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SECURITY ANALYSIS FOR INVESTMENT AND CORPORATE FINANCE

Aswath Damodaran

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To all those people with whom
I have debated valuation issues over time
and who have pointed out the errors
(or at least the limitations)
of my ways

Preface

There is nothing so dangerous as the pursuit of a rational investment policy in an irrational world.

—John Maynard Keynes

Lord Keynes was not alone in believing that the pursuit of true value based on financial fundamentals is a fruitless one in markets where prices often seem to have little to do with value. There have always been investors in financial markets who have argued that market prices are determined by the perceptions (and misperceptions) of buyers and sellers, and not by anything as prosaic as cash flows or earnings. I do not disagree with them that investor perceptions matter, but I do disagree with the notion that they are *all* that matter. It is a fundamental precept of this book that it is possible to estimate value from financial fundamentals, albeit with error, for most assets, and that the market price cannot deviate from this value in the long term.[1] From the tulip bulb craze in Holland in the early seventeenth century to the South Sea Bubble in England in the 1800s to the stock markets of the present, markets have shown the capacity to correct themselves, often at the expense of those who believed that the day of reckoning would never come.

The first edition of this book was my first attempt at writing a book, and hopefully I have gained from my experiences since. In fact, this edition is very different from the prior edition for a simple reason. My other book on investment valuation, also published by John Wiley & Sons, was designed to be a comprehensive valuation book, and repeating what was said in that book here, in compressed form, strikes me as a waste of time and resources.

This book has three parts to it. The first two parts, which stretch through the first nine chapters, provide a compressed version of both discounted cash flow and relative valuation models and should be familiar territory for anyone who has done or read about valuation before. The third part, which comprises the last nine chapters, is dedicated to looking at what I call the loose ends in valuation that get short shrift in both valuation books and discussions. Included here are topics like liquidity, control, synergy, transparency, and distress, all of which affect valuations significantly but either are dealt with in a piecemeal fashion or take the form of arbitrary premiums and discounts. You will notice that this section has more references to prior work in the area and is denser, partly

because there is more debate about what the evidence is and what we should do in valuation. I do not claim to have the answer to what the value of control should be in a firm, but the chapter on control should give you a road map that may help you come up with the answer on your own.

The four basic principles that I laid out in the Preface to the first edition continue to hold on this one. First, I have attempted to be as comprehensive as possible in covering the range of valuation models that are available to an analyst doing a valuation, while presenting the common elements in these models and providing a framework that can be used to pick the right model for any valuation scenario. Second, the models are presented with real-world examples, warts and all, so as to capture some of the problems inherent in applying these models. There is the obvious danger that some of these valuations will appear to be hopelessly wrong in hindsight, but this cost is well worth the benefits. Third, in keeping with my belief that valuation models are universal and not market-specific, illustrations from markets outside the United States are interspersed through the book. Finally, I have tried to make the book as modular as possible, enabling a reader to pick and choose sections of the book to read, without a significant loss of continuity.

Aswath Damodaran

New York, New York

June 2006

[1]But then again, as Keynes would have said, “In the long term, we are all dead.”

CHAPTER 1

Introduction to Valuation

Knowing what an asset is worth and what determines that value is a prerequisite for intelligent decision making—in choosing investments for a portfolio, in deciding on the appropriate price to pay or receive in a takeover, and in making investment, financing, and dividend choices when running a business. The premise of this book is that we can make reasonable estimates of value for most assets, and that the same fundamental principles determine the values of all types of assets, real as well as financial. Some assets are easier to value than others, the details of valuation vary from asset to asset, and the uncertainty associated with value estimates is different for different assets, but the core principles remain the same. This chapter lays out some general insights about the valuation process and outlines the role that valuation plays in portfolio management, in acquisition analysis, and in corporate finance. It also examines the three basic approaches that can be used to value an asset.

A PHILOSOPHICAL BASIS FOR VALUATION

A postulate of sound investing is that an investor does not pay more for an asset than it is worth. This statement may seem logical and obvious, but it is forgotten and rediscovered at some time in every generation and in every market. There are those who are disingenuous enough to argue that value is in the eyes of the beholder, and that any price can be justified if there are other investors willing to pay that price. That is patently absurd. Perceptions may be all that matter when the asset is a painting or a sculpture, but we do not and should not buy most assets for aesthetic or emotional reasons; we buy financial assets for the cash flows we expect to receive from them. Consequently, perceptions of value have to be backed up by reality, which implies that the price we pay for any asset should reflect the cash flows it is expected to generate. The models of valuation described in this book attempt to relate value to the level of, uncertainty about,

and expected growth in these cash flows.

There are many aspects of valuation where we can agree to disagree, including estimates of true value and how long it will take for prices to adjust to that true value. But there is one point on which there can be no disagreement. Asset prices cannot be justified by merely using the argument that there will be other investors around who will pay a higher price in the future. That is the equivalent of playing a very expensive game of musical chairs, where every investor has to answer the question "Where will I be when the music stops?" before playing. The problem with investing with the expectation that when the time comes there will be a bigger fool around to whom to sell an asset is that you might end up being the biggest fool of all.

INSIDE THE VALUATION PROCESS

There are two extreme views of the valuation process. At one end are those who believe that valuation, done right, is a hard science, where there is little room for analyst views or human error. At the other are those who feel that valuation is more of an art, where savvy analysts can manipulate the numbers to generate whatever result they want. The truth does lies somewhere in the middle, and we use this section to consider three components of the valuation process that do not get the attention they deserve—the bias that analysts bring to the process, the uncertainty that they have to grapple with, and the complexity that modern technology and easy access to information have introduced into valuation.

Value First, Valuation to Follow: Bias in Valuation

We almost never start valuing a company with a blank slate. All too often, our views on a company are formed before we start inputting the numbers into the models that we use, and, not surprisingly, our conclusions tend to reflect our biases. We begin by considering the sources of bias in valuation and then move on to evaluate how bias manifests itself in most valuations. We close with a discussion of how best to minimize or at least deal with bias in valuations.

Sources of Bias

The bias in valuation starts with *the companies we choose to value*. These choices are almost never random, and how we make them can start laying the foundation for bias. It may be that we have read something in the press (good or bad) about the company or heard from an expert that it was undervalued or overvalued. Thus, we already begin with a perception about the company that we are about to value. We add to the bias when we *collect the information* we need to value the firm. The annual report and other financial statements include not only the accounting numbers but also management discussions of performance, often putting the best possible spin on the numbers. With many larger companies, it is easy to access *what other analysts following the stock think about these companies*. Zacks, IBES, and First Call, to name three services among many, provide summaries of how many analysts are bullish or bearish about the stock, and we can often access their complete valuations. Finally, we have *the market's own estimate of the value of the company*—the market price—adding to the mix. Valuations that stray too far from this number make analysts uncomfortable, since they may reflect large valuation errors (rather than market mistakes).

In many valuations, there are *institutional factors* that add to this already substantial bias. For instance, equity research analysts are more likely to issue buy rather than sell recommendations; that is, they are more likely to find firms to be undervalued than overvalued.[1] This can be traced partly to the difficulties analysts face in obtaining access to and collecting information on firms on which they have issued sell recommendations, and partly to pressure that they face from portfolio managers, some of whom might have large positions in the stock, and from their own firm's investment banking arms, which have other profitable relationships with the firms in question.

The *reward and punishment structure* associated with finding companies to be undervalued and overvalued is also a contributor to bias. Analysts whose compensation is dependent upon whether they find firms to be under-or overvalued will be biased in their conclusions. This should explain why acquisition valuations are so often biased upward. The analysis of the deal, which is usually done by the acquiring firm's investment banker, who also happens to be responsible for carrying the deal to its successful conclusion, can come to one of two conclusions. One is to find that the deal is seriously

overpriced and recommend rejection, in which case the analyst receives the eternal gratitude of the stockholders of the acquiring firm but little else. The other is to find that the deal makes sense (no matter what the price is) and to reap the ample financial windfall from getting the deal done.

Manifestations of Bias

There are three ways in which our views on a company (and the biases we have) can manifest themselves in value. The first is in the *inputs* that we use in the valuation. When we value companies, we constantly come to forks in the road where we have to make assumptions to move on. These assumptions can be optimistic or pessimistic. For a company with high operating margins now, we can assume either that competition will drive the margins down to industry averages very quickly (pessimistic) or that the company will be able to maintain its margins for an extended period (optimistic). The path we choose will reflect our prior biases. It should come as no surprise then that the end value that we arrive at is reflective of the optimistic or pessimistic choices we made along the way.

The second is in what we will call *postvaluation tinkering*, where analysts revisit assumptions after a valuation in an attempt to get a value closer to what they had expected to obtain starting off. Thus, an analyst who values a company at $15 per share, when the market price is $25, may revise his growth rates upward and his risk downward to come up with a higher value, if he believed that the company was undervalued to begin with.

The third is to leave the value as is but attribute the difference between the value we estimate and the value we think is the right one to a *qualitative factor* such as synergy or strategic considerations. This is a common device in acquisition valuation where analysts are often called upon to justify the unjustifiable. In fact, the use of premiums and discounts, where we augment or reduce estimated value, provides a window on the bias in the process. The use of premiums—control and synergy are good examples—is commonplace in acquisition valuations, where the bias is toward pushing value upward (to justify high acquisition prices). The use of discounts—illiquidity and minority discounts, for instance—are more typical in private company valuations for tax and divorce court, where the objective is often to report as low a value as possible for a company.

What to Do about Bias

Bias cannot be regulated or legislated out of existence. Analysts are human and bring their biases to the table. However, there are several ways in which we can mitigate the effects of bias on valuation:

1. *Reduce institutional pressures.* As we noted earlier, a significant portion of bias can be attributed to institutional factors. Equity research analysts in the 1990s, for instance, in addition to dealing with all of the standard sources of bias had to grapple with the demand from their employers that they bring in investment banking business. Institutions that want honest sell-side equity research should protect their equity research analysts who issue sell recommendations on companies, not only from irate companies but also from their own salespeople and portfolio managers.

2. *Delink valuations from reward/punishment.* Any valuation process where the reward or punishment is conditional on the outcome of the valuation will result in biased valuations. In other words, if we want acquisition valuations to be unbiased, we have to separate the deal analysis from the deal making.

3. *No precommitments.* Decision makers should avoid taking strong public positions on the value of a firm before the valuation is complete. An acquiring firm that comes up with a price prior to the valuation of a target firm has put analysts in an untenable position in which they are called upon to justify this price. In far too many cases, the decision on whether a firm is undervalued or overvalued precedes the actual valuation, leading to seriously biased analyses.

4. *Self-awareness.* The best antidote to bias is awareness. An analyst who is aware of the biases he or she brings to the valuation process can either actively try to confront these biases when making input choices or open the process up to more objective points of view about a company's future.

5. *Honest reporting.* In Bayesian statistics, analysts are required to reveal their priors (biases) before they present their results from an analysis. Thus, an environmentalist will have to reveal that he or she strongly believes that there is a hole in the ozone layer before presenting empirical evidence to that effect. The person reviewing the study can then factor that bias in while looking at the conclusions. Valuations would be much more useful if analysts revealed their biases up front.

While we cannot eliminate bias in valuations, we can try to minimize its

impact by designing valuation processes that are more protected from overt outside influences and by reporting our biases with our estimated values.

It Is Only an Estimate: Imprecision and Uncertainty in Valuation

Starting early in life, we are taught that if we do things right, we will get the right answers. In other words, the precision of the answer is used as a measure of the quality of the process that yielded the answer. While this may be appropriate in mathematics or physics, it is a poor measure of quality in valuation. Barring a very small subset of assets, there will always be uncertainty associated with valuations, and even the best valuations come with a substantial margin for error. In this section, we examine the sources of uncertainty and the consequences for valuation.

Sources of Uncertainty

Uncertainty is part and parcel of the valuation process, both at the point in time when we value a business and in how that value evolves over time as we obtain new information that impacts the valuation. That information can be specific to the firm being valued, can be more generally about the sector in which the firm operates, or can even be general market information (about interest rates and the economy).

When valuing an asset at any point in time, we make forecasts for the future. Since none of us possess crystal balls, we have to make our best estimates given the information that we have at the time of the valuation. Our estimates of value can be wrong for a number of reasons, and we can categorize these reasons into three groups.

1. *Estimation uncertainty.* Even if our information sources are impeccable, we have to convert raw information into inputs and use these inputs in models. Any mistakes or misassessments that we make at either stage of this process will cause estimation error.

2. *Firm-specific uncertainty.* The path that we envision for a firm can prove to be hopelessly wrong. The firm may do much better or much worse than we expected, and the resulting earnings and cash flows will be very different from our estimates.

3. *Macroeconomic uncertainty.* Even if a firm evolves exactly the way we expected it to, the macroeconomic environment can change in unpredictable ways. Interest rates can go up or down, and the economy can do much better or worse than expected. These macroeconomic changes will affect value.

The contribution of each type of uncertainty to the overall uncertainty associated with a valuation can vary across companies. When valuing a mature cyclical or commodity company, it may be macroeconomic uncertainty that is the biggest factor causing actual numbers to deviate from expectations. Valuing a young technology company can expose analysts to far more estimation and firm-specific uncertainty. Note that the only source of uncertainty that can be clearly laid at the feet of the analyst is estimation uncertainty.

Even if we feel comfortable with our estimates of an asset's values at any point in time, that value itself will change over time as a consequence of new information that comes out both about the firm and about the overall market. Given the constant flow of information into financial markets, a valuation done

on a firm ages quickly and has to be updated to reflect current information. Thus, technology companies that were valued highly in late 1999, on the assumption that the high growth from the 1990s would continue into the future, would have been valued much less in early 2001, as the prospects of future growth dimmed. With the benefit of hindsight, the valuations of these companies (and the analyst recommendations) made in 1999 can be criticized, but they may well have been reasonable given the information available at that time.

Responses of Uncertainty

Analysts who value companies confront uncertainty at every turn in a valuation and they respond to it in both healthy and unhealthy ways. Among the healthy responses are:

- *Better valuation models.* Building better valuation models that use more of the information that is available at the time of the valuation is one way of attacking the uncertainty problem. It should be noted, though, that even the best-constructed models may reduce estimation uncertainty but they cannot reduce or eliminate the very real uncertainties associated with the future.
- *Valuation ranges.* A few analysts recognize that the value that they obtain for a business is an estimate and try to quantify a range on the estimate. Some use simulations and others derive best-case and worst-case estimates of value. The output that they provide therefore yields both their estimates of value and their uncertainty about that value.
- *Probabilistic statements.* Some analysts couch their valuations in probabilistic terms to reflect the uncertainty that they feel. Thus, an analyst who estimates a value of $30 for a stock that is trading at $25 will state that there is a 60 or 70 percent probability that the stock is undervalued rather than make the categorical statement that it is undervalued. Here again, the probabilities that accompany the statements provide insight into the uncertainty that the analyst perceives in the valuation.

In general, healthy responses to uncertainty are open about its existence and provide information on its magnitude to those using the valuation. These users can then decide how much caution they should exhibit while acting on the valuation.

Unfortunately, not all analysts deal with uncertainty in ways that lead to better decisions. The unhealthy responses to uncertainty include:

- *Passing the buck.* Some analysts try to pass on responsibility for the estimates by using other people's numbers in the valuations. For instance, analysts will often use the growth rate estimated by other analysts valuing a company as their estimate of growth. If the valuation turns out to be right, they can claim credit for it, and if it turns out wrong, they can blame other analysts for leading them down the garden path.
- *Giving up on fundamentals.* A significant number of analysts give up, especially on full-fledged valuation models, unable to confront uncertainty

and deal with it. All too often, they fall back on more simplistic ways of valuing companies (multiples and comparables, for example) that do not require explicit assumptions about the future. A few decide that valuation itself is pointless and resort to reading charts and gauging market perception.

It is natural to feel uncomfortable when valuing equity in a company. We are after all trying to make our best judgments about an uncertain future. The discomfort will increase as we move from valuing stable companies to valuing growth companies, from valuing mature companies to valuing young companies, and from valuing developed market companies to valuing emerging market companies.

What to Do about Uncertainty

The advantage of breaking uncertainty down into estimation uncertainty, firm-specific uncertainty, and macroeconomic uncertainty is that doing so gives us a window on what we can manage, what we can control, and what we should just let pass through into the valuation. Building better models and accessing superior information will reduce estimation uncertainty but will do little to reduce exposure to firm-specific or macroeconomic risk. Even the best-constructed model will be susceptible to these uncertainties.

In general, analysts should try to focus on making their best estimates of firm-specific information—How long will the firm be able to maintain high growth? How fast will earnings grow during that period? What type of excess returns will the firm earn?—and steer away from bringing in their views on macroeconomic variables. To see why, assume that you believe that interest rates today are too low and that they will go up by about 1.5 percent over the next year. If you build the expected rise in interest rates into your discounted cash flow (DCF) valuations, they will all yield low values for the companies that you are analyzing. People using these valuations will be faced with a conundrum because they will have no way of knowing how much of each valuation is attributable to your macroeconomic views and how much to your views of the company.

In summary, analysts should concentrate on building the best models they can with as much information as they can legally access, trying to make their best estimates of firm-specific components and being as neutral as they can be on macroeconomic variables. As new information comes in, they should update their valuations to reflect the new information. There is no place for false pride in this process. Valuations can change dramatically over time, and they should if the information warrants such a change.

Payoff to Valuation

Even at the end of the most careful and detailed valuation, there will be uncertainty about the final numbers, colored as they are by assumptions that we make about the future of the company and the economy in which it operates. It is unrealistic to expect or demand absolute certainty in valuation, since the inputs are only estimates. This also means that analysts have to give themselves reasonable margins for error in making recommendations on the basis of valuations.

The corollary to this statement is that a valuation cannot be judged by its precision. Some companies can be valued more precisely than others simply because there is less uncertainty about the future. We can value a mature company with relatively few assumptions and be reasonably comfortable with the estimated value. Valuing a technology firm will require far more assumptions, as will valuing an emerging market company. A scientist looking at the valuations of these companies (and the associated estimation errors) may very well consider the mature company valuation the better one, since it is the more precise, and the technology firms and emerging market company valuations to be inferior because there is more uncertainty associated with the estimated values. The irony is that the payoff to valuation will actually be highest when you are most uncertain about the numbers. After all, it is not how precise a valuation is that determines its usefulness but how precise the value is relative to the estimates of other investors trying to value the same company. Anyone can value a zero coupon default-free bond with absolute precision. Valuing a young technology firm or an emerging market firm requires a blend of forecasting skills, tolerance for ambiguity, and willingness to make mistakes that many analysts do not have. Since most analysts tend to give up in the face of such uncertainty, the ones who persevere and makes their best estimates (error-prone though they might be) will have a differential edge.

We do not want to leave the impression that we are completely helpless in the face of uncertainty. Later in the book, we look at simulations, decision trees, and sensitivity analyses as tools that help us deal with uncertainty but not eliminate it.

Are Bigger Models Better? Valuation Complexity

Valuation models have become more and more complex over the past two

decades as a consequence of two developments. On the one side, computers and calculators have become far more powerful and accessible. With technology as our ally, tasks that would have taken us days in the precomputer era can be accomplished in minutes. On the other side, information is both more plentiful and easier to access and use. We can download detailed historical data on thousands of companies and use the data as we see fit. The complexity, though, has come at a cost. In this section, we consider the trade-off on complexity and how analysts can decide how much to build into models.

More Detail or Less Detail

A fundamental question that we all face when doing valuations is how much detail we should break a valuation down into. There are some who believe that more detail is always better than less detail and that the resulting valuations are more precise. We disagree. The trade-off on adding detail is a simple one. On the one hand, more detail gives analysts a chance to use specific information to make better forecasts on each individual item. On the other hand, more detail creates the need for more inputs, with the potential for error in each one, and generates more complicated models. Thus, breaking working capital down into its individual components—accounts receivable, inventory, accounts payable, supplier credit, and the like—gives an analyst the discretion to make different assumptions about each item, but this discretion has value only if the analyst has the capacity to differentiate between the items.

Cost of Complexity

A parallel and related question to how much detail there should be in a valuation is the one of how complex a valuation model should be. There are clear costs that we pay as models become more complex and require more information.

- *Information overload.* More information does not always lead to better valuations. In fact, analysts can become overwhelmed when faced with vast amounts of conflicting information, and this can lead to poor input choices. The problem is exacerbated by the fact that analysts often operate under time pressure when valuing companies. Models that require dozens of inputs to value a single company often get short shrift from users. A model's output is only as good as the inputs that go into it; it is garbage in, garbage out.
- *Black box syndrome.* The models become so complicated that the analysts using them no longer understand their inner workings. They feed inputs into the model's black box and the box spits out a value. In effect, the refrain from analysts becomes "The model valued the company at $30 a share" rather than "We valued the company at $30 a share." Of particular concern should be models where portions of the models are proprietary and cannot be accessed (or modified) by analysts. This is often the case with commercial valuation models, where vendors have to keep a part of the model out of bounds to make their services indispensable.
- *Big versus small assumptions.* Complex models often generate voluminous and detailed output and it becomes very difficult to separate the big assumptions from the small assumptions. In other words, the assumption that pretax operating margins will stay at 20 percent (a big assumption that doubles the value of the company) has to compete with the assumption that accounts receivable will decline from 5 percent of revenues to 4 percent of revenues over the next 10 years (a small assumption that has almost no impact on value).

