ... The second assumption is ... true in theory, but its working out in practice is often unsatisfactory. Undervaluations caused by neglect or prejudice may persist for an inconveniently long time, and the same applies to inflated prices caused by over enthusiasm or artificial stimulants ... The analyst must seek to guard himself against this danger as best he can.

Given these qualifications, for Graham and Dodd the intrinsic value approach is the potentially most profitable.

More on the Relative Value Approach

Despite widespread acknowledgment of the discounted cash flow methodology as the theoretically appropriate approach to specifying a common stock valuation model, ***the 'relative value' approach***, also known as the 'method of comparables' or 'companion variable' approach, is often used by practising equity analysts.[4] As English (2001, p. 289) observes: "The discounted-cash-flow (*DCF*) technique is the most familiar and ... among the most infrequently used ... The *DCF* model ... is poorly suited for comparative valuations ... and is subject to whatever difficulties the capital asset pricing model itself may have". Other sources, such as Hooke (1998, p.241), agree with this view, adding the observation that *DCF* modeling depends on a range of assumptions and "practitioners ... decided long ago not to argue interminably among themselves about the merits of one projection against another". Casual inspection of valuation practices used in 'professional' equity analysis reveals a reliance on accounting-based, as opposed to cash flow-based, quantitative measures of common stock values, e.g., Stowe *et al.* (2007). Important examples of these measures include

[4]The method of comparables is not a technique that is unique to professional security analysts. Variations of this approach can be found in real estate appraisal, tax law, and probate law where valuations of untraded real assets and privately held businesses are required.

the *P/E* and *P/BV* multiples. These measures are used despite the limitations of GAAP in producing accounting measurements that capture the 'economic' performance of the firm.

Various arguments can be made against *DCF* modeling. English (2001, p. 290–1) expands on one type of rationale, the need for professional security analysts to use '***combat finance***' techniques that:[5] "work quickly; can accommodate a large number of stocks; and are framed in the market's valuation multiple language ... Instead of discounted projected cash flows, working analysts and many professional investors rely instead on accounting-based valuation techniques, relative/multiple valuation". The world of equity analysts imposes tremendous time demands. While academic treatments approach the subject of equity valuation with the discounted-cash-flow technique, the dividend yield, the *P/E* ratio, realized and forecasted earnings, market capitalization and relative earnings forecast for the industry group compared to the S&P 500 are all prominent metrics for the practising equity analyst. Many of the important variables that are most commonly used in relative valuation analysis can be readily identified by examining the output on Bloomberg (www.bloomberg.com) or Report on Business (www.globeinvestor.com) stock information screens (see Figure 4.2 for XOM). In addition, the combat equity analyst will also have at hand the *P/BV*, *ROE* (= *E(t)/BV(t))* or *ROBBV* (Return on Beginning Book Value, *E(t)/BV(t-1)*) and other comparables such as *P/Sales*, e.g., Stowe *et al.* (2007, ch. 4).

There are a range of possible approaches to arriving at price estimates that can be associated with the method of comparables. For example, Philip Fisher did not advocate *DCF* modelling preferring to use comparative measures, especially ***the P/E multiple***, to assess whether a stock was under

[5]Graham *et al.* (1962) observed that relative valuation analysis (method of comparables) is sensible for a fund that is required to be always fully invested in common stocks. This observation can be used to provide another rationale for the widespread use of the method of comparables in professional security analysis. In effect, both the buy-side and sell-side institutions can be viewed as fully invested funds. In aggregate, the buy-side institutions hold the bulk of common stock and the sell-side institutions make a large fraction of firm revenue from supporting common stock trading activities. Unlike Warren Buffett who has the luxury of sitting on the sidelines for years if common stocks are estimated to be over-valued, the professional security analyst is, of necessity, required to support a position that is continuously invested in common stocks. Hence, even if a detailed *DCF* model determined that stocks, as a whole, were overvalued and that a shift into bonds and other assets, e.g., real estate, was indicated, such a conclusion could not be sustained by the nature of the job the professional security analyst is required to do.

or over valued relative to current stocks. Fisher would estimate a future level for the earnings per share and combine this with the P/E to determine an estimate for the future price. One example involved a stock that currently had E= \$1 and $P/E = 10$ and was forecasted to have $E = \$2$ and $P/E = 20$ in the future. The P/E is expected to increase because the current P/E is low compared to other similar companies or, possibly, to the level of the market. The earnings are forecasted to increase based on an analysis of the business. The numbers used in the example imply the common stock price will increase from \$10 to \$40. Though extremely simple, this example does capture the essence of one possible approach to relative valuation analysis. The P/E is used as a measure to compare relative value across firms. Forecasted earnings are then combined with a P/E forecast and used to provide a future price forecast.

An ***illustration of the use of P/E multiples*** for relative value analysis has to deal with the limitations of the P/E ratio as a valuation measure. In particular, the volatility in earnings over time, either from quarter to quarter or from year to year, makes it difficult to identify the appropriate P/E ratio to use. Are current earnings the appropriate value? Is some weighted average of past earnings or some forecast of future earnings a better approach? For example, consider the relative value comparison of General Motors (GM) and Ford (F) given in Poitras (2005). On 4 September 2003, GM had a P/E of 5.80 based on a price of \$41.97 and *EPS* of \$7.24 based on a trailing 12-month estimate of earnings. (Dividend payout has been held constant at \$2 per share.) This value was up significantly from the \$3.34 *EPS* that GM was earning in calendar year 2002 and the \$4.58 for the trailing 12-month earnings estimate from the previous quarter. In contrast, Ford has a P/E of 20.30 based on a stock price of \$11.94 and a trailing 12-month *EPS* of \$0.58. This is up from the trailing 12-month *EPS* of \$0.46 from the previous quarter and a loss of −\$0.54 in calendar year 2002. (After suspending the dividend, in 2003 Ford resumed the dividend at a reduced payment of \$0.40 per share that was cut to \$0.25 in 2005 and suspended again in 2006.)

A comparison of the P/E multiples in September 2003 for GM and F was decidedly favourable to GM. Even if GM was unable to sustain the \$7.24 *EPS* and fell back to, say, the previous value of \$4.58, a doubling of the P/E would still leave GM as an attractive purchase at (11.6)(\$4.58) = \$53.12 which was considerably above the current price of \$41.97. In contrast, even if F was able to double *EPS* to \$1.16, at the same P/E value as used for GM this produced an estimated value of: (11.6)(\$1.16) = \$13.46.

Similarly, a doubling of the *EPS* for F still leaves the P/E at 10.15 if the stock price does not change. The analysis raises questions about the ability of both F and GM to grow earnings. By early 2008, Ford had entered an earnings collapse with EPS for year end 2004 to 2007 being: 2004, \$1.91; 2005, \$1.08; 2006, −\$6.94; 2007, −\$1.93. In late 2003 it appeared *ex ante* that if restructuring plans underway at Ford were successful, the prospects of a significant *EPS* increase were good. *Ex post* the drop in price from \$11.94 in September 2003 to \$6.39 on 11 February 2008 is consistent with the collapse in fundamentals.

By comparison, in September 2003 GM was not experiencing the same problems as Ford but also did not have a potential earnings upside comparable to Ford. Both companies had and still have a pension overhang problem associated with previous contracts negotiated with the UAW. The immense EPS losses for both F and GM in 2006 were a consequence of accounting rule changes aimed at improving the accounting for such plans. Yet, even with the mitigating factors, a relative value analysis based on P/E multiples circa September 2003 was still decidedly favourable to GM. There was nothing in the valuation by comparables to indicate the impending problems and ultimate collapse for GM. EPS for the years 2004 to 2007 for GM were 2004, \$6.51; 2005, −\$15.13; 2006, −\$3.50; 2007, −\$68.45. The stock price decline from \$41.97 in September 2007 to \$27.12 in February 2008 was not as large in percentage terms as the drop in F but was still dramatic. Despite posting the largest annual loss ever for an automotive company (−\$38.7 billion) during 2007, as late as early 2008 it still seemed that GM was nudging back toward profitability, an essential prerequisite to permit the practical use of P/E ratios to compare value. As it turns out, the method of comparable valuation for GM was rapidly eclipsed by the unexpected global economic crisis.

Similar to the variation in *DCF* techniques there are a range of possible approaches to the relative value approach. Hooke (1998, p. 232) provides a description of the heuristic style involved: "When the analyst is asked how he justifies this valuation, the response is invariably something like 'comparable companies are trading at 20x earnings, 8x EBIT or 3x book value'." There are a number of problems with such an approach. In particular, by comparing only companies within the same line of business, no evaluation is made about whether the group of comparables is appropriately valued. For example, General Motors (GM) may be a comparably better value than Ford Motor (F) but the automobile sector as a whole may be overvalued relative to, say, non-alcoholic beverages. Another problem with the relative value approach is the heterogeneity of company characteristics

within the same group of comparables. For example, though often classified into the same group of comparables, IBM (IBM), Dell (DELL) and Hewlett-Packard (HPQ) are substantively different companies operating in a range of over-lapping but not identical product markets.

As observed, the method of comparables or relative value approach is the rule rather than the exception among professional security analysts. Though this observation sometimes comes as a surprise to the uninitiated, this point has long been recognized by academics, as reflected in a number of studies comparing the pricing performance of *DCF* models with techniques from the method of comparables. For example, S. Kaplan and Ruback (1995) examines the pricing performance of a cash flow of a *DCF* technique to value highly leveraged transactions and find that the *DCF* model performs as least as well as the method of comparables. Berkman *et al.* (2000) report similar results when *DCF* models are compared with P/E multiples to value IPO's, i.e., *DCF* methods and the method of comparables have similar accuracy. Liu *et al.* (2002) report that the use of valuation multiples, the most common approach to relative value analysis, provides superior results when compared to simplified residual income *DCF* models. Contrary to the general view that the performance of relative value analysis is sensitive to the industry being examined, Liu *et al.* find these results apply across industries.

As noted previously, Leibowitz (1999, 2000) provides some developments of single stage and multi-stage growth models that are useful for doing relative value analysis with P/E ratios. Leibowitz (2000, p. 65) observes about the simplified dividend discount model (*DDM*): "Single-phase *DDM*s can be invaluable in developing key concepts ... when kept within the bounds of their underlying assumptions. However, when parameters are pushed into realms where more-complex interactions are brought into play, simplicity alone may no longer be a sufficient virtue". The *DDM* is based on the selection of parameters for the perpetual earnings and dividend growth rate (g) and constant dividend payout ratio (b). The third parameter, the discount rate k, is determined by equilibrium conditions associated with the aggregate equity market. This leaves the equity security market to determine a price, $P(0)$, for the firm's earnings $E(0)$ and associated future stream of earnings given by g. Alternatively, it can be said that the market values the current and future stream of earnings by determining a P/E ratio or ***earnings multiple***.

At least since Wilcox (1984) it has been recognized that the simplified *DDM* can be extended to incorporate cases where the stock is making a transition to a steady state. In this case, the P/E will also change along the

time path until the steady state is reached. To see this consider the implications of substituting the simplified *DDM* into the basic *DCF* equation:

$$k = \frac{P(1) - P(0)}{P(0)} + \frac{Div(1)}{P(0)} \rightarrow k = \frac{\Delta P}{P(0)} + \left(\frac{b(1+g)}{\frac{P(0)}{E(0)}} \right) = \frac{\Delta P}{P(0)} + \left(\frac{b}{\frac{P(0)}{E(1)}} \right)$$

where $P(0)/E(1)$ is the 'forward PE ratio'. Given this, it is possible to decompose the capital gain as:

$$\Delta P = \left[\frac{P(1)}{E(1)}(1+g) - \frac{P(0)}{E(0)} \right] E(0) = \left[\frac{P(1)/E(1)}{P(0)/E(0)}(1+g) - 1 \right] P(0)$$

Letting g_{PE} be the growth rate of the P/E ratio, it follows that:

$$\frac{\Delta P}{P(0)} = [g + g_{PE}(1+g)] \rightarrow k \cong \frac{b}{P(0)/E(1)} + g + g_{PE}$$

where $\cong$ means 'is approximately equal to'. As with the inputs in the simplified *DDM*, b and g are fixed over the time period of the perpetual cash flow stream.

Recognizing that k in the basic *DCF* is the expected one period return on the equity security, this formulation permits the *ex ante* return to be decomposed into components associated with dividend payout, earnings growth, and earnings multiple expansion or contraction from the current forward P/E ratio. Recognizing that only one unknown can be determined by the single equation, in certain valuations, an estimate for k can be determined by estimating the other variables. For example, consider the approximate Coca-Cola (KO) values of $b = 0.5$, $g = 0.136$ (compounded net income growth over 2002–2006) and $P(0)/E(1) = 20$ (February 2008). If it is assumed that $[P(1)/E(1)] = [P(0)/E(0)]$ then an estimate for k is obtained as $k = (0.5/20) + 0.136 = 16.1\%$. However if it is assumed *ex ante* that the earnings multiple will fall from $P(0)/E(0) = 22.4$ to $P(1)/E(1) = 16.8$, then $k = (0.5/20) + 0.136 + (-0.25) = -8.9\%$. This *ex ante* multiple contraction could occur, for example, because of an anticipated decline in market sentiment that lowers P/E's for a broad range of stocks. Observe that this formulation of the simplified *DCF* model permits a growth rate g higher than k to be used.

In theoretical applications, it is conventional to take k as the value consistent with capital market equilibrium. Following Leibowitz (1999, 2000), this leads to the question: given k, what b and g are required to keep the P/E ratio constant over time, $g_{PE} = 0$? It is apparent that this constant P/E time path occurs when b, g and $E(1) = E(0)(1+g)$ are such that $P(0)$

is equal to the value from the Gordon model. Given $E(0)$, if the values for b and g differ from the constant time path values then equilibrium can be maintained by having the P/E ratio change over time. Consider the case of no dividend payout ($b = 0$), $k = 12\%$, and $g = 16.5\%$. In this case, equilibrium requires that $g_{PE} = -4.5\%$ from $t = 0$ to $t = 1$. Recognizing that $E(0)$ is also an input, tracing the future path of the P/E ratio requires an initial P/E starting value. As Liebowitz (2000, p. 66) observes, practical insight is gained by selecting this starting value to be consistent with a two-stage growth model where a high period of initial earnings growth is followed by a period of stable and lower growth lasting to perpetuity.

To see this, let the starting P/E ratio be $(P(0)/E(0)) = 20$. To maintain the long run equilibrium value of $k = 12\%$, after one period, $P(1)/E(1) = 19.1$ after two periods, $P(2)/E(2) = 18.24$ and so on as long as the assumed values of k, b and g still apply. The P/E is falling because the increase in stock price cannot keep pace with the earnings growth rate and still satisfy the equilibrium condition imposed by k. Independent of the starting value of the P/E ratio, the process will continue to generate a falling P/E. In such a situation, it makes sense to assume that, at some point, the high growth in earnings and falling P/E will be replaced by a period where the growth in P/E is zero and the price is determined by the Gordon model. It is sensible to price the stock during this stable growth period using a higher b than applicable to the high earnings growth period. Setting $b = .8$ and $g = 3\%$ produces a long run P/E ratio of 8.89. To achieve this value, the high growth period would last about 18 years.

7.1.2 *Macroeconomics and Equity Valuation*

Until the recent introduction of ETF's that depend directly on the price of specific commodities, such as oil or gold, the tools of fundamental equity security valuation were found within the realm of accounting and finance. As a consequence, the macro-fundamentals of common stock valuation could be overlooked. In addition, because the analysis of macro-fundamentals is done mostly by economists, the connection to equity security valuation is often underdeveloped. Following Roger Babson, it is even possible to develop ***macro-fundamentalist*** investment strategies that rely on the fundamental analysis of macroeconomic factors to identify investment opportunities. For example, a strategy of buying cyclical stocks, e.g., steels and autos, just before the upswing in the business cycle and switching to defensive stocks, e.g., consumer products and tobacco/alcohol, at the peak of the business

cycle would be macro-fundamentalist. Security selection could be incorporated to identify stocks within a sector or industry that may outperform, but this is not necessary, especially with the availability of sector ETFs. Even if the analyst is not interested in using a macro-fundamentalist investment strategy, macro variables such as GDP, interest rates and exchange rates can be important elements in the industry and company analysis associated with micro-fundamentalism.

The history of using macro-fundamentals to value equity securities predates Graham and Dodd. In particular, prior to contributions of E. L. Smith during the 1920's, it was hypothesized that stock returns would typically outperform bond returns during inflationary periods and vice versa during deflationary periods. The set of variables that a macro-fundamentalist could consider included: inflation rates, the level and term structure of interest rates, exchange rates, unemployment rates, business cycles, national and international economic growth rates, money supply growth rates and changes in the supply and demand for credit. In contrast, Whitman (1999, p. 73) reflects a widespread view among micro-fundamentalists: "One reason — but far from the only one — that value investors do not factor into their investment decisions any views about general economic outlooks, stock market outlooks, or about interest rate outlooks is that almost no one is any good at making such predictions". Though this view may be somewhat harsh, there is an apparently conflicting body of empirical and theoretical results about the relationships between macroeconomic variables and stock prices.

Much of the perceived difficulty that practitioners and 'value investors' from the vernacular world of Finance have in assessing academic studies on macro-fundamentals is captured by the rhetoric used in modern Finance. This can be illustrated by perhaps the most widely debated macro-fundamental: ***the relationship between stock prices and inflation***. The economic theorist is concerned with developing models that possess the property of money-neutrality or inflation-neutrality where real variables, i.e., price level deflated nominal variables such as stock prices and GDP, are not affected by changes in the value of the monetary unit. The assumptions of the model can then be selectively relaxed to theoretically determine if there is non-neutrality when a particular assumption is not imposed. The end-product is a range of theoretical results where there may or may not be inflation-neutrality, depending on the specific assumptions that are adopted. Such theorizing is uninteresting to the vernacular value investor wanting to know if stocks are an inflation hedge. Unfortunately, a similar confusion emerges in the empirical results.

Siegel (1998, pp. 158, 159) presents an optimistic view of the evidence on the relationship between stock prices and inflation:

> Despite the overwhelming evidence that the returns on stocks compensate shareholders for increased inflation, investor acceptance of stocks as inflation hedges has undergone significant changes. In the 1950s, stocks were praised as hedges against rising commodity prices. For that reason, many investors stayed with stocks, despite witnessing the dividend yield on equities fall below the interest rate on bonds in 1958 for the first time ever. In the 1970s, however, stock prices were ravaged during the inflation triggered by OPEC oil price hikes and perpetuated by bad monetary policy. As a result, it became unfashionable to view equity as an effective hedge against inflation.

Siegel explains the poor performance of stocks in certain periods of high inflation with the claim that stocks are not adequate 'short-term' hedges against inflation but will provide long-term protection. Following Smith (1924), Siegel believes that stocks will outperform bonds over periods of both rising and falling prices and, as a consequence, provide the best inflation protection among financial assets.

While it may be comforting to claim that there is 'overwhelming evidence' for stocks being an inflation hedge, this was little comfort to those directly impacted by the poor performance of stocks during the high inflation of the 1970s.[6] To the uninitiated, it may seem somewhat odd that two important variables, such as stock returns and inflation, would be negatively related in the short-term but positively related in the long-term. What is the long-term but a sequence of short terms?[7] Interpretation of the empirical relationship between common stock investment performance and inflation is complicated by the use of a number of different conventions to define the stock variable in empirical studies. For example, Rapach (2002) examines the long-run response of real stock prices to a permanent inflation

[6]Framing the discussion in terms of 'common stocks being an inflation hedge' raises a semantical question about the usage of the word 'hedge'. In the analysis of derivative securities, a 'hedged' position is protected against changes in a particular random variable, in this case inflation. This could mean the security value does not change when the random variable changes or that the position value will not decrease when the variable changes, depending on the usage. In either case, if there is a short-run negative impact on the value of the position then it is semantically incorrect to refer to there being a hedge in place. The case of stocks being a 'hedge' against inflation uses the word 'hedge' in the sense that the real return on the capital invested in common stocks does not change as (expected) inflation changes. As such, evidence of a negative short-term relationship between nominal stock returns and inflation violates the 'hedge' condition.

[7]The empirical question of what length of time constitutes a short-run and a long-run is addressed in Hakkio and Rush (1991).

shock (where 'real stock prices' are nominal stock prices divided by a price index such as the producer or consumer price index). In contrast, Anari and Kolari (2001) use nominal stock prices, while Sharpe (2002) uses real stock returns. The objectives of empirical work also vary, with studies such as Anari and Kolari (2001) and Rapach (2001, 2002) focusing just on the empirical fit between stock performance and inflation while others, such as Sharpe (2002), are concerned with explaining the causal mechanism, e.g., the impact of inflation on earnings growth.

Despite Siegel's claim for overwhelming evidence in favor of stocks being a long-run inflation hedge, Anari and Kolari (2001, p. 588) observe that "few studies" report such evidence and these studies use very long sample periods, e.g., Boudoukh and Richardson (1993) use a sample period covering 1802–1990.[8] Results from sample periods of 100–200 years are of questionable usefulness for most practical security analysis applications. In contrast, there are a large number of studies that report a negative short-term relationship between inflation and stock performance, e.g., Bodie (1974), Geske and Roll (1983). This negative relationship is usually considered anomalous because the impact of the "Fisher effect" is expected to be positive. To see this, consider the decomposition of the nominal stock return into the real return and inflation. (Following convention, the $t = 0$ conditional expectation involved in the rate of return calculations is not explicitly stated but is understood.) Letting *RR(t)* be the real return and $\pi(t)$ the aggregate price level at time t: $p(t)$ = the security price; $Div(t)$ = the dividend; $R(t)$ = the nominal return; $RR(t)$ = the real return $\pi(t)$ = the aggregate price level, and $\Pi(t)$ = the inflation rate $= (\pi(t) - \pi(t-1))/\pi(t-1) = \Delta\pi/\pi(t-1)$:

$$\frac{P(t-1)}{\pi(t-1)} = \left[\frac{\frac{P(t)}{\pi(t)} + \frac{Div(t)}{\pi(t)}}{1 + RR(t)}\right] \rightarrow$$

$$1 + RR(t) = \frac{P(t) + Div(t)}{P(t-1)} \div \frac{\pi(t)}{\pi(t-1)} = \frac{(1 + R(t))}{(1 + \Pi(t))}$$

[8] Anari and Kolari (2001) also present evidence in favor of a positive long-run relationship between stock prices and inflation, i.e., that stock prices are a long-run inflation hedge. The sample in this study uses monthly observations from 1953–1999 for six countries. Using a sample of sixteen countries, Rapach (2002) presents evidence in favor of long-run neutrality that could also be interpreted as consistent with a positive long-run real stock price response to a permanent inflation shock. Rapach finds little evidence in favor of a negative long-run relationship.

In this framework, if stocks are a perfect inflation hedge then real returns will be constant through time which requires nominal returns, R, to adjust upwards to offset changes in inflation. This requires stock returns and inflation rates to be positively related.[9]

The considerable evidence that stock returns and inflation are negatively related in the short-run has produced numerous studies aimed at explaining the process by which inflation impacts the real return. For example, Sharpe (2002) presents empirical evidence that the negative relation between real stock returns and expected inflation is due to a combination of two effects. A rise in expected inflation is associated with lower expected earnings growth that, in turn, produces higher required real returns. Sharpe estimates that an increase of one percentage point in expected inflation raises real stock returns about one percentage point which implies a significant fall in nominal stock prices; hence, there is a negative short-term relationship between stock returns and inflation. Yet, the impact of expected inflation on expected real stock returns is also observed in real long-term Treasury bond yields implying that expected inflation will have little effect on the real long-run equity premium. This suggests that the impact of expected inflation on interest rates is another mechanism through which inflation can impact stock prices, e.g., by increasing borrowing costs and dampening sales on credit higher interest rates can have a significant effect on earnings.

Disentangling the impact of inflation on stock prices is sufficiently complicated that it is not surprising there is considerable disagreement on the mechanisms involved. Part of the disagreement is due to a failure to recognize that inflation can have a range of causes. Though monetarists are inclined to argue that 'inflation is always a monetary phenomenon', it is possible for inflation to originate from real sector shocks, especially oil price shocks. Inflation originating from this source can produce a negative impact on earnings and subsequent reduction in stock prices, as observed by Sharpe (2002), Jones and Kaul (1996), Fama (1981) and others. However, inflation

[9]Taking a log approximation produces the familiar result: $RR(t) \cong R(t) - \pi(t)$. In other words, the real interest rate can be approximated by subtracting the inflation rate from the nominal interest rate. Numerous empirical studies have been conducted to examine the impact of inflation on nominal interest rates. These studies usually proceed by assuming a constant real rate and then fitting a distributed lag of inflation rates on nominal interest rates. In cases where the assumption that the real rate is constant is justified, this is usually done by having the real rate being determined by 'real economic forces' that are determined outside the model. For example, the economy can be assumed to be on a steady state growth path.

originating from largely monetary sources will likely operate through a different economic mechanism. For example, Henry (2002) presents empirical evidence that levels of inflation above 40% produce a different impact on stock prices than inflation levels below 40%. As high levels of inflation are almost always due largely to excessive monetary expansion, the source of the inflation will influence the type of impact on stock prices.

If the source of the inflation matters for the impact on stock prices, then there will likely be variation in the impact of inflation across firms. Developing the notion of ***'money illusion'*** contained in Modigliani and Cohn (1979), Ritter and Warr (2002) present evidence that inflation confuses investors in two important ways: the discount rate to use in valuing common stocks is miscalculated; and the capital gains associated with the reduction in the real value of debt and other nominal contracts due to inflation is underestimated. The latter source of confusion will produce a variation in the impact of inflation across firms. Ritter and Warr make the argument that the bull market that started in 1982 and continued to 1999 was due to the market undervaluation of common stocks associated with the 'inflation illusion' of the 1970s. The reduction in inflationary expectations starting in the early 1980s dissipated the inflation illusion resulting in the emergence of corrected valuations. The resulting abnormal gains skewed the appearance of the equity risk premium and eventually resulted in overvalued common stocks as the bull market progressed to its logical conclusion in 1999.

This discussion makes it apparent that inflation is a complicated and pervasive factor in common stock valuation. Analysis of the role of inflation on stock prices during this and other periods suggests that the degree of hedging protection provided by stocks is affected by the source(s) of the inflationary pressures. Following Ritter and Warr (2002), inflation can also induce 'money illusion' resulting in valuation errors associated with incorrect estimation of capitalization rates and the real value of nominal contracts. In addition, inflation may have an impact on tax burdens, interest rates and investor risk perceptions. The impact on tax burdens can occur, for example, due to the impact of progressive tax rates resulting in a higher real tax burden as inflation-induced increases in nominal corporate earnings are taxed at higher marginal rates. Assuming 'money illusion', higher nominal interest rates created by higher levels of inflationary expectations increase the attractiveness of bonds relative to stocks causing the composition of portfolios to be allocated more toward fixed income securities at the expense of stocks. Finally, inflation makes investing in common stocks a riskier, more uncertain proposition, necessitating a higher real risk premium to be paid to justify common stock purchases.

Even though Ritter and Warr (2002) makes fascinating reading, the lessons for equity security valuation are largely limited to the inflation adjusted presentation of the 'residual income' model. It is difficult to draw lessons from the knowledge that a sustained period of high inflation resulted in 'valuation errors' that produced abnormal returns in subsequent periods as inflationary expectations readjusted and valuation errors dissipated. Even if the story is correct, the *ex post* investment horizon was 1982–1999 and the problems of when to buy, what to buy and when to sell are left unresolved. The analysis does not proceed much beyond the conventional 'averaging methodologies' of modern Finance, e.g., making distinctions between 'all firms' and 'high debt firms'. A similar comment applies to the general use of macro-fundamentals to formulate investment strategies. The investment horizons are typically long term, the buy and sell signals are difficult to determine and the mechanisms for identifying the appropriate securities to buy are unclear. The implied strategies usually focus on stock groups, e.g., industry groupings, and do not deal with individual stock values.

To the uninitiated, one of the most potentially attractive macro-fundamental investment strategies involves ***the use of business cycle predictions*** to either 'time the market' or to trigger 'industry rotation' portfolio reallocation. Siegel (1998, p. 169) describes the basic issues:

> The stock market ... responds quite powerfully to changes in economic activity ... Although there are many "false alarms" like 1987, when the market collapse was not followed by a recession, stocks almost always fall prior to a recession and rally rigorously at signs of an impending recovery. If you can predict the business cycle, you can beat the buy-and-hold strategy ... But this is no easy task ... to make money by predicting the business cycle, you must be able to identify peaks and troughs of economic activity *before* they actually occur, a skill few if any economists possess.

As numerous studies have demonstrated, aggregate stock market indexes are a leading, if somewhat noisy, indicator of business cycles. Putting aside the issues associated with how the business cycle is defined and identified, virtually all recessions and recoveries are preceded by corresponding stock market movements (see Table 7.1).[10] Increases of 8% or greater in the

[10]The relevant website for information about business cycles is www.nber.org/cycles. The National Bureau of Economic Research is a private research organization that is responsible for dating business cycles. The history of the organization stretches back to 1920 and has produced, in addition to the analysis of economic conditions, seminal contributions by Wesley Mitchell, Arthur Burns and Frederick Macaulay.

aggregate stock index always occur prior to the trough of the cycle being reached, though decreases of 8% or greater often do not happen before the peak of the cycle is reached.

The gains to correct ***business cycle timing*** can be substantial, e.g., Siegel (1998, p. 176) estimates that a strategy of switching from 100% invested in stocks to 100% in Tbills four months prior to a business-cycle peak and switching back to 100% invested in stocks four months prior to the trough would have produced an excess return of 4.8% per year over the postwar period. Being able to predict peaks and troughs one month prior would have produced a 1.8% per year excess return. The bulk of these gains accrue to predicting troughs. Given the strong connection between the business cycle and corporate earnings, similar gains could be achieved from sector or individual stock selection strategies. Siegel (1998, pp. 179, 180) provides a useful synopsis of these types of strategies:

> Stock values are based on corporate earnings, and the business cycle is a prime determinant of these earnings. The gains of being able to predict the turning points of the economic cycle are enormous. Yet doing so with any precision has eluded economists of all persuasions. And despite the growing body of economic statistics, predictions are not getting much better over time.
>
> The worst course an investor can take is to follow the prevailing sentiment about economic activity. This will lead to buying at high prices when times are good and everyone is optimistic, and selling at the low when the recession nears its trough and pessimism prevails.
>
> The lessons to investors are clear. Beating the stock market by analyzing real economic activity requires a degree of prescience that forecasters do not have. Turning points are rarely identified until several months after the peak or trough has been reached. By then, it is far too late to act in the market.

This wisdom is not unique to Siegel (1998), strikingly similar versions can be found in the writings of Warren Buffett, Philip Fisher, and Benjamin Graham, among others. In the absence of value-enhancing insights into business cycles, equity security valuation and selection has to depend heavily on micro-fundamentals.

7.1.3 *Techniques of Value Investing*

There is so much confusion about the precise definition of value inventing that it is not surprising someone as well informed about investing as Warren Buffett has a slanted view of this approach. For example, consider two recent books on 'value investing', Whitman (1999) and Greenwald *et al.*

Table 7.1 NBER Business Cycle Troughs and Peaks.

Business cycle expansions and contractions
U.S. business cycle expansions and contractions
Contractions (recessions) start at the peak of a business cycle and end at the through.

Business cycle reference dates		Duration in months			
Peak	Trough	Contraction	Expansion	Cycle	
Quarterly dates are in parentheses		Peak to trough	Previous trough to this peak	Trough from previous trough	Peak from previous peak
	December 1854 (IV)	—	—	—	—
June 1857(II)	December 1858 (IV)	13	30	40	—
October 1860(III)	June 1861 (III)	8	22	30	40
April 1865(I)	December 1867 (I)	32	46	78	54
June 1869(II)	December 1870 (IV)	18	18	36	50
October 1873(III)	March 1879 (I)	65	34	99	52
March 1882(I)	May 1885 (II)	30	36	74	101
March 1887(II)	April 1888 (I)	13	22	35	60
July 1890(III)	May 1891 (II)	10	27	37	40
January 1893(I)	June 1894 (II)	17	20	37	30
December 1095(IV)	June 1897 (II)	18	18	36	35
June 1899(III)	December 1900 (IV)	18	24	42	42
September 1902(IV)	August 1904 (III)	23	21	44	39
May 1907(II)	June 1908 (II)	13	33	46	56
January 1910(I)	January 1912(IV)	24	19	43	32
January 1913(I)	December 1914 (IV)	23	12	35	36
August 1918(III)	March 1919 (I)	7	44	51	67
January 1920(I)	July 1921 (III)	18	10	28	17
May 1923(II)	July 1924 (III)	14	22	36	40
October 1926(III)	November 1927 (IV)	13	27	40	41
August 1929(III)	March 1933 (I)	43	21	64	34
May 1937(II)	June 1938 (II)	13	50	63	93
February 1945(I)	October 1945 (IV)	8	80	88	93
November 1948(IV)	October 1949 (IV)	11	37	48	45
		—	—	—	—
April 1960(II)	February 1961 (I)	10	24	34	32
December 1969(IV)	November 1970(IV)	11	106	117	116
November 1973(IV)	March 1975 (1)	16	36	52	47
January 1980(I)	July 1980 (III)	6	58	64	74
July 1981(III)	November 1902 (IV)	16	12	28	18
July 1990(III)	March 1991(I)	8	92	100	108
March 2001(I)	November 2001 (IV)	8	120	128	128
December 2007 (IV)			73		81
Average all cycles:					
1854–2001 (32 cycles)		17	38	55	56’
l854–1919(16 cycles)		22	27	48	49”
1919–1945(6 cycles)		18	35	53	53
1945–2001 (10 cycles)		10	57	67	67

Source: NBER.

(2001). Whitman (p. 3) claims: 'Value investing is different from other kinds of investing ... The underlying approaches to and goals of value investing differ quite materially from those ... that are part of fundamental analysis as described in the various editions of *Security Analysis* by Benjamin Graham, David Dodd, and Sidney Cottle, popularly known as Graham and Dodd". Greenwald *et al.* (pp. 3, 4) take precisely the opposite view and refers to: "Value investing in the manner initially defined by Benjamin Graham and David Dodd ... A value investor estimates the fundamental value of a financial security and compares the value to the current price ... If the price is lower than value by a sufficient margin of safety, the value investor buys the security. We can think of this formula as the master recipe of Graham and Dodd value investing".

Modern Finance academics identify value investing with determining whether key ratios such as the dividend yield, the P/E and price to book value of equity (P/BV) ratios are low relative to other stocks. Typically, value stocks have high dividend yield, low P/E and low P/BV ratios compared to other stocks while stocks with low dividend yield, high P/E and high P/BV ratios are considered to be 'growth stocks'. These criteria are often supplemented by the requirement that stocks with zero or negative criteria values are excluded from comparison. For example, Dimson *et al.* (2002, p. 139) observe: "To simplify computation of the value-growth premia, it is common to focus on companies whose dividends, earnings or book values are all positive before entering an index of value or growth stocks". To practitioners, the exclusion of stocks that have negative earnings or no dividend payout may seem odd in a comparison of growth vs. value stocks. However, as with most 'knowledge' evaluations, it is better to examine the results that are produced rather than to condemn the methodology at the outset. Modern Finance is concerned primarily with obtaining information about averages across stocks, not with the evaluation of individual stocks.

Dimson *et al.* (2002, chap. 10) provides an overview of results for stock groups that are sorted annually according to the modern Finance value measures. To assess the performance of high dividend yield, over a 1926–2000 sample, Dimson *et al.* identify the 30% of US stocks that had the highest yield. The annualized return over the sample is compared with the 30% of lowest dividend yield stocks. Stocks paying no dividends are not included in the sample. The results of the averaging exercise indicate: "The annualized returns on the high [dividend] yield companies is 12.2 percent, compared with 10.4% for the low [dividend] yield stocks". This difference is too large to be explained by the difference in the tax rates for dividend

income versus capital gains. These results about the ***long-term*** relationship between dividend yields are consistent with those obtained from other studies, e.g., Litzenberger and Ramaswamy (1979), Hodrick (1992), Naranjo *et al.* (1998), and Wu and Wang (2000), to name only a few. Yet, these results are contradicted by Wolf (2000, p. 29) which uses a more sophisticated estimation procedure and a post-World War-II (WWII) sample to determine: "no convincing case for the predictability of stock returns from dividend yields can be made".

Disentangling the connection between stock returns and dividend yields is complicated by a number of issues. In particular, there is the substantive change in dividend yields that has emerged in the post-WWII period (see Fig. 4.1). Starting around 1950, there has been a secular decline in dividend yields relative to nominal bond yields. In 1958, dividend yields fell below bond yields for the first time challenging conventional wisdom that this was a strong signal that stocks were overvalued. Since 1958, dividends yields have stayed below, usually substantially below, the nominal bond yield. In addition, at least since Lintner (1956), it has been recognized that firms tend to maintain a relatively stable level of dividends over time, increasing dividends to the 'target payout ratio' only when an increase in earnings is judged to be permanent. This means that the 'true' dividend is not directly observed, creating an unresolved statistical 'errors in variables' problem. In addition, there are theoretical difficulties with the relationship, i.e., Miller and Modigliani (1961) demonstrated that, in perfect capital markets, the ***dividend policy of the firm is irrelevant*** to the firm's value. All this creates a complicated backdrop to the statistical evidence of a positive long-term relationship between dividend yield and stock returns.

The types of problems that arise with the 'evidence' on dividend yields does not extend to another element of the modern Finance model of value investing: ***the price-to-book ratio*** *(P/BV)*. The statistical evidence in favor of a positive relationship between the *P/BV* ratio and future stock returns is impressive. For example, Dimson *et al.* report results for a 1926–2000 sample of US stocks sorted annually by the price-to-book ratio or, in modern Finance terminology, the "book-to-market" ratio. Dimson *et al.* find: "The high book-to-market portfolio contains the 30 percent of stocks that rank highest on this criterion; the low book-to-market group contains the 30 percent of stocks that rank lowest ... The annualized return from 1926-2000 is 13.7 percent for value [high book-to-market] stocks and 10.2 percent for growth [low book-to-market] stocks". Similar empirical results have been reported in numerous other studies. For example, Piotroski

(2000) demonstrates the excess return performance of price-to-book portfolios can be improved by using other accounting information to include only financially healthy firms. For a sample of Japanese firms, Garza-Gomez (2001) demonstrate that higher levels of risk play only a weak role in the performance of price-to-book portfolios. In contrast to Piotroski, Griffin and Lemmon (2002) present evidence that the price-to-book effect could be associated with the presence of financially distressed firms.

Confronted with overwhelming statistical evidence, academic adherents of modern Finance have been driven to provide theoretical explanations for the price-to-book effect. Dimson *et al.* (2002, p. 141) summarize these developments:

> Why have value stocks outperformed growth stocks? There are three schools of thought. One is that investors become enthused about companies with good prospects, and bid their prices up to unrealistic levels ... Another possibility is that since value stocks are often distressed companies, their higher returns are simply a reward for the greater risks they impose on investors ... The third possibility ... is that the outcome is simply a chance event: Siegel (1998) attributes the post-1963 value-growth premium to the 1973–83 oil price rise and its impact on large oil firms, an event that is not recurrent.

The first explanation is consistent with Fisher's observations about 'stocks going in and out of favor' or Giffen's 'estimation of the public'. At any given time there are stocks that are overpriced and the bulk of these would appear as high price-to-book firms. While there may be some outstanding companies in the high price-to-book group, these companies would be less likely to appear than 'overvalued' companies.

The investment strategy associated with 'modern Finance value investing' differs significantly from the portfolios of 'value investors' motivated by Graham and Dodd. Assuming that the reported statistical results are correct, then what process is required to translate these results into superior portfolio performance? To generate the observed statistically significant excess returns associated with, say, low price-to-book ratios, the analyst begins with a large sample of stocks, e.g., the S&P 500 or all stocks traded on the NYSE. This sample of stocks is then segmented into, say, decile groupings ranked by P/BV (or P/E or dividend yield). The equally weighted portfolio of stocks defined by the decile with the lowest P/BV is then purchased on the start date, say, January 1. Following Piotroski (2000), a further refinement can be achieved by doing additional filtering of the stocks in the portfolio using other types of accounting information

to ensure that only 'financially strong', low P/BV firms are selected. The portfolio is then held for a fixed period, say one year. The sample is then resorted and firms no longer in the lowest P/BV decile are sold and those now in the lowest decile are purchased. This process is repeated until the investment horizon is reached and the portfolio is liquidated.

A key step in this modern Finance value investing scenario occurs with the annual resorting process. According to Philip Fisher (1975, p. 43) this resorting process would result in trading activities that are ill-advised:

> In my opinion, there are important reasons ... stocks [of outstanding companies] should be retained, even though their prices seem too high: If the fundamentals are genuinely strong, these companies will in time increase earnings not only enough to justify present prices but to justify considerably higher prices. Meanwhile, the number of truly attractive companies in regard to the first three dimensions is fairly small. Undervalued ones are not easy to find. The risk of making a mistake and switching into one that seems to meet all of the first three dimensions but actually does not is probably considerably greater for the average investor than the temporary risk of staying with a thoroughly sound but currently overvalued situation until genuine value catches up with current prices.

Armed only with heuristic arguments derived from years of market experience, Fisher (1975, p. 40) observes that many investors can be found:

> who over the years have prospered mightily from holding the right stocks for considerable periods of time. Their success may be due to understanding of basic investment rules. Or it may be due to just plain good luck. However, the common denominator in this success has been the refusal to sell certain unusual high-quality stocks simply because each has had such a sharp fast rise that its price-earnings ratio [or price-to-book ratio] looks high in relation to that to which the investment community has become accustomed.

While both the Graham and Dodd value investor and the modern Finance value investor or the Fisher value/growth investor may use the price-to-book ratio to do the security analysis used to identify investment opportunities, the implementation of the investment strategies differs dramatically.

Philip Fisher sees 'value' in companies, not in valuation ratios. It is not that Fisher ignores this information, rather Fisher feels companies that are strong on the first three dimensions can still be successful investments even if valuation ratios indicate the stock is 'overpriced'. Fisher is a long term buy-and-hold investor in the common stock of a small number of companies. This is in contrast with both the modern Finance value investor and the Graham and Dodd value investor. Following Greenwald

et al. (2001, p. 3) there are three key characteristics to being a ***Graham and Dodd value investor*** : the belief that market prices at any point in time are subject to "significant and capricious movements"; that there are 'intrinsic values' for securities that are relatively stable, that can be identified through fundamental analysis and that the market price will ultimately come to reflect; and, an investment strategy of estimating the intrinsic value and purchasing the security when this estimated intrinsic value is below the market price by an appropriate '***margin of safety***' will produce superior returns in the long-run. This approach may involve holding a sizable number of securities and selling the securities when market prices are at or above intrinsic value. This may or may not involve a long-term buy-and-hold.

Given the conventional distinction between 'value' and 'growth' strategies, can Fisher be considered a value investor? The essence of Fisher's approach is well-defined because there is only the opinions of one person to examine. The emphasis on company characteristics and the overall approach is concerned with the identification of a small number of high growth companies. Hence, Fisher can be considered a growth stock investor. However, there are a large number of Graham and Dodd value investors that adhere to the key characteristics of the intrinsic value approach to investing but do have significantly different styles of implementing the approach. These styles vary across: methods of selecting stocks for valuation; techniques for estimating the intrinsic value; criteria for setting the margin of safety; restrictions on the portfolio specification and so on. Included in the list of possible areas of divergence within the value investing category are: the amount of diversification; how the value weights for each security in a portfolio are determined; whether fixed income securities will be included in the portfolio; and, criteria for deciding when to sell the security.

Fisher took an individualized approach to security selection. As such, even with a broad interpretation, it is not possible to classify Fisher as a Graham and Dodd value investor, if only because of Fisher's lack of adherence to the margin of safety principle. Fisher will hold stocks that are 'overvalued' using measures such as the average P/E ratio for all stocks. The objective for Fisher is to find excellent companies not to troll the market for stocks that are undervalued using a DCF model. In a sense, Fisher does see excellent companies as 'undervalued' even if the conventional valuations using, say, the P/E ratio would indicate otherwise. There is a margin of safety, but this is associated with the market's undervaluation of the true long-run strength of the company, not with an explicit DCF calculation. Whether Fisher is considered to be a value investor is more a question of semantics than of substance. In stressing the connection between company

strength and conservation of investment value, ***Philip Fisher demonstrates the qualities of a value investor***. In the end, it is difficult to escape Warren Buffett's observation that the emphasis on making a distinction between value and growth investing styles can be misguided.

7.2 Interpreting Financial Statements

7.2.1 *Financial Statement Analysis*

One of the tenets of GDC (1962, p. 105) is "All security analysis involves the analysis of financial statements". Warren Buffett's recommendation of the *DCF* model raises a legitimate question about how 'cash flows' are determined from the accounting and other information provided by the firm. Even Fisher's focus on the characteristics of the business requires interpreting information from the firm's financial statements in order to make assessments about the performance of the business. Penman (2001, p. 12) makes the observation: "Payoffs from operations have to be measured. Are they cash inflows minus cash outflows (net cash flows)? Are they revenues minus expenses (net income)? If so, how is revenue measured and how is expense measured? Specifying and measuring the payoffs is critical to valuation [i.e., fundamental] analysis. It is an accounting issue". The subject of financial statement analysis is concerned with the various methods for extracting information from the financial statements of the firm. This includes both the current and past statements, as well as forecasts of future statements, i.e., pro forma analysis.

Under US generally accepted accounting principles (GAAP), the accounting statements that are typically available for analysis are: ***the balance sheet, the income statement, the cash flow statement, and the statement of stockholders' equity***. In addition to these statements, there is also the footnotes and other supplementary information that is provided along with the four basic statements. Best practice in the preparation of the annual report for the firm is to expand and detail the information that is contained in the financial statements. For example, the annual reports of the major Canadian banks contain a detailed discussion of the various sources of risk that face the firm, including value-at-risk estimates for the range of major market risks facing the firm arising from interest rates, exchange rates and commodity prices. Though a strict interpretation of financial statement analysis includes only 'analysis of the financial statements', this 'analysis' can be greatly aided by considering or incorporating the discussion that is included in the body of the annual report or 10-K that is being used as the source of the financial statements, especially

the Management Discussion and Analysis section. When such information is considered, the analyst cannot lose sight of the possible biases that can arise if the various pronouncements of the firm's management are taken at face value.

Following Penman (2001, ch. 2), analysis of financial statements requires discussion of both ***form*** and ***content***. Form deals with the manner that the statements, and parts of the statements, fit together. Content deals with the various line items that are reported in the statements. Except for specific items of interest, detailed consideration of content falls within the realm of accounting theory and practice. For U.S. companies, content has been largely determined by the GAAP formulated by the Financial Accounting Standards Board (FASB). Since October 2002, a process of convergence in the accounting rules used in most international jurisdictions, set by the International Accounting Standards Board (IASB), and GAAP rules, determined by FASB has been underway. More information can be obtained from either the FASB (www.fasb.org) or IASB (www.iasb.org.uk) websites. There are numerous excellent sources on GAAP for financial accounting, e.g., Bernstein (1989). Accounting principles for securities traded outside the U.S. are subject to accounting rules for those jurisdictions, with the International Accounting Standards Board (IASB) providing guidance in many non-US jurisdictions.[11] While there are some jurisdictions that do impose 'revealing' accounting standards, e.g., Canada and Singapore, it is unwise to expect the type of company information provided under US accounting standards to be available when foreign securities are being considered.

Though there are numerous constraints imposed by GAAP on financial accounting practices, ***GAAP is not a straightjacket***. There is some scope for working within GAAP to present accounts that are the most representative of the activities of the firm. This means that companies involved in different businesses or in more than one line of business will present accounts that do not have exactly the same content, e.g., because there is no information to report in certain content categories. There may

[11] An American depository receipt (ADR) is a security that represents a claim to shares of a foreign security, almost always a common stock listed and traded on an exchange outside the United States. Conceptually, an ADR can be viewed as an all equity financed closed end fund that holds a foreign security as the sole asset of the fund. While publicly traded on U.S. exchanges, an ADR is only subject to SEC reporting requirements on the receipt. The company associated with the foreign security is subject to reporting requirements imposed by the foreign market in which the security trades.

also be some cosmetic differences in form. This is illustrated in Table 7.2 that provides the "Consolidated Statement of Income" (income statement) for Ford Motor Company.[12] The conventional form of the income statement has been adjusted in the Ford case to recognize two distinct parts of the business: automotive; and, financial services. In addition to being the source of the important "net income" figure, i.e., the earnings generated by the firm for equity claimholders, the income statement contains numerous other items that can be used in the evaluation of company performance.

A model format for the income statement is given in Penman (2001, p. 33), based on the financial statement of Dell Computer (DELL):[13]

$$\textit{Net Revenue} - \textit{Cost of Goods Sold} = \textit{Gross Margin}$$
$$\textit{Gross Margin} - \textit{Operating Expenses}$$
$$= \textit{Operating Income before Tax } (\textit{EBIT})$$
$$\textit{Operating Income before Tax} - \textit{Interest Expense} = \textit{Income before Taxes}$$
$$\textit{Income before Taxes} - \textit{Income Taxes}$$
$$= \textit{Income after Taxes } (\textit{and before Extraordinary Items})$$
$$\textit{Income before Extraordinary Items} + \textit{Extraordinary Items} = \textit{Net Income}$$
$$\textit{Net Income} - \textit{Preferred Dividends} = \textit{Net Income Available to Common}$$

In the Ford (F) income statement, 'net revenue' is replaced by 'sales' for the automotive component and 'revenues' for financial services. Other variations are also possible. For example: prior to be taken over by CVRD, Alcan Inc. (AL) used a general category for 'Revenues' and then provided subsections for 'Sales and Operating Revenues' and 'Other Income'; and, Transocean Inc. (RIG) reports a line item for 'Operating Revenues'. In Table 7.3, U.S. Steel Group (X) reports a general category for 'Net Sales' instead of 'Net Revenue' and for 'Cost of Goods Sold' uses 'Operating

[12]As previously, the specific selection of Ford is for pedagogical purposes and not as a model for how accounts are to be prepared or because it represents a viable security selection opportunity. If anything, the method used by Ford is somewhat atypical and confusing due the difficulties of presenting both financing and automotive production elements of the business. Observe that the income statement can be referred to using other terminology. For example, U.S. Steel uses 'Consolidated Statement of Operations' (see Table 7.3).