The Principle of Parsimony

In the physical sciences, the principle of parsimony dictates that we try the simplest possible explanation for a phenomenon before we move on to more complicated ones. We would be well served adopting a similar principle in valuation. When valuing an asset, we want to use the simplest model we can get away with. In other words, if we can value an asset with three inputs, we should not be using five. If we can value a company with three years of cash flow forecasts, forecasting 10 years of cash flows is asking for trouble.

The problem with all-in-one models that are designed to value all companies is that they have to be set up to value the most complicated companies that we will face and not the least complicated. Thus, we are forced to enter inputs and forecast values for simpler companies that we really do not need to estimate. In the process, we can mangle the values of assets that should be easy to value. Consider, for instance, the cash and marketable securities held by firms as part of their assets. The simplest way to value this cash is to take it at face value. Analysts who try to build discounted cash flow or relative valuation models to value cash often misvalue it, either by using the wrong discount rate for the cash income or by using the wrong multiple for cash earnings.[2]

APPROACHES TO VALUATION

Analysts use a wide spectrum of models, ranging from the simple to the sophisticated. These models often make very different assumptions about the fundamentals that determine value, but they do share some common characteristics and can be classified in broader terms. There are several advantages to such a classification: It makes it is easier to understand where individual models fit into the big picture, why they provide different results, and when they have fundamental errors in logic.

In general terms, there are three approaches to valuation. The first, discounted cash flow valuation, relates the value of an asset to the present value of expected future cash flows on that asset. The second, relative valuation, estimates the value of an asset by looking at the pricing of comparable assets relative to a common variable like earnings, cash flows, book value, or sales. The third, contingent claim valuation, uses option pricing models to measure the value of assets that share option characteristics. While they can yield different estimates

of value, one of the objectives of this book is to explain the reasons for such differences, and to help in picking the right model to use for a specific task.

Discounted Cash Flow Valuation

In discounted cash flow (DCF) valuation, the value of an asset is the present value of the expected cash flows on the asset, discounted back at a rate that reflects the riskiness of these cash flows. This approach gets the most play in classrooms and comes with the best theoretical credentials. In this section, we will look at the foundations of the approach and some of the preliminary details on how we estimate its inputs.

Basis for Approach

We buy most assets because we expect them to generate cash flows for us in the future. In DCF valuation, we begin with a simple proposition. The value of an asset is not what someone perceives it to be worth, but rather it is a function of the expected cash flows on that asset. Put simply, assets with high and predictable cash flows should have higher values than assets with low and volatile cash flows. In DCF valuation, we estimate the value of an asset as the present value of the expected cash flows on it.

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \cdots + \frac{E(CF_n)}{(1+r)^n}$$

where

$E(CF_t)$ = Expected cash flow in period t

r = Discount rate reflecting riskiness of estimated cash flows

n = Life of asset

The cash flows will vary from asset to asset—dividends for stocks, coupons (interest) and the face value for bonds, and after-tax cash flows for a business. The discount rate will be a function of the riskiness of the estimated cash flows, with higher rates for riskier assets and lower rates for safer ones.

Using DCF models is in some sense an act of faith. We believe that every asset has an intrinsic value and we try to estimate that intrinsic value by looking at an asset's fundamentals. What is intrinsic value? Consider it the value that would be attached to an asset by an all-knowing analyst with access to all information available right now and a perfect valuation model. No such analyst exists, of course, but we all aspire to be as close as we can be to this perfect analyst. The problem lies in the fact that none of us ever gets to see what the true intrinsic value of an asset is and we therefore have no way of knowing whether our DCF valuations are close to the mark.

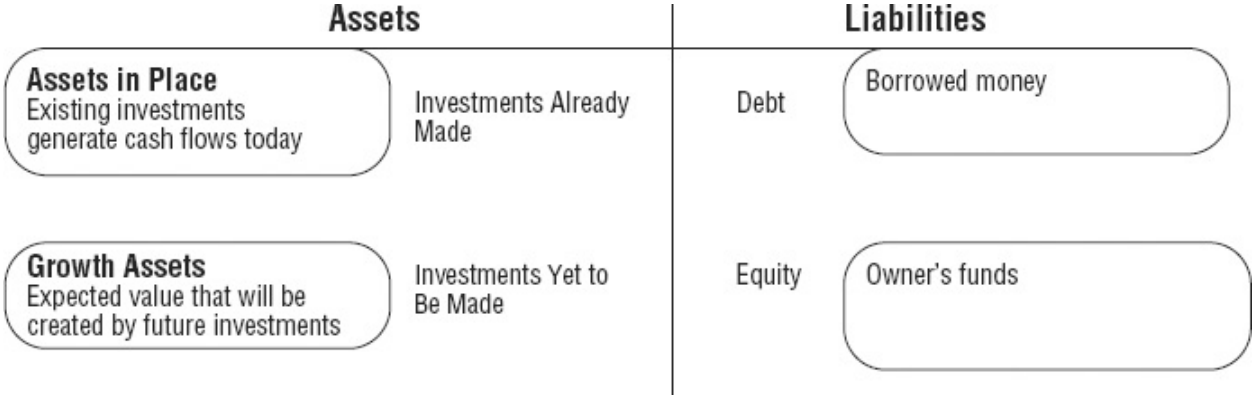
Classifying Discounted Cash Flow Models

There are three distinct ways in which we can categorize DCF models. In the first, we differentiate between valuing a business as a going concern as opposed to a collection of assets. In the second, we draw a distinction between valuing the equity in a business and valuing the business itself. In the third, we lay out two different and equivalent ways of doing DCF valuation in addition to the expected cash flow approach—a value based on excess returns and the adjusted present value (APV).

Going Concern versus Asset Valuation

The value of an asset in the DCF framework is the present value of the expected cash flows on that asset. Extending this proposition to valuing a business, it can be argued that the value of a business is the sum of the values of the individual assets owned by the business. While this may be technically correct, there is a key difference between valuing a collection of assets and a business. A business or a company is an ongoing entity with assets that it already owns and assets it expects to invest in the future. This can be best seen when we look at the financial balance sheet (as opposed to an accounting balance sheet) for an ongoing company in Figure 1.1. Note that investments that have already been made are categorized as assets in place, but investments that we expect the business to make in the future are growth assets.

FIGURE 1.1 Simple View of a Firm



A financial balance sheet provides a good framework to draw out the differences between valuing a business as a going concern and valuing it as a collection of assets. In a going concern valuation, we have to make our best judgments not only on existing investments but also on expected future investments and their profitability. While this may seem to be foolhardy, a large proportion of the market value of growth companies comes from their growth assets. In an asset-based valuation, we focus primarily on the assets in place and estimate the value of each asset separately. Adding the asset values together yields the value of the business. For companies with lucrative growth opportunities, asset-based valuations will yield lower values than going concern valuations.

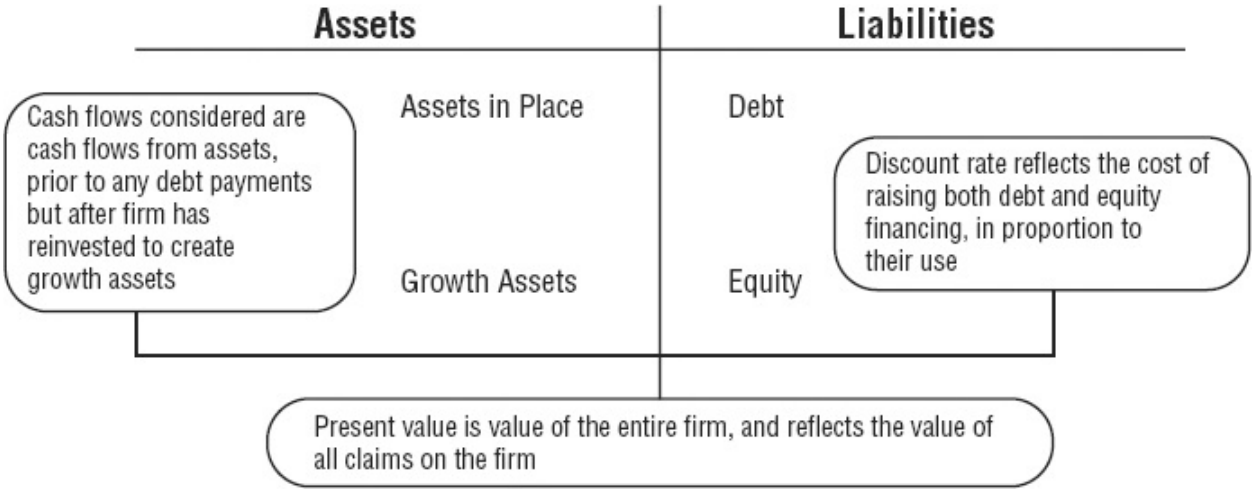
One special case of asset-based valuation is liquidation valuation, where we value assets based on the presumption that they have to be sold now. In theory,

this should be equal to the value obtained from DCF valuations of individual assets, but the urgency associated with liquidating assets quickly may result in a discount on the value. How large the discount will be will depend on the number of potential buyers for the assets, the asset characteristics, and the state of the economy.

Equity Valuation versus Firm Valuation

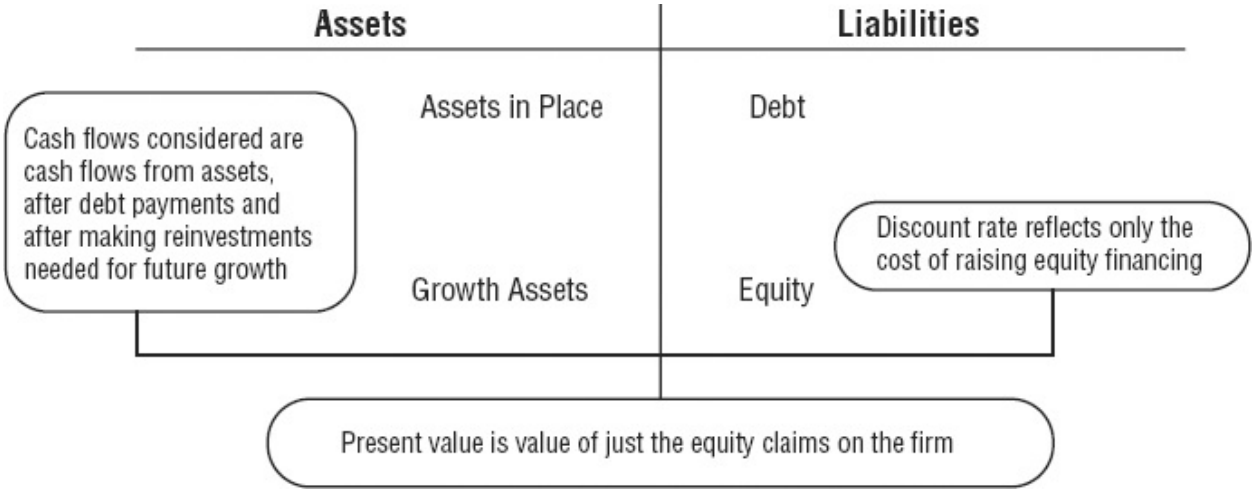
There are two ways in which we can approach DCF valuation. The first is to value the entire business, with both assets in place and growth assets; this is often termed firm or enterprise valuation. (See Figure 1.2.) The cash flows before debt payments and after reinvestment needs are called *free cash flows to the firm*, and the discount rate that reflects the composite cost of financing from all sources of capital is called the *cost of capital*.

FIGURE 1.2 Firm Valuation



The second way is to just value the equity stake in the business, and this is called equity valuation. (See Figure 1.3.) The cash flows after debt payments and reinvestment needs are called *free cash flows to equity*, and the discount rate that reflects just the cost of equity financing is the *cost of equity*.

FIGURE 1.3 Equity Valuation



Note also that we can always get from the former (firm value) to the latter (equity value) by netting out the value of all nonequity claims from firm value. Done right, the value of equity should be the same whether it is valued directly (by discounting cash flows to equity at the cost of equity) or indirectly (by valuing the firm and subtracting out the value of all nonequity claims). We will return to discuss this proposition in far more detail in Chapter 6.

Variations on Discounted Cash Flow Models

The model that we have presented in this section, where expected cash flows are discounted back at a risk-adjusted discount rate, is the most commonly used DCF approach, but there are two widely used variants. In the first, we separate the cash flows into excess return cash flows and normal return cash flows. Earning the risk-adjusted required return (cost of capital or equity) is considered a normal return cash flow, but any cash flows above or below this number are categorized as excess returns; excess returns can therefore be either positive or negative. With the *excess return valuation* framework, the value of a business can be written as the sum of two components:

Value of business = Capital invested in firm today + Present value of excess return cash flows from both existing and future projects

If we make the assumption that the accounting measure of capital invested (book value of capital) is a good measure of capital invested in assets today, this approach implies that firms that are expected to earn positive excess return cash flows will trade at market values higher than their book values and that the reverse will be true for firms that are expected to earn negative excess return cash flows.

In the second variation, called the *adjusted present value (APV)* approach, we separate the effects on value of debt financing from the value of the assets of a business. In general, using debt to fund a firm's operations creates tax benefits (because interest expenses are tax deductible) on the plus side and increases bankruptcy risk (and expected bankruptcy costs) on the minus side. In the APV approach, the value of a firm can be written as follows:

Value of business = Value of business with 100% equity financing + Present value of expected tax benefits of debt – Expected bankruptcy costs

In contrast to the conventional approach, where the effects of debt financing are captured in the discount rate, the APV approach attempts to estimate the expected dollar value of debt benefits and costs separately from the value of the operating assets.

While proponents of each approach like to claim that their approach is the best and most precise, we will show later in the book that the three approaches yield the same estimates of value if we make consistent assumptions.

Inputs to Discounted Cash Flow Models

There are three inputs that are required to value any asset in this model—the *expected cash flow*, the *timing* of the cash flow, and the *discount rate* that is appropriate given the riskiness of these cash flows. We look at discount rate and cash flow estimation in far more detail in the coming chapters, but lay out the fundamentals in this section.

Discount Rates

In valuation, we begin with the fundamental notion that the discount rate used on a cash flow should reflect its riskiness, with higher-risk cash flows having higher discount rates. There are two ways of viewing risk. The first is purely in terms of the likelihood that an entity will default on a commitment to make a payment such as interest or principal due, and this is called *default risk*. When looking at debt, the *cost of debt* is the rate that reflects this default risk. Since interest expenses are tax-deductible, the after-tax cost of debt will be lower for most firms.

The second way of viewing risk is in terms of the *variation of actual returns around expected returns*. The actual returns on a risky investment can be very different from expected returns; the greater the variation, the greater the risk. When looking at equity, we tend to use measures of risk based on return variance. The next chapter looks at the different models that attempt to do this in far more detail, but there are some basic points on which these models agree. The first is that risk in an investment has to be perceived through the eyes of the marginal investor in that investment (the investor most likely to be trading), and this marginal investor is assumed to be well diversified across multiple investments. Therefore, the risk in an investment that should determine discount rates is the nondiversifiable or market risk of that investment. The second is that the expected return on any investment can be obtained starting with the expected return on a riskless investment, and adding to it a premium to reflect the amount of market risk in that investment. This expected return yields the cost of equity.

The cost of capital can be obtained by taking an average of the cost of equity, estimated as just described, and the after-tax cost of borrowing, based on default risk, and weighting by the proportions used of each. We argue that the weights used, when valuing an ongoing business, should be based on the market values of debt and equity. While there are some analysts who use book value weights, doing so violates a basic principle of valuation, which is that at a fair value,[3] one should be indifferent between buying and selling an asset.

Expected Cash Flows

In the strictest sense, the only cash flow an equity investor gets out of a publicly traded firm is the dividend; models that use the dividends as cash flows are called *dividend discount models*. A broader definition of cash flows to equity would be the cash flows left over after the cash flow claims of nonequity investors in the firm have been met (interest and principal payments to debt holders and preferred dividends) and after enough of these cash flows has been reinvested into the firm to sustain the projected growth in cash flows. This is the free cash flow to equity (FCFE), and models that use these cash flows are called *FCFE discount models*.

The cash flow to the firm is the cumulated cash flow to all claim holders in the firm. One way to obtain this cash flow is to add the free cash flows to equity to the cash flows to lenders (debt) and preferred stockholders. A far simpler way of obtaining the same number is to estimate the cash flows prior to debt and preferred dividend payments, by subtracting from the after-tax operating income the net investment needs to sustain growth. This cash flow is called the free cash flow to the firm (FCFF) and the models that use these cash flows are called *FCFF models*.

Expected Growth

It is while estimating the expected growth in cash flows in the future that analysts confront uncertainty most directly. There are three generic ways of estimating growth. One is to look at a company's past and use the historical growth rate posted by that company. The peril is that past growth may provide little indication of future growth. The second is to obtain estimates of growth from more informed sources. For some analysts, this translates into using the estimates provided by a company's management, whereas for others it takes the form of using consensus estimates of growth made by others who follow the firm. The bias associated with both these sources should raise questions about the resulting valuations.

In this book, we promote a third way, where the expected growth rate is tied to two variables that are determined by the firm being valued—how much of the earnings is reinvested back into the firm and how well those earnings are reinvested. In the equity valuation model, this expected growth rate is a product of the retention ratio—that is, the proportion of net income not paid out to stockholders, and the return on equity on the projects undertaken with that money. In the firm valuation model, the expected growth rate is a product of the reinvestment rate, which is the proportion of after-tax operating income that goes into net new investments and the return on capital earned on these investments. The advantages of using these fundamental growth rates are twofold. The first is that the resulting valuations will be internally consistent and companies that are assumed to have high growth are required to pay for the growth with more reinvestment. The second is that it lays the foundation for considering how firms can make themselves more valuable to their investors.

Discounted Cash Flow Valuation: Pluses and Minuses

To true believers, DCF valuation is the only way to approach valuation, but the benefits may be more nuanced that they are willing to admit. On the plus side, DCF valuation, done right, requires analysts to understand the businesses that they are valuing and ask searching questions about the sustainability of cash flows and risk. Discounted cash flow valuation is tailor-made for those who buy into the Warren Buffett adage that what we are buying are not stocks but the underlying businesses. In addition, DCF valuation is inherently contrarian in the sense that it forces analysts to look for the fundamentals that drive value rather

than what market perceptions are. Consequently, if stock prices rise disproportionately relative to the underlying earnings and cash flows, DCF models are likely to find stocks to be overvalued, and if they fall disproportionately, DCF models find stocks to be undervalued.

There are, however, limitations with DCF valuation. In the hands of sloppy analysts, DCF valuations can be manipulated to generate estimates of value that have no relationship to intrinsic value. We also need substantially more information to value a company with DCF models, since we have to estimate cash flows, growth rates, and discount rates. Finally, DCF models may very well find every stock in a sector or even a market to be overvalued if market perceptions have run ahead of fundamentals. For portfolio managers and equity research analysts, who are required to find equities to buy even in the most overvalued markets, this creates a conundrum. They can go with their DCF valuations and conclude that everything is overvalued, which may put them out of business, or they can find an alternate approach that is more sensitive to market moods. It should come as no surprise that many choose the latter course.

Relative Valuation

While the focus in classrooms and academic discussions remains on DCF valuation, the reality is that most assets are valued on a relative basis. In relative valuation, we value an asset by looking at how the market prices similar assets. Thus, when determining what to pay for a house, we look at what similar houses in the neighborhood sold for rather than doing an intrinsic valuation. Extending this analogy to stocks, investors often decide whether a stock is cheap or expensive by comparing its pricing to that of similar stocks (usually in its peer group). In this section, we consider the basis for relative valuation, ways in which it can be used, and its advantages and disadvantages.

Basis for Approach

In relative valuation, the value of an asset is derived from the pricing of comparable assets, standardized using a common variable. Included in this description are two key components of relative valuation. The first is the notion of *comparable or similar assets*. From a valuation standpoint, this would imply assets with similar cash flows, risk, and growth potential. In practice, it is usually taken to mean other companies that are in the same business as the company being valued. The other is a *standardized price*. After all, the price per share of a company is in some sense arbitrary since it is a function of the number of shares outstanding; a two-for-one stock split would halve the price. Dividing the price or market value by some measure that is related to that value will yield a standardized price. When valuing stocks, this essentially translates into using multiples where we divide the market value by earnings, book value, or revenues to arrive at an estimate of standardized value. We can then compare these numbers across companies.

The simplest and most direct applications of relative valuations are with real assets where it is easy to find similar assets or even identical ones. The asking price for a Mickey Mantle baseball card or a 1965 Ford Mustang is relatively easy to estimate given that there are other Mickey Mantle cards and 1965 Ford Mustangs out there and that the prices at which they have been bought and sold can be obtained. With equity valuation, relative valuation becomes more complicated by two realities. The first is the absence of similar assets, requiring us to stretch the definition of comparable to include companies that are different from the one that we are valuing. After all, what company in the world is remotely similar to Microsoft or General Electric? The other is that different ways of standardizing prices (different multiples) can yield different values for the same company.

In our earlier discussion of DCF valuation, we argued that DCF valuation was a search (albeit unfulfilled) for intrinsic value. In relative valuation, we have given up on estimating intrinsic value and essentially put our trust in markets getting it right, at least on average.

Variations on Relative Valuation

In relative valuation, the value of an asset is based on how similar assets are priced. In practice, there are three variations on relative valuation, with the differences primarily in how we define comparable firms and control for differences across firms:

1. *Direct comparison.* In this approach, analysts try to find one or two companies that look almost exactly like the company they are trying to value and estimate the value based on how these similar companies are priced. The key part in this analysis is identifying these similar companies and getting their market values.

2. *Peer group average.* Analysts compare how their company is priced (using a multiple) with how the peer group is priced (using the average for that multiple). Thus, a stock is considered cheap if it trades at 12 times earnings and the average price-earnings ratio for the sector is 15. Implicit in this approach is the assumption that while companies may vary widely across a sector, the average for the sector is representative for a typical company.

3. *Peer group average adjusted for differences.* Recognizing that there can be wide differences between the company being valued and other companies in the comparable firm group, analysts sometimes try to control for differences between companies. In many cases, the control is subjective: A company with higher expected growth than the industry will trade at a higher multiple of earnings than the industry average but how much higher is left unspecified. In a few cases, analysts explicitly try to control for differences between companies either by adjusting the multiple being used or by using statistical techniques. As an example of the former, consider price-earnings/growth (PEG) ratios. These ratios are computed by dividing P/E ratios by expected growth rates, thus controlling (at least in theory) for differences in growth and allowing analysts to compare companies with different growth rates. For statistical controls, we can use multiple regressions where we can regress the multiple that we are using against the fundamentals that we believe cause that multiple to vary across companies. The resulting regressions can be used to estimate the value of individual companies. In fact, we argue later in this book that statistical techniques are powerful enough to allow us to expand the comparable firm sample to include the entire market.

Applicability of Multiples and Limitations

The allure of multiples is that they are simple and easy to relate to. They can be used to obtain estimates of value quickly for firms and assets, and are particularly useful when a large number of comparable firms are being traded on financial markets, and the market is, on average, pricing these firms correctly. In fact, relative valuation is tailor-made for analysts and portfolio managers who not only have to find undervalued equities in any market no matter how overvalued, but also get judged on a relative basis. An analyst who picks stocks based on their P/E ratios relative to the sectors in which they operate will always find undervalued stocks in any market; if entire sectors are overvalued and his stocks decline, he will still look good on a relative basis since his stocks will decline less than comparable stocks (assuming the relative valuation is right).

By the same token, multiples are also easy to misuse and manipulate, especially when comparable firms are used. Given that no two firms are exactly alike in terms of risk and growth, the definition of comparable firms is a subjective one. Consequently, a biased analyst can choose a group of comparable firms to confirm his or her biases about a firm's value. While this potential for bias exists with DCF valuation as well, the analyst in DCF valuation is forced to be much more explicit about the assumptions that determine the final value. With multiples, these assumptions are often left unstated.

The other problem with using multiples based on comparable firms is that it builds in errors (overvaluation or undervaluation) that the market might be making in valuing these firms. If, for instance, we find a company to be undervalued because it trades at 15 times earnings and comparable companies trade at 25 times earnings, we may still lose on the investment if the entire sector is overvalued. In relative valuation, all that we can claim is that a stock looks cheap or expensive relative to the group we compared it to; we do not make an absolute judgment about value. Ultimately, relative valuation judgments depend on how well we have picked the comparable companies and how good a job the market has done in pricing them.

Contingent Claim Valuation

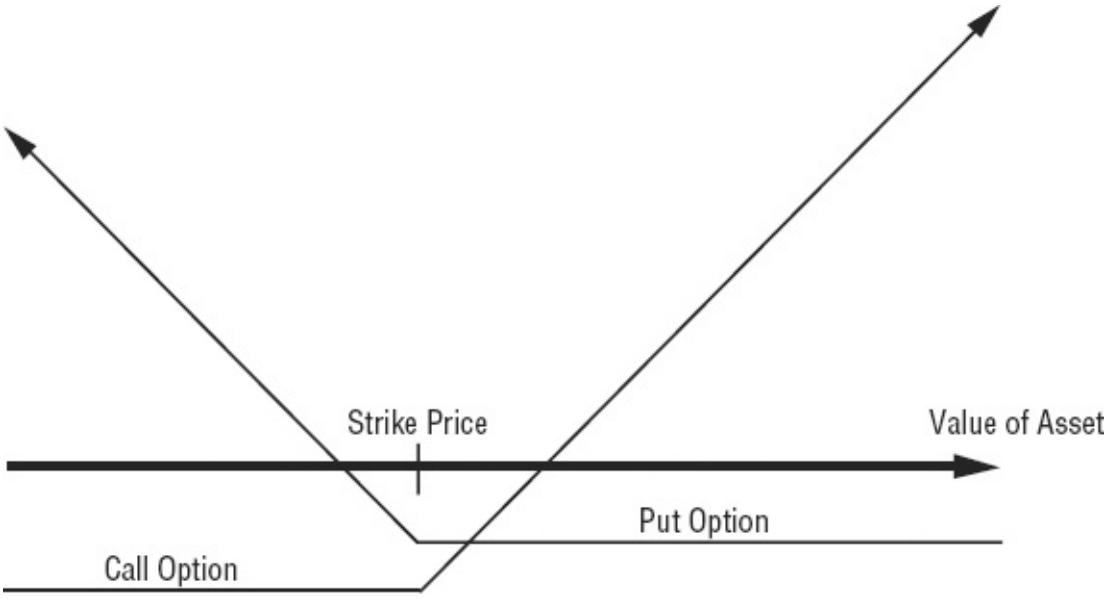
There is little in either DCF or relative valuation that can be considered new and revolutionary. In recent years, though, analysts have increasingly used option pricing models, developed to value listed options, to value assets, businesses, and equity stakes in businesses. These applications are often categorized loosely as real options, but as we will see later in this book, they have to be used with caution.

Basis for Approach

A contingent claim or option is an asset that pays off only under certain contingencies—if the value of the underlying asset exceeds a prespecified value for a call option, or is less than a prespecified value for a put option. Much work has been done in the past few decades in developing models that value options, and these option pricing models can be used to value any assets that have optionlike features.

Figure 1.4 illustrates the payoffs on call and put options as a function of the value of the underlying asset. An option can be valued as a function of the following variables: the current value and the variance in value of the underlying asset, the strike price and the time to expiration of the option, and the riskless interest rate. This was first established by Black and Scholes (1972)[4] and has been extended and refined subsequently in numerous variants. While the Black-Scholes option pricing model ignored dividends and assumed that options would not be exercised early, it can be modified to allow for both. A discrete-time variant, the binomial option pricing model, has also been developed to price options.

FIGURE 1.4 Payoffs on Options as a Function of the Underlying Asset's Value



An asset can be valued as a call option if the payoffs on it are a function of the value of an underlying investment; if that value exceeds a prespecified level, the asset is worth the difference; if not, it is worth nothing. It can be valued as a put option if it gains value as the value of the underlying investment drops below a

prespecified level, and it is worth nothing when the underlying investment's value exceeds that specified level. There are many assets that generally are not viewed as options but still share option characteristics. A patent can be analyzed as a call option on a product, with the investment outlay needed to get the project going considered the strike price and the patent life becoming the life of the option. An undeveloped oil reserve or gold mine provides its owner with a call option to develop the reserve or mine, if oil or gold prices increase.

The essence of the real options argument is that DCF models understate the value of assets with option characteristics. The understatement occurs because DCF models value assets based on a set of expected cash flows and do not fully consider the possibility that firms can learn from real-time developments and respond to that learning. For example, an oil company can observe what the oil price is each year and adjust its development of new reserves and production in existing reserves accordingly rather than be locked into a fixed production schedule. As a result, there should be an option premium added onto the DCF value of the oil reserves. It is this premium on value that makes real options so alluring and so potentially dangerous.

Applicability and Limitations

Using option pricing models in valuation does have its advantages. First, there are some assets that cannot be valued with conventional valuation models because their value derives almost entirely from their option characteristics. For example, a biotechnology firm with a single promising patent for a blockbuster cancer drug wending its way through the Food and Drug Administration (FDA) approval process cannot be easily valued using DCF or relative valuation models. It can, however, be valued as an option. The same can be said about equity in a money-losing company with substantial debt; most investors buying this stock are buying it for the same reasons they buy deep out-of-the-money options. Second, option pricing models do yield more realistic estimates of value for assets when there is a significant benefit obtained from learning and flexibility. Discounted cash flow models will understate the values of natural resource companies, where the observed price of the natural resource is a key factor in decision making. Third, option pricing models do highlight a very important aspect of risk. While risk is considered almost always in negative terms in DCF and relative valuation (with higher risk reducing value), the value of options increases as volatility increases. For some assets, at least, risk can be an ally and can be exploited to generate additional value.

This is not to suggest that using real-options models is an unalloyed good. Using real-options arguments to justify paying premiums on DCF valuations when the options argument does not hold can result in overpayment. While we do not disagree with the notion that firms can learn by observing what happens over time, this learning has value only if it has some degree of exclusivity. We argue later in this book that it is usually inappropriate to attach an option premium to value if the learning is not exclusive and competitors can adapt their behavior as well. There are also limitations in using option pricing models to value long-term options on nontraded assets. The assumptions made about constant variance and dividend yields, which are not seriously contested for short-term options, are much more difficult to defend when options have long lifetimes. When the underlying asset is not traded, the inputs for the value of the underlying asset and the variance in that value cannot be extracted from financial markets and have to be estimated. Thus the final values obtained from these applications of option pricing models have much more estimation error associated with them than the values obtained in their more standard applications (to value short-term traded options).

ROLE OF VALUATION

Valuation is useful in a wide range of tasks. The role it plays, however, is different in different arenas. The following section lays out the relevance of valuation in portfolio management, in acquisition analysis, in corporate finance, and for legal and tax purposes.

Valuation in Portfolio Management

The role that valuation plays in portfolio management is determined in large part by the investment philosophy of the investor. Valuation plays a minimal role in portfolio management for a passive investor, whereas it plays a larger role for an active investor. Even among active investors, the nature and the role of valuation is different for different types of active investment. Market timers use valuation much less than investors who pick stocks, and the focus is on market valuation rather than on firm-specific valuation. Among stock pickers, valuation plays a central role in portfolio management for fundamental analysts, and a peripheral role for technical analysts.

The following subsections describe, in broad terms, different investment philosophies and the roles played by valuation in each one.

Fundamental Analysts

The underlying theme in fundamental analysis is that the true value of the firm can be related to its financial characteristics—its growth prospects, risk profile, and cash flows. Any deviation from this true value is a sign that a stock is undervalued or overvalued. It is a long-term investment strategy, and the assumptions underlying it are that:

- The relationship between value and the underlying financial factors can be measured.
- The relationship is stable over time.
- Deviations from the relationship are corrected in a reasonable time period.

Fundamental analysts include both value and growth investors. The key difference between the two is in where the valuation focus lies. Reverting back to our breakdown of assets in Figure 1.1, value investors are primarily interested in assets in place and acquiring them at less than their true value. Growth investors are far more focused on valuing growth assets and buying those assets at a discount. While valuation is the central focus in fundamental analysis, some analysts use DCF models to value firms, while others use multiples and comparable firms. Since investors hold a large number of undervalued stocks in their portfolios, their hope is that, on average, these portfolios will do better than the market.

Activist Investors

Activist investors take positions in firms that have a reputation for poor management and then use their equity holdings to push for change in the way the companies are run. Their focus is not so much on what the company is worth today but rather what its value would be if it were managed well. Investors like Carl Icahn, Michael Price, and Kirk Kerkorian have prided themselves on their capacity not only to pinpoint badly managed firms but also to create enough pressure to get management to change its ways.

How can valuation skills help in this pursuit? To begin with, these investors have to ensure that there is additional value that can be generated by changing management. In other words, they have to separate how much of a firm's poor stock price performance has to do with bad management and how much of it is a function of external factors; the former are fixable but the latter are not. They then have to consider the effects of changing management on value; this will require an understanding of how value will change as a firm changes its investment, financing, and dividend policies. As a consequence, they have to not only know the businesses that the firm operates in but also have an understanding of the interplay between corporate finance decisions and value. Activist investors generally concentrate on a few businesses they understand well and attempt to acquire undervalued firms. Often, they wield influence on the management of these firms and can change financial and investment policy.

Chartists

Chartists believe that prices are driven as much by investor psychology as by any underlying financial variables. The information available from trading measures—price movements, trading volume, and short sales—gives an indication of investor psychology and future price movements. The assumptions here are that prices move in predictable patterns, that there are not enough marginal investors taking advantage of these patterns to eliminate them, and that the average investor in the market is driven more by emotion than by rational analysis. While valuation does not play much of a role in charting, there are ways in which an enterprising chartist can incorporate it into analysis. For instance, valuation can be used to determine support and resistance lines[5] on price charts.

Information Traders

Prices move on information about the firm. Information traders attempt to trade in advance of new information or shortly after it is revealed to financial markets. The underlying assumption is that these traders can anticipate information announcements and gauge the market reaction to them better than the average investor in the market. For an information trader, the focus is on the relationship between information and changes in value, rather than on value per se. Thus an information trader may buy an overvalued firm if he believes that the next information announcement is going to cause the price to go up because it contains better than expected news. If there is a relationship between how undervalued or overvalued a company is and how its stock price reacts to new information, then valuation could play a role in investing for an information trader.

Market Timers

Market timers note, with some legitimacy, that the payoff to calling turns in markets is much greater than the returns from stock picking. They argue that it is easier to predict market movements than to select stocks and that these predictions can be based on factors that are observable. While valuation of individual stocks may not be of much direct use to a market timer, market timing strategies can use valuation in one of at least two ways:

1. The overall market itself can be valued and compared to the current level.

2. Valuation models can be used to value a large number of stocks, and the results from the cross section can be used to determine whether the market is over-or undervalued. For example, as the number of stocks that are overvalued, using the valuation model, increases relative to the number that are undervalued, there may be reason to believe that the market is overvalued.

Efficient Marketers

Efficient marketers believe that the market price at any point in time represents the best estimate of the true value of the firm, and that any attempt to exploit perceived market efficiencies will cost more than it will make in excess profits. They assume that markets aggregate information quickly and accurately, that marginal investors promptly exploit any inefficiencies, and that any inefficiencies in the market are caused by frictions, such as transactions costs, and cannot be exploited. For efficient marketers, valuation is a useful exercise to determine why a stock sells for the price that it does. Since the underlying assumption is that the market price is the best estimate of the true value of the company, the objective becomes determining what assumptions about growth and risk are implied in this market price, rather than on finding undervalued or overvalued firms.

Valuation in Acquisition Analysis

Valuation should play a central part of acquisition analysis. The bidding firm or individual has to decide on a fair value for the target firm before making a bid, and the target firm has to determine a reasonable value for itself before deciding to accept or reject the offer.

There are special factors to consider in takeover valuation. First, there is synergy, the increase in value that many managers foresee as occurring after mergers because the combined firm is able to accomplish things that the individual firms could not. The effects of synergy on the combined value of the two firms (target plus bidding firm) have to be considered before a decision is made on the bid. Second, the value of control, which measures the effects on value of changing management and restructuring the target firm, will have to be taken into account in deciding on a fair price. This is of particular concern in hostile takeovers.

As we noted earlier, there is a significant problem with bias in takeover valuations. Target firms may be overly optimistic in estimating value, especially when the takeover is hostile, and they are trying to convince their stockholders that the offer price is too low. Similarly, if the bidding firm has decided, for strategic reasons, to do an acquisition, there may be strong pressure on the analyst to come up with an estimate of value that backs up the acquisition price.

Valuation in Corporate Finance

There is a role for valuation at every stage of a firm's life cycle. For small private businesses thinking about expanding, valuation plays a key role when they approach venture capital and private equity investors for more capital. The share of a firm that a venture capitalist will demand in exchange for a capital infusion will depend on the value he or she estimates for the firm. As the companies get larger and decide to go public, valuations determine the prices at which they are offered to the market in the public offering. Once established, decisions on where to invest, how much to borrow, and how much to return to the owners will all be decisions that are affected by valuation. If the objective in corporate finance is to maximize firm value,[6] the relationships among financial decisions, corporate strategy, and firm value have to be delineated.

As a final note, value enhancement has become the mantra of management consultants and CEOs who want to keep stockholders happy, and doing it right requires an understanding of the levers of value. In fact, many consulting firms have come up with their own measures of value—economic value added (EVA) and cash flow return on investment (CFROI), for instance—that they contend facilitate value enhancement.

Valuation for Legal and Tax Purposes

Mundane though it may seem, most valuations, especially of private companies, are done for legal or tax reasons. A partnership has to be valued whenever a new partner is taken on or an old one retires, and businesses that are jointly owned have to be valued when the owners decide to break up. Businesses have to be valued for estate tax purposes when the owner dies, and for divorce proceedings when couples break up. While the principles of valuation may not be different when valuing a business for legal proceedings, the objective often becomes providing a valuation that the court will accept rather than the "right" valuation. After all, legal precedents and the language of the law often trump common sense in the courtroom.

CONCLUSION

Valuation plays a key role in many areas of finance—in corporate finance, in

mergers and acquisitions, and in portfolio management. The models presented in this book provide a range of tools that analysts in each of these areas will find of use, but the cautionary note sounded in this chapter bears repeating. Valuation is not an objective exercise, and any preconceptions and biases that an analyst brings to the process will find their way into the value.

[1] There are approximately five times as many buy recommendations issued by analysts on Wall Street as there are sell recommendations.

[2] The income from cash is riskless and should be discounted back at a riskless rate. Instead, analysts use risk-adjusted discount rates (costs of equity or capital) to discount the cash income, thus resulting in a discount on face value. When analysts use multiples, they often use the average price-earnings (P/E) ratio of peer group companies as the multiple for cash income.

[3] When book value weights are used, the costs of capital tend to be much lower for many U.S. firms, since book equity is lower than market equity. This then pushes up the value for these firms. While this may make the asking price attractive to the sellers of these firms, very few buyers would be willing to pay this price for the firm, since it would require that the debt that they use in their financing would have to be based on the book value, often requiring tripling or quadrupling the dollar debt in the firm.

[4] F. Black and M. Scholes, "The Valuation of Option Contracts and a Test of Market Efficiency," *Journal of Finance* 27 (1972): 399–417.

[5] On a chart, the support line usually refers to a lower bound below which prices are unlikely to move and the resistance line refers to the upper bound above which prices are unlikely to venture. While these levels are usually estimated using past prices, the range of values obtained from a valuation model can be used to determine these levels (i.e., the maximum value will become the resistance level and the minimum value will become the support line).

[6] Most corporate financial theory is constructed on this premise.

CHAPTER 10

Cash, Cross Holdings, and Other Assets

Most firms, private and public, have assets on their books that can be considered to be nonoperating assets. The first and most obvious example of such assets is cash and near-cash investments—investments in riskless or very low-risk investments that most companies with large cash balances make. The second is investments in equities and bonds of other firms, sometimes for investment reasons and sometimes for strategic ones. The third is holdings in other firms, private and public, which are categorized in a variety of ways by accountants. Finally, there are assets that do not generate cash flows but nevertheless could have value—undeveloped land in New York or Tokyo or an overfunded pension plan. When valuing firms, little or no serious attention is paid to these assets, and the consequences can be serious. In the earlier chapters on discounted cash flow and relative valuation, we referred in passing to these assets. In this chapter, we examine some of the challenges associated with valuing nonoperating assets and common errors that can enter valuations of these assets.

CASH AND NEAR-CASH INVESTMENTS

On every firm's balance sheet, there is a line item for cash and marketable securities, referring to its holding of cash and near-cash investments. Investments in short-term government securities or commercial paper, which can be converted into cash quickly and with very low cost, are considered near-cash investments. We begin by considering the motives for holding cash and the extent of such holdings at companies. We then discuss various approaches used to categorize cash holdings and how best to deal with cash holdings in both discounted cash flow and relative valuations.

Why Do Companies Hold Cash?

Every business has some cash on its books, and many have very large cash balances as a percent of their values. John Maynard Keynes provided three motives for individuals to hold money. He suggested that they hold cash for

transactions, as a precaution against unanticipated expenses, and for speculative purposes.[1] It can be argued that firms accumulate cash for the same reasons, but there is an added incentive. The separation of management and stockholders at large publicly traded companies can create an incentive for firms (or at least the managers in these firms) to accumulate cash.[2]

Operating (Transactions)

Motive Firms need cash for operations, and the needs are likely to be different for different businesses. For instance, retail firms have to have cash available in the cash registers of the stores to run their businesses. Furthermore, these firms need access to cash to replace depleted inventory and to meet their weekly payrolls.[3] In contrast, a computer software company may be able to get away with a much smaller operating cash balance. We would expect cash needs for operations to be a function of the following variables:

- *Cash-oriented versus credit-oriented businesses.* Firms that are in cash-oriented businesses (fast-food restaurants, grocery stores) will require more cash for operations than firms that operate in credit-oriented businesses.
- *Small versus large transactions.* Firms that generate their revenues in multitudes of small transactions are more likely to require cash for their businesses than firms that generate revenues in a few large transactions. It is unlikely that a firm like Boeing, which receives its revenues on a few large transactions, will receive or pay cash on most of its transactions. As a related point, there should be some economies of scale that allow larger firms to maintain lower (proportional) operating cash balances than smaller firms.[4]
- *Banking system.* As banking systems evolve, fewer and fewer transactions will be cash based. As a consequence, we would expect cash requirements to decrease as banking systems get more sophisticated, allowing customers to pay with credit cards or checks.