[13]In the following, ticker symbols appear after the company names to facilitate the retrieval of the company information from an appropriate information source such as *www.bloomberg.com*. In all cases, the information provided is obtained from the financial statements provided in the 10-K or annual reports of the companies.

Table 7.2 Ford Motor Company, Consolidated Statement of Income, 2006–2008.

(in millions, except per share amounts)	2008	2007	2006
Sales and revenues			
Automotive sales	$129,166	$154,379	$143,249
Financial services revenues	17,111	18,076	16,816
Total sales and revenues	146,277	172,455	160,065
Costs and expenses			
Automotive cost of sales	127,103	142,587	148,866
Selling, administrative and other expenses	21,430	21,169	19,148
Goodwill impairment	—	2,400	—
Interest expense	9,682	10,927	8,783
Financial services provision for credit and insurance losses	1,874	668	241
Total costs and expenses	160,089	177,751	177,038
Automotive interest income and other non-operating income/(expense), net	(755)	1,161	1,478
Automotive equity in net income/(loss) of affiliated companies	163	389	421
lncome/(Loss) before Income taxes	(14,404)	(3,746)	(15,074)
Provision for/(Benefit from) income taxes (Note 19)	63	(1,294)	(2,655)
lncome/(Loss) before minority interests	(14,467)	(2,452)	(12,419)
Minority interests in net income/(loss) of subsidiaries	214	312	210
lncome/(Loss) from continuing operations	(14,681)	(2,764)	(12,629)
lncome/(Loss) from discontinued operations (Note 20)	9	41	16
Net income/(loss)	$(14,672)	$(2,723)	$(12,613)
Average number of shares of Common and Class B Stock outstanding	2,273	1,979	1,879
Amounts per share of common and class B stock (Note 21) basic income/(loss)			
lncome/(Loss) from continuing operations	$(6.46)	$(1.40)	$(6.73)
lncome/(Loss) from discontinued operations	—	0.02	0.01
Net income/(loss)	$(6.46)	$(1.38)	$(6.72)
Diluted income/(loss)			
lncome/(Loss) from continuing operations	$(6.46)	$(1.40)	$ (6.73)
lncome/(Loss) from discontinued operations	—	0.02	0.01
Net income/(loss)	$(6.46)	$(1.38)	$(6.72)
Cash dividends	$—	$—	$0.25

Note: There are accompanying notes that are also part of the financial statements.

Expenses', which are given in six categories the most important being 'Cost of Sales'. Banks use a somewhat different format. For example, the income statement provided in the annual report for the Royal Bank of Canada (RY), which is prepared under Canadian GAAP, has two general categories, one for 'interest income' and another for 'other income'. Each of these categories contains numerous subheadings that decompose income by source.

The basic problem of financial statement analysis is to translate accounting numbers into a viable economic interpretation of the operations of the firm. As such, the cash flows in *DCF* analysis can be interpreted as the economic profits generated by the firm. In economics, profits are defined as revenues minus costs. Subject to adjustments for accruals, revenues can usually be taken directly from the income statement. However, the precise cost items to include in the calculation of economic profits is not obvious. The income statement provides various possible methods of determining costs. Inclusion of all cash and accrual cost items results in ***the income statement accounting relationship***:

$$Revenue - Costs = Net\ Income.$$

After deduction for preferred dividends, this is the 'cash flow' or net income or 'earnings' available to common shareholders. Under clean surplus accounting, these earnings are either paid out as dividends or retained by the firm and used to make additions to the assets of the firm. Yet, there are legitimate reasons to consider other ways of calculating economic profits than earnings available to common shareholders. For example, 'depreciation costs' are a non-cash expense that is calculated according to accounting rules. The value used may or may not represent the economic depreciation of assets.

The various possible methods of calculating revenues minus costs is facilitated by the accounting procedures for reporting cost items. As such, the revenue item usually has considerably less components than the cost line. The components of cost almost always include four key items: cost of goods sold; selling general and administrative expenses; depreciation, depletion and amortization; and, income taxes. If the firm has engaged in borrowing activities then there will be another item associated with the 'interest expense' or 'net interest expense', with both interest revenue and interest expense usually being reported in the latter case. For example, in Table 7.2, Ford reports a combined interest expense item for both the automotive and financial services divisions, together with an intreest revenue component for

Table 7.3 United States Steel Corporation Consolidated Statement of Operations.

	Year ended 31 December		
(Dollars in millions)	2008	2007	2006
Net sales			
Net sales	$22,466	$15,701	$14,752
Net sales to related parties (Note 25)	1,288	1,172	963
Total	23,754	16,873	15,715
Operating expenses (income)			
Cost of sales (excludes items shown below)	19,723	14,633	12,968
Selling, general and administrative expenses	625	589	604
Depreciation, depletion and amortization (Note 1)	605	506	441
Income from investees	(93)	(26)	(57)
Net gains on disposal of assets	(17)	(23)	(13)
Other income, net (Note 17)	(158)	(19)	(13)
Total	20,685	15,660	13,930
Income from operations	3,069	1,213	1,785
Interest expense	169	152	116
Interest income	(14)	(79)	(67)
Other financial (income) costs	(93)	32	13
Net interest and other financial costs (Note 6)	62	105	62
Income before income taxes and minority interests	3,007	1,108	1,723
Income tax provision (Note 9)	853	218	324
Minority interests (Note 17)	42	11	25
Net income	2,112	879	1,374
Dividends on preferred stock	—	—	(8)
Net income applicable to common stock	$2,112	$879	$1,366
Income Per Common Share (Note 7)			
Net income:			
-Basic	$18.04	$7.44	$11.88
- Diluted	$17.96	$7.40	$11.18

Note: There are accompanying notes that are also an integral part of these consolidated financial statements.

the automotive division. In Table 7.3, U.S. Steel reports both an interest expense and an item for 'net interest and other financial costs'. Information about the sources of interest revenue can be obtained from the balance sheet and the notes to the financial statements. For companies involved in financial intermediation, such as commercial and investment banks, the handling of interest costs and expenses will be decidedly more complicated.

Other important cost items may appear depending on the company's type of business. For example, oil and gas companies such as Suncor (SU) will include a line item for 'exploration' and, possibly, 'royalties'.

Technology companies, such as Genetech (DNA) or Intel (INTC), will include a line for 'research and development'. For companies that have been actively involved in mergers and acquisitions, e.g., Transocean, there will be an item for 'goodwill amortization'. There are also items that have a classification component. One such item is 'gain (loss) from the sale of assets'. US Steel classifies this item under revenue, while Transocean treats this as an expense. Both of these treatments involve accounting for this item in operating income before interest and taxes (EBIT). In certain situations, it is not straightforward to determine whether such items appear in EBIT or are subtracted afterward as 'extraordinary gains and losses'. This classification decision can have significant implications for analysis of profitability that uses measures such as EBIT and EBITDA.

The common stock valuation problem can be modelled using the 'stock' and 'flow' interaction encountered in the theoretical economic analysis of the firm. The 'stock' of productive assets, both tangible and intangible, produces a 'flow' of earnings. The income statement relates to the accounting for the flow component and the balance sheet relates to the 'stock' component. Insofar as the ***market value*** of assets reflects the ability to generate cash flow, then the balance sheet can also be used as vehicle for valuation of the firm's securities. Because of the complicated interaction of tangible and intangible assets that is involved in the production of net income, it is usually not practical to sum the market value of each asset to determine an aggregate market value of assets. Rather, it is more appropriate to assess the acquisition value of the firm's assets as a whole. Except for large sophisticated investors such as Warren Buffett, this is not typically an exercise that can be accomplished by individual investors. Rather, when an ability to estimate acquisition value is not available, then the balance sheet becomes an adjunct to analysis of the income statement, providing information about: the stock of assets used to generate net income; and, the capital structure used to finance those assets.

Theoretically, the balance sheet is the appropriate accounting statement to use for determining the value of common stock. This is apparent from the ***basic balance sheet accounting identity***:

$$Assets - Liabilities = Shareholders' \ Equity$$

Netting out the value of preferred stock and dividing the remaining value of shareholders' equity (or, as in Ford's balance sheet, 'stockholders' equity') by the number of shares outstanding gives a value for a share of common stock. For a whole range of reasons, this estimated value for common stock

will differ significantly from the observed market price. In other words, the book value of equity does not typically provide an accurate estimate for the market value of the common stock. The book value of equity is an accounting number that reflects the initial capital invested in the business plus the accumulated retained earnings. Understanding how this accounting number can deviate from the economic or intrinsic value of equity is a key aspect of accurately doing a security analysis. The ratio of the ***market capitalization of equity*** (market cap) — the market price of common stock times the number of shares outstanding — to the book value of common stockholders' equity — ***the price-to-book ratio (P/BV)*** — is a key measure of this aspect of security analysis.

The composition of the balance sheet is considerably less complicated to understand than that of the income statement (see Tables 7.4 and 7.5). However, this simplicity and associated problems with book value versus market values of equity does not mean that the balance sheet is uninteresting. Depending on the specific valuation, there are numerous items on the balance sheet that are of interest, e.g., Gross (1982). For example, GDC identified the net current asset position per share as an important indicator of value. For both Ford and U.S. Steel the employee pension and benefit plans are key items. For Ford, this item is bundled into 'other liabilities' while for U.S. Steel the item is decomposed into 'employee benefits' and 'prepaid pensions'. Another important balance sheet item is the property, plant and equipment account. For Ford, this item is itemized as 'net property'. In both cases, the property, plant and equipment item (PPE) includes an allowance for accumulated depreciation. Because both Ford and U.S. Steel are engaged in industries with large amounts of tangible assets and relatively low amounts of intangible assets, evaluation of the market value of PPE is an important element in assessing the 'acquisition value' of these companies.[14]

The income statement, cash flow statement and statement of changes in shareholders' equity conceptually capture different aspects of changes in the balance sheet. Yet another approach explaining balance sheet changes is ***the clean surplus equation***:

$$E_t = D_t + RE_t = D_t + BV_t - BV_{t-1} \rightarrow E_t - D_t = \Delta A - \Delta L$$

[14]The valuation of intangible assets has been an ongoing source of concern and confusion, e.g., Lev (2003). While a value for an intagible asset, e.g., a trademark or brandname, is determined when the asset is sold or the firm is taken over, the bulk of intangible escape this type of valuation.

Table 7.4 Ford Motor Company, Consolidated Balance Sheet.

(in millions of dollars)	31 December 2008	31 December 2007
Assets		
Cash and cash equivalents	$22,049	$35,283
Marketable securities (Note 3)	17,411	5,248
Loaned securities (Note 3)	—	10,267
Finance receivables, net	93,484	109,053
Other receivables, net	6,073	8,210
Net investment in operating leases (Note 5)	25,738	33,255
Retained interest in sold receivables (Note 7)	92	653
Inventories (Note 8)	8,618	10,121
Equity in net assets of affiliated companies (Note 9)	1,592	2,853
Net property (Note 12)	28,565	36,239
Deferred income taxes	3,108	3,500
Goodwill and other net intangible assets (Note 14)	1,593	2,069
Assets of discontinued/held-for-sale operations (Note 20)	198	7,537
Other assets	9,807	14,976
Total assets	$218,328	$279,264
Liabilities and stockholders' equity		
Payables	$14,772	$20,832
Accrued liabilities and deferred revenue (Note 15)	63,386	74,738
Debt (Note 16)	154,196	168,787
Deferred income taxes	2,035	3,034
Liabilities of discontinued/held-for-sale operations (Note 20)	55	4,824
Total liabilities	234,444	272,215
Minority interests	1,195	1,421
Stockholders' equity		
Capital stock (Note 21)		
Common Stock, par value $0.01 per share (2,341 million share is issued of 6 billion authorized)	23	21
Class B Stock, par value $0.01 per share (71 million shares issued of 530 million authorized)	1	1
Capital in excess of par value of stock	9,076	7,834
Accumulated other comprehensive income/(loss)	(10,085)	(558)
Treasury stock	(181)	(185)
Retained eamings/(Accumulated deficit)	(16,145)	(1,485)
Total stockholders' equity	(17,311)	5,628
Total liabilities and stockholders' equity	$218,328	$279,264

Note: There are accompanying notes that are also part of the financial statements.

Historically, accounting practice was content to provide only the income statement and the balance sheet, even though the use of these statements alone has certain limitations for equity valuation purposes. To address some of these limitations, the cash flow statement and statement of changes in shareholders' equity are prepared. While the statement of changes in shareholders' equity has limited analytical uses, the cash flow statement can be invaluable. This statement is based on a rearrangement of balance sheet

Table 7.5 United States Steel Corporation Consolidated Balance Sheet.

(Dollars in millions)	31 December 2008	2007
Assets		
Current assets		
Cash and cash equivalents	$724	$401
Receivables, less allowance of $52 and $42 (Note 18)	2,144	1,924
Receivables from related parties (Note 25)	144	153
Inventories (Note 8)	2,492	2,279
Deferred income tax benefits (Note 9)	177	151
Other current assets	51	51
Total current assets	5,732	4,959
Investments and long-term receivables (Note 10)	695	694
Property, plant and equipment, net (Note 11)	6,676	6,688
Intangibles-net (Note 12)	282	419
Goodwill (Note 12)	1,609	1,712
Assets held for sale (Note 5)	211	233
Prepaid pensions (Note 19)	16	734
Deferred income tax benefits (Note 9)	666	16
Other noncurrent assets	200	177
Total assets	$16,087	$15,632
Liabilities		
Current liabilities		
Accounts payable	$1,440	$1,668
Accounts payable to related parties (Note 25)	43	62
Bank checks outstanding	11	53
Payroll and benefits payable	967	995
Accrued taxes (Note 9)	203	95
Accrued interest	33	20
Short-term debt and current maturities of long-term debt (Note 15)	81	110
Total current liabilities	2,778	3,003
Long-term debt, less unamortized discount (Note 15)	3,064	3,147
Employee benefits (Note 19)	4,767	3,187
Deferred income tax liabilities (Note 9)	9	162
Deferred credits and other liabilities	410	514
Total liabilities	11,028	10,013
Contingencies and commitments (Note 27)		
Minority interests (Note 17)	164	88
Stockholders' equity		
Common stock issued—123,785,911 shares and 123,785,911 shares (par value $1 per share, authorized 400,000,000 shares) (Note 21)	124	124
Treasury stock, at cost (7,587,322 shares and 5,790,827 shares)	(612)	(395)
Additional paid-in capital	2,986	2,955
Retained earnings	5,666	3,683
Accumulated other comprehensive loss	(3,269)	(836)
Total stockholders' equity	4,895	5,531
Total liabilities and stockholders' equity	$16,087	$15,632

and income statement items into a form that is particularly well suited for identifying items of relevance in security analysis, such as free cash flow.

In many circumstances, ***the cash flow statement*** contains the most useful accounting information for doing equity security valuations. This statement is based on the following identity:

$$\text{Change in Cash} = \text{Cash from Operations} + \text{Cash from Investing Activities} + \text{Cash from Financing Activities}$$

Though it might seem that the change in cash is only an incidental item for most equity valuations, it is the process of arriving at the change that is important. By collecting items according to function, the activities of the firm reflected in the other accounting statements becomes more transparent. It is often stated that earnings are, in many ways, something of a fiction. The rationale for this observation is apparent in Table 7.6 where, in 2008, a net income reported loss of over $14 billion (see Table 7.2) is reduced to a loss of $179 million when translated to 'net cash flows from operating activities' on the cash flow statement. For whatever reason, Ford chooses to examine the essential transformation from net income, which is an accounting accruals number, to 'net cash flow from operations' in a Note (Note 24). The conventional presentation of the cash flow statement is used by U.S. Steel where some 16 accrual related items are reported that transform net income into net cash provided by operating activities (see Table 7.7). The cash flow statements for both Ford and U.S. steel permit ready calculation of a crude free cash flow measure by listing Capital Expenditures immediately below net cash flows from operating activities.

The motivation for the *Statement of Stockholders' Equity* — to reconcile the items that produced the change in the book value of equity over the period — is well conceived even if the statement is not usually too useful. However the execution leaves much to be desired. The basic accounting identify for this statement is, more or less, the same as the clean surplus equation: ***Change in Shareholders' equity = Earnings − Net cash paid to shareholders*** (not given). As Penman (2001, p. 35) observes: "Unfortunately, the statement is not presented as clearly as this reconciliation of beginning and ending equity prescribes. Indeed, ... the accounting in this statement is rather poor". Yet, this does not mean this statement is always without value. For example, the impact of foreign currency translation losses and derivative accounting transactions on Ford Motor is revealed and the impact of FAS 158 adoption can be determined. Negative values

Table 7.6 Ford Motor Company Consolidated Statement of Cash Flows.

(in millions of dollars)	2008	2007	2006
Cash flows from operating activities of continuing operations			
Net cash flows from operating activities (Note 24)	$ (179)	$ 17,074	$ 9,622
Cash flows from investing activities of continuing operations			
Capital expenditures	(6,696)	(6,022)	(6,848)
Acquisitions of retail and other finance receivables and operating leases	(44,562)	(55,681)	(59,793)
Collections of retail and other finance receivables and operating leases	42,061	45,498	41,502
Purchases of securities	(64,754)	(11,423)	(23,678)
Sales and maturities of securities	62,046	18,660	18,456
Settlements of derivatives	2,533	861	486
Proceeds from sales of retail and other finance receivables and operating leases	—	708	5,120
Proceeds from sale of businesses	6,854	1,236	56
Cash paid for acquisitions	(13)	—	—
Transfer of cash balances upon disposition of discontinued/held-for-sale operations	(928)	(83)	(4)
Other	316	(211)	(161)
Net cash (used in)/provided by investing activities	(3,143)	(6,457)	(24,864)
Cash flows from financing activities of continuing operations			
Cash dividends	—	—	(468)
Sales of Common Stock	756	250	431
Purchases of Common Stock	—	(31)	(183)
Changes in short-term debt	(5,120)	919	(5,825)
Proceeds from issuance of other debt	42,163	33,113	58,258
Principal payments on other debt	(46,299)	(39,431)	(36,601)
Other	(604)	(88)	(339)
Net cash (used in)/provided by financing activities	(9,104)	(5,268)	15,273
Effect of exchange rate changes on cash	(808)	1,014	464
Net increase/(decrease) in cash and cash equivalents from continuing operations	(13,234)	6,363	495
Net increase/(decrease) in cash and cash equivalents	$(13,234)	$6,389	$484
Cash and cash equivalents at January 1	$35,283	$28,894	$28,412
Cash and cash equivalents at December 31	$ 22,049	$ 35,283	$ 28,896

for such items can, in some cases, be offset by positive values in later periods mitigating the impact on shareholders' equity. This type of revealing information is not always the case. For example, the statement reveals little about the operations of U.S. Steel.

Table 7.7 United States Steel Corporation Consolidated Statement of Cash Flows.

Increase (decrease) in cash and cash equivalents (Dollars in millions)	Year ended 31 December 2008	2007	2006
Operating Activities			
Net income	$2,112	S879	$1,374
Adjustments to reconcile net cash provided by operating activities			
Depreciation, depletion, and amortization	605	506	441
Provision for doubtful accounts	24	(14)	3
Pensions and other postretirement benefits	(502)	(157)	(209)
Minority interests	42	11	25
Deferred income taxes	366	182	57
Noncash other income (Note 17)	(150)	—	—
Net gains on disposal of assets	(17)	(23)	(13)
Distributions received, net of equity investees income	(29)	24	(9)
Changes in	485	440	—
Current receivables sold			
repurchased	(635)	(290)	—
operating turnover	(140)	72	(93)
Inventories	(376)	305	(109)
Current accounts payable and accrued expenses	81	(440)	232
Bank checks outstanding	(42)	(13)	(49)
Foreign currency translation	(117)	259	(14)
All other, net	(49)	(9)	(4)
Net cash provided by operating activities	1,658	1,732	1,632
Investing activities			
Capital expenditures	(735)	(692)	(612)
Capital expenditures—Gateway Energy & Coke Company, LLC	(161)	—	—
Acquisition of non-controlling interests of Clairton 1314B Partnership, L.P.	(104)	—	—
Acquisition of pickle lines	(36)	—	—
Acquisition of Lone Star Technologies, Inc.	—	(1,993)	—
Acquisition of Stelco Inc.	(1)	(2,036)	—
Disposal of assets	24	42	26
Restricted cash, net	2	13	—
Investments, net	(21)	(9)	(4)
Net cash used in investing activities	(1,032)	(4,675)	(590)
Financing Activities:			
Revolving credit facilities — borrowings	359	—	—
— repayments	(44)	—	(248)
Issuance of long-term debt, net of refinancing costs	—	2,976	—
Repayment of long-term debt	(380)	(873)	(359)

(*Continued*)

Table 7.7 (*Continued*)

(Dollars in millions)	Year ended 31 December 2008	2007	2006
Common stock issued	5	18	33
Common stock repurchased	(227)	(117)	(442)
Distributions from (to) minority interest owners	102	(14)	(18)
Dividends paid	(129)	(95)	(77)
Excess tax benefits from stock-based compensation	9	9	5
Net cash (used in) provided by financing activities	(305)	1,904	(1,106)
Effect of exchange rate changes on cash	2	18	7
Net increase (decrease) in cash and cash equivalents	323	(1,021)	(57)
Cash and cash equivalents at beginning of year	401	1,422	1,479
Cash and cash equivalents at end of year	$724	$401	$1,422

Note: There are accompanying notes that are also part of the financial statements.

7.2.2 *Earnings, Free Cash Flow, and EVA*

The central importance of *DCF* valuation models in modern equity security analysis begs an obvious question: ***what is the appropriate 'cash flow' to discount in the DCF model?*** Given the potential limitations in the net income number identified in the discussion of the cash flow statement, this earnings number that receives so much attention in 'sell side' security analysis would seem to be a relatively poor candidate, though this is not a clear cut issue. Buffett recommends using owner's earnings calculated as 'reported income' (presumably net income) plus depreciation, depletion, amortization, and certain other non-cash charges minus the average annual amount of capitalized expenditures for property plant and equipment and other items that the business requires to fully maintain its long-term competitive position and its unit volume. This is similar enough to the calculation of free cash flow that it could be called '***economic free cash flow***'. In other places, Buffett recommends discounting the amount of cash that will be paid out during the life of the firm. Both of these measures are difficult to implement precisely. Both notions require estimating values that are effectively unknown. The desire for more precision in the numbers used in the *DCF* analysis dictates that only cash flow variants derived from manipulation of accounting numbers be considered as viable proxies, e.g., English (2001, chs. 14–16).

The form of the financial statements is determined by accounting standards such as GAAP. There is no such guidance available where analysis of the financial statements is involved. Construction of 'earnings' numbers

as inputs for use in *DCF* analysis and other techniques of security analysis is guided more by conceptual intuition than precise rules. An example of this is provided by the text for the Canadian Securities Course (Canadian Securities Institute 1992), a security industry sanctioned certification course required to work in the Canadian securities markets. This source defines earnings per common share (*EPS*) as: ***[Net earnings (before extraordinary items)-preferred dividends]/number of common shares outstanding***, where 'net earnings' means 'net income'. While the adjustment of net income for preferred dividend payments is consistent with Bernstein (1993, ch. 12), the exclusion of extraordinary items is not. On this point, Bernstein (1993, p. 767) observes: "in determining the earning power of an enterprise, no item of income and expense should be excluded. Since every item of income or expense is part of the enterprise's operating experience, the question is only what year items should be assigned". This disparate handling of extraordinary items impacts the calculation of the most basic earnings numbers used for analytical purposes.

While being clear on the calculation of earnings, Bernstein does recognize the adjustments that may be made for purposes of analysis:

> For purposes of analysis or comparison, analysts may, however, wish to focus on an adjusted level of earnings for a short period... This can be done by adding to, or removing from, reported earnings per share selected items of income or expense that were included therein. If this is to be done on a per share basis, every item must be adjusted for tax effect (by using the enterprise's effective tax rate unless the applicable tax rate is otherwise specified) and must be divided by the number of shares that are used in the basic computation of earnings per share.

Hence, even though the adjustment for extraordinary items in the Canadian Securities Course method of calculating *EPS* is acceptable on grounds of 'analysis or comparison', there is no explicit recognition of the tax adjustment for the extraordinary items. Given the key role played by *EPS* in various aspects of security analysis, e.g., in the determination of the P/E ratio, it is not surprising that there are disparate opinions about the appropriate calculation of other less commonly used 'cash flow' measures, such as free cash flow.