While we can debate how much operating cash is needed in a firm, there can be little argument that banking technology and investment opportunities have improved for most firms in most economies, leading to lower operating cash requirements across the board.

Precautionary Motives

The second reason for holding cash is to cover unanticipated expenses or to meet unspecified contingencies. For example, cyclical firms will accumulate cash during economic booms and draw on that cash in the event of a recession to cover operating deficits. In general, therefore, we would expect this component of the cash balance to be a function of the following variables:

- *Volatility in the economy.* Firms should accumulate more cash, other things remaining equal, in unstable and volatile economies than they do in mature economies. There is a far greater likelihood of shocks in the former and thus a much higher need for cash.[5]
- *Volatility in operations.* In any given economy, we would expect firms with more volatile operating cash flows to hold higher cash balances to meet contingencies than firms with stable cash flows. Technology companies often have large cash balances precisely because they are so uncertain about their future earnings.
- *Competitive environment.* One factor that adds to instability is the presence of strong competition in the business in which a firm operates. We would expect firms that operate in more intensely competitive sectors to hold more cash than otherwise similar firms that are protected from competition.[6]
- *Financial leverage.* A firm that has a higher debt ratio, for any given operating cash flow, has committed itself to making higher interest payments in the future. Concerns about being able to make these payments should lead to higher cash balances.

Future Capital

Investments If capital markets were efficient and always accessible with no transactions costs, firms could raise fresh capital when needed to invest in new projects or investments. In the real world, firms often face constraints and costs in accessing capital markets. Some of the constraints are internally imposed (by management) but many are external, and they restrict a firm's capacity to raise fresh capital to fund even good investments. In the face of these constraints, firms will set aside cash to cover future investment needs; if they fail to do so, they run the risk of turning away worthwhile investments. We would expect this part of the cash balance to be a function of the following variables:

- *Magnitude of and uncertainty about future investments.* The need to hold cash will be greatest in firms that have both substantial expected investment needs and high uncertainty about the magnitude of these needs. After all, firms that have large but predictable investment needs can line up external funding well in advance of their needs, and firms with small investment needs can get away without setting aside substantial cash balances.[7]
- *Access to capital markets.* Firms that have easier and cheaper access to capital markets should retain less cash for future investment needs than firms without this access. Thus, we would expect cash balances to be higher (in proportional terms) in smaller companies than in larger ones, in private businesses than in publicly traded firms and in emerging market companies as opposed to developed market companies. Cash balances should also decrease with an increase in the financial choices that firms have to raise capital. Thus, the capacity to access corporate bond markets in addition to conventional banks for debt should allow nonfinancial corporations to reduce their cash balances.[8]
- *Information asymmetry about investments.* Firms will generally face far more difficulty raising capital at a fair price for investments where external investors have less information about the potential payoffs than the firm does.[9] Thus, we would expect firms to acquire larger cash balances in businesses where projects are difficult to assess and monitor. This may explain why cash holdings tend to be higher in firms that have substantial R&D investments; both lenders and equity investors face difficulties in evaluating the possibility of success with these investments.

Strategic Cash Holdings

In some cases, companies hold cash not because they have specific investments in mind that they want to finance with the cash but just in case. “Just in case of what?” you might ask. These companies view cash as a strategic weapon that they can use to take advantage of opportunities that may manifest in the future. Of course, these opportunities may never show up but it would still be rational for firms to accumulate cash. In fact, the advantage of having cash is greatest when cash is a scarce resource and capital markets are difficult to access or closed. In many emerging markets, for instance, companies hold huge cash balances and use the cash during economic crises to buy assets from distressed firms at bargain prices. The advantage to holding cash becomes much smaller in developed markets but it will still exist.

Management Interests

As we noted at the start of the section, the one variable that sets aside publicly traded companies from individuals is the separation of management and ownership. The cash may belong to the stockholders but the managers maintain the discretion on whether it should be returned to stockholders (in the form of dividends and stock buybacks) or held by the firm. In many firms, it can be argued that managers have their own agendas to pursue and that cash provides them with the ammunition to fund the pursuit.[10] Thus, a CEO who is intent on empire building will accumulate cash, not because it is good for stockholders, but because it can be used to fund expansion.[11] If this rationale holds, we would expect cash balances to vary across companies for the following reasons:

- *Corporate governance.* Companies where stockholders have little or no power over managers, because of either corporate charter amendments, inertia, or shares with different voting rights, will accumulate more cash than companies where managers are held to account by stockholders.[12]
- *Insider holdings.* If insiders hold large blocks of the company and also are part of the management of the company, we would expect to see larger cash balances accumulating in the company.[13]

There is also evidence that firms that accumulate cash tend to report subpar operating performance, at least on average.[14]

Extent of Cash Holdings

Cash holdings vary widely not only across companies at any point in time but for the same company across time. To get a sense of how much cash (and near-cash investments) companies hold, we looked at three measures of cash holdings.

1. *Cash as a percent of the overall market value of the firm.* This firm value is defined as the sum of the market values of debt and equity. Figure 10.1 presents the distribution of this measure for companies in the United States in January 2005. While the median is 6.07 percent for this ratio, more than 300 firms have cash in excess of 50 percent of firm value. There is also a significant number of firms where cash is less than 1 percent of firm value.

2. *The second measure is cash as a percent of the book value of all assets.* The difference between this measure and the previous one is that this one is scaled to the accountant's estimate of how much a business is worth rather than the market's judgment. Figure 10.2 reports on the distribution of cash to book value of assets for companies in the United States in January 2005. The median for this measure is 7.14 percent, slightly higher than the median for cash as a percent of firm value.

3. *Cash as a percent of a firm's revenues.* This measures the linkage (if one exists) between cash holdings and operations. Figure 10.3 provides the distribution of cash as a percent of revenues for companies in the United States in January 2005. The median for this measure is 3.38 percent, but there is a large number of positive outliers with this measure as well. Many young, high-growth firms have cash that exceeds 100 percent of revenues in the most recent financial year.

FIGURE 10.1 Cash as a Percent of Firm Value (Market)—U.S. Companies

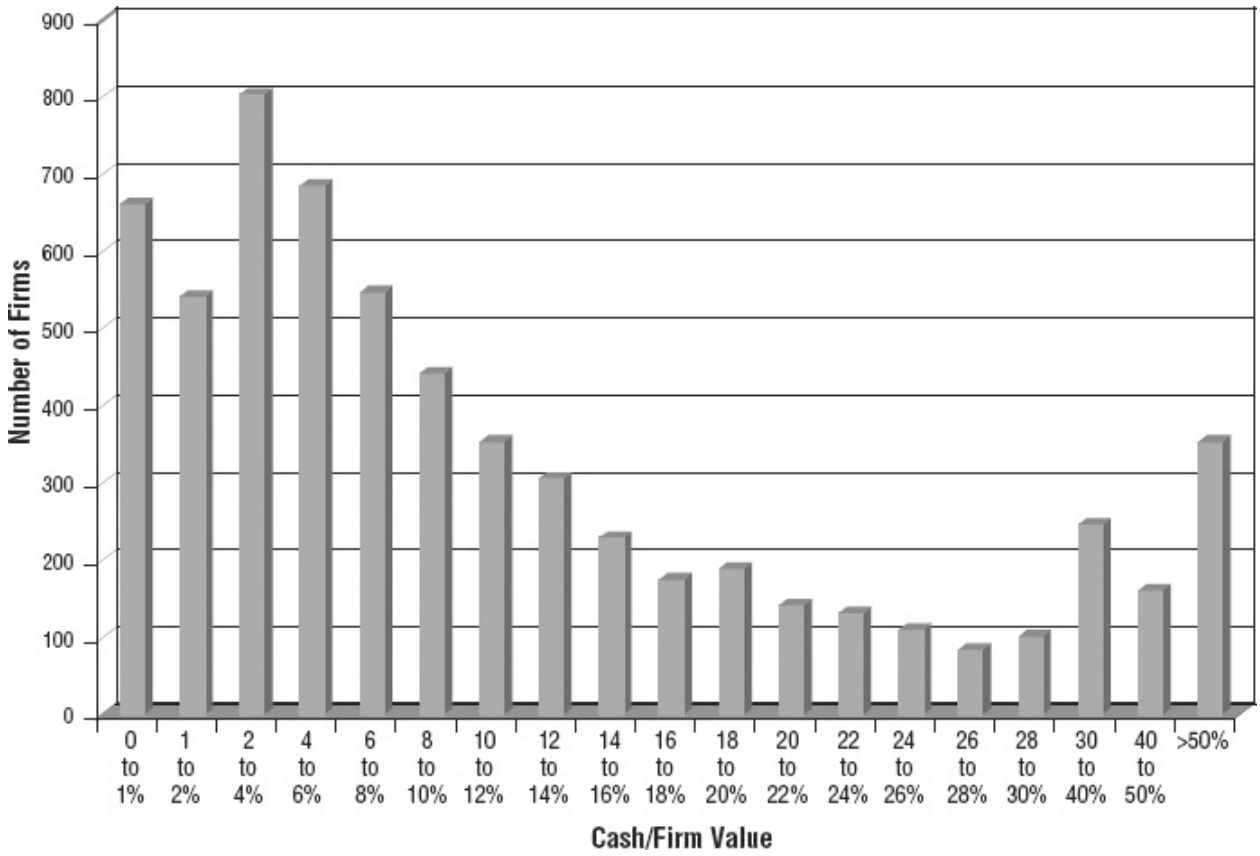


FIGURE 10.2 Cash as a Percent of Book Value of Assets

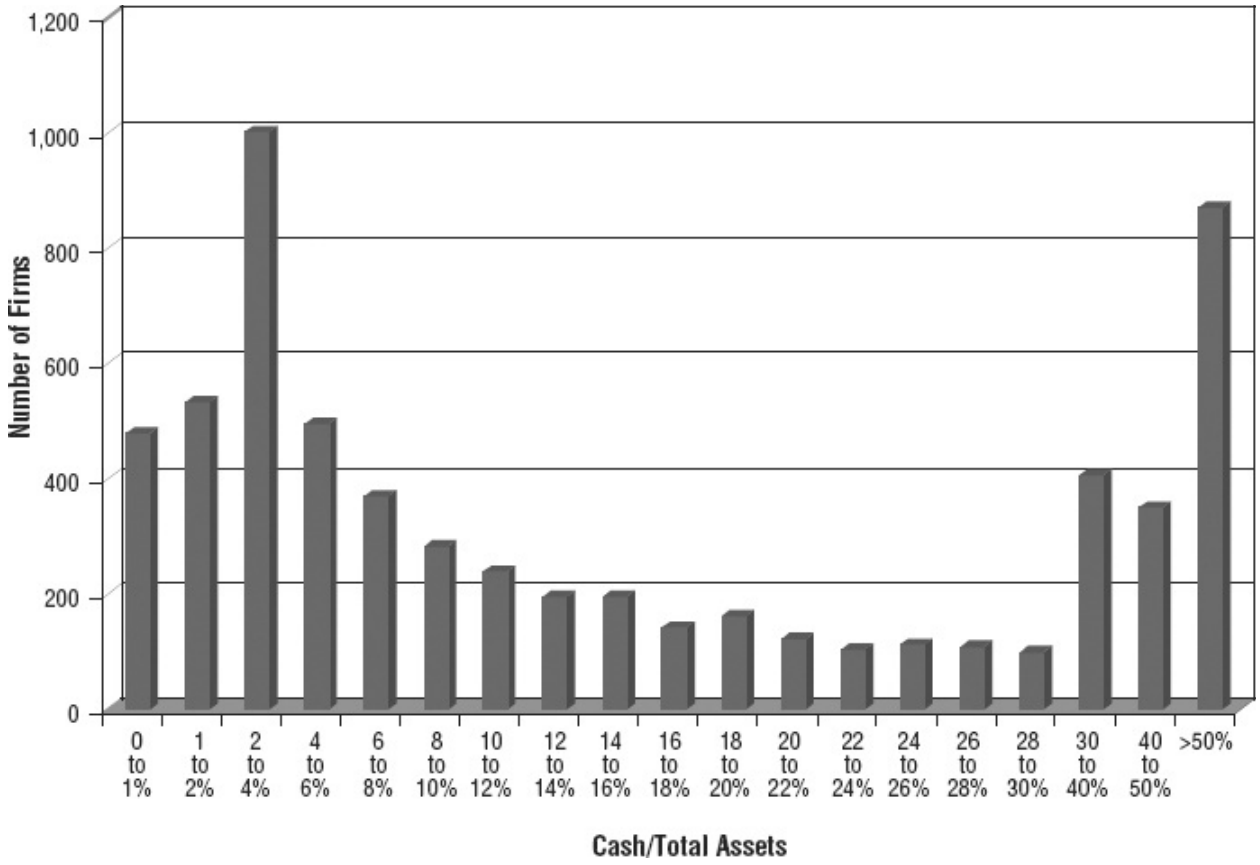
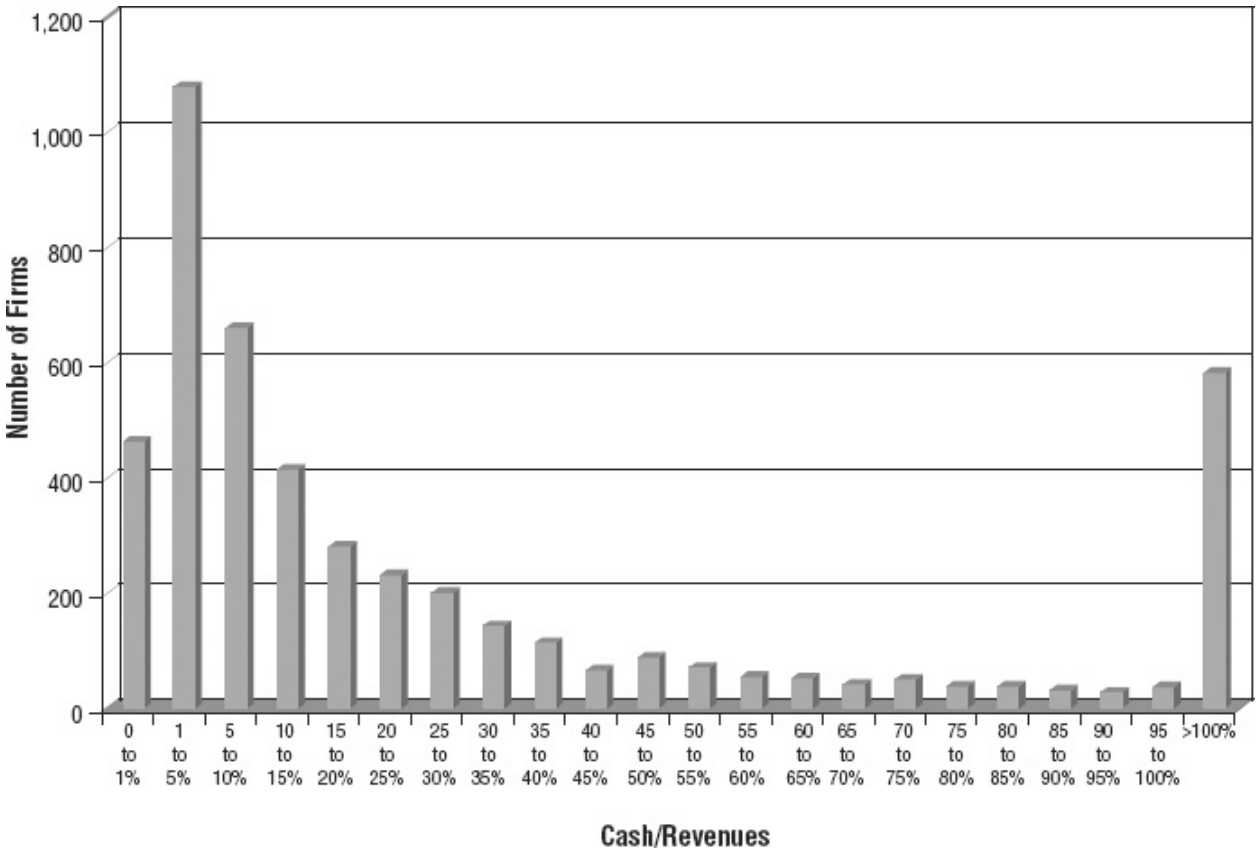


FIGURE 10.3 Cash as a Percent of Revenues



While Figures 10.1 through 10.3 provide useful information about the differences across all firms, it is still instructive to look underneath at differences across sectors when it comes to cash holdings. We computed the average values of the three measures outlined—cash/firm value, cash/book assets, and cash/revenues—for different industries in the United States, and the results are reported in Appendix 10.1 (at the end of the chapter).[15]

Categorizing Cash Holdings

Given the different motives for holding cash, it should come as no surprise that analysts have tried to categorize cash holdings in many ways. The most common one in practice separates the cash balance into an operating cash balance and excess cash. A more useful categorization from a valuation perspective is one that divides cash into wasting cash and nonwasting cash, based on where the cash is invested.

Operating versus Nonoperating (Excess)

Cash In the preceding section, we outlined why companies may hold cash for operating purposes. For many analysts, determining how much cash is needed for operating purposes is viewed as a key step in analyzing cash. Once that determination has been made, operating cash is considered to be part of working capital and affects cash flows, and cash held in excess of the operating cash balance is either added back to the estimated value of the operating assets or netted out against total debt outstanding to arrive at a net debt number. Making the determination of how much cash is needed for operations is not easy, though there are three ways in which this estimation is made:

1. *Rule of thumb.* For decades, analysts have used rules of thumb to define operating cash. One widely used variation defined operating cash to be 2 percent of revenues, though the original source for this number is not clear. Using this approach, a firm with revenues of $100 billion should have a cash balance of $2 billion. Any cash held in excess of $2 billion would be viewed as excess cash. The disadvantage of this approach is that it does not differentiate across firms, with large and small firms in all industries treated equivalently.

2. *Industry average.* An alternative approach that allows us to differentiate across firms in different industries uses the industry averages reported in Appendix 10.1. Based on the presumption that there is no excess cash in the average cash holdings of the sector, the industry averages become proxies for operating cash. Any firm that holds a cash balance greater than the industry average will therefore be holding excess cash.

3. *Cross-sectional regressions.* When examining the motives for cash holdings, we referenced several papers that examine the determinants of cash holdings. Most of these papers come to their conclusions by regressing cash

balances at individual companies against firm-specific measures of risk, growth, investment needs, and corporate governance. These regressions can be used to obtain predicted cash balances at individual companies that reflect their characteristics. Any cash in excess of this predicted balance is viewed as nonoperating cash.

Wasting versus Nonwasting

Cash In our view, the debate about how much cash is needed for operations and how much is excess cash misses the point when it comes to valuation. Note that even cash needed for operations can be invested in near-cash investments such as Treasury bills or commercial paper. These investments may make a low rate of return but they do make a fair rate of return. Put another way, an investment in Treasury bills is a zero net present value investment, earning exactly what it needs to earn, and thus has no effect on value. As we noted in Chapter 3, we should not consider that cash to be part of working capital when computing cash flows.

The categorization that affects value is therefore the one that breaks the cash balance down into wasting and nonwasting cash. Only cash that is invested at below-market rates, given the risk of the investment, should be considered wasting cash. Thus, cash left in a checking account, earning no interest, is wasting cash. Given the investment opportunities that firms (and individual investors) have today, it would require an incompetent corporate treasurer for a big chunk of the cash balance to be wasting cash. As an illustration, almost all of Microsoft's very large cash balance is invested in commercial paper or Treasury bills, and the same can be said for most companies.

As an analyst, how would you make this categorization? One simple way is to examine interest income earned by a firm as a percent of the average cash balance during the course of the year and compare this book interest rate on cash to a market interest rate during the period. If the cash is productively invested, the two rates should converge. If it is being wasted, the book interest rate earned on cash will be lower than the market interest rate. Consider a simple example. CyberTech Inc. had an average cash balance of $200 million in the 2004 financial year and it reported interest income of $4.2 million from these holdings. If the average Treasury bill rate during the period was 2.25 percent, we can estimate the wasting cash component as follows:

Interest income for 2004 = $4.2 million

$$\text{Book interest rate on average cash balance} = \frac{\text{Interest income}}{\text{Average cash balance}} = \frac{4.2}{200} = 2.1\%$$

Market interest rate (Treasury bills) = 2.25%

$$\text{Proportion of cash balance that is wasting cash} = 1 - \frac{\text{Book interest rate}}{\text{Market interest rate}}$$

$$= 1 - \frac{.021}{.0225} = 0.0667 \text{ or } 6.67\%$$

Thus, 6.67 percent of $200 million ($13.34 million) would be treated as wasting cash and considered, like inventory and accounts receivable, to be part of working capital, but the remaining $186.66 million would be viewed as nonwasting cash and be added to the value of the operating assets of the firm.

Dealing with Cash Holdings in Valuation

While valuing cash in a firm may seem like a trivial exercise, there are pitfalls in the analysis that can cause large valuation errors. In this section, we consider how best to deal with cash in both discounted cash flow and relative valuations.

Valuing Cash in a Discounted Cash Flow Valuation

There are two ways in which we can deal with cash and marketable securities in discounted cash flow valuation. One is to lump them in with the operating assets and value the firm (or equity) as a whole. The other is to value the operating assets and the cash and marketable securities separately. As we argue in this subsection, the latter approach is a much more reliable one and less likely to result in errors.

Consolidated Valuation

Is it possible to consider cash as part of the total assets of the firm and to value it on a consolidated basis? The answer is yes and it is, in a sense, what we do when we forecast the total net income for a firm and estimate dividends and free cash flows to equity from those forecasts. The net income will then include income from investments in government securities, corporate bonds, and equity investments.[16] While this approach has the advantage of simplicity and can be used when financial investments comprise a small percent of the total assets, it becomes much more difficult to use when financial investments represent a larger proportion of total assets for two reasons:

1. The cost of equity or capital used to discount the cash flows has to be adjusted on an ongoing basis for the cash. In specific terms, you would need to use an unlevered beta that represents a weighted average of the unlevered beta for the operating assets of the firm and the unlevered beta for the cash and marketable securities. For instance, the unlevered beta for a steel company where cash represents 10 percent of the value would be a weighted average of the unlevered beta for steel companies and the beta of cash (which is usually zero). If the 10 percent were invested in riskier securities, you would need to adjust the beta accordingly. While this can be done simply if you use bottom-up betas, you can see that it would be much more difficult to do if you obtain a beta from a regression.[17]

2. As the firm grows, the proportion of income that is derived from operating assets is likely to change. When this occurs, you have to adjust the inputs to the valuation model—cash flows, growth rates, and discount rates—to maintain consistency.

What will happen if you do not make these adjustments? You will tend to mis-value the financial assets. To see why, assume that you were valuing the steel company just described, with 10 percent of its income coming from cash. This cash is invested in government securities and earns a risk-free rate of, say, 2 percent. If this income is added to the other income of the firm and discounted back at a cost of equity appropriate for a steel company—say 11 percent—the value of the cash will be discounted. A billion dollars in cash will be valued at $800 million, for instance, because the discount rate used is incorrect.

Separate Valuation

It is safer to separate cash and marketable securities from operating assets and to value them individually. We do this almost always when we use approaches to value the firm rather than just the equity. This is because we use operating income to estimate free cash flows to the firm, and operating income generally does not include income from financial assets. Once you value the operating assets, you can add the value of the cash and marketable securities to it to arrive at firm value.

Can this be done with the FCFE valuation models described in the earlier chapters? While net income includes income from financial assets, we can still separate cash and marketable securities from operating assets, if we wanted to. To do this, we would first back out the portion of the net income that represents the income from financial investments (interest on bonds, dividends on stock) and use the noncash net income to estimate free cash flows to equity. These free cash flows to equity would be discounted back using a cost of equity that would be estimated using a beta that reflected only the operating assets. Once the equity in the operating assets has been valued, you could add the value of cash and marketable securities to it to estimate the total value of equity.

If cash is kept separate from other assets, there is one final adjustment that has to be factored into the valuation. To estimate sustainable or fundamental growth, we link growth in net income to returns on equity and growth in operating income to return on capital.[18] These returns should be computed using only the noncash earnings and capital invested in operating assets:

$$\text{Noncash return on equity} = \frac{\text{Net income} - \text{Interest income from cash}}{\text{Book value of equity} - \text{Cash}}$$

$$\text{Return on invested capital} = \frac{\text{EBIT}(1 - \text{Tax rate})}{\text{Book value of equity} - \text{Book value of debt} - \text{Cash}}$$

These are also the returns we should be comparing to the costs of equity and capital to make judgments on whether firms are generating excess returns on their investments. Including cash in the picture (which we almost always do with return on equity and sometimes with return on capital) just muddies the waters.

ILLUSTRATION 10.1: Consolidated versus Separate Valuation: All-Equity Firm

To examine the effects of a cash balance on firm value, consider a firm with investments of $1,000 million in noncash operating assets and $200 million in cash. For simplicity, let us assume the following.

- The noncash operating assets have a beta of 1 and are expected to earn $120 million in net income each year in perpetuity, and there are no reinvestment needs (to match the assumption of no growth).
- The cash is invested at the riskless rate, which we assume to be 4.5%.
- The net income is returned to stockholders every year (as dividends or buybacks).
- The market risk premium is assumed to be 5.5%.
- The firm is all equity funded.

Under these conditions, we can value the equity, using both the consolidated and separate approaches.

Let us first consider the consolidated approach. Here, we estimate a cost of equity for all of the assets (including cash) by computing a weighted average beta of the noncash operating and cash assets, using the estimated values of each as weights (see below for estimated value of operating assets).

$$\text{Beta of the firm} = (\text{Beta}_{\text{Noncash assets}})(\text{Weight}_{\text{Noncash assets}}) + (\text{Beta}_{\text{Cash assets}})(\text{Weight}_{\text{Cash assets}})$$
$$= (1)\left(\frac{1,200}{1,400}\right) + (0)\left(\frac{200}{1,400}\right) = 0.8571$$

$$\text{Cost of equity for the firm} = 4.5\% + 0.8571(5.5\%) = 9.21\%$$

$$\text{Expected earnings for the firm} = \text{Net income from operating assets} + \text{Interest income from cash}$$
$$= (120 + 0.045 \times 200)$$
$$= 129 \text{ million (which is also the FCFE since there are no reinvestment needs)}$$

$$\text{Value of the equity} = \frac{\text{FCFE}}{\text{Cost of equity}}$$
$$= \frac{129}{0.0921} = \$1,400 \text{ million}$$

The equity is worth $1,400 million.

Now, let us try to value them separately, beginning with the noncash investments.

$$\text{Cost of equity for noncash investments} = \text{Riskless rate} + \text{Beta} \times \text{Risk premium}$$
$$= 4.5\% + 1(5.5\%) = 10\%$$

$$\text{Expected earnings from operating assets} = \$120 \text{ million (which is the FCFE from these assets)}$$

$$\text{Value of noncash assets} = \frac{\text{Expected earnings}}{\text{Cost of equity for noncash assets}}$$
$$= \frac{120}{0.1} = \$1,200 \text{ million}$$

To this, we can add the value of the cash, which is $200 million, to get a value for the equity of $1,400 million.

To see the potential for problems with the consolidated approach, note that if we had discounted

the total FCFE of $129 million at the cost of equity of 10% (which reflects only the operating assets), we would have valued the firm at $1,290 million. The loss in value of $110 million can be traced to the mishandling of cash.

Interest income from cash = 4.5% × 200 = $9 million

If we discount the cash at 10%, we would value the cash at $90 million instead of the correct value of $200 million—hence the loss in value of $110 million.

Gross Debt, Net Debt, and the Treatment of Cash

In much of Latin America and Europe, analysts net cash balances out against debt outstanding to come up with a net debt value, which they use in computing debt ratios and costs of capital. In firm value calculation, therefore, the differences between using the gross debt approach and the net debt approach will show up in the following places:

- Assuming that the bottom-up beta of the company is computed, we will begin with an unlevered beta and lever the beta up using the net debt to equity ratio rather than the gross debt to equity ratio, which should result in a lower beta and a lowest cost of equity when using the net debt ratio approach.
- When computing the cost of capital, the debt ratio used will be the net debt to capital ratio rather than the gross debt ratio. If the cost of debt is the same under the two approaches, the greater weight attached to the cost of equity in the net debt ratio approach will compensate (at least partially) for the lower cost of equity obtained under the approach. *In general, the cost of capital obtained using the gross debt ratio will not be the same as the cost of capital obtained under the net debt approach.*
- The cash flows to the firm are the same under the two approaches, and once the value is obtained by discounting the cash flows back at the cost of capital, the adjustments under the two approaches for debt and cash are the same. In the gross debt approach, we add the cash balance back to the operating assets and then subtract the gross debt. In the net debt approach, we accomplish the same by subtracting the net debt.

The reason that the two approaches will yield different values lies therefore in the difference in the costs of capital obtained with the two approaches. To understand why there is the difference, consider a firm with a value for the noncash assets of $1.25 billion and a cash balance of $250 million. Assume further that this firm has $500 million in debt outstanding, with a pretax cost of

debt of 5.90 percent and $1 billion in market value of equity. In the gross debt approach, we assume that the gross debt-to-capital ratio that we compute for the firm by dividing the gross debt ($500 million) by the market value of the firm ($1,500 million) is used to fund both its operating and cash assets. Thus, we compute the cost of capital using the gross debt ratio and use it to discount operating cash flows.

In the net debt ratio approach, we make a different assumption. We assume that cash is funded with riskless debt (and no equity). Consequently, the operating assets of the firm are funded using the remaining debt ($250 million) and all of the equity. The resulting lower debt ratio (250/1,250) will usually result in a slightly higher cost of capital and a lower value for the operating assets and equity. Figure 10.4 summarizes the different assumptions we make about how assets are financed under the two approaches. Note that the cost of the debt used to fund debt in both approaches is assumed to be the risk-free rate. In the gross debt approach, we assume that equity used to fund debt is also risk-free (and has a beta of zero).

FIGURE 10.4 Gross Debt versus Net Debt Approaches—Implicit Assumptions ($ millions)

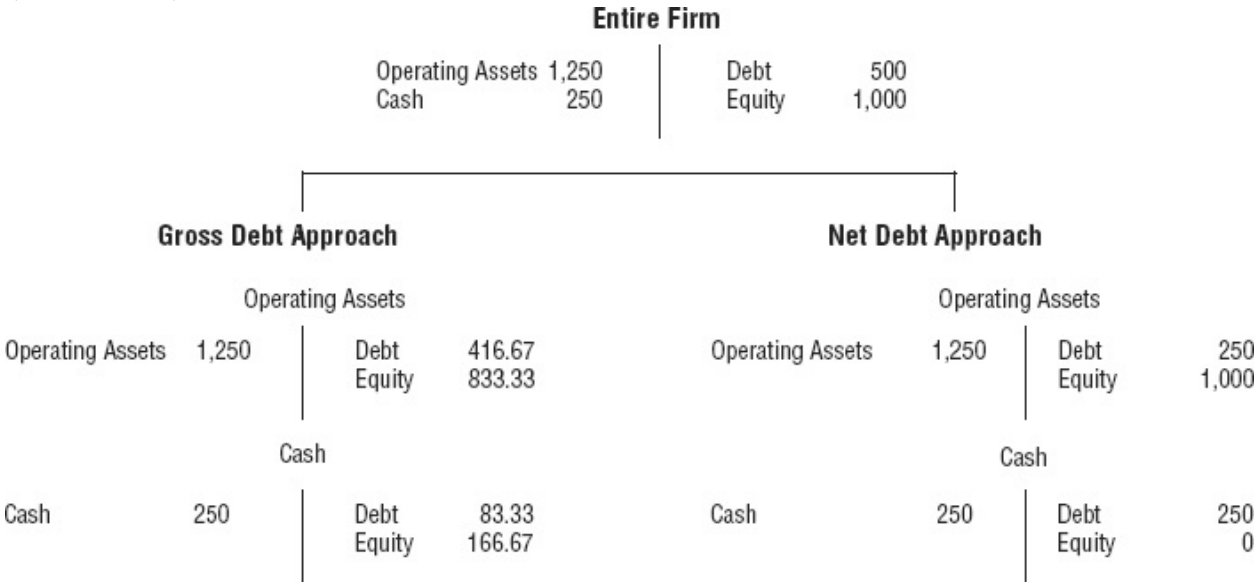


ILLUSTRATION 10.2: Valuing a Levered Firm with Cash: Gross Debt and Net Debt Approaches

Consider a firm with $1 billion invested in operating assets, earning an aftertax return on capital

of 12.5% on its operating investments, and $250 million invested in cash, earning 4% risklessly; there is no expected growth in earnings from either component, and the earnings are expected to be perpetual. Assume that the unlevered beta of the operating assets is 1.42 and that the firm has $500 million in outstanding debt (with a pretax cost of debt of 5.9%). Finally, assume that the market value of equity is $1 billion, that the firm faces a tax rate of 40%, and that the equity risk premium is 5%.

Gross Debt Valuation

$$\text{Gross debt-to-capital ratio} = \frac{\text{Gross debt}}{\text{Gross debt} + \text{Equity}} = \frac{500}{500 + 1{,}000} = 33.33\%$$

$$\text{Levered beta} = \text{Unlevered beta}\left[1 + (1 - \text{Tax rate})\left(\frac{\text{Gross debt}}{\text{Market equity}}\right)\right]$$

$$= 1.42\left[1 + (1 - .40)\left(\frac{500}{1{,}000}\right)\right] = 1.846$$

$$\text{Cost of equity} = \text{Risk-free rate} + \text{Beta} \times \text{Risk premium} = 4\% + 1.846(5\%) = 13.23\%$$

$$\text{Cost of capital} = 13.23\%\left(\frac{1{,}000}{1{,}500}\right) + 5.9\%(1 - .4)\left(\frac{500}{1{,}500}\right) = 10.00\%$$

$$\text{Expected after-tax operating income} = \text{Capital invested} \times \text{Return on capital}$$
$$= 1{,}000 \times .125 = \$125 \text{ million}$$

$$\text{Value of operating assets} = \frac{\text{Expected after-tax operating income}}{\text{Cost of capital}}$$

$$= \frac{125}{.10} = \$1{,}250 \text{ million}$$

$$\text{Expected cash earnings} = \$250 \text{ million} \times .04 = \$10 \text{ million}$$

$$\text{Value of cash} = \frac{\text{Expected cash earnings}}{\text{Risk-free rate}} = \frac{\$10 \text{ million}}{.04} = \$250 \text{ million}$$

$$\text{Value of firm} = \text{Value of operating assets} + \text{Cash} = \$1{,}250 + \$250 = \$1{,}500 \text{ million}$$

$$\text{Value of equity} = \text{Value of firm} - \text{Gross debt} = \$1{,}500 - \$500 = \$1{,}000 \text{ million}$$

Net Debt Valuation

Net debt = Gross debt – Cash = \$500 – \$250 = \$250 million

$$\text{Net debt-to-capital ratio} = \frac{\text{Net debt}}{\text{Net debt} + \text{Equity}} = \frac{250}{250 + 1{,}000} = 20\%$$

$$\text{Levered beta} = \text{Unlevered beta}\left[1 + (1 - \text{Tax rate})\left(\frac{\text{Net debt}}{\text{Market equity}}\right)\right]$$

$$= 1.42\left[1 + (1 - .40)\left(\frac{250}{1{,}000}\right)\right] = 1.644$$

Cost of equity = Risk-free rate + Beta × Risk premium = 4% + 1.644(5%) = 12.22%

$$\text{Cost of capital} = 12.22\%\left(\frac{1{,}000}{1{,}200}\right) + 5.90\%(1 - .4)\left(\frac{250}{1{,}250}\right) = 10.41\%$$

Expected after-tax operating income = Capital invested × Return on capital
= 1,000 × .125 = \$125 million

$$\text{Value of operating assets} = \frac{\text{Expected after-tax operating income}}{\text{Cost of capital}}$$

$$= \frac{125}{.1041} = \$1{,}200.45 \text{ million}$$

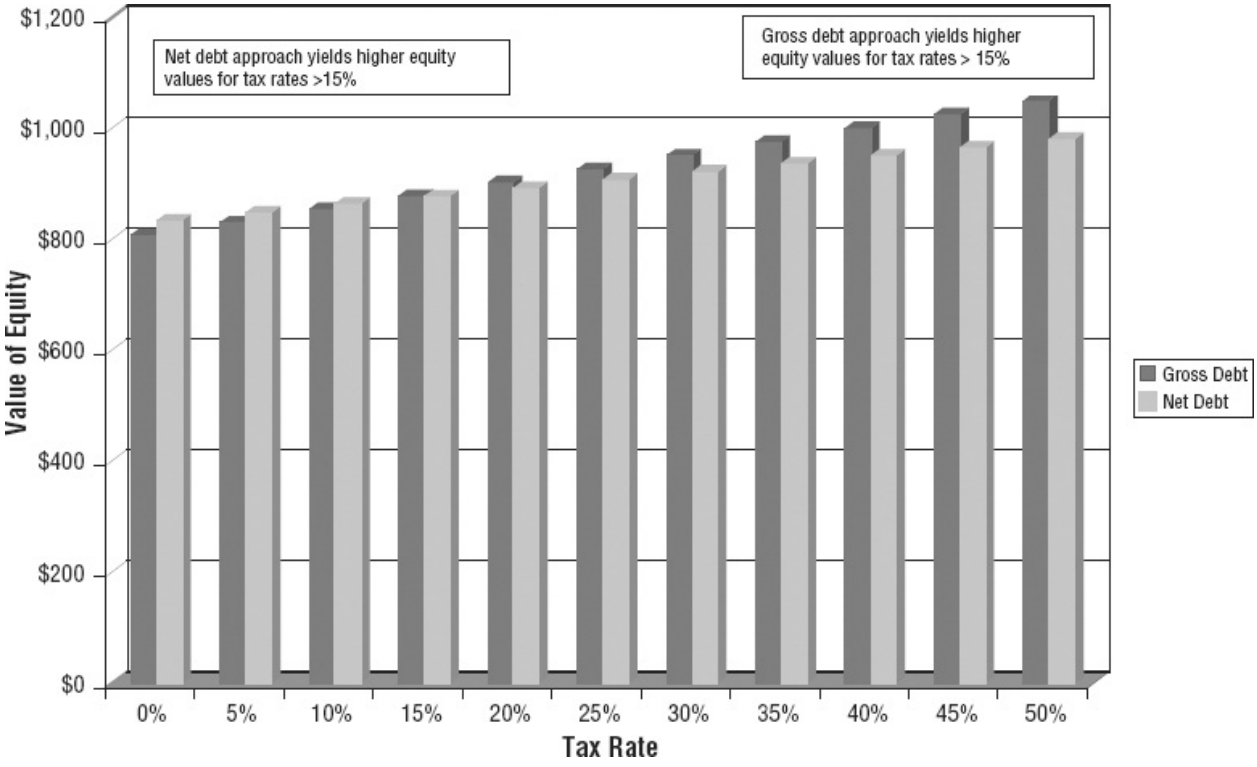
Value of equity = Value of operating assets – Net debt = \$1,200.45 – \$250 = \$950.45 million

The net debt approach yields a lower value for equity.

Reconciling the Two Approaches

In the specific case that we examined, the value of equity is lower using the net debt ratio approach than with the gross debt ratio approach, but that is not always the case. Figure 10.5 reports the value of the firm just described for tax rates varying from 0 percent to 50 percent. For tax rates less than 15 percent, the net debt value approach delivers a higher value for equity than the gross debt ratio approach. In fact, the equity value is identical *if we assume a zero tax rate and that the cost of debt is the risk-free rate*.

FIGURE 10.5 Tax Rate and Equity Value—Gross Debt and Net Debt Approaches



There are two factors causing the equity value difference. The first is that we used the same cost of debt used under the two approaches for computing the cost of capital for operating assets. If there is default risk, the cost of debt used for computing the cost of capital should be higher under the net debt approach than under the gross debt approach. To see why, consider the cost of debt of 5.9 pecent used in the last example and assume that this is the cost of debt for the entire company on its total debt of $500 million. In the net debt approach, $250 million of this debt is used to fund cash and is at the risk-free rate. The pretax

cost of borrowing on the remaining debt (used to fund operating assets) therefore has to be much higher:

$$\text{Pretax cost of borrowing under net debt} = \frac{(.059 \times 500) - (.04 \times 250)}{250} = 7.80\%$$

In the gross debt approach, only a third of the cash is funded with debt; this works out to $83.33 million at the riskless rate. The cost of the remaining debt is as follows:

$$\text{Pretax cost of borrowing under gross debt} = \frac{(.059 \times 500) - (.04 \times 83.33)}{416.67} = 6.28\%$$

If we use these different pretax costs of debt in computing the operating cost of capital, the values of equity are identical using both the gross debt and net debt approaches under a zero tax rate assumption.

The second factor is that the net debt approach nullifies the tax advantage that you receive on the debt used to fund cash, whereas the gross debt approach preserves the tax advantage on all debt, even if it is used to fund cash.[19] As the tax rate increases, this difference between the two valuations will increase. The bottom line is that the difference in values between the two approaches will increase as tax rates and the default risk increase. As to which one yields the better estimate of value, we remain undecided. The net debt approach makes the more realistic assumption about the tax advantage of debt being canceled out by the tax liability on the income from cash. However, the net debt ratio can become negative (if cash exceeds debt)[20] and shifting cash balances over time can add to its volatility. On balance, we are inclined to use the gross debt approach to value operating assets and keep cash as a separate asset.

Should You Ever Discount Cash?

In general, we would argue that a dollar in cash should be valued at a dollar and that no discounts and premiums should be attached to cash, at least in the context of an intrinsic valuation. There are two plausible scenarios where cash may be discounted in value; in other words, a dollar in cash may be valued at less than a dollar by the market.[21]

1. The cash held by a firm is invested at a rate that is lower than the market rate, given the riskiness of the investment.

2. The management is not trusted with a large cash balance because of its past track record on investments.

Cash Invested at Below-Market Rates

The first and most obvious condition occurs when much or all the cash balance does not earn a market interest rate. If this is the case, holding too much cash will clearly reduce the firm's value. While most firms in the United States can invest in government bills and bonds with ease today, the options are much more limited for small businesses and in some markets outside the United States. When this is the case, a large cash balance earning less than a fair rate of return can destroy value over time.