Higgins (1998, p. 19) observes: "So many conflicting definitions of cash flow exist today that the term has almost lost meaning". In the absence of 'generally accepted cash flow calculation principles', there has been a proliferation of cash flow valuation models that purport to accurately capture the economics of equity valuation. In the management consulting industry,

these models are also marketed as methodologies for 'managing company value', 'generating shareholder value' and accurately setting executive compensation. A partial list of these methodologies includes: Economic Value Added (EVA) from Stern Stewart & Company, the Economic Profit Model from McKinsey & Company, Economic Value Management from KPMG, and Value Builder from Price-Waterhouse. The basic idea behind these methodologies is to make adjustments to GAAP numbers to produce measures of cash flow that can be used to better assess economic value. As Copeland *et al.* (1996) observe in describing the McKinsey & Company approach: 'Cash is King'. The number of adjustments to GAAP numbers can be considerable. For example, Weaver (2001) estimates that determining EVA from GAAP numbers can involve up to 164 adjustment items. The precise adjustments used will depend on subjective assessments of factors such as the nature of the industry and the availability of data.

To evaluate the different variations that arise in determining the 'cash flow' variable to be used in *DCF* valuation it is helpful to examine the conceptual foundations of the technique. *DCF* valuation is a variation on the net present value (NPV) model used in capital budgeting. The NPV model has a long history, with elements that can be traced to Frank Knight, Alfred Marshall and the Austrian capital theorists.[15] Though conventional microeconomic theory is largely static, the capital investment problem requires the introduction of expectations about future input and output prices, the length of the production period, the production plan, the accumulation of capital, the degree of competition in the industry, and so on. In this theoretical approach: "the market value of the firm is a reflection of its expected future earnings . . . the object of the owner of the firm is to make this market value, called its ***capitalized present value***, as large as possible" (Baumol 1970, p. 24). Earnings are defined: "The sum of the money value of his outputs during a period is the entrepreneur's total revenue for that period, and the sum of the money values of the inputs is the total cost incurred during period. The difference constitutes his total [profit] for that period" (Baumol 1970, p. 65). Profit, earnings and surplus are loosely used to capture the same concept.

[15]Baumol (1977, ch. 25) contains references to some of the early studies from the 1940s and 1950s where the capital budgeting theory currently taught in corporate finance was developed. Included in these studies are a number from engineering economics.

Given this, the theoretical foundation for *DCF* analysis requires evaluating the discounted present value of the future stream of 'economic profits', where profits are measured as the cash value of revenues minus the cash value of costs, including interest payments, adjusted for taxes. In capital budgeting, the terminology 'net cash flow' or 'cash earnings' is substituted for 'economic profit'. To determine ***net cash flow*** from operations using GAAP numbers:[16]

$$\text{Net Cash Flow} = \text{Net Income} \pm \text{Non} - \text{Cash Items}$$

From this conceptual starting point, the calculations become fuzzier. Ignoring the problems associated with GAAP recognizing revenues and costs when booked not when the cash is received, important non-cash expenses reported for almost all firms are: 'depreciation, depletion and amortization' and 'deferred taxes'. In Table 7.7, U.S. Steel also report other items that involve non-cash components, e.g., 'provision for doubtful accounts' and 'pensions and other post-retirement benefits'.

Working backwards from net income to net cash flow involves disentangling 'cash' from non-cash items. This can be a complicated exercise. In addition, there are cash items that may provide positive or negative cash flow to the company but are better considered differently when doing the 'economic profit' calculation. The most important such item is often cash adjustments to working capital that took place due to the firm's operations. All these considerations go into determining the 'net cash flows from operating activities' reported in the Statement of Cash Flows. The analytical fuzziness of this cash flow calculation is captured in the treatment of 'net interest expense' which is included in net income and not subtracted out in determining 'net cash flow from operating activities', e.g., Penman (2001, p. 119). Whether an adjustment for net interest is required is not a clear cut issue.[17] If this adjustment is made, then the tax implications also need

[16]This definition corresponds with the 'indirect method' of calculating cash from operations in the cash flow statement. More precisely, there are two methods of calculating the cash flow statement: the direct method and the indirect method, e.g., Penman (2001, p. 314). The indirect method calculates: $Net\ income + accruals = cash\ from\ operations$. Following Barth *et al.* (2001), the major components of accruals are: change in accounts receivable, change in accounts payable, change in inventory and depreciation/amortization. Barth *et al.* demonstrate that accruals have a statistically significant ability to forecast future cash flows.

[17]This adjustment can depend, for example, whether the *DCF* valuation is determining the market value of the firm or the market value of common equity. Adjustment for net interest expense is more appropriate if the market value of the firm is being calculated.

to be taken into account. In the end, this item only relates to the cash revenues (adjusted for some of the cash costs) part of 'economic profit'. Because 'depreciation, depletion and amortization' has been added back, a further adjustment is required to account for the cash capital expenditures that were made to support the productive activities of the firm.

While the Statement of Cash Flows seems to be a promising source of accounting numbers for calculating the 'economic profit' needed in the *DCF* calculation, it is apparent that numerous adjustments are required. These adjustments are not mechanical but, rather, require subjective assessments. This is especially the case for the capital expenditure adjustment. 'Depreciation, depletion and amortization' was added back to net income because this item is a non-cash expense that, in many cases, does not reflect the underlying economic requirement for a cash expenditure item that reflects the assumptions about the length of the production period, the production plan, the accumulation of capital, the degree of competition in the industry and so on. More precisely, the forecasting of future economic profits embeds an assumption about a stream of capital expenditures required to sustain this projection. Firms facing an earnings squeeze may react by cutting back on capital expenditures and permitting a running down of the capital stock. Though this does not appear to be is happening with Ford in Table 7.6, the cash outflow associated with capital expenditures (capex) derived from the cash flow statement may not provide a realistic picture of the capex required to keep a firm on a sustainable future growth path. Adjusting for alternative growth scenarios is even more complicated.

Conceptually, the *DCF* calculation can be used to produce either a market value of the firm, by discounting cash flows going to the firm, or a market value of common equity, by discounting the cash flows going to common equity. Abstracting from less typical sources of equity such as warrants, the connection between these two approaches to *DCF* valuation follows from the ***market value balance sheet relationship***:

Market value of equity

= Market value of common stock + Market value of preferred stock

= Market value of assets − Market value of liabilities

where the market value of assets is equal to the market value of the firm. In effect, the *DCF* calculation for the estimated market value of the firm adjusted for the market value of liabilities plus the market value of any preferred stock will theoretically be equal to the *DCF* calculation for the estimated market value of equity. This relationship is only theoretical

because *DCF* valuations are only estimates. The implication is that the *DCF* value of items that are excluded from cash flows to equity and included in cash flows to the firm will be sufficient to reconcile the two approaches. Because these items are related to debt and preferred stock cash flows the market values and values estimated by *DCF* methods will likely be approximately equal. As a consequence, subtracting the market value of debt and preferred stock from a *DCF* estimation of the market value of the firm can be expected to give more-or-less the same value as doing *DCF* for common equity directly.

The cash flow variable that is most commonly calculated from GAAP numbers to be used in *DCF* analysis is ***free cash flow*** (FCF). The precise FCF calculation depends on whether the *DCF* valuation is for the firm or for common equity. Different presentations of the calculation of FCF are available, depending on the particular financial statement(s) used in the calculation and whether FCF for common equity (FCFE) or FCF to the firm (FCFF) is required.[18] For example, Higgins (1998) gives the following calculation:

$$\begin{aligned}\text{FCFF} = {} & \text{EBIT}(1 - \text{Tax rate}) + \text{depreciation} - \text{capital expenditures} \\ & \pm \Delta\text{net working capital}\end{aligned}$$

Following Higgins (1998, p. 323) the rationale for this FCF to the firm calculation is

> The rationale for using free cash flows goes like this. EBIT is the income a company earns without regard to how the business is financed; so EBIT(1 − tax rate) is income after tax excluding any effects of debt financing. Adding depreciation and any other significant noncash items yields the standard after tax cash flows used in capital expenditure analysis. If management were prepared to run the company into the ground, it could distribute this cash to owners and creditors, and that would be the end of it. But in most companies, management retains some of this cash flow in the business to pay for new capital expenditures and possibly to increase net working capital. The cash available for distribution to owners and creditors is thus after tax cash flow less capital expenditures and increases in net working capital. Reductions in net working capital are also possible, and they add to free cash flow.

[18]There is a procedural difference between these two numbers in determining a *DCF* value. If FCFF is used, then discounting is done at the weighted average cost of capital. If FCFE is used then discounting is done at the cost of equity, e.g., Stowe *et al.* (2007, ch. 2).

This rationale captures the essential point that free cash flow is a 'best efforts' attempt to use GAAP numbers to calculate a value for 'economic profit'.

The approach to calculating FCF given by Higgins differs somewhat from approaches that work backward from net income, e.g., Damodaran (1994, p. 127). Users of this approach are often motivated to obtain FCFE, because net income has already made provision for payments to debt holders. In this case, assuming no outstanding preferred share issues:

$$\begin{aligned}\text{FCFE} = {} & \text{net income} + \text{depreciation} - \text{capital expenditures} \\ & - \Delta\text{net working capital} - \text{debt principal repayments} \\ & + \text{proceeds of new debt issues}\end{aligned}$$

This formulation differs from the Higgins approach due, for example, to the inclusion of extraordinary items. Because FCF is an analytical concept, there is no 'correct' method for calculating this value. The analyst is required to determine which calculation is most appropriate. If ease of calculation is a concern, comparison of this calculation with the cash flow statement reveals that FCFF and FCFE can be easily calculated as

$$\begin{aligned}\text{FCFF} = {} & \text{cash flow from operations} - \text{capital expenditures} \\ & + \text{interest expense}(1 - \text{Tax Rate}) \\ \text{FCFE} = {} & \text{cash flow from operations} - \text{capital expenditures} \\ & - \text{preferred dividends} - \text{debt principal repayments} \\ & + \text{proceeds of new debt issues}\end{aligned}$$

For firms without any preferred stock and no changes in outstanding debt issues the FCFE calculation is simplified to the subtraction of two items from the cash flow statement: ***FCFE = cash flow from operations − capital expenditures***.

Free cash flow is a practical attempt to use GAAP numbers to determine a value for economic profit. It is not difficult to see that FCF inherits many of the problems associated with reconciling GAAP numbers to be consistent with economic value. Unfortunately, the appropriate method for adjusting GAAP numbers is not obvious and is likely to vary from firm to firm, depending on particular circumstances. This situation has created an opportunity for the management consulting industry to sell customized adjustments on a fee-for-service basis. There is considerable attractiveness in this activity. On the one hand, there is the potential for measuring the

'true value' of a company. Changes in that value can be used as a measure of management effectiveness and to provide a guide to management as to appropriate corporate policies to 'enhance shareholder value'. On the other hand, the conceptual difficulties of correctly manipulating GAAP accounting numbers can prevent corporations from accomplishing this task with in-house resources. Management consulting services can compete on service by 'branding' the techniques and procedures used to produce 'accurate economic value measures'. As a consequence, there has emerged in the last decade a significant number of such 'branding exercises'. 'Economic Value Added' (EVA) is the registered trademark for the methodology developed by Stern Stewart & Company, e.g., Ehrbar (1998).

Despite the presence of proprietary techniques that are only known within Stern Stewart Company, ***the basic elements of the EVA technique*** do not differ substantively from, say, the 'Economic Profit Model' developed by McKinsey & Company, e.g., Copeland *et al.* (1996).[19] Both techniques are usually applied to aid with corporate management decision making, so the corresponding FCF value is FCFF. Though there are a number of equivalent ways of calculating basic EVA, one revealing formulation is

$$\begin{aligned}\text{EVA} &= \text{EBIT}(1 - \text{Tax rate}) \\ &\quad - \{(\text{Weighted average cost of capital})(\text{invested capital})\} \\ &= \text{Invested capital (return on invested capital} \\ &\quad - \text{weighted average cost of capital)} \\ &\equiv \text{Invested capital}(ROIC - WACC)\end{aligned}$$

where the return on invested capital (*ROIC*) is expressed after tax and depreciation.[20] The relevance of using of *EBIT(1 − Tax rate)* is captured by the introduction of a new terminology, either NOPAT or NOPLAT to refer to 'net operating profit after tax' or 'net operating profits less adjusted taxes'.

[19]Following Ehrbar (1998), the types of additional adjustments that are made involve: goodwill amortization; asset write-offs; full expensing of R&D; restructuring charges; and, leasing arrangements.

[20]Calculation of the weighted average cost of capital is discussed in introductory corporate finance texts, e.g., Giammarino *et al.* (1996). The formula defines *ROIC* after taxes and depreciation as $ROIC = \{EBIT(1 - tax\ rate)\}/invested\ capital$.

The number in EVA that is somewhat complicated to determine is 'invested capital'. This number can be determined from either the side of the balance sheet, e.g., Copeland *et al.* (1996, p. 164):

> Invested capital represents the amount invested in the *operations* of the business. Invested capital is the sum of operating working capital; net property, plant and equipment; and net other assets (net of noncurrent, noninterest-bearing liabilities). Invested capital, plus any nonoperating investments, measures the total amount invested by the company's investors, which we will call total investor funds. Total investor funds can also be calculated from the liability side of the balance sheet as the sum of all equity (plus quasi-equity items like deferred taxes) and interest-bearing debt.

Poitras (2005, p. 457) provides a basic example reconciling the two different approaches. The example does not provide an exhaustive list of the relevant right hand side balance sheet items that could be included. A partial listing of the items that could be used to calculate invested capital are:[21]

$$\begin{aligned}\text{Invested capital} = {} & \text{bank indebtedness} + \text{short-term debt} \\ & + \text{dividends payable} \\ & + \text{current portion of long term debt} \\ & + \text{deferred taxes} + \text{preferred shares} \\ & + \text{share capital} + \text{retained earnings} \\ & + \text{other financial assets}\end{aligned}$$

Examination of items appearing in the statement of shareholder equity, e.g., Table 1.2 for Boeing, reveals a number of other items that have to be assessed.

The EVA approach is conceptually the same as the 'Economic Profit Model' of McKinsey & Company. As described by Copeland *et al.* (1996, pp. 149, 150), the economic profit model is an advance over *DCF* valuation using FCF:

> An advantage of the economic profit model over the [FCF] *DCF* model is that economic profit is a useful measure for understanding a company's performance in any single year, while free cash flow is not. For example, you would not track a company's progress by comparing actual and projected free cash flow, because free cash flow in any year is determined

[21] The Canadian Securities Course (1993, p. 97) does not include deferred taxes in the calculation of invested capital.

> by highly discretionary investments in fixed assets and working capital. Management could easily delay investments simply to improve free cash flow in a given year at the expense of long term value creation.

According to proponents, EVA and the Economic Profit Model are conceptual advances over using FCF-based *DCF*:[22]

Economic profit measures the value created in a company in a single period of time and is defined as follows:

$$\text{Economic profit} = \text{invested capital} \times (ROIC - WACC)$$

The economic profit approach says that the value of a company equals the amount of capital invested, plus a premium or discount equal to present value of its projected economic profit (Copeland 1996, p. 150):

$$\text{Value} = \text{invested capital} + \text{present value of projected economic profit.}$$

> The logic behind this is simple. If a company earned exactly its *WACC* every period, then the discounted value of its projected free cash flow should exactly equal its invested capital. In other words, the company is worth exactly what was originally invested. A company is worth more or less than its invested capital only to the extent that it earns more or less than its *WACC*. So the premium or discount relative to invested capital must equal the present value of the company's future economic profit.

Such claims beg an obvious question: are these approaches as superior to other *DCF* approaches and other valuation techniques as the proponents claim?

EVA and the related techniques being marketed by the management consulting industry were initially proposed to measure corporate performance and assess the use of shareholder capital by management. Because this involves a valuation exercise, it is natural that the performance of EVA as a tool in security analysis was empirically examined. For example, for a period of time Stern Stewart provided at www.sternstewart.com annual rankings of firm performance based on estimates of EVA and a related measure, market value added (MVA). Stern Stewart describes the rankings and MVA as follows:

[22]Though proponents of EVA and the economic profit model distinguish between these techniques and *DCF* models, there is no conceptual difference in the underlying methodology. The distinction is largely one of semantics. The intent is to distinguish between the types of cash flows being discounted, the EVA-type being closer to 'economic profit' than the accounting determined FCF values.

> Stern Stewart compiles annual performance rankings of large, publicly owned companies in most of the major countries of the world. The rankings are in terms of a measure that we call MVA, for Market Value Added. MVA is the difference between the market value of a company (both equity and debt) and the capital that lenders and shareholders have entrusted to it over the years in the form of loans, retained earnings and paid-in capital. As such, MVA is a measure of the difference between "cash in" (what investors have contributed) and "cash out" (what they could get by selling at today's prices). If MVA is positive, it means that the company has increased the value of the capital entrusted to it and thus created shareholder wealth. If MVA is negative, the company has destroyed wealth.

As illustrated in Table 7.8, the MVA rankings for 2000 produce some odd results with Lucent and Sun Micro all ranking in the top 15 of the 1,000 firms being ranked. For reasons not explained, Stern Stewart no longer posts the rankings on the website. Yook and McCabe (2001) even present evidence that MVA is negatively related with future stock returns. However, it does not follow that EVA and MVA will produce similar predictions about future returns. For example, the EVA for a number of firms in Table 7.8 does seem to provide an indication of the impending poor performance.

Unfortunately, the promise of superior performance for EVA as a security analysis tool compared to traditional measures such as net income does not have much empirical support. For example, Clinton and Chen (1998) found that other traditional accounting measures, such as P/E, *EPS* and *ROA*, tracked stock returns more reliably than EVA. More recently, Cordeiro and Kent (2001) considered whether analysts that adopted EVA outperformed other analysts in forecasting future *EPS* and found "no significant relationship between EVA adoption and security analyst forecasts of future firm *EPS* performance". Biddle *et al.* (1997, 1998) find similar results. For example, Biddle *et al.* (1997) conclude: "earnings [are] more highly associated with returns and firm values than EVA, residual income, or cash flow from operations. Incremental tests suggest that EVA components add only marginally to information content beyond earnings... these results do not support claims that EVA dominates earnings in relative information content, and suggest rather that earnings generally outperform EVA".

7.2.3 *From Value Drivers to Valuations*

What is a Value Driver?

In equity security analysis, a ***value driver*** is a factor that has a significant impact on the level and change in the value of an equity security. There

Table 7.8 The Top 30 Firms in the Stern Stewart Performance 1000.

MVA Rank					MVA	EVA (Average capital)	Capital (Year-end (operating capital)	Return on capital (R)	Cost of capital (WACC)
1999	1998	1994	TIC*	Company Name	1999	1999	1999	1999	1999
1	1	10	MSFT	Microsoft	629,470	5,796	20,034	51.78	12.62
2	2	2	GE	General Electric	467,510	3,499	75,830	17.20	12.47
3	8	50	CSCO	Cisco Systems	348,442	182	23,653	13.72	12.78
4	5	3	WMT	Wal-Mart Stores	282,655	1,528	54,013	14.31	10.99
5	3	26	INTC	Intel	253,907	4,695	29,825	30.55	12.19
6	9		LU	Lucent Technologies	200,540	−1,828	65,594	9.81	13.96
7	23	425	AOL	American Online	187,558	−156	4,482	11.10	15.53
8	41	38	ORCL	Oracle	154.263	605	5,413	24.59	12.42
9	11	78	IBM	IBM	154,219	1,349	66,827	13.33	11.40
10	19	25	HD	Home Depot	148,358	884	16,145	16.60	10.49
11	10	6	XOM	Exxon Mobil	144,687	4,440	180,040	11.67	8.16
12	4	5	MRK	Merck	143,001	3,449	29,553	23.09	10.72
13	6	1	KO	Coca-Cola	134,149	1,562	18,120	21.80	12.31
14	47	307	SUNW	Sun Microsystems	133,953	595	5,954	23.85	13.03
15	14	430	DELL	Dell Computer	132,609	1,330	7,320	46.33	14.79
16	43		YHOO	Yahoo!	128,748	−862	8,847	−2.66	15.99
17	15	11	PG	Proctor & Gamble	127,222	1,782	31,587	15.52	9.72
18	362	393	QCOM	QUALCOMM	126,323	78	3,521	15.80	13.05
19	30	133	AIG	American International Group	118,726	−119	48,774	10.44	10.70
20	12	18	BMY	Bristol-Myers Squibb	115,411	2,589	17,811	24.90	10.08
21	7	21	PFE	Pfizer	113,097	1,953	16,959	22.57	10.37
22	32	134	C	Citigroup	112,964	1,003	74,566	14.32	12.82
23	38	112	EMC	EMC	111,255	668	7,168	25.09	12.70
24	16	12	JNJ	Johnson & Johnson	107,564	1,555	29,570	16.24	10.39
25	28	8	T	AT&T	105,248	−6,379	176,869	4.39	9.22
26	18	349	WCOM	WorldCom	96,151	−4,736	94,105	5.55	10.78
27	34	36	HWP	Hewlett-Packard	92,842	−195	29,117	10.72	11.42
28	27	45	TWX	Time Warner	81,476	−1,354	48,588	6.35	9.80
29	26	37	VZ	Verizon Communications	74,563	1,854	57,673	11.12	7.74
30	52	128	TXN	Texas Instruments	71,813	−123	11,966	13.61	14.76

*Ticker symbol.
Source: www.sternstewart.com

are usually two key dimensions to value drivers: ***profitability*** and ***growth***. Reference to value drivers is a relatively new development in equity security analysis. The concept migrated into security analysis from the management consulting industry where value drivers were introduced as concepts to 'measure, manage and maximize shareholder value'. The definition of a value driver does differ with usage. For example, in a management consulting context Copeland *et al.* (1996, p. 107) observe that: "Value drivers must be developed down to the level of detail that aligns the value driver with the decision variables directly under the control of line management". Similarly, "value drivers need to be organized so we can identify those which have the greatest impact on value and assign responsibility for their performance to individuals who can help the organization meet its targets".

Given the sizable amount of management consulting done by the large accounting firms, it is not surprising that academic sources using the value driver terminology, e.g., Guo *et al.* (2005), Liu *et al.* (2002), Bartov *et al.* (2002), are primarily from the accounting stream, though there are also some studies using value drivers in a strategic management context. In management consulting, value drivers are used to better manage a company to enhance shareholder value. While it is not difficult to conceptually extend this notion to using value drivers to measure the value of a company's common stock, ***the emphasis on specific value drivers and the analytical role of value drivers may differ significantly***. In particular, management is often in a better position to measure and monitor a value driver such as, say, profit margins on specific items. Management seeks to redeploy resources to deal with poor value driver performance. Equity analysts are making an external assessment of relevant value drivers and evaluating management's reaction.

Recognizing the connection between the use of value drivers and accounting, a useful starting point for the discussion of value drivers is the residual income model. The numerator in the residual income model is: $(ROE(t) - k)\ BV(t-1)$ where ROE can be interpreted as the return on common equity. This can be mechanically transformed into the 'Dupont approach' a format that is more amenable to examining value drivers (see Table 7.9):

$$ROE = \frac{net\ income}{book\ value\ of\ equity}$$
$$= \left(\frac{net\ income}{sales}\right)\left(\frac{sales}{total\ assets}\right)\left(\frac{total\ assets}{book\ value\ of\ equity}\right)$$

Expressed in other words: return on equiyt = (profit margin) x (asset turnover) x (financial leverage). This approach to roughing out the value drivers is consistent with the management consulting approach where (Copeland *et al.* 1996, p. 107): " Generic value drivers such as sales growth, operating margins and capital turns, apply equally well to all business units". Using this approach, there are ***three value drivers for the residual income model***. The variation of these drivers across various sectors is illustrated in Table 7.9. The next step in this approach is to decompose the profit margin, asset turnover and financial leverage to gain further insight into the value drivers, e.g., profit margin can be examined by considering elements of fixed and variable costs associated with the business.

Table 7.9 ROE and Levers of Performance for 10 Diverse Companies, 1995.

	Return on equity		Profit Margin		Asset Turnover		Financial leverage
Analog Devices, Inc.	18.2	= 12.7	×	0.94	×	1.53
Bank America Corporation	13.2	= 13.1	×	0.09	×	11.49
Duke Power	14.9	= 15.3	×	0.35	×	2.79
Exxon Corporation	16.0	= 5.3	×	1.33	×	2.26
Food Lion Inc.	15.7	= 2.1	×	3.10	×	2.40
Hewlett-Packard	20.6	= 7.7	×	1.29	×	2.06
Nike	20.4	= 8.4	×	1.51	×	2.60
Nordstrom Inc.	11.6	= 4.0	×	1.51	×	1.92
Southwest Airlines	12.8	= 6.4	×	0.88	×	2.28
Tiffany & Company	14.8	= 4.9	×	1.23	×	2.48

Source: Adapted from Higgins (1998).

The use of ROE to define the value drivers is only one possible approach. Even within the framework of the residual income DCF model, examination of the model variables, $(ROE(t) - k)BV(t-1)$, reveals that k has not been taken directly into account. A more telling comment applies to ***the method of measuring the profit margin using net income divided by sales as a value driver***. Presumably, the profit margin is concerned with the success of the operating component of the business. In this case, it is more conventional to measure profit margin using, say, ***gross profit margin = {sales − cost of goods sold}/sales or EBITDA profit margin = {sales − cost of goods sold − selling, administrative and general expenses}/sales.*** In addition to having a range of accruals, net income may also include significant extraordinary items. Another complication associated with starting from ROE arises with the use of *Book Value of Equity* which does not directly account for the inherent increase in riskiness associated with leveraging. One method of addressing this concern is to use the ***ROIC = {EBIT (1 − tax rate)}/invested capital*** of the 'economic profit model' as a starting point for specifying value drivers.

Taking a cue from the management consulting approach, the nuts-and-bolts problem of identifying value drivers for specific companies is not as easy to solve as the mechanical accounting formulas would suggest. Though the generic value drivers such as sales growth, operating margins and capital turnovers "apply equally well to all business units" these notions "lack specificity and cannot be used well at the grassroots level". This comment applies equally well to the use of value drivers in security analysis. When

pressed for precisely how to identify value drivers, the management consulting approach is decidedly vague, e.g., Copeland *et al.* (1996, p. 111): "Identifying the key value drivers is also a creative process that requires trial and error. Mechanical approaches based on existing information and purely financial approaches rarely identify the key value drivers".

In the absence of a well-defined method for identifying value drivers it is not surprising that: "Identifying the key value drivers for a company can be difficult because it requires the company to think differently about its processes" (Copeland *et al.* 1996, p. 111). References are often made to 'decision trees' and 'scenario analysis' as techniques for dealing with the difficulty of identifying value drivers, even though these techniques appear to involve substituting one form of mechanistic analysis for another. Similar difficulties arise when the value driver approach is applied to the valuation of the common stock of companies. Mechanistic approaches to identifying value drivers seek factors of homogeneity across firms, while it is ***the identification and assessment of heterogeneity across firms*** that is most helpful in equity security analysis. For example, while the breakeven load factor is a key value driver in the airline industry, each firm has a different breakeven load factor and a different composition of routes, interest expenses, pricing decisions and so on that determine the load factor for a given airline. Understanding the elements contributing to load factor differences is especially important in the relative valuation approach to equity security analysis.

Value Drivers in the Airline Industry

Identification of the value drivers for a particular firm will typically require a detailed analysis of the business operations for a given company to be conducted. This will involve analysis of the business sector of the firm's operation and a comparison with similar companies in the sector. With this background in hand, ***the value drivers need to be estimated*** to obtain the appropriate inputs to the *DCF* model. In certain cases where simple models such as the Gordon model are applicable, the *DCF* model can be inverted to provide, say, k or g parameters that would make sense of an observed price. In some cases, such as the valuation of resource companies with known reserves, the *DCF* model can be used to provide an estimate for the implied average future selling price for the commodity. However, in other cases, the *DCF* calculation is sufficiently complicated that the simple models do not apply. This is, arguably, the case with most of the firms in

the U.S. airline industry, especially following the collapse of air travel in the U.S. following 9/11, e.g., Weatherford and Belobaba (2002).

Prior to 9/11, there were some systemic problems with certain large, old-line, hub-and-spoke carriers such as United Airlines (UAL), but other carriers such as Delta (DAL) were in fair shape. By the end of the 1990s the progressive airline industry deregulation that began with the passage of the Airline Deregulation Act in 1978 had produced fierce competition from point-to-point low cost carriers such as Southwest Airlines (LUV), e.g., Gittell (2003), Victor (1998), and U.S. Dept. of Transportation (1996). The large hub-based carriers were caught in a vice of intense competition on the most profitable routes. ***Then came 9/11*** and the increased costs of security combined with a dramatic and sustained fall in traffic generated by a combination of macroeconomic, geopolitical and psychological factors. By the start of the U.S.-led war in Iraq in March 2003, major carriers such as Delta (DAL), Northwest Airlines, American Airlines (AMR) and United Airlines (UAL) were bleeding staggering amounts of red ink. Problems in the industry were so severe that UAL entered chapter 11 bankruptcy protection in early 2003 with Delta Airlines and Northwest Airlines entering chapter 11 in September 2005. At the time, there was considerable discussion about whether AMR would follow.

Ex post, those investors willing to take a stand on AMR at a price near $1 in January 2003 made one of the most remarkable *ex ante* investments of the new century. With the company returning to profitability for the first time post-9/11 in fiscal 2006, ***AMR common stock*** nearly reached the $40 level in Feb. 2007 (see Fig. 7.1.). A return of around 4000% in four years. For those investors without the astute timing to exit at the high, AMR managed to give back virtually all of this gain, until recovering to the $6 level in September 2009. Still a profitable venture for those buying near the January 2003 lows but quite a hectic ride! Faced with similar industry and company prospects, the evolution of the value of AMR common stock followed a much different path than for DAL or UAL where the equity security values went to zero and these firms required reorganization in Chapter 11 bankruptcy proceedings. Can the value driver methodology provide any insight into the contrasting results for seemingly similar company situations? What were the sources of heterogeneity among the hub-and-spoke U.S. airlines that contributed to the positive outcome for AMR and negative outcomes for UAL and DAL?

Is it feasible to use DCF methods to value AMR stock? Post-9/11 profit margins in the airline industry were negative and looking to

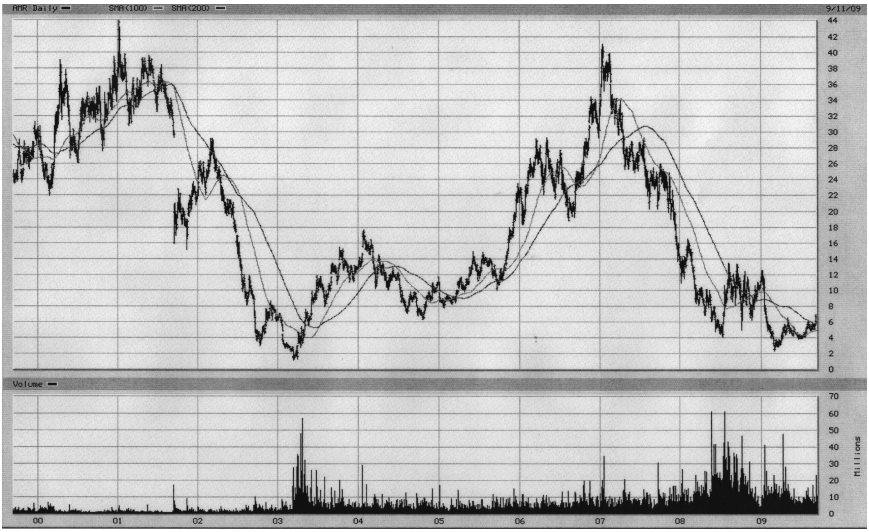


Fig. 7.1 AMR 1999–2009, with MA (100) and MA (200).

remain so for the foreseeable future. This view about profitability circa January 2003 was confirmed by AMR *EPS* in 2003–2005 which were large (relative to the share price) and negative. In such situations, it is difficult to apply any sensible *DCF* model to value stocks generating a recent stream of negative cash flows. Despite the return to profitability in 2006 and 2007, book value of equity is negative for 2008 making it difficult to apply even the abnormal earnings form of the *DCF* model (see Tables 7.10–7.12).[23] AMR has progressively faced the problem of improving asset turnover by reducing routes and capacity to adjust to the decline in traffic which is driven by levels of competition, fluctuating fuel prices, significant fixed cost elements and other factors. Until 2006, the prospects were tending to negative growth.

[23]While a firm is bankrupt if the fair economic value of equity is negative, the book value of equity can be negative because the market value of assets exceeds the book value. This can happen because non-cash adjustments such depreciation and amortization reduce the book value (sometimes to zero) while the economic value of the real asset is being reduced less or not at all. This is the case in the airline industry, where airplanes continue to produce revenue long past the date when the asset has been fully depreciated. Similarly, gate and maintenance facilities are carried at cost when the market value may be much higher.

Table 7.10 AMR Corporation, Consolidated Statement of Operations.

	Year Ended 31 December		
(in millions, except per share amounts)	2008	2007	2006
Revenues			
Passenger — American Airlines	$18,234	$17,651	$17,291
- Regional Affiliates	2,486	2,470	2,502
Cargo	874	825	827
Other revenues	2,172	1,989	1,943
Total operating revenues	23,766	22,935	22,563
Expenses			
Aircraft fuel	9,014	6,670	6,402
Wages, salaries and benefits	6,655	6,770	6,813
Other rentals and landing fees	1,298	1,278	1,283
Depreciation and amortization	1,207	1,202	1,157
Maintenance, materials and repairs	1,237	1,057	971
Commissions, booking fees and credit card expense	997	1,028	1,076
Aircraft rentals	492	591	606
Food service	518	534	508
Special charges	1,213	63	—
Other operating expenses	3,024	2,777	2,687
Total operating expenses	25,655	21,970	21,503
Operating income (loss)	(1,889)	965	1,060
Other income (expense)			
Interest income	181	337	279
Interest expense	(756)	(914)	(1,030)
Interest capitalized	33	20	29
Miscellaneous—net	360	96	(107)
	(182)	(461)	(829)
Income (loss) before income taxes	(2,071)	504	231
Income tax	—	—	—
Net earnings (loss)	$(2,071)	$504	$231
Earnings (loss) per share			
Basic	$(7.98)	$2.06	$1.13
Diluted	$(7.98)	$1.78	$0.98

Until the operating losses abated, there was a downward spiral of increasing financial leverage required to fund ongoing losses raising interest costs, contributing to an erosion of the ability to compete on routes and fares in the future.

As AMR common stock illustrates, equity valuation in the airline industry cannot rely on accounting estimates of accruals, cash flows and book values to determine a *DCF* estimate. Using this approach to *DCF* valuation arrives at a value of zero for AMR, if only because negative *DCF* values are set to zero. One possible resolution is to transform the residual income

Table 7.11 AMR Corporation, Consolidated Statement of Cash Flows.

	Year ended 31 December		
(in millions, except per share amounts)	2008	2007	2006
Cash flow from operating activities:			
Net earnings (loss)	$(2,071)	$504	$231
Adjustments to (income) net income :			
Depreciation	1,055	1,036	1,022
Amortization	152	166	135
Equity based stock compensation	53	133	142
Restructuring and settlement charges	1,317	63	—
Gain on sale of investments/subsidiaries	(432)	(138)	(13)
Redemption payments			
bonds	(188)	(100)	(28)
Decrease (increase) in assets and liabilities:			
Receivables	217	(41)	3
Inventories	5	(128)	(7)
Derivative collateral and unwound contracts	(940)	164	—
Accounts payable and accrued liabilities	(421)	248	(130)
Air traffic liability	(277)	203	168
Other liabilities and deferred credits	178	(135)	382
Other, net	(42)	(40)	34
Net cash provided by (used in) operating activities	(1,394)	1,935	1,939
Cash flow from investing activities:			
Capital expenditures, including purchase deposits on flight equipment	(876)	(714)	(530)
Net decrease (increase) in short-term investments	1,471	207	(918)
Net decrease (increase) in restricted cash and short-term investments	(31)	40	42
Proceeds from sale of equipment, property and investments/subsidiaries	480	228	49
Other	11	5	(8)
Net cash provided by (used in) investing activities	1,055	(234)	(1,365)
Cash flow from financing activities:			
Payments on long-term debt and capital leases	(1,092)	(2,321)	(1,366)
Proceeds from:			
Issuance of common stock, net of issuance costs	294	497	400

(*Continued*)

Table 7.11 (*Continued*)

	Year ended 31 December		
	2008	2007	2006
Reimbursement from reserve account	—	59	145
Exercise of stock options	1	90	230
Issuance of long-term debt	825	—	—
Sale leaseback transactions	354	—	—
Net cash provided by (used in) financing activities	382	(1,675)	(591)
Net increase (decrease) in cash	43	27	(17)
Cash at beginning of year	148	121	138
Cash at end of year	$191	$148	$121

(abnormal earnings) model into the ***economic residual income model***, where book value of equity is replaced with 'economic book value' determined as the market value of assets minus the market value of liabilities. As a consequence of changing the book value variable, the rate of return on the economic book value replaces the *ROE* in the residual income model. While this is a theoretically sound, even advisable, substitution, the difficulties in practical implementation are considerable. Even given that the market value of liabilities can be accurately determined, determining the market value of assets is complicated. In the case of an airline, there are visible assets such as the aircraft (see Table 7.13). While owning 398 out of a fleet of 697 planes would seem a promising place to establish some asset value, there is the following ominous statement from the 2006 annual report: "A very large majority of the Company's owned aircraft are encumbered by liens granted in connection with financing transactions".

Factors threatening bankruptcy means AMR seriously violates the 'large, stable firm' assumption needed to apply a *DCF* valuation. These factors can be assessed by examining the cash flow statement (Table 7.11) where the accrual earnings loss of over $2 billion translates into a cash loss from operations of just under $1.4 billion. This cash result would have been much better but for a $940 million adjustment due to derivative security positions. This loss is being absorbed by sales of short-term investments. The balance sheet reveals an additional $2.9 billion of short term investment available to cover future losses. From a free cash flow perspective, cash needed to fund ongoing net capital expenditures, just under $400 million

Table 7.12 AMR Corporation Consolidated Balance Sheets.

	31 December	
(in millions, excepts shares and par value)	2008	2007
Assets		
Current Assets		
Cash	$191	$148
Short-term investments	2,916	4,387
Restricted cash and short-term investments	459	428
Receivables, less allowance for uncollectible accounts (2008–$49; 2007–$41	811	1,027
Inventories, less allowance for obsolescene (2008–$488; 2007–$424	525	601
Fuel derivatives contracts	188	416
Fuel derivatives collateral deposits	575	—
Other current assets	270	222
Total current assets	5,935	7,229
Equipment and Property		
Flight equipment, at cost	19,601	23,006
Less accumulated depreciation	7,147	9,029
	12,454	13,977
Purchase deposits for flight equipment	671	241
Other equipment and property, at cost	5,132	5,238
Less accumulated depreciation	2,762	2,825
	2,370	2,413
	15,495	16,631
Equipment and Property Under Capital Leases		
Flight equipment	561	1,698
Other equipment and property	215	217
	776	1,915
Less accumulated amortization	536	1,152
	240	763
Other Assets		
Route acquisition costs, slots and airport operating and gate lease rights, accumulated amortization (2008–$416; 2007–$389	1,109	1,156
Other assets	2,396	2,792
	3,505	3,948
Total Assets	$25,175	$28,571

Note: The accompanying notes are an integral part of these financial statements.

Table 7.13

Flight Equipment — Operating, Owned and Leased Aircraft Operated by the Company at 31 December 2006.

Equipment type	Average seating capacity	owned	Capital leased	Operating leased	total	Average Age (Years)
American airlines aircraft						
Airbus A300-600R	267	10	—	24	34	17
Boeing 737-800	148	67	—	10	77	7
Boeing 757-200	187	87	6	49	142	12
Boeing 767-200 extended range	167	3	11	1	15	20
Boeing 767-300 extended range	220	47	—	11	58	13
Boeing 777-200 extended range	246	46	—	—	46	6
McDonnell Douglas MD-80	136	138	72	115	325	17
Total		398	89	210	697	14

Of the operating aircraft listed above, 25 McDonnell Douglas MD-80 aircraft — 12 owned, eight operating leased and five capital leased — were in temporary storage as of 31 December 2006. A very large majority of the Company's owned aircraft are encumbered by liens granted in connection with financing transactions antered into by the Company.

when asset disposals are netted against capital expenditure outlays. These costs were being paid for with a combination of equity and debt, which includes both actual debt issues and sale and lease buyback transactions. The ability of AMR to raise equity and, especially, debt financing is a positive signal for future developments. Compared to the financial situations at Delta and UAL prior to entering chapter 11, the situation at AMR appeared manageable for the near term.

Given the near term financial viability of AMR, if a *DCF* valuation is not possible then what avenue remains to use in valuing AMR common stock? This question can be translated into: what are the key value drivers for an airline such as AMR? Traditional equity security valuation focuses on assessing ***key value drivers in the airline industry***: load factors and yields, where load factor is 'revenue passenger miles' divided by 'available seat miles' and 'passenger revenue yield per passenger mile' takes ticket prices into account. According to Penman (2001, p. 499): "The analyst cuts to these key factors [of load factor and yield] but is also sensitive to any

changes in available seat miles with new routes and gate allocations. Other drivers such as labor productivity, labor costs, commission rates to travel agents, and fuel costs per mile are also monitored". Given this, the history of AMR stock suggests that traditional *ex post* measures of operating performance may not turn out to be the *ex ante* variables that drive the future performance. Significantly, the collapse in demand for U.S. air travel due to the exogenous increase in security concerns following 9/11 swamped the relevance of the traditional measures.

Traditional valuation measures for airlines often avoid detailed consideration of the most volatile expense component, fuel costs, and the associated derivative security programs that are used to hedge the associated price risk. As such, listing of factors without an assessment of ***the relative ex ante impact of the most important factors on equity security value*** is problematic when the *DCF* model is not available to guide the valuation process. Important but difficult-to-measure value drivers, such as the evolution of competition from point-to-point airlines, go unrecognized because these cannot be summarized in a number. In general, factors that are longer term in nature often go undiscussed due to a focus on near-term performance. The return to profitability of AMR in 2006–2007 altered the cycle of increasing debt to pay for current losses, raising the breakeven load factor and further enroding the competitive position of the airline. The importance of near term profitability for an airline with negative book value of equity depends on the available supply of assets, such as airplanes, available for sale or sale-leaseback. When carried at a book value less than market value, such assets provide a valid economic explanation for the negative book value of equity.

When the equity security of companies with the profile of AMR are the subject of the valuation, a focus on numbers in the assessment of value drivers tends to mask conceptual questions essential to equity security valuation. Avoidance of ***the logical fallacy of false precision*** is required. The more accurately a future cash flow can be estimated, the more precise the equity security valuation can be. In most valuations, particularly where the basics of the situation defy a simplified *DCF* estimate, such precision is unobtainable. Yet, given the amount of numerical data available such as accounting numbers and past price histories, estimated stock price targets can be presented in a manner that implies better precision than is actually the case. Because precision implies accuracy, excess numerical precision in the estimated value generates overconfidence in the accuracy of that estimate. The often intuitive and imprecise process of translating the

numbers into a 'valuation' is not consistent with providing such an exact estimate.

Value Drivers for Coca-Cola

Ultimately, the format used to structure the identification of value drivers pales in comparison with the economics and accounting required to assess how the dynamics of the underlying business impact the value drivers. Consider the problem of identifying ***the value drivers for Coca-Cola***, a company that Buffett describes as a 'wonderful' company. Penman (2001, p. 497) suggests that: "For Coca-Cola sales and margins are key drivers". These drivers are related to 'brand creation and maintenance' and 'product innovation'. "Coca-Cola is a ***brand management firm*** where value is driven by exploiting a brand". The accounting information for Coca-Cola that is provided in Penman (2001, pp. 468, 497) covers the years 1990–1997 and reflects a strong and steady increase in sales estimated to be 7.5% per year. This sales growth is used by Penman to provide an estimate of future sales growth that, in turn, is used as a key input to a *DCF* valuation of the common stock of $56.20. Poitras (2005) examined the *ex post* performance of the Penman *ex ante* valuation of KO to find that sales from 1998–2002 did not conform with past patterns. Sales fell significantly in 2000 and 2001. Net Income fell from 2001 to 2002. Though dividends per share had been increased and the share buyback program had been stepped up, the *ROIC* fell. The value of the stock on 27 March 2003 of $40.73 was well below Penman's *ex ante* valuation.

Buffett is correct to characterize Coca-Cola (KO) as a 'wonderful' company. In the macroeconomic and stock market environments of 2000–2003 and 2008–2009 where many firms were suffering, both on an operating and common stock price basis, Coca-Cola weathered these storms with some dignity. Using simplified *DCF* models applied to the accounting numbers up to year-end 2002, Poitras (2005) forecasted 'glimmers of hope' that the corner may be in sight for KO common stock. Figure 7.2 confirms that over the next four years the corner on stock price performance was reached and turned upward, only to find KO engulfed in the market downdraft of 2008-2009. In contrast, the performance based on accounting numbers did not justify the downward price move (see Table 7.14). To make any further statement about future performance requires considerably more dissecting of factors such as the regional and product distribution of sales, developments in the marketing of the key brands (Coke, Fanta, Sprite, Minute

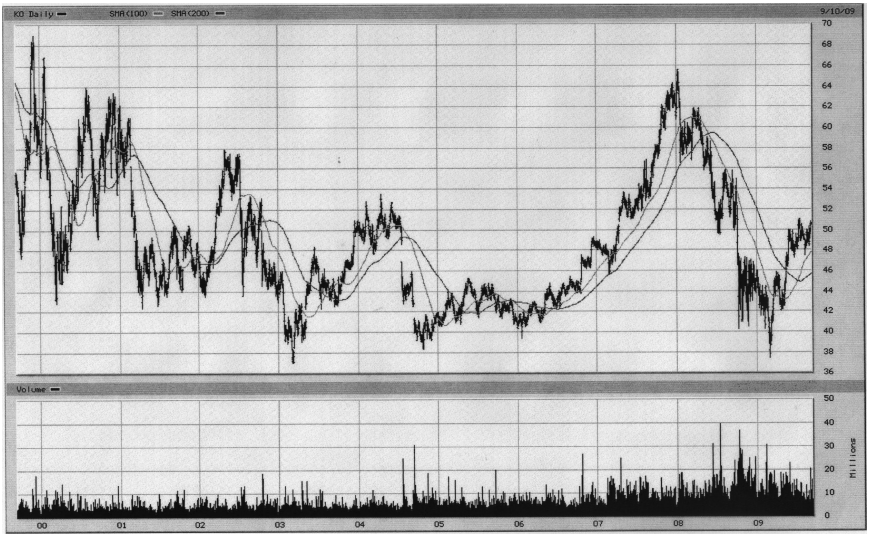


Fig. 7.2 KO 1999–2009, with MA (100) and MA (200).

Maid, etc.), roll-outs of new products, projected changes in the financial structure and so on. Casual, or even intensive, analysis of accounting numbers is only of secondary importance relative to analysing and understanding the business that generates these accounting numbers. The general accounting format for value drivers based, say, on a decomposition of *ROE* provides a motivation for which elements to examine. However, this is only a guide to channelling energies in dissecting the business.

Picking a DCF Model

Hartley Withers (1910) observed about common stock valuation: "The pedantic mind craves a precise formula ... But second thoughts put the formula into the waste-paper basket". The *DCF* model is a formula that suggests it is possible to arrive at a precise estimate for the value of a common stock. Reinventing Withers in the present, it is still true that ***there is no precise formula*** — though some techniques do perform better in particular situations. Acknowledging that there are cases where the cash flows and discount rate are more-or-less known with relative certainty, a *DCF* valuation will only be as precise as the inputs that are used. Because the relevant inputs are typically imprecise, the resulting estimated value obtained

Table 7.14 Selected Financial Data for Coca-Cola, 2004-2008.

(In millions except per share data) Year ended December 31	2008	2007	2006	2005	2004
Summary of operations					
Net operating revenues	$31,944	$28,857	$24,088	$23,104	$21,742
Cost of goods sold	11,374	10,406	8,164	8,195	7,674
Gross profit	20,570	18,451	15,924	14,909	14,068
Selling, general and administrative expenses	11,774	10,945	9,431	8,739	7,890
Other operating charges	350	254	185	85	480
Operating income	8,446	7,252	6,308	6,085	5,698
Interest income	333	236	193	235	157
Interest expense	438	456	220	240	196
Equity income (loss) — net	(874)	668	102	680	621
Other income (loss) — net	(28)	173	195	(93)	(82)
Gains on issuances of stock by equity investees	—	—	—	23	24
Income before income taxes	7,439	7,873	6,578	6,690	6,222
Income taxes	1,632	1,892	1,498	1,818	1,375
Net income	$5,807	$5,981	$5,080	$4,872	$4,847
Average shares outstanding	2,315	2,313	2,348	2,392	2,426
Average shares outstanding assuming dilution	2,336	2,331	2,350	2,393	2,429
Per share data					
Basic net income	$2.51	$2.59	$2.16	$2.04	$2.00
Diluted net income	2.49	2.57	2.16	2.04	2.00
Cash dividends	1.52	1.36	1.24	1.12	1.00
Closing market price	45.27	61.37	48.25	40.31	41.64
Total market value of common stock	$104,683	$142,289	$111,857	$95,504	$100,325
Balance sheet data					
Cash, cash equivalents and current marketable securities	$4,979	$4,308	$2,590	$4,767	$6,768
Property, plant and equipment — net	8,326	8,493	6,903	5,831	6,091
Depreciation	993	958	763	752	715
Capital expenditures	1,968	1,648	1,407	899	755
Total assets	40,519	43,269	29,963	29,427	31,441
Long-term debt	2,781	3,277	1,314	1,154	1,157
Shareowners' equity	20,472	21,744	16,920	16,355	15,935
Net cash provided by operating activities	$7,571	$7,150	$5,957	$6,423	$5,968

from a *DCF* model will also be imprecise. However, even though the formula does not yield a precise value, it does not follow that the waste-paper basket is the appropriate end point. The *DCF* model provides a process of constructing an estimated value that can provide insight into the future evolution of the value drivers that determine the common stock price. To what extent the estimated price determined from a *DCF* model can be used as the primary vehicle for conducting a security analysis will depend on a range of factors including the type of stock and the biases of the analyst.