ILLUSTRATION 10.3: Cash Invested at below market rates

In Illustration 10.1, we assumed that cash was invested at the riskless rate. Assume, instead, that the firm was able to earn only 3% on its cash balance of $200 million, while the riskless rate is 4.5%. The estimated value of the cash kept in the firm would then be:

$$\text{Estimated value of cash invested at 3\%} = \frac{(0.03)(200)}{0.045} = 133.33$$

The value of cash that is invested at a lower rate is $133.33 million. In this scenario, if the cash is returned to stockholders, it would yield them a surplus value of $66.67 million. In fact, liquidating any asset that has a return less than the required return would yield the same result, as long as the entire investment can be recovered on liquidation.[22]

Distrust of Management

While making a large investment in low-risk or riskless marketable securities by itself is value neutral, a burgeoning cash balance can tempt managers to accept large investments or make acquisitions even if these investments earn substandard returns. In some cases, these actions may be taken to prevent the firm from becoming a takeover target.[23] To the extent that stockholders anticipate such substandard investments, the current market value of the firm will reflect the cash at a discounted level. The discount is likely to be largest at firms with few investment opportunities and poor management, and there may be no discount at all in firms with significant investment opportunities and good management.

ILLUSTRATION 10.4: Discount for Poor Investments in the Future

Return now to the firm described in Illustration 10.1, where the cash is invested at the riskless rate of 4.5%. Normally, we would expect the equity in this firm to trade at a total value of $1,400 million. Assume, however, that the managers of this firm have a history of poor acquisitions and that the presence of a large cash balance increases the probability from 0% to 30% that the management will try to acquire another firm. Further, assume that the market anticipates that the firm will overpay by $50 million on this acquisition. The cash will then be valued at $185 million.

$$\text{Estimated discount on cash balance} = (\Delta\text{Probability}_{\text{Acquisition}})(\text{Expected overpayment}_{\text{Acquisition}})$$
$$= (0.3)(\$50 \text{ million}) = \$15 \text{ million}$$

$$\text{Value of cash} = \text{Cash balance} - \text{Estimated discount}$$
$$= \$200 \text{ million} - \$15 \text{ million} = \$185 \text{ million}$$

The two factors that determine this discount—the incremental likelihood of a poor investment and the expected net present value of the investment—are likely to be based on investors' assessments of management quality. Cash is more likely be discounted in the hands of management that is perceived to be incompetent than in the hands of good managers.

Separate versus Consolidated Valuation: Summary

It is easy to see why so many valuations make mistakes with cash holdings. The differences between the approaches are subtle and the inputs have to be fine-tuned to reflect the approach used. At the risk of repeating what has been said in the last few pages, we have summarized the differences between the approaches

in Table 10.1.

We are trying to avoid two mistakes. The first is double counting cash, by including income from cash in the cash flows and also adding back cash to the value at the end. The other is miscounting cash, which occurs when you apply the wrong discount rate to the income from cash. This happens, for instance, when you include interest income from cash in the cash flows and discount the cash flows back at a cost of equity that reflects only the operating assets. At a more subtle level, it also happens when we fail to adjust the cost of debt in the gross debt and net debt approaches to reflect our assumptions about how cash is funded.

Dealing with Cash in a Relative Valuation

If analysts are sometimes imprecise when dealing with cash in a discounted cash flow valuation, they are often even sloppier in incorporating cash into relative valuation. In this section, we will examine how best to consider cash when computing multiples and comparing them across companies.

TABLE 10.1 Differences between Cash Valuation Approaches

	Consolidated Valuation	**Separate Valuation**
Objective	Value firm as a whole with cash as part of the assets.	Value noncash assets separately from cash.
Earnings	Should include interest income from cash and marketable securities.	Should exclude interest income from cash and marketable securities. (If using net income to estimate cash flows to equity, you need to remove aftertax interest income.)
Reinvestment	Should consider reinvestment in both operating assets and cash.	Reinvestment should be only in operating assets.
Unlevered beta	Should be the weighted average of the unlevered beta of operating assets and the beta of cash (generally zero). Weights should be based on estimated values of operating assets and cash.	Unlevered beta of just the operating assets.
Accounting returns	Should be measured using total earnings (including earnings from cash) and capital inclusive of cash.	Should be measured using noncash earnings, and cash should be netted from capital measure.
Growth rate	Growth rate should reflect growth in consolidated earnings (including earnings from cash).	Growth rate should be only in operating earnings.
Final valuation	The present value of the cash flows will already include cash. Do not add cash to it.	The present value of the cash flows is the value of the operating assets. Cash has to be added to it.

Equity Multiples

The most widely used equity earnings multiple is the price-earnings ratio, and it is interesting that few analysts who use it seem to consider the consequences of having large cash balances for this multiple. If a firm has operating assets and a large cash balance, the different rates of return and levels of risk on the two investments will make the price-earnings ratio a function of the size of the cash balance. To see why, consider a firm with $1 billion invested in operating assets and $250 million in cash. Assume that the operating assets generate a 12.5 percent aftertax return, with a cost of capital of 10 percent, and that the cash earns 4 percent, with a cost of capital of 4 percent. For simplicity, assume that the earnings from both components will stay fixed in perpetuity and that the firm has no debt. We can estimate the value of an intrinsic price earnings ratio for each component (money amounts in millions of dollars):

Component	Capital Invested	After-Tax Earnings	Value	P/E
Operating assets	1,000	125	$\frac{125}{.10} = 1,250$	$\frac{1,250}{125} = 10.00$
Cash	250	10	$\frac{10}{.04} = 250$	$\frac{250}{10} = 25.00$
Firm	1,250	135	1,500	$\frac{1,500}{135} = 11.11$

In this case, cash trades at a much higher multiple of earnings because it is riskless, and the price-earnings ratio for the firm will rise as cash increases as a proportion of firm value. Note, though, that the effect of cash on P/E ratios can shift quickly if we introduce growth into the picture, in conjunction with excess returns. If there is expected growth in the earnings from operating assets, the value of the operating assets (and the implied P/E ratio) will increase.[24] At some growth rate, the P/E ratio for operating assets will exceed the P/E ratio for cash. Once this happens, increasing the cash holdings of a firm (as a percent of its value) will reduce the price-earnings ratio rather than increase it.

What relevance does this have for relative valuation? In most relative

valuations, analysts compare the price-earnings ratios of firms in a sector, even though these firms have very different cash holdings. The preceding analysis suggests that this can often skew recommendations toward or against firms with larger cash balances. In mature sectors, where growth is low or moderate, firms with larger cash balances will trade at higher P/E ratios, not because they are overvalued but because cash commands a higher multiple of earnings than operating assets do. In high-growth sectors, firms with higher cash balances will often trade at lower price-earnings ratios, but that will not make them bargains. The only cases where cash holdings will not matter is if all firms in a sector have similar holdings (as a percent of overall market capitalization) or the even more unusual scenario where cash and operating earnings command the same multiple. There is a very simple solution to this comparison problem. As we noted in Chapter 8, we can compute the price-earnings ratios for all firms using noncash equity and the noncash earnings:

$$\text{Price-earnings ratio (cash-adjusted)} = \frac{\text{Market capitalization} - \text{Cash}}{\text{Net income} - \text{Interest income from cash}}$$

This ratio will not be affected by cash holdings.

The problems created by cash holdings also spill over when analysts use price-to-book equity ratios. In fact, cash should generally trade at or close to book value, but operating assets can trade at price-to-book ratios that are significantly different from 1. Using the example from the previous section (money amounts in millions of dollars):

Component	Capital Invested	After-Tax Earnings	Value	P/BV
Operating assets	1,000	125	1,250	$\frac{1,250}{1,000} = 1.25$
Cash	250	10	250	$\frac{250}{250} = 1.00$
Firm	1,250	135	1,500	$\frac{1,500}{1,250} = 1.20$

In this case, cash trades at a lower price-to-book ratio than the operating assets do, and the presence of cash will push down the price-to-book ratio for the firm. Of course, the reverse will occur in firms where operating assets generate subpar returns and trade at below book value. Here again, the solution to the problem is to net cash out of both the market value and book value of equity when computing price-to-book ratios.

$$\text{Price-book ratio (Cash-adjusted)} = \frac{\text{Market capitalization} - \text{Cash}}{\text{Book value of equity} - \text{Cash}}$$

The failure to deal with cash explicitly in relative valuation is becoming a larger and larger issue as cash holdings diverge across firms even within the same sector.

Firm and Enterprise Value Multiples

In general, analysts have been more cognizant of the effects of cash when using firm value multiples. As noted in Chapter 9, most analysts use enterprise value, which nets cash out of the market value of debt and equity, to compute these multiples. Since the denominator is usually a variation of operating income (EBITDA, aftertax operating income), the resulting multiple should not be affected by cash holdings. There are two areas, though, where analysts have to show caution:

1. The cash balance that is netted out against firm value usually is from the most recent financial statements. To the extent that there are seasonal factors affecting expenses and cash balances, using the most recent cash balance can skew the multiple. For instance, assume that a firm builds up a large cash balance toward the end of every December to meet large cash outflows that it expects to incur in January. Using this cash balance to compute enterprise value will result in a low enterprise value multiple (and perhaps a buy recommendation). In the presence of seasonal variation in the cash balance, it makes more sense to look at the average cash balance over the year rather than the most recent cash balance.

2. Reemphasizing what was said in Chapter 9, when using enterprise value-to-capital ratios, cash should be netted out against the book value of capital, just as it was in the price-to-book calculation:

$$\text{EV/capital invested} = \frac{\text{Market value of equity} + \text{Market value of debt} - \text{Cash}}{\text{Book value of equity} + \text{Book value of debt} - \text{Cash}}$$

The failure to adjust for cash in the denominator will generally bias multiples downward, and more so for companies with significant cash balances.

Note that the cash adjustment is robust to various actions that can be taken by the firm that reduce or augment the cash balance. A firm that pays a large dividend or buys back stock will reduce its cash balance but the market value of equity will also decline by an equivalent amount. A firm that borrows a substantial sum just before the end of a fiscal year will report a higher cash balance but it will also report more debt outstanding.

The final caveat that we should add relates to divestitures of portions of existing business, especially toward the end of a fiscal year, when computing enterprise value-to-operating income or cash flow multiples. The divestiture will replace operating assets with a large cash balance (the proceeds of the

divestiture) but the operating income or EBITDA from last year will include the earnings from the assets that were divested. To get a more realistic estimate, we have to either remove the portion of the EBITDA that is attributable to the divested assets or use a projected number that does not include earnings from these assets.

How Does the Market Value Cash?

In the last section, we considered how best to value cash in both a discounted cash flow and in a relative valuation. Ultimately, though, the discussion cannot be complete without examining how the market values cash. After all, if the market systematically misestimates the value of cash, there will be no payoff to the analyst who values it correctly. Pinkowitz and Williamson (2002) tried to estimate the value that markets were attaching to cash by regressing the market values of firms against fundamental variables that should determine value (including growth, leverage, and risk) and adding cash as an independent variable.[25] They concluded that the market values a dollar in cash at about face value, with a substantial standard error. Consistent with the motivations for holding cash, they found that cash is valued more highly in the hands of high-growth companies with more uncertainty about future investment needs than in the hands of larger, more mature companies. Surprisingly, they find only a weak relationship between how the market values cash and a firm's access to capital markets. In an interesting contrast, another study that applies the same technique to non-U.S. markets finds that a dollar in cash is valued at only $0.65 in emerging markets with weak stockholder protection.[26]

Schwetzler and Reimund (2004) extend this analysis to look at cash holdings in German companies.[27] Relating the enterprise value of German firms to their cash-to-sales ratios, they conclude that firms that have lower cash holdings than the median for the industries in which they operate trade at lower values, whereas firms that hold excess cash (relative to the median) trade at higher values. Faulkender and Wang (2004) find contradictory evidence, at least in the aggregate.[28] They conclude that the marginal value of a dollar in cash across all firms is $0.96. In other words, markets discount cash by a small amount rather than add a premium. Furthermore, the marginal value of cash decreases as the cash holding increases and as firms borrow more money. The marginal value of cash is also lower for firms that pay dividends rather than buy back stock, reflecting the tax disadvantages accruing to dividends during the sample period.

Finally, the marginal value of cash is much higher for firms that are capital constrained and have significant investment opportunities. Faulkender and Wang attribute the differences between their findings and the findings in earlier studies to the fact that they used equity values rather than enterprise values to estimate the value of cash.

It should be noted that all of these studies are based on very large samples of diverse firms. While they all try to control for differences across firms using proxies for growth and risk, the regressions themselves have limited explanatory power and the proxies are not precise. For instance, the historical sales growth is an imperfect proxy for future growth; this can translate into large shifts in the coefficients on cash. The bottom line is that the studies all agree that the market treats a dollar in cash differently in the hands of different firms, and that we cannot automatically assume that cash will be valued at face value at all firms.

FINANCIAL INVESTMENTS

So far in this chapter, we have looked at holdings of cash and near-cash investments. In some cases, firms invest in more risky securities, which can range from investment-grade bonds to high-yield bonds to publicly traded equity in other firms. In this section, we examine the motivation, consequences, and accounting for such investments.

Reasons for Holding Risky Securities

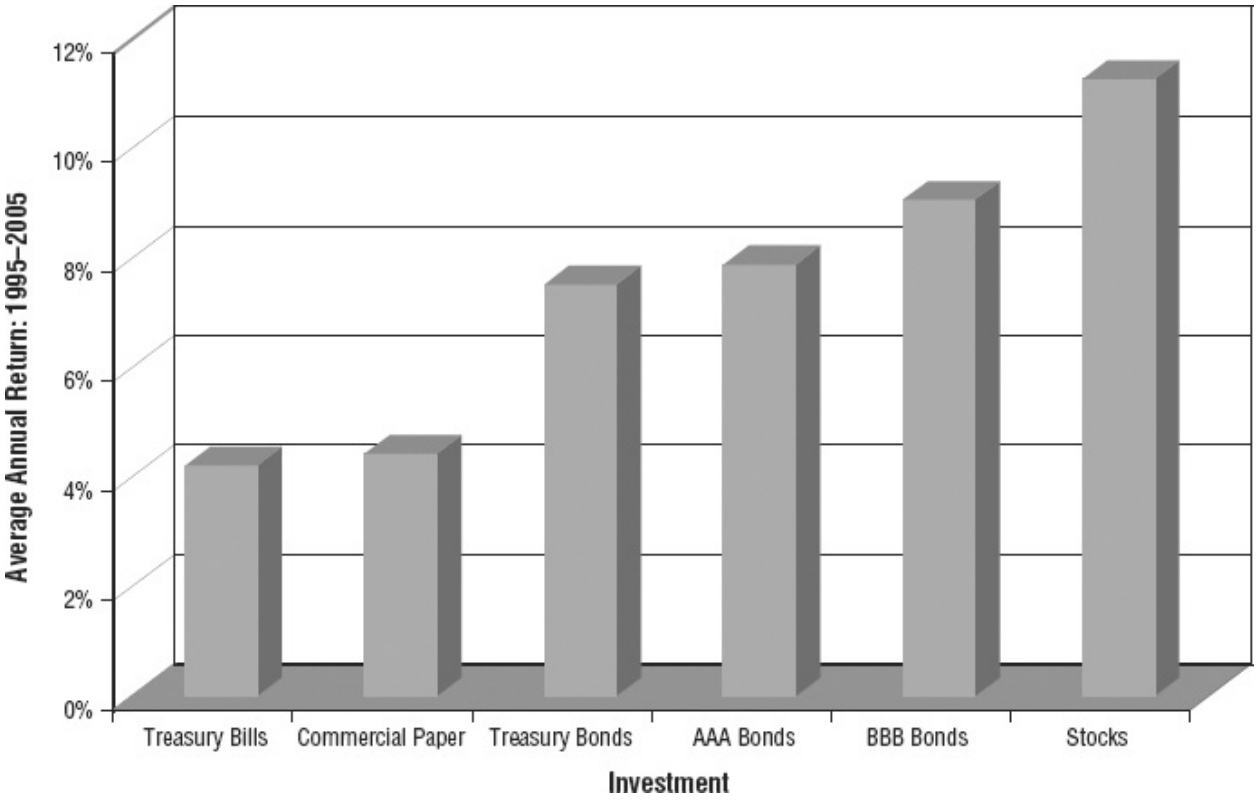
Why do firms invest in risky securities? Some firms do so for the allure of the higher returns they can expect to make investing in stocks and corporate bonds, relative to Treasury bills. In recent years, there has also been a trend for firms to take equity positions in other firms to further their strategic interests. Still other firms take equity positions in firms they view as undervalued by the market. And finally, investing in risky securities is part of doing business for banks, insurance companies, and other financial services companies.

To Make a Higher

Return Near-cash investments such as Treasury bills and commercial paper are liquid and have little or no risk, but they also earn low returns. When firms have substantial amounts invested in marketable securities, they can expect to earn considerably higher returns by investing in riskier securities. For instance, investing in corporate bonds will yield a higher interest rate than investing in Treasury bonds, and the rate will increase with the riskiness of the investment. Investing in stocks will provide an even higher expected return, though not necessarily a higher actual return, than investing in corporate bonds. Figure 10.6 summarizes returns on risky investments—corporate bonds and equities—and compares them to the returns on near-cash investments between 1995 and 2005.

FIGURE 10.6 Returns on Investments, 1995–2005

Source: Federal Reserve.



Investing in riskier investments may earn a higher return for the firm, but it does not make the firm more valuable. In fact, using the same reasoning that we used to analyze near-cash investments, we can conclude that investing in riskier investments and earning a fair market return (which would reward the risk) is value neutral.

To Invest in Undervalued Securities

A good investment is one that earns a return greater than its required return (given its risk). That principle, developed in the context of investments in projects and assets, applies just as strongly to financial investments. A firm that invests in undervalued stocks is accepting positive net present value investments, since the return it will make on these equity investments will exceed the cost of equity on these investments. Similarly, a firm that invests in underpriced corporate bonds will also earn excess returns and positive net present values.

How likely is it that firms will find undervalued stocks and bonds to invest in? It depends on how efficient markets are and how good the managers of the firm are at finding undervalued securities. In unique cases, a firm may be more adept at finding good investments in financial markets than it is at competing in product markets. Consider the case of Berkshire Hathaway, a firm that has been a vehicle for Warren Buffett's investing acumen over the last few decades. At the end of the second quarter of 1999, Berkshire Hathaway had $69 billion invested in securities of other firms. Among its holdings were investments of $12.4 billion in Coca-Cola, $6.6 billion in American Express, and $3.9 billion in Gillette. While Berkshire Hathaway also has real business interests, including ownership of a well-regarded insurance company (Geico), investors in the firm get a significant portion of their value from the firm's passive equity investments.

Notwithstanding Berkshire Hathaway's success, most firms in the United States steer away from looking for bargains among financial investments. Part of the reason for this is their realization that it is difficult to find undervalued securities in financial markets. Part of the reluctance on the part of firms to make investments can also be traced to a recognition that investors in firms like Procter & Gamble and Coca-Cola invest in them because of these firms' competitive advantages in product markets (brand name, marketing skills, etc.) and not for their perceived skill at picking stocks.

Strategic Investments

During the 1990s, Microsoft accumulated a huge cash balance. It used this cash to make a series of investments in the equity of software, entertainment, and Internet-related firms. It did so for several reasons.[29] First, it gave Microsoft a say in the products and services these firms were developing and preempted competitors from forming partnerships with the firms. Second, it allowed Microsoft to work on joint products with these firms. In 1998 alone, Microsoft announced investments in 14 firms, including ShareWave, General Magic, RoadRunner, and Qwest Communications. In an earlier investment in 1995, Microsoft invested in NBC to create the MSNBC network to give it a foothold in the television and entertainment business.

Can strategic investments be value enhancing? As with all investments, it depends upon how much is invested and what the firm receives as benefits in return. If the side benefits and synergies that are touted in these investments exist, investing in the equity of other firms can earn much higher returns than the hurdle rate and create value. It is clearly a much cheaper option than acquiring the entire firm.

Business Investments

Some firms hold marketable securities not as discretionary investments, but because of the nature of their business. For instance, insurance companies and banks often invest in marketable securities in the course of their business, the former to cover expected liabilities on insurance claims and the latter in the course of trading. While these financial services firms have financial assets of substantial value on their balance sheets, these holdings are not comparable to those of the firms described so far in this chapter. In fact, they are more akin to the raw material used by manufacturing firms than to discretionary financial investments.

Dealing with Marketable Securities in Valuation

Marketable securities can include corporate bonds, with default risk embedded in them, and traded equities, which have even more risk associated with them. As the marketable securities held by a firm become more risky, the choices on how to deal with them become more complex. We have three ways of valuing marketable securities.

1. The simplest and most direct approach is to *obtain or estimate the current market value* of these marketable securities and add the value to the value of operating assets. For firms valued on a going-concern basis, with a large number of holdings of marketable securities, this may be the only practical option.

2. The second approach is to estimate the current market value of the marketable securities and *net out the effect of capital gains taxes* that may be due if those securities were sold today. This is the best way of estimating value when valuing a firm on a liquidation basis.

3. The third and most difficult way of incorporating the value of marketable securities into firm value is to *value the firms that issued these securities* and estimate the security value. This approach tends to work best for firms that have relatively few, but large, holdings in other publicly traded firms.