Following Graham *et al.* (1962) and other 'value investors' such as Warren Buffett, the *DCF* price estimate puts a face on the 'intrinsic value'. Combining an intrinsic value with the 'margin of safety' principle is an implicit recognition that the value estimates obtained from *DCF* models are inherently imprecise. Consistent with the investment philosophy of value investors (see Fig. 1.4), at any given time a particular common stock may be overvalued or undervalued relative to the 'true' intrinsic value that will eventually be reflected in the market price. *DCF* models are a theoretically sound if imprecise method of determining an estimate for the intrinsic value. Even if there is not enough confidence in the *DCF* estimate to make a trading decision, if the common stock price is significantly different than the *DCF* estimate, either above or below, then this is a flag to reexamine the assumptions and forecasts that were made for the value drivers and inputs to the *DCF* model. Hence, following Hooke (1998, ch.12) and others, estimating a price using ***a DCF model is a sound first step*** in the security analysis process. It will not likely be sufficient to generate a trading decision and, even if it is, there will almost certainly be a number of iterations of the *DCF* price estimate before a trading decision is made.

Given that a *DCF* model is used to construct a first step value estimate, ***a number of key questions have to be addressed*** before the forecasts of the inputs are determined. One question concerns the specific type of *DCF* model to use. The various *DCF* alternatives to equity valuation differ according to the variable that is being discounted, i.e., dividends, accrual earnings, free cash flow, economic profit and so on. In terms of the simplified *DCF* models in conventional use, the associated alternatives can be classified as the dividend discount model, the residual income model and the free cash flow model.[24] Each of these models is expressed in a simple

[24]Ruback (2002) suggests an alternative *DCF* model, the 'capital cash flow model' that involves discounting free cash flow by the weighted average cost of capital. Because in this method the interest tax shields are included in the cash flows, the capital cash flow

format, e.g., the Gordon growth model version of the dividend discount model. Alternatively, a more general *DCF* model can appear in a more flexible format that does not make, say, constant growth assumptions but calculates the price estimate by individually discounting a string of future cash flows. Though more conceptually appealing, because it is not feasible to discount cash flows out to infinity this approach requires some forecasting horizon to be specified and some method for estimating the terminal value. Following Penman and Sougiannis (1998), the different *DCF* models have different sensitivities to the selection of the forecast horizon.

A natural question arises about the practical differences in determining value estimates from the simplified *DCF* models. In cases where dividend payouts are zero or not approximately based on a constant target dividend payout ratio, then there will be difficulties with applying the Gordon growth version of the dividend discount model. In such cases, the residual income or free cash flow approaches will be superior. Which of these two simplified models works best for zero-dividend firms depends on whether the inclusion or exclusion of accruals provides a better *ex ante* fit to the future stream of cash flows.[25] There is no assurance that the simplified *DCF* models will provide much the same valuations as the general *DCF* models. In the end, simplified models are well suited to providing a relatively quick check on the difference between the estimated intrinsic price and the observed stock price. As such, the simplified models avoid some of the 'difficulty of application' criticism that is often made by professional security analysis of the general *DCF* model.

In order to examine the informativeness of different value estimates obtained from different *DCF* models, Poitras (2005) executed a comparative valuation of Coca-Cola. Three different simplified *DCF* models were examined: the Gordon growth model; the simplified residual income model; and the simplified free cash flow model. To this end, recall the Gordon model: $P(0) = \{D(0)(1 + g)\}/\{k - g\}$. Deriving this model required a constant growth rate in dividends assumption, which translates to a constant earnings growth rate when the dividend payout ratio (b) is constant. Recognizing that constant growth in dividends with a constant dividend

approach is easier to apply when debt is forecasted in levels instead of as a percent of total firm value.

[25]Though there is some empirical accounting research on the relative *ex post* ability of current cash flows and current earnings to predict future cash flows, this research is better suited to the more general *DCF* models that require estimating a stream of future cash flows and a terminal value at the fixed horizon end point.

payout does not ensure that FCFE will also grow at the same rate, it is possible to assume that FCFE grows at a constant rate g_f such that $\text{FCFE}(t) = \text{FCFE}(t-1)(1+g_f)$, this produces the simplified free cash flow valuation model: $P(0) = \{\text{FCFE} * (0)(1+g_f)\}/\{k-g_f\}$. Only under restrictive simplifying assumptions is it possible to assume $g = g_f$. This assumption is not plausible in many situations.[26] Similarly, continuing with the constant growth in earnings and assuming that the book value of equity grows at a rate $g_b(t)$ such that $BV(t) = BV(t-1)(1+g_B(t))$, produces the simplified residual income model: $P(0) = BV(0)\{ROE(1) - g_B(1)\}/\{k-g\} = BV(0)\{bROE(1)\}/\{k-g\}$.

Valuing Coca-Cola using DCF

Coca-Cola (KO) is an excellent company to use for purposes of comparing simplified *DCF* models, as it has many characteristics of a 'large, stable company (see Table 7.14). Other aspects that make it an attractive company to value are that, being a stock that is highly touted by Warren Buffett, it can be viewed as a classic example of a 'value company'. Such companies are likely to be excellent candidates for applying *DCF* techniques. Another attractive feature of Coca-Cola is that it is such a strong company, many problems that can arise in estimating the input values, e.g., where earnings have been negative or highly volatile for some time or dividends have been suspended, do not arise. The questions at hand are: which *DCF* model to use? How do valuations from each of the simplified *DCF* models compare? Are there similar value estimates from the different models?

Given this, consider the results in Poitras (2005) ***applying the Gordon model to value KO*** on 27 March 2003, where the five-year growth for dividends is estimated as $g = 7.4\%$ with $D(0) = \$.80$ and $P(0) = \$40.73$. With this information the implied expected return on equity was solved from the

[26]Free cash flow is an elusive variable to model and measure, e.g., Adhikari and Duru (2006). To this end, there is the distinction between FCF to the firm and FCFE. The FCF to the firm number is affected by the capital expenditure number which, in a given period, can be substantively impacted by the evolution of capital investment decisions. For example, some long lived investments may require years of initial investment. The required expenditures may not be linearly allocated across years but may be quite lumpy with, say, larger expenditures in the initial years than in later years (e.g., due to the need to make one-shot purchases of construction equipment and materials to commence building). Similarly, FCFE can be impacted by the timing of debt refinancing and the 'lumpiness' of such transactions. The connection between the accounting measurement of FCFE in any given period and the 'economic free cash flow to equity' that is theoretically correct can be very tenuous.

Gordon model as $k = \{0.8(1.074)/\$40.73\} + 0.074 = 9.51\%$. Given that the estimated beta for Coca-Cola at the time was 0.624 and the long-term Treasury bond at the time was yielding 5.375% using Damodaran's long-term market risk premium of $E[R_M] - r = 5.5\%$ the CAPM provided an alternative estimate of the discount rate (k) of $8.81\% = 5.375 + 0.624(5.5\%)$. This value of k provided an estimated price of \$61.06. KO was found to be significantly undervalued. While this common stock price did not emerge for some time following the valuation, KO did reach this level by the second half of 2007 (see Table 7.14). Significantly, a valuation of KO using the Gordon model on 11 February 2008 (\$59.50 NYSE closing price) is not possible due to the growth rate of both earnings and dividends over the 2002–2007 period being far in excess of the estimated k from the CAPM using current values for the long term Treasury bond and estimated beta: $k = 0.0803 = 0.44 + 0.66(0.55)$. However it is possible to use the Gordon model to back out an estimate for g : $\$59.50 = \{1.50/(0.0803 - g)$ where $D(1) = 1.50$ is determined by increasing the 2007 by as much as the increase between 2006 and 2007. The value which solves the unknown is $g = 5.51\%$.

In contrast to the price estimate provided by the Gordon model, the simplified free cash flow and residual income models for Coca-Cola are more difficult to evaluate. The ***simplified residual income model*** can provide a bridge between the Gordon model and the simplified free cash flow model. Recognizing that the simplified residual income model requires an estimate of the constant dividend payout ratio, examination of the 15 year (1992–2007) dividend payout ratio for Coca-Cola reveals considerable variance in the payout ratio which, *ex ante*, reduces confidence in the constant dividend payout assumption. Though the dividend payout ratio was always below 45% and sometimes below 40% until 2000, the payout ratios in 2000 and 2002 were 77% and 65%. Though lower, dividend payout ratios for 2002–2006 did not return to below the 45% payout level common in the 1990s. Based on the available accounting number, a value of $b = 0.5$ seems reasonable for a valuation of the February 2007 price.

Poitras (2005) estimates the book value per share on 27 March 2003 as $BV(0) = 11.8/2.478 = 4.762$ and assuming $b = 0.5$, used the $\{k - g\}$ values from the dividend growth model to provide an estimate for the simplified residual income model: $P(0) = 4.762\{0.5(.35)\}/\{0.0951 - 0.074\} = \$39.50$. The value for $ROE(1)$ is based on the 34.3% value observed in 2002 and similar values observed in a number of previous years. Using the discount rate estimate from the CAPM of 8.81% (instead of the 9.51% rate backed

out from the Gordon model) gives a price estimate of \$59.10. It was observed that the close correspondence of these values with the Gordon model price estimates supports a conclusion that 0.5 is close to the equilibrium dividend payout ratio that is consistent with the growth rate of 7.4% and discount rate of 0.0951 derived using the Gordon model. Doing a simplified residual income valuation on 11 February 2008 using the g value backed out of the Gordon model gives: $\$44.89 = (\$7.07)(0.5(0.32))/(0.0803 - 0.0551)$. Using the growth rate of 7.4% that was used in the Poitras (2005) valuation gives an estimated price of \$179.56.

In some valuations, the required inputs are readily obtained, as with the steady 7.4% growth per share for KO-dividend payments between 1997–2002 used in Poitras (2005). However, in numerous other cases, determining a growth rate for net income, book value of equity per share and even dividends is more difficult. This can be illustrated in KO dividend and earnings growth. For example, the compounded annual growth rate for KO earnings between 2002–2006 is 13.6% and for dividends is 11%. Both of these values exceed k and are not admissible for use in simplified DCF valuation. Similarly, Poitras (2005) estimated a growth rate for KO net income between 1997–2002 of -5.9% while the 10 year rate is 6.2%. Return on equity from 1997–2007 has also been quite variable with a high over the ten year period of 61.6% in 1997 to a low of 23.1% in 2000. Between 2004 and 2007, the ROE stayed within a narrow range of 30–32%.

The growth rate for book value of equity can also be difficult to determine. For example, the three year compound growth rate for BV from 1999–2002 is 7.45%. While this value is admissible, the four year compound growth rate for 2002–2006 is 10.38%. As with the use of BV values from the 1992–1997 period the estimated growth rate for book value is in excess of k, violating the stability condition. The reliance of the residual income model on the book value of equity and net income is a substantive limitation on the effectiveness of this approach. BV and E are residual outcomes of a significant number of accounting calculations. Accrual values for items such as depreciation, company pension fund adjustments, methods of inventory valuation and so on can have a significant impact on this method of calculating a DCF price estimate. Yet, BV and E do have generally accepted definitions. The same cannot be said for the key input to the $FCFE$ model.

In theory, the use of a DCF model implies the discounting of 'cash flow'. Net income and book value are accrual accounting numbers and, as such, are only proxies for 'true' cash flows. Free cash flow is an attempt to arrive at a better cash flow measure. Yet, FCF is not without problems and limitations.

In particular, there is no agreed upon definition of FCF. While FCF requires a value for capital expenditures to be subtracted from 'net cash provided by operating activities', the specific capital expenditure number to use is subject to debate. The conventional approach is to use the observed capital expenditure item(s) from the investing activities section of the cash flow statement, even though this is not conceptually correct. The logic of the *DCF* model requires the use of a capital expenditure expense that reflects the assumptions used to generate the future stream of free cash flows, e.g., English (2001, p. 295). This may or may not be close to the conventional value. In simplified models, a number for capital expenditures sufficient to maintain existing operations on the estimated growth path is required.

Coca-Cola does not report FCF as a separate line item in the 10-K financial statements. This value has to be calculated and, to this end, a number of conceptual problems arise. In particular, the calculation of capital expenditures is equated in the financial statements with purchases of property, plant and equipment. Yet, the line item 'acquisitions and investments, principally trademarks and bottling companies' is sufficiently close to capital expenditures that it is appropriate to be included. Despite some opaqueness in the total debt number, debt repayments and debt issuance are directly identifiable from the cash flow statement. Using this calculation process Poitras (2005) reports following calculated FCFE* (not per share) values:

Free cash flow to equity for Coca-Cola, 1996–2001
(millions US$; shares in millions)

	1996	1997	1998	1999	2000	2001
FCFE	$1770	$1870	$1894	$2551	$1244	$2370
Trademarks	(−651)	(−397)	(−1876)	(−1428)	(−1100)	(−645)
#Shares	2,487	2,477	2,468	2,467	2,477	2,494

Defining FCFE* = cash from operations − PPE − acquisitions of trademarks − debt repayments + debt issuance, the number in brackets below the free cash flow number is the 'acquisitions and investments, principally trademarks and bottling companies' that is listed separately from the conventional capital expenditure number associated with purchases of property, plant and equipment.

Extending the *FCFE** calculations to include 2002–2008 gives:

Free cash flow to equity for Coca-Cola, 2002–2008
(millions US$; shares in millions)

	2002	2003	2004	2005	2006	2007	2008
FCFE	$2591	$3305	$6660	$2605	$2245	$4190	$4873
Trademarks	(−544)	(−359)	(−267)	(−637)	(−901)	(−5653)	(−759)
#Shares	2,478	2,459	2,426	2,348	2,350	2,331	2,336

Based on these FCF numbers setting $g_f = 0$ does not appear to be a plausible assumption. However, even without calculating any estimated values, it is apparent that without growth in free cash flow appearing in the denominator, the simplified free cash flow to equity formula will produce an estimated value considerably lower than the market price. In addition to erratic growth in FCF, there is also considerable noise in individual numbers. The largest FCFE number occurs during 2004 with 1998 being similar to 2002 and 2005. However, the large value in 2004 is associated with a sizeable net cash inflow from debt issues that occurred in that year but resulted in an approximately comparable cash outflow from debt repayment in 2005. Similar debt program implications appear in 2007 (see Tables 7.15 and 7.16). Some smoothing of numbers to reduce the implications of corporate debt management activities is indicated. In such situations, an alternative approach is to first, calculate FCF to the firm and to arrive at an estimated value for FCFE by subtracting the market value of debt from the estimated value.

To determine an estimated value for 2002, Poitras (2005) begins by assuming $g_f = 0$ and determining the per share FCFE as $FCFE = \$2{,}500/2{,}478$ shares $= \$1.01$/share and using the CAPM discount rate of 8.81% gives an estimated price of $11.51. If the 'trademark and bottling companies' number is not included then the valuation produces $\text{FCFE}^* = \$3,100/2,478 = \$1.25$ with $k = 8.81\%$ for an estimated price of $14.20. Using the simple constant growth FCFE valuation model to estimate a projected growth rate for free cash flow to equity that is consistent with $P(0) = \$40.73$ produces $g_f = 6.86\%$ for $k = 9.51\%$ and $g_f = 6.18\%$

Table 7.15 Coca-Cola Company, Consolidated Statement of Cash Flows.

Year ended 31 December (In millions)	2008	2007	2006
Operating Activities			
Net income	$5,807	$5,981	$5,080
Depreciation and amortization	1,228	1,163	938
Stock-based compensation expense	266	313	324
Deferred income taxes	(360)	109	(35)
Equity income or loss, net of dividends	1,128	(452)	124
Foreign currency adjustments	(42)	9	52
Gains on sales of assets, including bottling interests	(130)	(244)	(303)
Other operating charges	209	166	159
Other items	153	99	233
Net change in operating assets and liabilities	(688)	6	(615)
Net cash provided by operating activities	7,571	7,150	5,957
Investing activities			
Acquisitions and investments, principally beverage and bottling companies and trademarks	(759)	(5,653)	(901)
Purchases of other investments	(240)	(99)	(82)
Proceeds from disposals of bottling companies and other investments	479	448	640
Purchases of property, plant and equipment	(1,968)	(1,648)	(1,407)
Proceeds from disposals of property, plant and equipment	129	239	112
Other investing activities	(4)	(6)	(62)
Net cash used in investing activities	(2,363)	(6,719)	(1,700)
Financing activities			
Issuances of debt	4,337	9,979	617
Payments of debt	(4,308)	(5,638)	(2,021)
Issuances of stock	586	1,619	148
Purchases of stock for treasury	(1,079)	(1,838)	(2,416)
Dividends	(3,521)	(3,149)	(2,911)
Net cash provided by (used in) financing activities	(3,985)	973	(6,583)
Effect of exchange rate changes on cash and cash equivalents	(615)	249	65
Cash and cash equivalents			
Net increase (decrease) during the year	608	1,653	(2,261)
Balance at beginning of year	4,093	2,440	4,701
Balance at end of year	$4,701	$4,093	$2,440

for $k = 8.81\%$ with the 'trademark' number included and $g_f = 6.25\%$ for $k = 9.51\%$ and $g_f = 5.57\%$ for $k = 8.81\%$ with the 'trademark' number excluded. All this to and fro begs the question: Why do the FCFE price estimates differ so much from the Gordon model and residual income model?

Table 7.16 Coca-Cola Company, Balance Sheets.

31 December (In millions except par value)	2008	2007
Assets		
Current assets		
Cash and cash equivalents	$4,701	$4,093
Marketable securities	278	215
Trade accounts receivable, less allowances of $51 and $56, respectively	3,090	3,317
Inventories	2,187	2,220
Prepaid expenses and other assets	1,920	2,260
Total current assets	12,176	12,105
Investments		
Equity method investments:		
Coca-Cola Hellenic Bottling Company S.A.	1,487	1,549
Coca-Cola FEMSA, S.A.B. de C.V.	877	996
Coca-Cola Amatil Limited	638	806
Coca-Cola Enterprises Inc.	—	1,637
Other, principally bottling companies and joint ventures	2,314	2,301
Other investments, principally bottling companies	463	488
Total investments	5,779	7,777
Other assets	1,733	2,675
Property, plant and equipment — net	8,326	8,493
Trademarks with indefinite lives	6,059	5,153
Goodwill	4,029	4,256
Other intangible assets	2,417	2,810
Total assets	$40,519	$43,269
Liabilities and shareowners' equity		
Current liabilities		
Accounts payable and accrued expenses	$6,205	$6,915
Loans and notes payable	6,066	5,919
Current maturities of long-term debt	465	133
Accrued income taxes	252	258
Total current liabilities	12,988	13,225
Long-term debt	2,781	3,277
Other liabilities	3,401	3,133
Deferred income taxes	877	1,890
Shareowners' equity		
Common stock, $0.25 par value; Authorized — 5,600 shares; Issued — 3,519 and 3,519 shares, respectively	880	880
Capital surplus	7,966	7,378
Reinvested earnings	38,513	36,235
Accumulated other comprehensive income (loss)	(2,674)	626
Treasury stock, at cost — 1,207 and 1,201 shares, respectively	(24,213)	(23,375)
Total shareowners' equity	20,472	21,744
Total liabilities and shareowners' equity	$40,519	$43,269

Which DCF to Use for Valuing Coca-Cola?

The answer to the question of which *DCF* model to use in valuing KO depends on the confidence allotted to the three simplified *DCF* models employed.[27] The sizable difference in the price estimates suggests that estimates from these models are, at best, imprecise and subject to a number of vagaries. The FCFE model had a particularly questionable performance due to the absence of a discernable growth rate for FCF per share (*FCF*). What the simple *DCF* models do provide is the first step in a structured approach to evaluating observed market prices. For example, in Poitras (2005) the dividend discount model demonstrated that for a current dividend of \$0.80 per share and $g = 7.4\%$ then a $k = 9.51\%$ is needed to make sense of the current price of \$41. The CAPM estimated discount rate of 8.81% indicates the KO stock price may be somewhat undervalued. This was arguably a correct *ex ante* assessment as KO stock increased at a 7.9% compounded growth rate. At the same time, the S&P 500 increased at an 8.5% rate (with comparable dividend payouts) over the five years following the estimate.

There are many sources of possible variation that can affect a simplified *DCF* valuation. All the simplified models require an estimate of k. The beta estimate or market risk premium used to determine the k from the CAPM is somewhat arbitrary. Is a 5.5% equity risk premium too high? This raises the general question: what expected return is appropriate for KO? Similarly, the residual income model required evaluation of the erratic growth rate in earnings. It is possible to 'guess' this value by looking at the growth in dividends, but this is subject to a number of restrictions. Comparison of the residual income and free cash flow results indicate some concerns about whether retained earnings have been effectively employed in the purchase of cash flow generating assets. In addition, the difference

[27]Though the objective of doing a valuation for Coca-Cola in Poitras (2005) was to illustrate the use of simple *DCF* models, the analysis indicated that KO was close to fairly valued with the balance pointing toward undervaluation. Mitigation came from the reasonably robust improvement in variables such as free cash and earnings in 2002. In addition, this improvement has been accompanied by a fall in the common stock price level to values that were historically low for KO at the time of the valuation. However, with a *P/E* at 23, a *P/BV* of 8.5 and a deterioration in the dividend payout ratio there did not appear to be sufficient improvement in free cash flow to support a significant upside price movement from the then current price level. An expected increase in net operating revenue similar to what was experienced from 2001 to 2002 was indicated for the current common stock price to sustain the view that KO was still a legitimate 'value investing' company.

between the accrual and cash flow estimates raises concern that the high value for $ROE = \{P/BV\}/\{P/E\} = \{E/BV\}$ may be masking price-to-book and price-to-earnings ratios that are 'overvalued' at 8.5 and 23 (for 2002).

Lacking confidence in all three of the simple *DCF* valuation models, it would be possible to employ more detailed *DCF* models where cash flows for each individual time period up to the end of a forecasting horizon is specified.[28] In residual income model applications, the terminal period is often assumed to be where $ROE(T) = k$ and all future terms after the terminal period in the (infinite) sum can be set to zero. The economic rationale for this is that when $ROE(T) = k$ the firm has reached a 'competitive equilibrium' where no further abnormal earnings are possible. If dividends or free cash flows are being discounted, the terminal period is often assumed to be where the relevant dividend or free cash flow is constant from that point forward, again being rationalized as an implication of the firm reaching a long-run stationary a competitive equilibrium. The value of the cash flows beyond the terminal period is then determined using a perpetuity pricing model and that value is discounted back to the present at the appropriate discount rate.[29]

Which DCF approach works better? Is it better to discount free cash flow, dividends, economic value added, residual income or some other cash flow measure? As the valuation of Coca-Cola illustrates, the answer to this question is elusive. In general, the applicability of a certain model will depend on the specifics of the situation. The various *DCF* models are simplified characterizations of reality and are useful as an initial screen

[28]Modeling the future cash flows individually permits the introduction of *real option* values into the valuation. In addition, variability and contingency in the future cash flows (or accruals) can be captured using Monte Carlo analysis. However, while Monte Carlo methods are attractive when valuing fixed income securities with embedded options and real options are valuable for capital budgeting decisions, the problem of valuing a common stock is usually not sufficiently precise for these techniques to be as valuable in this type of application.

[29]Recognizing that 'competitive equilibrium' may be an impractical endpoint because it cannot be attained in a foreseeable future, Penman and Sougiannis (1998, p. 347) suggest that, if the forecast horizon is truncated at a practical horizon of five to eight years, then accrual techniques, i.e., the residual income model, "yield lower valuation errors than those based on forecasting dividends or cash flows". The potential for accrual numbers to outperform cash flow numbers in forward-looking valuations is also supported by Barth *et al.* (2001).

and a crude check on other aspects of the valuation exercise. There is a need to do intensive study of a particular security in order to do an adequate valuation. Such study goes well beyond the confines of a simplified *DCF* calculation. In turn, the process of determining the inputs into the *DCF* calculation provides a structure within which the various sources of information about a particular security can be organized. Simplified *DCF* models generally work best with stable cash flow industries. As such, the performance of a specific *DCF* model will depend on the sources of cash flow instability. When possible, it is advisable to calculate an estimated security value from a number of *DCF* models and use the diversity or disagreement of the estimates as a guide to further investigations.

In addition to the three basic *DCF* models, a number of hybrids have been proposed based on approaches such as EVA or ***the economic profit model***. Penman (2001, p. 468) develops one such model, based on capitalizing the value of the cash flows from net operating assets ($VNOA$). This model is used to estimate a 'firm value' for Coca-Cola. Setting: $ROIC =$ the return on invested capital; $IC =$ invested capital; $WACC =$ the weighted average cost of capital; and $g_s =$ the growth rate of sales, Penman provides the following simple valuation formula:

$$VNOA(0) = IC(O) + \frac{(ROIC(0) - WACC(0))IC(0)}{WACC(0) - g_s(0)}$$

The connection with the economic profit model is apparent in the use of *WACC, ROIC*, and *IC*. Based on the 2002 values in the Coca-Cola financial statements, Poitras (2005) provides the estimates: $IC(0) = \$17,156$, $ROIC(0) = 24.5\%$ and $g_s = 3.3\%$ (five year compound rate). Observing that $BV(0) = \$11,800$ with a value for debt of \$5,356, completion of the valuation requires an estimate for the *WACC*. Taking the CAPM value of 8.81% and assuming a debt cost of 7% produces a *WACC* of 8.25%.

Arriving at price estimate based on this formula requires evaluating *VNOA*. This can be viewed as an estimate for the right hand side of the balance sheet. Deducting the (book) value of debt to obtain an estimate for the value of equity and dividing by the number of shares outstanding produces a common stock price estimate. Using the values given produces an estimate of $P(0) = \$27.51$. This value is sensitive to the assumption made about the growth rate in sales. Instead of the five-year sales growth rate, Poitras (2005) also provided a valuation using the ten year sales growth rate of 6.3%. With this estimate for sales growth, the common stock price estimate rises to \$62.41. A growth rate of 5.1% produces a price estimate

of $40.48. This method of valuation is a hybrid, mixing the economic profit model with simplifying assumptions needed to achieve a readily calculated pricing formula. Much like the residual income model, the methodology combines income statement and balance sheet items. The estimated values relate to capitalizing cash flows associated with net operating assets, hence the use of the sales growth rate. While the connection between a sales growth rate and the $WACC$ may seem somewhat tenuous, g_s can be viewed as a proxy for other more conceptually appealing growth rates.

7.3 Accounting, Legal, and Other Issues

7.3.1 *Earnings Management and Manipulation*

It is difficult to find a period since the enactment of the major securities legislation in 1933 and 1934 where the failures of the accounting profession have been so apparent than in the period surrounding the Enron collapse. Arthur Anderson, one of the at-the-time-big-five accounting firms, was indicted and dismantled for practices that were seemingly devious and illegal. Collapses at telecom firms, such as Worldcom, raised serious concerns about the ability of firms to manipulate the accounting numbers that were being presented in annual reports and regulatory filings. These are only two of a large number of similar situations that led Congress to introduce and pass legislation requiring substantive oversight of the accounting profession in the form of the Sarbanes-Oxley Act.[30] All this is clouded by the confusion over which activities were 'manipulation', i.e., illegal frauds, and which were legal if arguably unethical, 'management' of accounting numbers.[31] Even if accounting numbers are prepared according to Generally Accepted Accounting Practices (GAAP), there is still considerable leeway in massaging the accounting numbers to present a misleading description of the firm's financial performance.

[30]Sutton (2002) provides a practical overview of this crisis including a brief overview of the main points of the Sarbanes–Oxley Act. The text of this Act can be viewed from links at the SEC website.

[31]The definition of legality requires clarification. For example, under the federal law in the US, the SEC is only empowered to being civil actions, while the Department of Justice prosecutes criminal activity. Only in the most extreme cases does the fraud associated with earnings manipulation result in criminal prosecution. Civil damages often result in payment of a fine or other settlement, typically without an acknowledgement of wrong doing. In addition to legal actions under specific state statutes, private civil actions are also brought in some cases. In this milieu, the boundary between legal and illegal, between manipulation and management, can become blurred.

Schilit (2002) is a now classic primer on the identification of financial shenanigans. The author, Howard Schilit is also the founder of the Center for Financial Analysis and Research (www.cfraonline.com), a provider of analysis about misleading information produced by the accounting practices of specific firms. The seven shenanigans identified in Schilit (2002, pp. 24, 25) have achieved recognition in various other sources as a benchmark for discussing these issues, e.g., English (2001, p. 129). However, Schilit fails to distinguish between accounting practices that would be considered: 'earnings management'; and, 'earnings manipulation'. Recognizing various definitions for these terms have been proposed, e.g., Poitras *et al.* (2002), the definition(s) used here take earnings 'manipulation' ('management') to be the intentional disguising of 'bad news' ('good news'). To see the difference, consider the first type of accounting manipulation:

Earnings Manipulation No. 1:
Recording Revenue Too Soon or of Questionable Quality

* Recording revenue when future services remain to be provided
* Recording revenue before shipment or before the customer's unconditional acceptance
* Recording revenue even though the customer is not obligated to pay
* Selling to an affiliated party
* Giving the customer something of value as a quid pro quo
* Grossing up revenue

Each of the (*) items is a technique that can be used by a corporation to achieve the desired manipulation of the accounting numbers. Schilit provides an example this type of manipulation where in 1996 Sunbeam began using the technique of booking revenue to boost sales of gas grills, even though there was a significant probability of right-of-return in the sales. In such cases, FAS 48 requires recognition of such sales in revenue only when the cash is received. The SEC later determined that Sunbeam did overstate revenues on these sales.

This type of accounting manipulation is related to the first, though the issues involved here have a greater element of unethical or fraudulent intent:

Earnings Manipulation No. 2:
Recording Bogus Revenue

* Recording sales that lack economic substance
* Recording cash received in lending transactions as revenue

* Recording investment income as revenue
* Recording as revenue supplier rebates tied to future required purchases
* Releasing revenue that was improperly held back before a merger

Surprisingly, it is not just 'shady characters' that engage in such activities. Major companies such as Bausch & Lomb and Xerox have engaged in this type of activity. For example, Xerox improperly recognized revenue from lease operations that involved future deliveries of supplies and services. In addition to corporate giants, there are also smaller firms populated by shady characters that engage in such activities. An excellent sources on such activities can be found in the writings of David Baines at the *Vancouver Sun* documenting, among other things, the phony revenue recognition schemes of various promoters that populated the Vancouver Stock Exchange and now operate on the pinks sheets of the OTC bulletin board. Of course, bogus revenue schemes are not restricted to the small firms examined by Baines, as evidenced by the infamous ZZZZ Best bankruptcy of 1987 (Baliga 1995). Another example occurred in the Erron fraud involving off-balance sheet transactions that generated bogus revenue.

The objective of accounting manipulations is to produce financial statements that are not accurate reflections of the position of the firm intended by GAAP. This usually involves a desire to inflate current earnings numbers, though there are some earnings management reasons in order to achieve better earnings in later periods. While the previous two techniques of earnings manipulation related to boosting earnings by inflating revenues, a similar impact on earnings can be achieved by deflating expenses or by suppressing the recording of liabilities. This objective is covered in:

Earnings Manipulation No. 3:
Shifting Current Expenses to Other Periods

* Capitalizing normal operating costs, particularly if recently changed from expensing
* Changing accounting policies and shifting current expenses to an earlier period to inflate current reported earnings.
* Amortizing costs too slowly
* Failing to write down or write off impaired assets
* Reducing asset reserves

AOL provides an excellent example of this type of manipulation where, according to the SEC, the costs of marketing to acquire customers were inappropriately capitalized. Other examples are: Snapple and JDS Uniphase

where expenses were reclassified and booked against previous periods; Orion Pictures where costs of failed films were written off too slowly; and, Lockheed where impaired assets, effectively new aircraft designs that were not feasible for production, were not written off quickly enough. Some financial institutions also engage in this type of activity by being too slow to make provisions for bad loans.

The next type of manipulation has a number of dimensions. A topical example is captured in the debate over the expensing of executive stock options:

Earnings Manipulation No. 4:
Failing to Record or Improperly Reducing Liabilities

* Failing to record expenses and related liabilities when future obligations remain
* Reducing liabilities by changing accounting assumptions
* Releasing questionable reserves into income
* Creating sham rebates
* Recording revenue when cash is received, even though future obligations remain

Warren Buffett (Cunningham 2002, p. 226) makes the following observation about the executive stock option aspect of this shenanigan:

> The most egregious case of let's-not-face-up-to-reality behavior of executives and accountants has occurred in the world of stock options . . . even when options are structured properly, they are accounted for in ways that make no sense. The lack of logic is not accidental. For decades, much of the business world has waged war against accounting rulemakers, trying to keep the costs of stock options from being reflected in the profits of the corporations that issue them.

Buffett describes the pre-FAS 123 accounting treatment for executive stock options as "outrageous". In addition to stock option abuses, the category also includes the questionable release by Worldcom of reserves for unpaid accounts in order to meet unrealistic earnings targets.

The first type of earnings management is somewhat less insidious than the manipulations. For example, consider an airline that is under earnings pressure and is anxious to avoid reporting poor earnings numbers. One option would be to sell or lease-back an airplane that had a low book value due to substantial depreciation. Another example of a possible transaction that could be used to boost earnings is to sell a marketable security carried at book value that was purchased at a price well below the price at which

the security could be sold.[32] The listing of possible techniques for these types of activities are:

Earnings Management #1:
Boosting (Depressing) Income with One-Time Gains (Losses)

* Boosting (depressing) profits by selling undervalued (overvalued) real assets
* Including investment income or gains (losses) as part of revenue
* Reporting investment income or gains (losses) as a reduction (increase) in operating expenses
* Creating (eliminating) income by reclassification of balance sheet accounts

Schilit provides a number of examples where this boosting of income originated from the pooling of interests associated with a merger or acquisition. In practice, income boosts from one-time gains are common occurrences on the earnings statement, as are reductions in income from one-time losses. Some firms such as real estate investment trusts buy and sell assets as part of regular business activities. This raises the legitimate issue of precisely when a particular accounting activity is cause for suspicion of manipulation and when the accounting activity is actually being conducted as required by GAAP, e.g., Poitras *et al.* (2002).

The final two types of accounting practices are not concerned with inflating current profits but, rather, with deflating current profits in order to make profits in future periods more attractive. There are a number of possible reasons for such activities. Many of these reasons are legitimate, though manipulative accounting could occur with these practices. Healthy companies may legitimately want to create a 'reserve' for use in future periods. For example, Microsoft is well known for sitting on substantial near cash reserve of investment assets that could be used to manage future earnings. Alternatively, a weak company may want to 'take a bath' and get all the bad news out of the way in order to "relieve future periods of these expenses". Companies involved in an acquisition may want to depress target firm profits in order to obtain the appearance that the offered purchase

[32]Poitras *et al.* (2002) discusses the different accounting standards that are used in various jurisdictions. In some locales, it is possible to revalue assets without doing an asset sale. In practice, this transforms the earnings management decision into a classificatory problem.

price is attractive. Alternatively, shifting revenue forward submerges bad news within the costs of the merger in order to disguise the true operating state of the acquiring firm and give the appearance the merger was more successful in boosting future earnings than warranted. Given this, the accounting practices related to deflating revenues are referred to as earnings mangement:

Earnings Management #2:
Shifting Current Revenue to a Later Period

* Creating reserves and releasing them into income in a later period
* Improperly holding back revenue just before an acquisition closes

In the extreme, such management activities can cross the line into manipulation. An example where this type of accounting practice led to an SEC enforcement action is provided in 1998 by W.R. Grace that used "a significant and unanticipated increase in revenue as a result of Medicare reimbursements" at a subsidiary in the early 1990s to create a reserve that was used to smooth income in later periods. As a consequence of the release of reserves in later periods, the subsidiary was able to report steady earnings growth between 27% and 31% instead of erratic earnings growth of −8% to 61% that would have been observed without the reserve.

The earnings management converse to deflating current revenue is inflating current expenses by shifting future expenses backward, leading to:

Earnings Management #3:
Shifting Future Expenses to the Current Period as a Special Charge

* Improperly inflating amount included in a special charge
* Improperly writing off in-process R&D costs from an acquisition
* Accelerating discretionary expenses into the current period

Much of accounting is concerned with the classification of items. In some cases, the classification decision is discretionary, leaving considerable scope for legitimate earnings management. A special accounting category has been created for many such items: 'the extraordinary items' entry. Though the most reported earnings number includes extraordinary items, equity security analysts in vernacular Finance often consider earnings before extraordinary items as a more revealing estimate of actual earnings. This follows because extraordinary items are often associated with non-cash accruals, such as the write down of goodwill.

Schilit (2002) apparently did not have sufficient information or lead time to discuss the massive accounting frauds at ***Enron and Worldcom***. These accounting frauds led to the two largest U.S. corporate bankruptcies in history at the time of the bankruptcy filings. More than one type of accounting fraud was involved. Two key accounting manipulations involved in the scandal that resulted in Worldcom filing for bankruptcy protection in July 2002 were: improper revenue recognition; and the capitalizing of operating expenses. Much of the revenue recognition related to the release of reserves into current revenue. The use of reserve accounts is common for telecom firms, e.g., to allow for customer accounts that are not paid. The release of these reserves into revenue when the potential losses are still likely to occur was designed to inflate revenue in order to hit earnings targets set by senior management. The capitalizing of operating expenses involved the shift of operating expenses to the capital expenditure account. Not only did this give an incorrect impression of operating profits, it permitted the depreciation of those expenses over time effectively shifting the expenses into the future.

Enron filed for bankruptcy protection in December 2001. The Enron bankruptcy was, from an accounting standpoint, more complicated and involved considerably more elements than the Worldcom case. At least five types of inter-related accounting irregularities can be identified. The primary vehicles in the accounting manipulations were the non-consolidated 'special purpose entities' (SPE's) that Enron used to disguise losses and liabilities. These SPE's were privately held partnerships, usually 'owned' by the Enron CFO or members of his family. FAS 94 requires that consolidation of accounts be used if there is an element of control between entities making the transactions. Though there was clearly an element of control in the Enron-SPE transactions, consolidation was not used. In addition, many of the SPE transactions involved the sale of stock in exchange for notes receivable. The SEC requires that such transactions be reflected in the balance sheet, which Enron did not do. Yet, another manipulation involved derivative security transactions between Enron and the SPE's, allowing Enron to shift risk to the SPE's that was not reported due to absence of financial statement consolidation.

Examples of the types of transactions between Enron and the SPE's are described in Enron's 2000 financial statements where the company recognizes a transfer to the SPE's of assets valued at $1.2 billion, including $150 million in notes payable, 3.7 million restricted Enron shares and subscription rights to receive up to 18 million Enron common shares in March 2003,

subject to certain conditions. Enron also transferred to the partnerships other assets valued at $309 million, including a $50 million note payable and "an investment in an entity that indirectly holds warrants convertible into common stock of an Enron equity method investee". In return for these considerations, Enron reports receiving 'economic interests in the entities', $309 million in notes receivable against the SPE's and an additional $1.2 billion in SPE notes receivable as part of a 'special distribution'. The disclosure went on to mention a series of purchases by Enron of 'share-settled options from the entities' on shares of Enron common stock. Through the selective use of hedge accounting rules, Enron was also able to disguise a range of derivative transactions done with the SPE's. In sum, the Enron transactions were sufficiently opaque that even the most well-informed accounting professionals could not make sense of the financial statements, a clear violation of the intent of GAAP which requires "information deemed necessary to an understanding of the effects of the transactions on the financial statements" be revealed.

Though an excellent and well organized source, Schilit (2002) is only one of a number of interesting studies of accounting manipulations.[33] The introduction of the securities laws of 1933–1934 is a watershed in the history of accounting manipulations. Prior to this time, manipulations were the rule rather than the exception. Warren Buffett provides a delightful satire given to him by Ben Graham on various financial shenanigans of a fictitious company (Cunningham 2002, pp. 185–191). Included in the accounting operations are an immediate writedown of assets to a large minus number in order to be able to claim a regular asset 'appreciation', as opposed to depreciation, credit. Elimination of wage and salary expenses by making all such payments using stock options. This would also benefit the company with a large cash inflow as the options are exercised. The success of the accounting manipulations in inflating the market price of the stock by greatly inflating company earnings will be a windfall to employees receiving the stock options. And so the story goes, tongue-in-cheek but not without an almost depressing sense of reality.

[33]The number of academic accounting studies on techniques of earnings management and earnings manipulation is difficult to estimate, certainly numbering in the hundreds. Dechow and Skinner (2000) examines the differences between views of various academics, practitioners and regulators about earnings management. Sutton (2002) discusses some of the issues associated with the reform of financial reporting.

7.3.2 *Value Investing for Special Situations*

A '***special situation***' is a catch-all expression aimed at capturing instances where conventional valuation techniques either do not apply or have to be adjusted significantly. In general, a special situation will depend on the valuation model and investment philosophy being used by the analyst. However, as it is conventional to use a *DCF* model for valuation, then special situations arise where the process of discounting expected cash flows either cannot be done, e.g., there are no cash flows to discount in the foreseeable future, or the expected cash flows are too difficult to determine in the usual fashion and some other valuation methodology is more appropriate, e.g., due to substantial material changes in the structure of the firm. From this perspective, the classic special situation is a firm in bankruptcy or about to enter bankruptcy due to severe financial distress. For a bankrupt firm facing liquidation, a *DCF* model is not too useful because the only expected net cash flows to discount are the distributions that will be made from the sale of assets. Firms in severe financial distress also pose difficulties for *DCF* models because the expected cash flows will be negative for the foreseeable future and there is the need to estimate the probability of bankruptcy and the type of bankruptcy filing, e.g., chapter 7 vs. chapter 11. In such situations, the firm's equity securities have little value and the debt securities acquire characteristics similar to conventional equity.

Depending on the type of *DCF* model employed, other potential types of special situations could include: privately held firms and firms about to go public; highly speculative stocks; firms that are going to be liquidated; certain types of mergers, acquisitions and recapitalizations; arbitrage operations; and, firms with significant amounts of intangible assets, product options or untraded warrants. It is even possible to include securities of firms in emerging markets or the junior natural resource sector. Special situations require either different valuation models than the conventional *DCF* model or using *DCF* models with unconventional adjustments. In particular, such alternative investment models include: ***asset valuation*** models; ***breakup or liquidation*** assessment techniques; ***acquisition value*** models; and, ***cash-burn*** models. Asset valuation models are applicable when asset values predominate in determining security prices, e.g., in situations where there is no observable cash flow or, as in the case of some mid-cap natural resource companies, the observable cash flow is small relative to the asset base. Acquisition value models are applicable to valuation of takeover candidates, including leveraged buyout candidates. Breakup or liquidation

assessment techniques are applicable to valuation of bankruptcies, equity carve-outs and the like. Finally, cash-burn models are applicable to technology startups, such as small biotechs and dot.coms.

In general, ***asset valuation models*** are not a competitor to *DCF* analysis, just an alternative approach that can be used to achieve the same endpoint. As illustrated in Sec. 7.1, the residual claim represented by the common stock has both a 'stock' and a 'flow' component. In *DCF* analysis, it is the net cash flows generated by the stock of assets that determines the estimate of the firm's value. This approach is the most direct and appropriate avenue to estimating intrinsic value when it can be implemented. Alternatively, it is possible to estimate a market value of the assets and net the estimated market value of liabilities to determine an intrinsic market value for equity. Presumably, the market value of the assets of a firm would reflect the ability of those assets to generate the cash flows that are being valued in *DCF* analysis. However, there are numerous problems that can arise in determining an estimated market value for assets. For example, many types of assets are firm specific, non-traded or difficult to assess. Such assets pose a problem of estimating a market value. In addition, the cash flows generated by assets are often not the result of mechanistic activities but depend fundamentally on the effectiveness of 'the people factor' to utilize those assets. Again, this poses problems for using asset values to estimate an intrinsic value for equity.

Because of the difficulties with arriving at intrinsic values, asset values are often largely ignored in 'value investing'. GDC (1962, p. 551) recognized this point:

> The basic fact is that — except in certain limited parts of the common stock universe — asset values are virtually ignored in the stock market. Not only that; there is a sense in which tangible asset values are a negative factor in the company's exhibit. For, given any amount of earnings, the larger the net worth, the lower the profitability or percent earned on capital; hence the less favorable the showing. There is a temptation to accept this verdict of the market place and to confine our treatment of the asset factor to exceptional cases or the special areas in which the net worth can clearly be shown to exert an influence on average price.

The special areas identified by GDC as applicable for asset valuation or using asset valuation to supplement intrinsic value calculations based on *DCF* are privately held corporations or partnerships; public utility companies; financial companies; natural resource companies; small initial public offerings; and, companies where the price-to-book ratio lies outside the

'roughly drawn' 'normal range' of 2/3 to 2. In contrast to 'value investing' in modern Finance where the price-to-book ratio now plays such an important role, GDC are not strong proponents of using book value to do valuations because of the numerous problems that can crop up with this measure.

The one situation where GDC (1962, pp. 561–566) were strong proponents of selecting common stocks using asset values was the ***"net-current-asset value" rule***:

> We feel on more solid ground in discussing those cases in which the market price or computed value based on earnings and dividends is less than the *net current assets* applicable to common stock... From long experience with this type of situation we can say that it is always interesting and that the purchase of a diversified group of companies on the "bargain basis" is almost certain to result profitably within a reasonable period of time.

The relevant calculation involved here requires the deduction of all obligations and preferred stock from the working capital of the firm to determine the 'net' current asset balance available to common stock. Though it is unusual in U.S. stock markets to find companies with a market value of equity below net current asset value, there are some instances where such companies can be found in international markets. If such a company or group of companies is presently identified in U.S. markets, there likely would be some significant offsetting factor, such as poor future earnings prospects requiring the cash and near-cash assets to be paid out in the near future to sustain firm operations. This type of situation is best examined using a 'cash-burn' valuation model.

While not too useful in modern stock markets, this net current asset rule does have considerable historical interest, if only to illustrate how valuation practices are not immutable. GDC (1962, p. 562) provide a useful discussion:

> The historical development of the [net current asset] relationship has been interesting. Before the 1920s, common stocks selling under current-asset value were practically unknown. During the "new-era" market, when prime emphasis was placed on prospects to the exclusion of other factors, a few issues in depressed industries sold below their working capital. In the Great Depression of the early 1930s this phenomenon became widespread. Our computations show that about 40 percent of all industrial companies on the New York Stock Exchange were quoted at some time in 1932 at less than their net current assets. Many issues were actually sold for less than their net cash assets alone. Writing about this

> situation in 1932, we stated that the market prices as a whole seemed to indicate that American business was 'worth more dead than alive'. It seemed evident that the market had carried its pessimism much too far — to compensate, no doubt, for its reckless optimism of the 1920s.

By 1937, at the end of a run-up in stock prices, GDC estimate that there were few 'net current asset' plays in the market but in the recession that preceded WWII, about 20% of all industrial stocks were selling below net current asset values. GDC suggest that from the early 1920s to the period leading up to the bull market of the 1960s, the fraction of shares in the stock market selling below net current asset value was a useful indicator of market strength or weakness. GDC also observe that it was not always the case that poor earnings prospects drove prices down to 'too low' a level. In particular, during 1946–1950, many stocks traded below net current asset values due to the accumulation of cash from high levels of earnings that were not correctly valued. Barring a brief period during the 1970s, since the early 1960s the net current asset rule has had little application as companies no longer trade at such low price levels relative to asset valuations.

The 'net current asset' rule can be interpreted as a form of ***liquidation assessment technique***. For GDC, net current assets provide a 'minimum liquidating value', a conservative lower bound for computing the value of a company to be liquidated. Losses on working capital associated with converting these assets to cash are typically offset by the gains associated with the sale of assets from the property, plant and equipment account, as well as other miscellaneous assets. Hooke (1998, p. 385) describes the general process of doing a liquidation valuation:

> In performing a liquidation analysis, you examine the worth of each asset category in a quick sell-off, aggregate these liquidation values, and subtract from this sum the estimated cost of closing the business and paying off its liabilities. . . From this [value] must then be subtracted your time-adjusted rate of return requirement.
>
> Unless the business has substantial intangible assets such as well-respected brand-names, exclusive patents or quasi-monopoly operating rights, the first "back of the envelope" evaluation focuses on historical balance sheet financial data. For each balance sheet item, you determine an estimated range of "liquidated value" percentages, which are based on experiences for similar businesses. Later on, after further study, these percentages are adjusted to include the new information.

This general scheme needs to take account of additional factors such as: the uncertainty associated with liquidation values; the 'burn rate' on cash and near-cash assets to pay for earnings losses that the firm will sustain

between the valuation date and the liquidation date; and, whether there are any third-parties that would be willing to acquire the firm's assets at a 'going concern' price rather than at liquidation value.

Almost all liquidations are the result of financial distress or bankruptcy. As such, the equity claim is likely to be relatively small, if not zero. Firms that are in financial distress often pay for on-going losses by borrowing against tangible assets and future cash flows. The experience of firms such as United Airlines or Bethlehem Steel are useful examples. The accumulation of debt on the balance sheet introduces a fixed cost component into the income statement that further erodes the profitability of the firm creating a downward spiral that is difficult to stop. The final result is the usually more than complete leveraging of the firm's assets leaving only secured debt holders with a substantial claim against assets in liquidation. Hence, liquidation value calculations are usually aimed at determining the fraction of par value that debt holders will receive upon disposal of assets. The common stockholders have some say in the process by controlling the timing of the entry into bankruptcy and the type of bankruptcy filing that is made. Chapter 11 filings hold the possibility that the firm may be reorganized and reemerge from bankruptcy a 'leaner and meaner' enterprise with common stock holders still in control. All these twists and turns makes a liquidation analysis a decidedly complicated exercise that extends well beyond simple calculation of the disposal value of firm assets. However, disposal value does provide a useful lower bound within which further analysis can take place.