ILLUSTRATION 10.5: Microsoft's Cash and Marketable Securities

Between 1991 and 2000, Microsoft accumulated a large cash balance as a consequence of

holding back on free cash flows to equity that could have been paid to stockholders. In June 2000, for instance, the following table reports Microsoft's holdings of near-cash investments (in millions of dollars):

	1999	2000
Cash and Equivalents		
Cash	$635	$849
Commercial paper	3,805	1,986
Certificates of deposit	522	1,017
U.S. government and agency securities	0	729
Corporate notes and bonds	0	265
Money market preferreds	13	0
Subtotal	$ 4,975	$ 4,846
Short-Term Investments		
Commercial paper	$ 1,026	$612
U.S. government and agency securities	3,592	7,104
Corporate notes and bonds	6,996	9,473
Municipal securities	247	1,113
Certificates of deposit	400	650
Subtotal	$12,261	$18,952
Total cash and short-term investments	$17,236	$23,798

When valuing Microsoft, we should clearly consider this $24 billion investment as part of the firm's value. The interesting question is whether there should be a discount, reflecting investor's fears that the company may use the cash to make poor investments in the future. Over its life, Microsoft has not been punished for holding to cash, largely as a consequence of its impeccable track record in delivering both ever-increasing profits on the one hand and high stock returns on the other. We would add the cash balance at face value to the value of Microsoft's operating assets.

The more interesting component is the $17.7 billion in 2000 that Microsoft shows as investments in riskier securities. Microsoft reports the following information about these investments (in millions of dollars):

		Unrealized		
	Cost Basis	Gains	Losses	Recorded Basis
Debt Securities Recorded at Market				
Within one year	$ 498	$ 27	$ 0	$ 525
Between 2 and 10 years	388	11	–3	396
Between 10 and 15 years	774	14	–93	695
Beyond 15 years	4,745	0	–933	3,812
Subtotal	$ 6,406	$ 52	–$ 1,029	$ 5,429
Equities and Other Investments				
Common stock and warrants	$ 5,815	$5,655	–$ 1,697	$ 9,773
Preferred stock	2,319	0	0	$ 2,319
Other investments	205			205
Subtotal	$ 8,339			$12,297
Total debt securities, equities, and other investments	$14,745	$5,707	–$ 2,726	$17,726

Microsoft has generated a paper profit of almost $3 billion on its original cost of $14.745

billion and reports a current value of $17.726 billion. Most of these investments are traded in the market and are recorded at market value. The easiest way to deal with these investments is to add the market value of these securities to the value of the operating assets of the firm to arrive at firm value. The most volatile item is the investment in common stock of other firms.

The value of these holdings has almost doubled, as reflected in the recorded basis of $9,773 million. Should we reflect this at current market value when we value Microsoft? The answer is generally yes. However, if these investments are overvalued, we risk building this overvaluation into the valuation. The alternative is to value each of the equities that the firm has invested in, but this will become increasingly cumbersome as the number of equity holdings increases. In summary, then, you would add the values of both the near-cash investments of $23.798 billion and the equity investments of $17.726 billion to the value of the operating assets of Microsoft.

As a postscript, it is worth noting that Microsoft did pay out the largest corporate dividend (of about $30 billion) in history in 2003–2004, leaving the firm still with a cash balance in the tens of billions. While the dividend was partly precipitated by the change in the tax laws governing dividends in 2003, an argument can be made that it also reflected the market's increasing impatience with Microsoft. After all, the company has had little to show in terms of financial successes after Microsoft Windows and Office.

Premiums or Discounts on Marketable Securities?

As a general rule, you should not attach a premium or discount for marketable securities. Thus, you would add the entire value of $17,726 million to the value of Microsoft. There is an exception to this rule, though, and it relates to firms that make it their business to buy and sell financial assets. These are the closed-end mutual funds of which there are several hundred listed on the U.S. stock exchanges, and investment companies, such as Fidelity and T. Rowe Price. Closed-end mutual funds sell shares to investors and use the funds to invest in financial assets. The number of shares in a closed-end fund remains fixed and the share price changes. Since the investments of a closed-end fund are in publicly traded securities, this sometimes creates a phenomenon where the market value of the shares in a closed-end fund is greater or less than the market value of the securities owned by the fund. For these firms, it is appropriate to attach a discount or premium to the marketable securities to reflect their capacity to generate excess returns on these investments.

A closed-end mutual fund that consistently finds undervalued assets and delivers much higher returns than expected (given the risk) should be valued at a premium on the value of its marketable securities. The amount of the premium will depend on how large the excess return is and how long you would expect the firm to continue to make these excess returns. Conversely, a closed-end fund that delivers returns that are much lower than expected should trade at a discount

on the value of the marketable securities. The stockholders in this fund would clearly be better off if it were liquidated, but that may not be a viable option.

ILLUSTRATION 10.6: Valuing a Closed-End Fund

The Pierce Regan Asia fund is a closed-end fund with investments in traded Asian stocks, valued at $4 billion at today's market prices. The fund has earned an annual return of 13% over the past 10 years, but based upon the riskiness of its investments and the performance of the Asian market over the period, we would have expected it to earn 15% a year.[30] Looking forward, your expected annual return for the Asian market for the future is 12%, but you expect the Pierce Regan fund to continue to underperform the market by 2% each year (and earn only 10% a year).

To estimate the discount from its net assets you would expect to see on the fund, let us begin by assuming that the fund will continue in perpetuity and earn 2% less than the return on the market index also in perpetuity.

$$\text{Estimated discount} = \frac{(\text{Excess return})(\text{Fund value})}{\text{Expected return on the market}}$$
$$= \frac{(0.10 - 0.12)(4{,}000)}{0.12} = -\$667 \text{ million}$$

On a percent basis, the discount represents 16.67% of the market value of the investments. If you assume that the fund will either be liquidated or begin earning the expected return at a point in the future—say 10 years from now—the expected discount will become smaller.

HOLDINGS IN OTHER FIRMS

In this category, we consider a broader category of nonoperating assets, which include holdings in other companies, public as well as private. We begin by looking at the differences in accounting treatment of different holdings and how this treatment can affect the way they are reported in financial statements.

Accounting Treatment

The way in which cross holdings are valued depends on the way the investment is categorized and the motive behind the investment. In general, an investment in another firm can be categorized as a minority passive investment, a minority, active investment; or a majority active investment, and the accounting rules vary depending on the categorization.

Minority Passive Investments

If the securities or assets owned in another firm represent less than 20 percent of the overall ownership of that firm, an investment is treated as a minority passive investment. These investments have an acquisition value, which represents what the firm originally paid for the securities, and often a market value. Accounting principles require that these assets be subcategorized into one of three groups—investments that will be held to maturity, investments that are available for sale, and trading investments. The valuation principles vary for each.

1. For investments that will be held to maturity, the valuation is at historical cost or book value, and interest or dividends from this investment are shown in the income statement.

2. For investments that are available for sale, the valuation is at market value, but the unrealized gains or losses are shown as part of the equity in the balance sheet and not in the income statement. Thus, unrealized losses reduce the book value of the equity in the firm and unrealized gains increase the book value of equity.

3. For trading investments, the valuation is at market value and the unrealized gains and losses are shown in the income statement.

In general, firms have to report only the dividends that they receive from minority passive investments in their income statements, though they are allowed an element of discretion in the way they classify investments and, subsequently, in the way they value these assets. This classification ensures that firms such as investment banks, whose assets are primarily securities held in other firms for purposes of trading, revalue the bulk of these assets at market levels each period. This is called marking to market and provides one of the few instances in which market value trumps book value in accounting statements.

Minority Active Investments

If the securities or assets owned in another firm represent between 20 percent and 50 percent of the overall ownership of that firm, an investment is treated as a minority active investment. While these investments have an initial acquisition value, a proportional share (based on ownership proportion) of the net income and losses made by the firm in which the investment was made is used to adjust the acquisition cost. In addition, the dividends received from the investment reduce the acquisition cost. This approach to valuing investments is called the equity approach.

The market value of these investments is not considered until the investment is liquidated, at which point the gain or loss from the sale, relative to the adjusted acquisition cost, is shown as part of the earnings in that period.

Majority Active

Investments If the securities or assets owned in another firm represent more than 50 percent of the overall ownership of that firm, an investment is treated as a majority active investment.[31] In this case, the investment is no longer shown as a financial investment but is instead replaced by the assets and liabilities of the firm in which the investment was made. This approach leads to a consolidation of the balance sheets of the two firms, where the assets and liabilities of the two firms are merged and presented as one balance sheet. The share of the firm that is owned by other investors is shown as a minority interest on the liability side of the balance sheet. A similar consolidation occurs in the other financial statements of the firm as well, with the statement of cash flows reflecting the cumulated cash inflows and outflows of the combined firm. This is in contrast to the equity approach, used for minority investments, in which only the dividends received on the investment are shown as a cash inflow in the cash flow statement.

Here again, the market value of this investment is not considered until the ownership stake is liquidated. At that point, the difference between the market price and the net value of the equity stake in the firm is treated as a gain or loss for the period.

Valuing Cross Holdings in Other Firms—Discounted Cash Flow Valuation

Given that the holdings in other firms can be accounted for in three different ways, how do you deal with each type of holding in valuation? The best way to deal with all of them is to value the equity in each holding separately and estimate the value of the proportional holding. This would then be added on to the value of the equity of the parent company. Thus, to value a firm with holdings in three other firms, you would value the equity in each of these firms, take the percent share of the equity in each, and add it to the value of equity in the parent company. When income statements are consolidated, you would first need to strip the income, assets, and debt of the subsidiary from the parent company's financials before you do any of the above. If you do not do so, you will double count the value of the subsidiary.

Why, you might ask, do we not value the consolidated firm? You could, and in

some cases because of the absence of information, you might have to. The reason we would suggest separate valuations is that the parent and the subsidiaries may have very different characteristics—costs of capital, growth rates, and reinvestment rates. Valuing the combined firm under these circumstances may yield misleading results. There is another reason. Once you have valued the consolidated firm, you will have to subtract out the portion of the equity in the subsidiary that the parent company does not own. If you have not valued the subsidiary separately, it is not clear how you would do this.

Full Information Environment

If we adopt the approach of valuing each holding separately and taking the proportionate share of that holding, we do need the information to complete these valuations. In particular, we need to have access to the full financial statements of the subsidiary. If the subsidiary is a publicly traded company that operates independently, this should be relatively straightforward. Things become more complicated when the holdings are in other private businesses or the accounts of the parent and the subsidiary are intermingled. In the former case, the financial statements may exist but not be public. In the latter, the transactions between the parent and the subsidiary—intracompany sales or loans—can make the financial statements misleading. Assuming that the information can be extracted on cross holdings, these are the steps involved in valuing a company with cross holdings:

Step 1: If the company has any majority cross holdings, use the financial statements that isolate the parent company to value the parent company. If only consolidated statements are available, strip the subsidiary's numbers from the consolidated statement, and then value the parent company as a standalone entity, and estimate the value of the equity in the parent company by adding back cash and subtracting debt.

Step 2: Value each of the subsidiaries in which the parent company has holdings as independent companies, using risk, cash flow, and growth assumptions that reflect the businesses that the subsidiaries operate in. Value the equity in each subsidiary.

Step 3: To value the equity in the parent company with the cross holdings incorporated into the estimate, add the proportional share of each subsidiary's equity (estimated in step 2) to the value of equity in the parent company (from Step 1).

ILLUSTRATION 10.7: Valuing Holdings in Other Companies

Segovia Entertainment operates in a wide range of entertainment businesses. The firm reported $300 million in operating income (EBIT) on capital invested of $1,500 million in the current year; the total debt outstanding is $500 million. A portion of the operating income ($100 million), capital invested ($400 million), and debt outstanding ($150 million) represent Segovia's holdings in Seville Televison, a television station owner. Segovia owns only 51% of Seville, and Seville's financials are consolidated with Segovia.[32] In addition, Segovia owns 15%

of LatinWorks, a record and CD company. These holdings have been categorized as minority passive investments, and the dividends from the investment are shown as part of Segovia's net income but not as part of its operating income. LatinWorks reported operating income of $75 million on capital invested of $250 million in the current year; the firm has $100 million in debt outstanding. We will assume the following:

- The cost of capital for Segovia Entertainment, without considering its holdings in either Seville or LatinWorks, is 10%. The firm is in stable growth, with operating income (again not counting the holdings) growing 5% a year in perpetuity.
- Seville Television has a cost of capital of 9% and it also is in stable growth, with operating income growing 5% a year in perpetuity.
- LatinWorks has a cost of capital of 12% and it is in stable growth, with operating income growing 4.5% a year in perpetuity.
- None of the firms has a significant balance of cash and marketable securities.
- The tax rate for all of these firms is 40%.

We can value Segovia Entertainment in three steps:

1. Value the equity in the operating assets of Segovia, without counting any of the holdings. To do this, we first have to cleanse the operating income of the consolidation.

Operating income from Segovia's operating assets = $300 – $100 = $200 million

Capital invested in Segovia's operating assets = $1,500 – $400 = $1,100 million

Debt in Segovia's operating assets = $500 – $150 = $350 million

$$\text{Return on capital invested in Segovia's operating assets} = \frac{200(1-0.4)}{1{,}100} = 10.91\%$$

$$\text{Reinvestment rate} = \frac{g}{\text{ROC}} = \frac{5\%}{10.91\%} = 45.83\%$$

$$\text{Value of Segovia's operating assets} = \frac{\text{EBIT}(1-t)(1-\text{Reinvestment rate})(1+g)}{\text{Cost of capital} - g}$$
$$= \frac{200(1-0.4)(1-0.4583)(1.05)}{0.10-0.05}$$
$$= \$1{,}365 \text{ million}$$

$$\text{Value of equity} = \text{Value of operating assets} - \text{Value of debt}$$
$$= 1{,}365 - 350 = \$1{,}015 \text{ million}$$

2. Value the 51% of equity in Seville Enterprises:

Operating income from Seville's operating assets = $100 million

Capital invested in Seville's operating assets = $400 million

Debt invested in Seville = $150 million

$$\text{Return on capital invested in Seville's operating assets} = \frac{100(1-0.4)}{400} = 15\%$$

$$\text{Reinvestment rate} = \frac{g}{\text{ROC}} = \frac{5\%}{15\%} = 33.33\%$$

$$\text{Value of Seville's operating assets} = \frac{\text{EBIT}(1-t)(1-\text{Reinvestment rate})(1+g)}{\text{Cost of capital} - g}$$
$$= \frac{100(1-0.4)(1-0.3333)(1.05)}{0.09-0.05}$$
$$= \$1{,}050 \text{ million}$$

Value of Seville's equity = Value of operating assets – Value of debt
= 1,050 – 150 = $900 million

Value of Segovia's equity stake in Seville = 0.51(900) = $459 million

3. Value of the 15% stake in LatinWorks:

Operating income from LatinWorks' operating assets = $75 million

Capital invested in LatinWorks' operating assets = $250 million

$$\text{Return on capital invested in LatinWorks' operating assets} = \frac{75(1-0.4)}{250} = 18\%$$

$$\text{Reinvestment rate} = \frac{g}{\text{ROC}} = \frac{4.5\%}{18\%} = 25\%$$

$$\text{Value of LatinWorks' operating assets} = \frac{\text{EBIT}(1-t)(1-\text{Reinvestment rate})(1+g)}{\text{Cost of capital} - g}$$
$$= \frac{75(1-0.4)(1-0.25)(1.045)}{0.12-0.045}$$
$$= 470.25 \text{ million}$$

Value of LatinWorks' equity = Value of operating assets – Value of debt
= 470.25 – 100 = $370.25 million

Value of Segovia's equity stake in LatinWorks = 0.15(370.25) = $55 million

The value of Segovia as a firm can now be computed (assuming that it has no cash balance).

Value of Segovia as a firm = Value of equity in Segovia + 51% of equity in Seville
+ 15% of equity in LatinWorks
= $1,015 + $459 + $55 = $1,529 million

To provide a contrast, consider what would have happened if we had used the consolidated income statement and Segovia's cost of capital to do this valuation. We would have valued Segovia and Seville together.

Operating income from Segovia's consolidated assets = $300 million
Capital invested in Segovia's consolidated assets = $1,500 million
Consolidated debt = $500 million

$$\text{Return on capital invsted in Segovia's operating assets} = \frac{300(1-0.4)}{1{,}500} = 12\%$$

$$\text{Reinvestment rate} = \frac{g}{\text{ROC}} = \frac{5\%}{12\%} = 41.67\%$$

$$\text{Value of Segovia's operating assets} = \frac{\text{EBIT}(1-t)(1-\text{Reinvestment rate})(1+g)}{\text{Cost of capital} - g}$$
$$= \frac{300(1-0.4)(1-0.4167)(1.05)}{0.10-0.05}$$
$$= \$2{,}205 \text{ million}$$

$$\text{Value of equity in Segovia} = \text{Value of operating assets} - \text{Consolidated debt} - \text{Minority interests in Seville} + \text{Minority holdings in LatinWorks}$$
$$= 2{,}205 - 500 - 122.5 + 22.5 = \$1{,}605 \text{ million}$$

Note that the minority interests in Seville are computed to be 49% of the book value of equity at Seville.

$$\text{Book value of equity in Seville} = \text{Capital invested in Seville} - \text{Seville's debt} = 400 - 150 = 250$$

$$\text{Minority interest} = (1 - \text{Parent company holding})\text{Book value of equity} = (1 - 0.51)250 = \$122.5 \text{ million}$$

The minority interests in LatinWorks are computed as 15% of the book value of equity in LatinWorks, which is $250 million (capital invested minus debt outstanding). It would be pure chance if the value from this approach were equal to the true value of equity, estimated earlier, of $1,529 million.

We can see from the discussion of how best to value holdings in other firms that we need a substantial amount of information to value cross holdings correctly.

Partial-Information

Environment As a firm's holdings become more numerous, estimating the values of individual holdings will become more onerous. In fact, the information needed to value the cross holdings may be unavailable, leaving analysts with less precise choices:

- *Market values of cross holdings.* If the holdings are publicly traded, substituting the market values of the holdings for estimated value is an alternative worth exploring. While you risk building into your valuation any

mistakes the market might be making in valuing these holdings, this approach is more time-efficient, especially when a firm has dozens of cross holdings in publicly traded firms.

- *Estimated market values.* When a publicly traded firm has a cross holding in a private company, there is no easily accessible market value for the private firm. Consequently, you might have to make your best estimate of how much this holding is worth, with the limited information that you have available. There are a number of alternatives.

  One way to do this is to estimate the multiple of book value at which firms in the same business (as the private business in which you have holdings) typically trade and apply this multiple to the book value of the holding in the private business. Assume, for instance that you are trying to estimate the value of the holdings of a pharmaceutical firm in five privately held biotechnology firms, and that these holdings collectively have a book value of $50 million. If biotechnology firms typically trade at 10 times book value, the estimated market value of these holdings would be $500 million. In fact, this approach can be generalized to estimate the value of complex holdings where you lack the information to estimate the value for each holding or if there are too many such holdings. For example, you could be valuing a Japanese firm with dozens of cross holdings. You could estimate a value for the cross holdings by applying a multiple of book value to their cumulative book value.

Note that using the accounting estimates of the holdings, which is the most commonly used approach in practice, should be a last resort, especially when the values of the cross holdings are substantial.

Valuing Cross Holdings in Other Firms—Relative Valuation

Much of what was said about cash and its effects on relative valuation can be said about cross holdings as well, but the solutions are not as simple. To begin with, consider how different types of holdings affect equity multiples.

- *Minority passive investments.* Only dividends received on these investments are shown as earnings in the income statement. Since most firms pay out less in dividends than they have available in earnings, this is likely to bias upward the price-earnings ratios for firms with substantial minority passive holdings (since the market value of equity will reflect the value of the

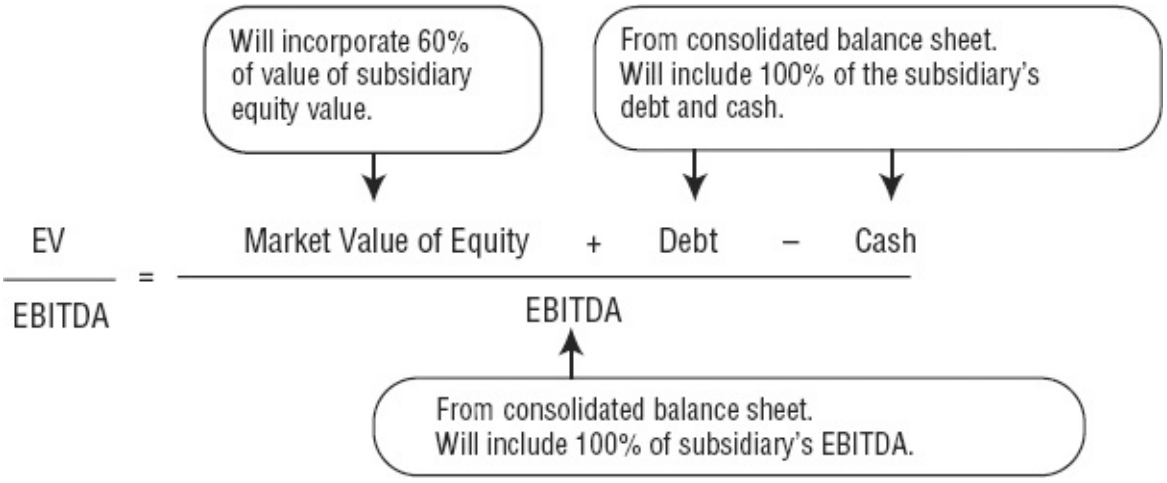
holdings but the net income will not).