A basic assumption made in *DCF* analysis is that the firm being valued is a going concern. The cash flows are estimated based on an analyst-specific view of the characteristics of the company and industry, possibly supplemented by some macroeconomic considerations. An alternative method of arriving at a value estimate is to determine the '***acquisition value***' of the firm or, to use a Warren Buffett expression, the 'private market value' of the firm. Unfortunately, one of the most difficult exercises in equity valuation is to determine the maximum value that one firm will pay to acquire or merge with another going concern.[34] The protracted infighting over the

[34]Based on an aggregated empirical evidence by Jensen and Ruback (1983), Jarrell *et al.* (1988) and others, it is safe to conclude the shareholders of target firms in successful acquisitions benefit substantially while acquiring firms experience either no significant or a small negative ($> -5\%$) impact on stock returns. For example, for a sample of 663 successful tender offers, Jarrell *et al.* found bid premiums for the pre-announcement value of the target firm's stock price of 19% during the 1960s, 35% during the 1970s and 30% during the first half of the 1980s. The empirical evidence on corporate acquisitions

Compaq-HP merger in 2002 is just one recent example of these difficulties. Walter Hewlett, the son of a founding partner of Hewlett-Packard, was so seriously at odds with the HP management team led by Carla Fiorina over the valuation of Compaq that he initiated a proxy-fight to reject the merger and, when this was unsuccessful, filed suit in an attempt to prevent the merger on grounds that shareholders were misled by inaccurate financial statements concerning the merger. Though the suit was unsuccessful, it does serve as an extreme indicator of the difficulties in assessing the 'private market value' for a firm such as Compaq. Ultimately, the determination of acquisition value will depend on a range of factors such as: whether the acquisition is a hostile takeover, friendly takeover or merger; what the synergies would be for the acquiring firm; what the alternative cost of acquiring the assets of the target firm would be; and, whether the firm is a potential candidate for a leveraged buyout.

While the liquidation value of a firm is determined by calculating the disposal value of the assets, the acquisition value of a going concern is based on the 'reproduction cost' of the assets. Unlike most liquidations where any 'hidden assets' have long since been dissipated or sold-off, going concerns often have a range of potentially valuable assets that are not recorded in the financial statements. For example, going concerns usually have well established customer relationships that will cost money for a new entrant to develop. Another example concerns R&D infrastructure that may be hard to replicate such as a drug company that has viable products that are in development but not yet generating cash flows. There may be licenses or franchises in place that permit the firm to carry on a business, such as a casino or a television station. Though it may be possible to obtain estimates for some of these hidden assets that were observed in related transactions, when the objective is to determine an estimated value for a going concern that is to be acquired there is a bundling of the hidden assets with tangible assets and management structure that makes the estimated value quite difficult to determine.

has led to the use of crude rules of thumb regarding acquisitions such as: a 20%–30% bid premium is required to obtain corporate control of a going concern in a friendly tender offer. Like most rules of thumb, such estimates of the bid premium will differ depending on the specifics of the acquisition involved.

Following Hooke (1998, ch. 15) one method of determining an acquisition value is to assess the value of the company as a leveraged buyout (LBO) opportunity. Because an LBO does not place significant synergistic values on the target firm, ***the LBO acquisition value*** can be considered as a lower bound on the acquisition value. The relevance of the LBO estimate is supported by the approximately 150 investment firms that specialize in LBO's. According to Hooke, there are another 50–100 investment banks, venture capital firms and general investment funds that also do some occasional LBO business. The estimated equity value of the top five firms in the industry is approximately $10–$15 billion dollars. Though there is considerable variation in the types of LBO deals, the conventional LBO transaction operates under four principles as much as possible: use other people's money by leveraging the assets and cash flows of the target company; buy at relatively low multiples; search for targets in out-of-fashion industries; and, improve operating performance following acquisition. The actual valuations are done using 'guideposts' of 80%/20% (4×) target debt to equity post-acquisition leverage and 1.4 × interest coverage on cash flow.

The final special situation valuation method is the ***cash-burn model***. This valuation methodology is applicable to firms that have no substantial performing assets and are using the capital raised in an equity issue to achieve a positive earnings situation. Examples where this valuation model could be applied include start-up biotechnology firms, junior mining and oil exploration companies and dot.com's. Because the operating structure of these type of companies is relatively simple, the period to period operating costs are usually quite predictable. After the initial costs of establishing the plant and equipment, the balance sheet will contain a sizeable amount of cash and near-cash assets that will be depleted as the project is in development. Because there is typically no revenues, the development/exploration costs represent a 'cash burn' rate that permits a length of time before additional financing, usually another equity issue, is required. For example, a small biotechnology firm could be undertaking to clear the FDA Phase I–III trials in order to produce a drug that can be marketed to the public. The length of time to complete the trials is estimated and used to determine whether the cash-burn will exhaust the available cash and near-cash assets. Combined with an estimate of the revenues generated by the drug if trials are successfully completed, it is possible to determine an approximate value for the company.

7.3.3 *Basics of Credit Risk and Default Risk*

The Legal Aspects of Default

Consideration of credit risk and default risk is relevant to equity security valuation for a number of resons. In particular, as a firm approaches brankruptcy, the value of equity securities approaches zero and the debt securities start to trade as an equity-like claim against the liquidation value of the firm. As such, bankruptcy laws and procedures assume a critical role in the valuation of firms in financial distress. Entry into, say, a chapter 11 bankruptcy results in *de facto* control of the firm being transferred to the court and the value of equity securities, in most cases, going to zero. For fixed income valuation purposes, there are considerable advantages to abstracting from embedded option features associated with credit risk. Yet, the bulk of fixed income securities do not conform to this abstraction. Even for bonds that would seem to conform to the abstraction of no credit risk, such as U.S. Treasuries, there is still an element of credit risk that has to be addressed. For example, on rare occasions the U.S. Congress has threatened to withhold legislation to increase the debt ceiling raising the possibility that the U.S. Treasury would be unable to make scheduled interest or principal payments on outstanding debt issues, e.g., Nippani *et al.* (2001). Following Fabozzi (2002, ch. 7), credit risk can be decomposed into three parts: default risk; credit spread risk; and downgrade risk. For bonds, default risk relates to the possibility that the issuer will not fulfill the obligations set out in the bond indenture. This could be due to the failure to make a coupon payment or to return the principal value at maturity or to meet some other provision in the indenture, such as a covenant on net asset value. Such events have a number of possible implications.

Because the possibility of default varies across bond issuers, this will be reflected in the quoted prices and yields for different bond issues. The difference between yields for issues with different credit ratings is the ***credit spread***. Due to a variety of factors, the credit spread changes over time. For example, in periods of contracting economic activity credit spreads will typically widen to reflect the pressure on firm cash flows needed to make debt payments. Credit spread risk relates to these changes in the difference between yields for issues with different credit ratings. To facilitate this assessment there are a number of services that provide ratings to the bond market. Related to credit spread risk is the concept of downgrade risk. While credit spread risk depends on general conditions such as aggregate economic activity, downgrade risk is more firm specific. For example, it is

possible for, say, a telecom firm such as Worldcom to experience a credit downgrade from a rating agency at a time when the credit risk for telecom firms was narrowing relative to U.S. Treasuries. Another example would be a firm that experienced an unfavorable result in litigation, e.g., Dow-Corning with breast implants or Johns Mansville with asbestos. Given this, it is expected that the factors causing a widening of credit spreads will also contribute to an increase in downgrades for individual firms.

Credit spread risk and downgrade risk are extensions of the issue of default risk. Credit spreads widen and narrow because of changes in the perception that default will occur. Downgrading of a firm's debt by a credit rating agency occurs because there is the perception that default is more imminent. Yet, while driven by economic factors, default is a legal event. As such, it is necessary to detail the relevant laws and legal remedies associated with default on a debt obligation.[35] A fixed income security is a debt instrument that is defined by a contract. For a corporate bond, this contract is the bond indenture. For publicly traded issues falling with the scope of the regulations of the SEC, such indentures must conform to the Trust Indenture Act (1939) that require appointment of a trustee to protect the interests of bondholders set out in the indenture. In addition, as publicly traded securities, the debt instruments must satisfy the relevant SEC rules regarding registration, resale of securities and the like. Debt instruments have a number of SEC Rules of specific relevance, such as Rule 415 on shelf registrations and Rule 144A on resale of privately placed securities.

Though there is considerable variation in the specifics of indentures, the American Bar Association (ABA) does provide examples of model contracts for specific bond indentures. For example, there are 15 articles, plus preamble, for the model debenture indenture and 16 articles, plus preamble, for the model mortgage bond indenture. Given that there is variation between specific indentures and the model indenture outlined by the ABA, the indenture contents do have a common set of essential characteristics. The preamble will typically make reference to the basis under which the indenture was issued, e.g., "the articles of incorporation permit the board of directors to authorize up to $xxx million of senior subordinated debentures". There will also be articles associated with the definition of terms,

[35]Though default on federal, state and local government debt is possible, the legal implications are more complicated. Though only the case of corporate default is examined in detail, the basic principles of the issuer seeking protection under the bankruptcy laws and the purchaser seeking remedies under the terms of the debt contract still apply to sovereign debt issues.

methods of notifying trustees, the specific wording on the security certificate, the denominations, the record dates and so on. While such articles are important from a legal standpoint, it is the articles relating to remedies and covenants that are of greatest interest to the assessment of default risk. Articles relating to mergers and consequences of changes in the status of assets are also important, as are preambles and articles that describe the property securing a secured debt issue.

The indenture sets out the conditions required to initiate a default proceeding. Conventionally, once a credit event sufficient to trigger a default has occurred, e.g., failure to make a scheduled coupon or principal payment, the trustee (or a holder of 25% or more of the outstanding debt) can demand payment in full of any outstanding obligations. Whether the trustee initiates such an action is not straight forward. Because the trustee has a fiduciary obligation to act in the best interest of the bondholders, the trustee may deem it more prudent to enter into negotiations with the issuer to attempt to get a resolution to the indenture violation. If the debtor is unable or unwilling to resolve the indenture violation, a U.S. corporate issuer would likely respond by filing for bankruptcy under the relevant chapter of the Bankruptcy Reform Act (1978). Similarly, if the trustee wants to proceed with a default action, a bankruptcy filing can be made by a creditor as well as a debtor. The Bankruptcy Reform Act has 15 chapters dealing with different types of bankruptcy. For filings resulting from a corporate debt issuer violating an indenture, the relevant chapter governing the bankruptcy filing would be either chapter 7, governing liquidation, or chapter 11, governing reorganization.

The problems confronting a trustee having to decide the correct course in dealing with an issuer in default on an indenture provision are legally complex. Once the bankruptcy process is initiated for a corporation in default, a number of provisions of the bankruptcy code come into effect that create considerable uncertainty about the final disposition. In particular, a bankruptcy filing introduces the bankruptcy court into the decision making process. The law requires that there be an active role for judicial supervision and oversight. Decisions of the court are binding on the parties involved. Another provision of the bankruptcy code involves the imposition of a standstill agreement on all creditors. This is required to provide for an orderly process of liquidation or reorganization, preventing actions such as senior creditors seizing assets that are essential to the viability of the firm as a going concern or allowing the firm to make disbursements to certain creditors at the expense of others. One final provision of importance is

the provision that the debtor retain control of firm operations during the period that the bankruptcy filing is being decided, unless a specific directive is ordered by the court such as the appointment of a receiver.

In theory, a bankruptcy proceeds under the ***absolute priority rule***. This rule dictates that senior creditors are to be paid in full before junior creditors receive any payments. For a number of reasons, the absolute priority rule may not be followed. One of these reasons has to do with the judicially supervised negotiation process between the debtor and the creditors that commences with the bankruptcy filing. Under chapter 7 filings, the negotiating process is usually not overly complicated and the division of assets conforms relatively closely to the absolute priority rule. However, under chapter 11 filings, the negotiating process can be onerous. The process is complicated by two provisions: during the reorganization the court may permit the firm to undertake new financing that is given a senior claim to existing claims; and, the reorganization plan does not require unanimous consent, only a majority of all creditors holding 2/3 of the outstanding value in each debt classification. This legal structure makes a bankruptcy filing under chapter 11 somewhat uncertain for debt holders.

Not surprisingly, there is considerable evidence that the distributions in chapter 11 bankruptcies do not typically adhere to the absolute priority rule, e.g., Fabozzi *et al.* (1993) and Weiss (1990). Due to all the legal complexities and other uncertainties, there are real incentives for the trustee and large individual creditors to avoid formal bankruptcy proceedings and to attempt a resolution outside the court process. In addition to monitoring bankruptcy filings, the major credit rating agencies also issue credit event releases that recognize various types of financial distress and the associated resolution. All this makes the securities of distressed firms, whether in bankruptcy or working toward a resolution outside the court process, a potentially fruitful area for identifying abnormal returns using the techniques of security analysis, e.g., John (1993).

The Assessment of Credit Risk and Default Risk

Information on credit risk and default risk comes from two sources: ratings agencies and market prices. Because of the large number of traded fixed income securities, firms have emerged that specialize in providing credit

ratings for a wide range of different debt issues. In the United States, these firms are Standard and Poor's Corporation, Moody's Investors Services Inc. and Fitch Ratings (created by the merger of Fitch IBCA with Duff and Phelps Credit Rating Co.). It is often the case that firms pay the rating agencies to have their debt issues rated. In addition to ratings agency information, the larger investment banking firms and institutional investors will also have resources dedicated to doing credit analysis on specific firms and sectors that are of interest. There are also firms that specialize in ratings for specific industries such as Demotech, Inc. that assesses insurance companies and HMO's. As illustrated in Table 7.17, there is a close correspondence in the symbolic method of specifying ratings used by the different ratings agencies. However, this does not mean that the same methodologies are used by different ratings agencies to arrive at a credit rating for a specific firm.

Inspection of Table 7.17 reveals three general categories of debt ratings: investment grade, rated BBB− (Baa3) and above; speculative, below investment grade, rated BB+ (Ba1) to B− (B3); and, purely speculative, CCC+ (Caa) to D. The ratings category that a debt issue falls into can have an important impact on the pricing of the issue in the market. In particular, various institutional borrowers, such as pension funds and insurance companies, are restricted from holding issues that are classified as being below investment grade. When a debt issue is downgraded to a rating below investment grade this can have a significant impact on the price of the issue. Similarly, certain types of bond funds, e.g., high yield funds, invest only in issues that are below investment grade. The implication is that lower rated issues typically have to offer substantially higher yields in order to attract the types of investors that purchase debt with below investment grade ratings.

Though there is a close correspondence between the credit rating issued by the rating services and, presumably, by the in-house credit analysts, the ratings do not translate precisely into pricing of debt issues. For example, it is possible for a bond with a lower credit rating to sell at a lower yield than a comparable bond with a higher credit rating. It is possible for this to happen because the relative credit ratings are not judged to be accurate by the market. However, it is more likely that this type of pricing occurs because the market price of an issue depends both on the credit rating and

Table 7.17 Summary of Corporate Bonds Rating Systems and Symbols.

Fitch	Moody's	S&P	Summary description
Investment grade — high credit worthiness			
AAA	Aaa	AAA	Gilt edge, prime, maximum safety
AA+	Aa1	AA+	
AA	Aa2	AA	High grade, high-credit quality
AA−	Aa3	AA−	
A+	A1	A+	
A	A2	A	Upper-medium grade
A−	A3	A−	
BBB+	Baa1	BBB+	
BBB	Baa2	BBB	Lower-medium grade
BBB−	Baa3	BBB−	
Speculative — Lower Credit Worthiness			
BB+	Ba1	BB+	
BB	Ba2	BB	Low-grade, speculative
BB−	Ba3	BB−	
B+	B1		
B	B2	B	Highly speculative
B−	B3		
Predominately speculative, substantial risk, or in default			
CCC+		CCC+	
CCC	Caa	CCC	Substantial risk, in poor standing
CC	Ca	CC	May be in default, very speculative
C	C	C	Extremely speculative
		C1	Income bonds — no interest being paid
DDD			
DD			Default
D		D	

Source: Rating agency websites.

the potential ***recovery rate***.[36] The recovery rate is the payout on the debt issue that takes place when default occurs. For example, the recovery rate for a corporate mortgage bond will depend on the value of the collateral securing the issue. If the collateral is sufficient to repay the principal value of the borrowing, a default by the issuer will not have severe consequences. Similarly, it is possible that, though default may be less likely, the recovery

[36]Other important factors that can influence the yield spread between two different debt issues are: the liquidity; differences in covenants and special provisions such as callability; and, the tax status of the coupon and principal payments.

rate may also be lower in the event that default does occur, e.g., due to the asset structure of the company.

For a portfolio of bonds, it is possible to calculate the "default loss rate" as the product of the default rate and the recovery rate, e.g., Fabozzi (2002, p. 202). For example, if 10% of the issues in a portfolio defaulted and a weighted average of 50% of the value of the investment was recovered then the default loss rate was 5%. Ignoring costs associated with the disruption of cash flow associated with having to wait until the defaulted issue is paid out to bondholders, if the portfolio was initially purchased with a promised yield of more than 5% above Treasuries then the investor would, *ex post*, have done better than investing in Treasuries. As such, analysis of fixed income securities subject to credit risk requires both the default rate and the recovery rate to be assessed to determine an appropriate valuation. Table 7.18 provides evidence from Altman and Karlin (2008) on both default rates and recovery rates for U.S. high yield corporate bonds for 1978–2007 Q3. Accurate interpretation of Table 7.18 requires understanding of how default rates are calculated.

The numerous studies of default rates use a variety of calculation methods. For example, Asquith *et al.* (1989) report that about one in three high yield bond issues default. This is a cumulative default rate that is calculated by using the total outstanding amount of high yield debt issued in an initial year and dividing this value into the cumulative value of outstanding issues that defaulted for all issues for that year. In contrast, Table 7.18 reports the default rate by dividing the par value of outstanding bonds that default in a given year by the total par value outstanding issues for that year. This provides a year-by-year estimate. For example, Table 7.18 reports that the default rate on high yield bonds in 1997 was 1.25%. Until the wave of defaults in 2002, the highest level of default reported was for 1991 where a default rate of 10.27% is reported. Results in Altman and Karlin (2008) are not confined to this method of estimating default rates, a wealth of other information is provided including defaults by original rating, years to default from original issue date, and defaults by industry.

Table 7.18 also provides information on recovery rates. This is calculated as the weighted average price after default, where the weights are the fraction of the par value of defaults in the year for that issue. Being all less than $30 per $100 par value, the recovery rates for 1999–2002 and 2004–2007 are at the bottom end of recovery rate values over the last two

Table 7.18 Bond Default Rate and Losses, 1978–2007.

(Dollars in Millions)						
			Default weighted price			
Year	Par value outstanding($)[a]	Par value of default($)	rate (%)	after default($)	Weighted coupon (%)	Default loss (%)[b]
2007	1,075,400	5,473	0.51	66.6	9.64	0.19
2006	993,600	7,559	0.76	65.3	9.33	0.30
2005	1,073,000	36,209	3.37	61.1	8.61	1.46[b]
2004	933,100	11,657	1.35	57.7	10.30	0.59[b]
2003	825,000	36,451	4.66	45.5	9.55	2.78[b]
2002	757,000	96,658	12.79	25.3	9.37	10.15[b]
2001	649,000	63,609	9.80	25.5	9.18	7.78
2000	597,200	30,295	5.07	28.4	8.54	3.95
1999	567,400	23,532	4.15	27.9	10.55	3.21
1998	465,500	7,464	1.80	35.9	9.46	1.10
1997	335,400	4,200	1.25	54.2	11.87	0.65
1996	271,000	3,336	1.23	51.9	8.92	0.65
1995	240,000	4,551	1.90	40.6	11.83	1.24
1994	235,000	3,418	1.45	39.4	10.25	0.96
1993	206,907	2,287	1.11	58.6	12.98	0.56
1992	163,000	5,545	3.40	50.1	12.32	1.91
1991	183,600	18,862	10.27	36.0	11.59	7.16
1990	181,000	18,354	10.14	23.4	12.94	8.42
1989	189,258	8,110	4.29	38.3	13.40	2.93
1988	148,187	3,944	2.66	43.6	11.91	1.66
1987	129,557	7,486	5.78	75.9	12.07	1.74
1986	90,243	3,158	3.50	34.5	10.61	2.48
1985	58,088	992	1.71	45.9	13.69	1.04
1984	40,939	344	0.84	48.6	12.23	0.48
1983	27,492	301	1.09	55.7	10.11	0.54
1982	18,109	577	3.19	38.6	9.61	2.11
1981	17,115	27	0.16	72.0	15.75	0.15
1980	14,935	224	1.50	21.1	8.43	1.25
1979	10,356	20	0.19	31.0	10.63	0.14
1978	8,946	119	1.33	60.0	8.38	0.59
Arithmetic average 1978–2007			3.37	45.15	10.80	2.27
Weighted average 1978–2007			3.82			2.64

[a]Excludes defaulted issues [b]Default loss rate adjusted for fallon angels is 9.3% in 2002 1.82% in 2003, 0.59% in 2004, 1.5% in 2005, 0.039% in 2006 and 0.20% in 2007.

Sources: Altman and Karlin (2008).

decades. The strong economic fundamentals of 1992–1997 permitted recovery rates that were usually in excess of $50 per $100. Table 7.19 provides further useful information on recovery rates by decomposing the results by type of issue. It is significant that senior secured debt does not provide full protection, with a low recovery rate of $26.90 in 1999, below that of the

Table 7.19 Weighted Average Recovery Rates on Defaulted Debt by Seniority per $100 Face Amount, 1978–2007.

	Senior secured			Senior unsecured			Senior Sub ordinated			Subordinated			Discount and zero coupon			All seniorities	
Default Year	No.	%	$	No.	%	$	No.	%.	$	No.	%	$	No.	%	$	No.	$
2007	10	35	87.24	10	36	47.70	6	21	63.98	2	7	46.53	0	0	0.00	28	66.65
2006	9	18	90.60	26	52	60.90	8	18	50.24	1	2	60.33	6	12	76.31	50	65.32
2005	67	64	76.50	44	36	45.88	7	6	32.67	0	0	0.00	5	4	74.21	123	62.96
2004	27	39	63.67	33	48	56.77	2	3	37.44	0	0	0.00	7	10	43.06	69	57.72
2003	57	28	53.51	108	53	45.40	29	14	35.98	1	0	38.00	8	4	32.27	203	45.76
2002	37	11	52.81	254	75	21.82	21	6	32.79	0	0	0.00	28	8	26.47	340	26.25
2001	9	3	40.95	187	67	28.84	48	17	18.37	0	0	0.00	37	13	15.05	281	25.62
2000	13	8	39.58	47	29	25.40	61	37	25.96	26	16	26.62	17	10	23.61	164	26.74
1999	14	11	26.90	60	47	42.54	40	31	23.56	2	2	13.66	11	9	17.30	127	32.20
1998	6	18	70.36	21	62	39.57	6	18	17.54	0	0	0.00	1	3	17.00	34	40.46
1997	4	16	74.90	12	48	70.94	6	24	31.89	1	4	60.00	2	8	19.00	25	57.61
1996	4	17	59.08	4	17	50.11	9	38	48.99	4	17	44.23	3	13	11.99	24	45.44
1995	5	15	44.64	9	27	50.50	17	52	39.01	1	3	20.00	1	3	17.50	33	41.77
1994	5	23	48.66	8	36	51.14	5	23	19.81	3	14	37.04	1	5	5.00	22	39.44
1993	2	6	55.75	7	22	33.38	10	31	51.50	9	28	28.38	4	13	31.75	32	36.63
1992	15	22	59.85	8	12	35.61	17	25	58.20	22	33	49.13	5	7	19.82	67	50.03
1991	4	3	44.12	69	44	55.84	37	24	31.91	36	24	24.30	9	6	27.89	157	40.67
1990	12	10	32.18	31	27	29.02	38	33	25.01	24	21	18.83	11	9	15.63	116	24.66
1989	9	11	82.69	16	21	53.70	21	28	19.60	30	39	23.95				76	35.97
1988	13	21	67.96	19	31	41.99	10	16	30.70	20	32	35.27				62	43.45
1987	4	13	90.68	17	55	72.02	6	19	56.24	4	13	35.25				31	66.63
1986	8	14	48.32	11	20	37.72	7	13	35.20	30	54	33.39				56	36.60

(*Continued*)

Table 7.19 (*Continued*)

	Senior secured			Senior unsecured			Senior Sub ordinated			Subordinated			Discount and zero coupon			All seniorities	
Year	No.	%	$	No.	%	$	No.	%.	$	No.	%	$	No.	%	$	No.	$
1985	2	7	74.25	3	11	34.81	7	26	36.18	15	56	41.45				27	41.76
1984	4	29	53.42	1	7	50.50	2	14	65.88	7	50	44.68				14	50.62
1983	1	13	71.00	3	38	67.72				4	50	41.79				8	55.17
1982				16	80	39.31				4	20	32.91				20	38.03
1981	1	100	72.00													1	72.00
1980				2	50	26.71				2	50	16.63				4	21.67
1979										1	100	31.00				1	31.00
1978				1	100	60.00										1	60.00
Total/	342	16%	$60.45	1027	47%	$36.95	420	19%	$31.08	251	11%	$31.30	156	7%	$25.98	2,196	$37.54
Average			$17.69			$13.72			$14.47			$17.78			$20.70		$14.28
Standard Dev*																	
Median			$59.47			$45.64			$34.00			31.96			$19.41		$41.77

*Standard deviations are calculated based on the yearly averages.
Source: See table 7.18.

recovery rate of senior unsecured debt in the same year. The implication is that the priority claim of security is less important than it would seem. Another interesting result is the absence of any defaults on subordinated debentures in 2001 and 2002. This is likely the result of less credit worthy companies being generally unable to issue this type of security.

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