- *Minority active and majority holdings.* These are less problematic, because the net income should reflect the proportion of the subsidiary's earnings.[33] Though the earnings multiples will be consistent, with both the market value of equity and earnings including the portion of the subsidiary owned by the parent company, finding comparables can become difficult, especially if the subsidiary is large and has different fundamentals (cash flow, growth, and risk) than the parent company.

With firm value multiples, we run into a different set of problems, again depending on how a cross holding is categorized.

- *Minority passive and active investments.* Firm value multiples are usually based on multiples of operating measures (revenues, operating income, EBITDA). In minority investments, none of these numbers will incorporate the corresponding values for the subsidiary in which the parent company has a minority holding. In fact, all adjustments for minority investments occur below the operating income line. As a consequence, firm value multiples will be biased upward when there are significant minority investments, since the firm value will incorporate the value of these holdings (at least in the market value of equity) but the denominator (revenues or operating income) will not.
- *Majority investments.* The consolidation that follows majority investments can wreak havoc on firm value multiples. To see why, assume that company A owns 60 percent of company B and reports consolidated financial statements. Assume also that you are trying to compute the enterprise value-to-EBITDA multiple for this firm. Figure 10.7 shows how each input into the multiple will be affected by the consolidation.

FIGURE 10.7 Consolidated Holdings and EV/EBITDA Multiple



As we noted in Chapter 9, analysts often try to fix the inconsistency problem by adding back minority interest (the accountant's estimate of the value of the 40 percent of company B that does not belong to company A) to the numerator. The problem, however, is that they should be adding back 40 percent of the market value of the subsidiary to the numerator if they want to construct a composite enterprise value-to-EBITDA multiple. We can use the techniques suggested in the past section, including applying a price-to-book multiple to the minority interest, to complete this estimation. As with equity multiples, the problem will be finding comparable firms with the same mix of businesses. A much more effective way of dealing with majority holdings would be to compute a pure parent company enterprise value-to-EBITDA multiple, described in Chapter 9, where we net out the value of all holdings, minority as well as majority, from the enterprise value.

$$\frac{\text{EV}}{\text{EBITDA}}(\text{Parent}) = \frac{\begin{array}{c}\text{Market value of equity} + \text{Parent debt} \\ -\text{Parent cash} - \text{Market value of equity of all cross holdings}\end{array}}{\text{Parent EBITDA}}$$

This can then be compared to other companies that are similar to the parent company.

OTHER NONOPERATING ASSETS

Firms can have other nonoperating assets, but they are likely to be of less importance than those listed so far. In particular, firms can have unutilized assets that do not generate cash flows and have book values that bear little resemblance to market values. An example would be prime real estate holdings that have appreciated significantly in value since the firm acquired them, but produce little

if any cash flows. An open question also remains about overfunded pension plans. Do the excess funds belong to stockholders and, if so, how do you incorporate the effect into value?

Unutilized Assets

The strength of discounted cash flow models is that they estimate the value of assets based on expected cash flows that these assets generate. In some cases, however, this can lead to assets of substantial value being ignored in the final valuation. For instance, assume that a firm owns a plot of land that has not been developed and that the book value of the land reflects its original acquisition price. The land obviously has significant market value but does not yet generate any cash flow for the firm. If a conscious effort is not made to bring the expected cash flows from developing the land into the valuation, the value of the land will be left out of the final estimate.

How do you reflect the value of such assets in firm value? An inventory of all such assets (or at least the most valuable ones) is a first step, followed up by estimates of market value for each of the assets. These estimates can be obtained by looking at what the assets would fetch in the market today or by projecting the cash flows that could be generated if the assets were developed and discounting the cash flows at the appropriate discount rate.

The problem with incorporating unutilized assets into firm value is an informational one. Firms do not reveal their unutilized assets as part of their financial statements. While it may sometimes be possible to find out about such assets as investors or analysts, it is far more likely that they will be uncovered only when you have access to information about what the firm owns and uses.

Pension Fund Assets

Firms with defined pension liabilities sometimes accumulate pension fund assets in excess of these liabilities. While the excess does belong to stockholders, they usually face a tax liability if they claim it. The conservative rule in dealing with overfunded pension plans would be to assume that the social and tax costs of reclaiming the excess funds are so large that few firms would ever even attempt to do so. An alternative approach would be to add the aftertax portion of the excess funds into the valuation. As an illustration, consider a firm that reports pension fund assets that exceed its liabilities by $1 billion. Since a firm that withdraws excess assets from a pension fund is taxed at 50 percent on these withdrawals (in the United States), you would add $500 million to the estimated value of the operating assets of the firm. This would reflect the 50 percent of the excess assets that the firm will be left with after paying the taxes.

A more practical alternative is to reflect the overfunding in future pension contributions. Presumably, a firm with an overfunded pension plan can lower its contributions to the pension plan in future years. These lower pension plan contributions can generate higher cash flows and a higher firm value.

Joint Venture Investments

Joint venture investments present many of the same problems that cross holdings do. Depending on the country and the nature of the joint venture investment, a firm can use the equity method, proportional consolidation, or full consolidation to report on a joint venture investment.[34] In some cases, one of the joint venture partners will provide the primary backing for the debt in the joint venture. Finally, the joint venture will almost never be publicly traded, making it more akin to a private company cross holding than a publicly traded one. When working with joint venture investments, analysts have to begin by examining how the joint venture is accounted for in the books. If the joint venture investments are either proportionally or fully consolidated, the operating income of the parent company already includes the earnings from the joint venture; in the case of full consolidation, an adjustment has to be made for the proportion of the joint venture that does not belong to the firm (akin to the minority interest adjustment with majority cross holdings). If the joint venture investments are accounted for using the equity method, they have to be treated like minority cross holdings. In firm valuation, this will require valuing the proportional ownership in the joint venture and adding it to the value of the operating assets. In equity valuation, the net income will include the proportional share of the joint venture earnings and there is no need to value the joint venture separately.

CONCLUSION

Investments in cash, marketable securities, and other businesses (cross holdings) are often viewed as afterthoughts in valuation. Analysts spend little time assessing the impact of these assets on value but they do so at their own risk. In this chapter, we first considered the magnitude of investments in cash at firms and the motivations for accumulating this cash. We followed up by looking at how best to assess the value of cash in both discounted cash flow and relative valuation. Cash is riskless and generally earns low rates of return, and this makes it different from the operating assets of a firm. The safest way to deal with cash is to separate it from operating assets and to value it independently in both discounted cash flow and relative valuation. We also considered how to incorporate the values of financial investments, cross holdings, and other nonoperating assets into firm value.

APPENDIX 10.1: INDUSTRY AVERAGES: CASH RATIOS—JANUARY 2005

Industry	Number of Firms	Cash as Percent of Firm Value	Cash as Percent of Total Assets	Cash as Percent of Revenues
Advertising	35	8.89%	13.68%	14.80%
Aerospace/Defense	67	7.18	11.89	7.77
Air Transport	46	20.26	16.74	14.07
Apparel	65	13.84	13.23	10.51
Auto & Truck	25	6.19	6.45	6.32
Auto Parts	60	6.24	7.50	6.94
Bank	499	13.01	3.31	NA
Bank (Canadian)	7	3.79	0.49	NA
Bank (Foreign)	5	5.09	1.14	NA
Bank (Midwest)	38	10.79	3.18	NA
Beverage (Alcoholic)	22	8.69	10.70	3.47

Industry	Number of Firms	Cash as Percent of Firm Value	Cash as Percent of Total Assets	Cash as Percent of Revenues
Beverage (Soft Drink)	17	3.09	6.53	3.75
Biotechnology	90	13.06	44.95	48.32
Building Materials	49	9.91	8.60	7.71
Cable TV	21	3.79	9.00	12.21
Canadian Energy	11	6.60	10.44	14.92
Cement & Aggregates	13	5.24	9.32	8.46
Chemical (Basic)	16	6.37	5.67	4.63
Chemical (Diversified)	31	6.39	8.17	7.80
Chemical (Specialty)	92	8.06	12.29	15.10
Coal	11	2.53	4.21	6.18
Computer Software/Services	389	20.27	31.97	33.82
Computers/Peripherals	143	20.38	33.37	34.61
Diversified Co.	117	8.86	10.64	12.59
Drug	305	21.79	52.76	58.73
E-Commerce	52	20.67	39.46	35.98
Educational Services	38	13.79	23.19	24.56
Electric Utility (Central)	25	2.91	4.92	10.15
Electric Utility (East)	31	5.91	3.99	7.65
Electric Utility (West)	16	5.37	3.68	9.21
Electrical Equipment	93	11.43	18.64	22.20
Electronics	179	12.94	22.31	22.79
Entertainment	88	6.19	11.49	16.47
Entertainment Tech	31	10.71	28.78	31.00
Environmental	85	6.67	12.61	12.64
Financial Services (Div.)	233	19.36	20.27	26.45
Food Processing	104	4.97	9.63	9.31
Food Wholesalers	20	7.70	9.40	9.98
Foreign Diversified	1	100.00	96.84	0.00
Foreign Electronics	12	13.98	13.72	9.27
Foreign Telecom	21	20.96	18.03	18.73
Furniture/Home Furnishings	38	5.66	8.72	4.78
Grocery	23	9.02	9.15	3.85
Health Care Information	32	21.68	33.49	31.50
Home Appliance	16	14.58	19.05	19.74
Homebuilding	34	8.11	10.23	14.52
Hotel/Gaming	77	10.34	13.38	17.86
Household Products	30	4.25	9.31	10.51
Human Resources	28	9.95	17.99	10.46
Industrial Services	200	13.44	19.52	15.40
Information Services	33	5.46	17.43	16.43
Insurance (Div.)	1	23.02	26.25	N/A
Insurance (Life)	43	15.53	4.25	N/A
Insurance (Prop./Cas.)	78	17.62	6.96	N/A
Internet	297	17.85	35.10	33.27
Investment Co.	21	1.46	1.89	4.36
Investment Co. (Foreign)	17	0.21	0.73	0.67

Industry	Number of Firms	Cash as Percent of Firm Value	Cash as Percent of Total Assets	Cash as Percent of Revenues
Machinery	133	9.40	11.20	9.84
Manuf. Housing/RV	19	11.92	14.98	8.16
Maritime	28	4.53	4.35	7.47
Medical Services	195	10.42	23.20	19.06
Medical Supplies	262	10.39	27.23	27.92
Metal Fabricating	38	4.58	7.31	3.56
Metals & Mining (Div.)	76	6.79	13.02	9.70
Natural Gas (Distrib.)	30	2.59	2.68	2.44
Natural Gas (Div.)	38	1.75	2.87	6.09
Newspaper	20	7.34	9.33	11.58
Office Equip./Supplies	28	9.19	11.60	7.67
Oilfield Services/Equip.	93	5.66	9.13	14.23
Packaging & Container	35	3.66	6.58	4.41
Paper/Forest Products	39	4.05	5.77	6.08
Petroleum (Integrated)	34	4.62	9.79	9.64
Petroleum (Producing)	145	7.96	12.60	15.40
Pharmacy Services	14	3.76	7.59	2.31
Power	24	12.50	21.16	30.96
Precious Metals	61	8.90	23.98	36.59
Precision Instrument	104	13.91	25.12	29.42
Publishing	43	6.38	7.95	5.29
Railroad	18	3.80	3.94	6.68
Recreation	78	11.06	16.04	14.25
REIT	135	1.53	1.57	2.15
Restaurant	84	7.61	9.82	7.50
Retail (Special Lines)	175	10.87	15.94	9.39
Retail Automotive	14	3.44	5.04	4.71
Retail Building Supply	9	3.11	5.67	2.52
Retail Store	49	6.42	7.20	3.43
Securities Brokerage	26	40.43	30.84	58.01
Semiconductor	124	21.94	35.54	47.58
Semiconductor Equip.	16	17.86	30.90	43.56
Shoe	24	11.93	17.44	12.23
Steel (General)	24	3.13	4.59	4.05
Steel (Integrated)	14	5.14	4.75	3.10
Telecom Equipment	120	21.55	33.96	39.37
Telecom Services	137	13.41	17.74	19.26
Thrift	222	24.70	4.32	N/A
Tire & Rubber	14	6.31	17.04	11.81
Tobacco	13	5.77	10.38	9.83
Toiletries/Cosmetics	23	9.00	11.23	11.44
Trucking	36	3.03	5.34	6.67
Utility (Foreign)	6	2.42	3.26	8.56
Water Utility	17	2.33	2.02	8.67
Wireless Networking	66	16.09	27.23	33.23
Market	**7,091**	**12.69%**	**18.48%**	**18.97%**

[1]J. M. Keynes, *The General Theory of Employment, Interest and Money* (New York: Harcourt, Brace & World, 1936).

[2]Tim Opler, Lee Pinkowitz, René Stulz, and Rohan Williamson, "The Determinants and Implications of Corporate Cash Holdings," *Journal of Financial Economics* 52 (1999): 3–46. This paper examines the determinants of cash holdings and notes that many of the variables that lead companies to have low debt ratios (significant growth opportunities, high risk) also lead to large cash balances.

[3]M. H. Miller and D. Orr, "A Model of the Demand for Money by Firms," *Quarterly Journal of Economics* (1966): 413–435. They develop a simple model for computing the optimal operating cash balance, as a function of the opportunity cost of holding cash and cash requirements for operations.

[4]M. Faulkender, "Cash Holdings among Small Businesses," Working paper, Social Science Research Network (SSRN), 2002. This paper finds that there are economies of scale and that cash balances decrease as firms get bigger.

[5]C. Custodio and C. Raposo, "Cash Holdings and Business Conditions," working paper, SSRN, 2004. This paper finds strong evidence that financially constrained firms adjust their cash balances to reflect overall business conditions, holding more cash during recessions. Firms that are not financially constrained also exhibit the same pattern, but the linkage is much weaker. Their findings are similar to those in another paper by C. F. Baum, M. Caglayan, N. Ozkan, and O. Talvera, "The Impact of Macroeconomic Uncertainty on Cash Holdings for Nonfinancial Service Firms," working paper, SSRN, 2004.

[6]D. Haushalter, S. Klasa, and W. F. Maxwell, "The Influence of Product Market Dynamics on the Firm's Cash Holdings and Hedging Behavior," working paper, SSRN, 2005. In this paper, the authors find evidence that firms that share growth opportunities with strong rivals are more likely to accumulate higher cash balances, and that these cash holdings provide strategic benefits to the firms.

[7]V. Acharya, H. Almeida, and M. Campello, "Is Cash Negative Debt? A Hedging Perspective on Corporate Financial Policies," working paper, SSRN, 2005. The authors present a twist on this argument by noting that firms that have to make significant investments when their operating cash flows are low, which they categorize as a hedging need, will maintain much larger cash balances to cover these investments.

[8]Lee Pinkowitz and Rohan Williamson, “Bank Power and Cash Holdings: Evidence from Japan,” *Review of Financial Studies* 14 (2001): 1059–1082. They compare cash holdings of firms in Japan, Germany, and the United States and conclude that the median Japanese firm holds two and a half times more cash than the median German or U.S. firm. They hypothesize (and provide evidence) that these higher cash balances reflect banks extracting rents from Japanese firms by forcing them to hold more cash than they need. In particular, they note that cash balances in Japan were higher during periods of high bank power.

[9]S. Myers and N. Majluf, “Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have,” *Journal of Financial Economics* 13 (1984): 187–221.

[10]Michael C. Jensen. “Agency Costs of Free Cash Flow, Corporate Finance ond Takeovers,” *American Economic Review* 76 (1986): 323–329.

[11]There have been several papers that show that companies with large cash holdings are more likely to make poor investments and overpay for acquisitions with the cash. See J. Harford, “Corporate Cash Reserves and Acquisitions,” *Journal of Finance* 54 (1999): 1969–1997; O. Blanchard, F. Lopez-de-Silanes, and A. Shleifer, “What Do Firms Do with Cash Windfalls?,” *Journal of Financial Economics* 36 (1994): 337–360; J. Harford, S. A. Mansi, and W.F. Maxwell, “Corporate Governance and a Firm’s Cash Holdings,” working paper, SSRN, (2004). The last paper finds that companies with weak stockholder rights do not have higher cash balances but that they tend to dissipate cash much more quickly on poor investments than firms with stronger stockholder rights.

[12]A. Dittmar, J. Mahrt-Smith, and H. Servaes, “International Corporate Governance and Corporate Cash Holdings,” *Journal of Financial and Quantitative Analysis* 38 (2003): 111–133. L. F. Pinkowitz, R. M. Stulz, and R. Williamson, “Do Firms In Countries with Poor Protection of Investor Rights Hold More Cash?,” working paper, SSRN, (2003). Both papers find that companies in countries where stockholders have less power tend to hold more cash. Their results are confirmed by Y. Guney, A. Ozkan, and N. Ozkan, “Additional International Evidence on Corporate Cash Holdings,” working paper, SSRN, 2003. They compare cash holdings across 3989 companies in Japan, France, Germany, and the United Kingdom and conclude that the stronger the protections for stockholders, the lower the cash holdings at companies.

[13]R. Zhang, “The Effects of Firm-and Country-Level Governance Mechanisms on Dividend Policy, Cash Holdings and Firm Value: A Cross Country Study,” working paper, SSRN, 2005. This paper finds that cash holdings are higher at companies where ownership is concentrated.

[14]W. H. Mikkelson and M. Partch, “Do Persistent Large Cash Reserves Hinder Performance?,” *Journal of Financial and Quantitative Analysis* 38 (2003): 257–294.

[15]The updated versions of these ratios will be accessible on my web site (www.damodaran.com) under “Updated Data.”

[16]Thus, if cash represents 10 percent of the firm value, the unlevered beta used will be a weighted average of the beta of the operating assets and the beta of cash (which is zero).

[17]The unlevered beta that you can back out of a regression beta reflects the average cash balance (as a percent of firm value) over the period of the regression. Thus, if a firm maintains this ratio at a constant level, you might be able to arrive at the correct unlevered beta.

[18]Growth rate in net income = Return on equity × Equity reinvestment rate (or retention ratio); growth rate in operating income = Return on capital × Reinvestment rate. The reinvestment rate is the sum of reinvestment (net capex and change in working capital) divided by the aftertax operating income.

[19]In the net debt ratio approach, we are assuming that any tax benefits from debt (used to fund cash) are exactly offset by the tax costs associated with receiving interest income on the cash.

[20]When net debt ratios become negative, analysts should continue to use the negative values, even though it may give rise to some discomfort. In effect, this will mean that the levered beta will be lower than the unlevered beta and that the debt ratio in the cost of capital calculation will be a negative number.

[21]There is a third scenario. When interest income from cash (which is riskless) is discounted back at a risk-adjusted discount rate (see Illustration 10.1), cash will be discounted in value, but for the wrong reasons.

[22]While this assumption is straightforward with cash, it is less so with real assets, where the liquidation value may reflect the poor earning power of the asset. Thus, the potential surplus from liquidation may not be as easily claimed.

[23]Firms with large cash balances are attractive targets, since the cash can be used to offset some of the cost of making the acquisition.

[24]This statement is true only if the firm earns excess returns on its investments.

Growth with zero excess returns has no effect on value or the price-earnings ratio.

[25]L. Pinkowitz and R. Williamson, "What Is A Dollar Worth? The Market Value of Cross Holdings," working paper, Georgetown University, 2002.

[26]L. Pinkowitz, R. Stulz, and R. Williamson, "Do Firms in Countries with Poor Protection of Investor Rights Hold More Cash?, working paper, SSRN, 2003.

[27]B. Schwetzler and C. Reimund, "Valuation Effects of Corporate Cash Holdings: Evidence from Germany," HHL Working Paper, SSRN, 2004.

[28]M. Faulkender and R. Wang, "Corporate Financial Policy and the Value of Cash," working paper, SSRN, 2004.

[29]One of Microsoft's oddest investments was in one of its primary competitors, Apple Computer, early in 1998. The investment may have been intended to fight the antitrust suit brought against Microsoft by the Justice Department.

[30]The expected return can be obtained on a risk-adjusted basis by using the beta for the stocks in the fund and the overall market returns in the Asian equity markets in which the fund invests. A simpler technique would be to use the overall market return as the expected return, thus making the implied assumption that the fund invests in average-risk stocks in these markets.

[31]Firms have evaded the requirements of consolidation by keeping their share of ownership in other firms below 50 percent.

[32]Consolidation in the United States requires that you consider 100 percent of the subsidiary, even if you own less. There are other markets in the world where consolidation requires only that you consider the portion of the firm that you own. This is called proportional consolidation.

[33]With majority holdings, this will happen indirectly. Full consolidation will initially count 100 percent of the earnings of the subsidiary in the parent company's earnings but the portion of these earnings that are attributable to minority stockholders in the subsidiary will be subtracted to arrive at the net income of the parent company.

[34]The equity method and full consolidation are similar to the approaches used with cross holdings. In proportional consolidation, the firms involved in the joint venture have to consolidate the proportion of the joint venture revenues, operating expenses, and operation income that is attributable to them. In the balance sheet, they have to report on the proportion of the joint venture assets and liabilities that belong to them.