CHAPTER 6

ESTIMATING FIRM VALUE

In the last chapter, you examined the determinants of expected growth. Firms that reinvest substantial portions of their earnings and earn high returns on these investments should be able to grow at high rates. But for how long? In this chapter, you bring closure to firm valuation by considering this question. As a firm grows, it becomes more difficult for it to maintain high growth and it eventually will grow at a rate less than or equal to the growth rate of the economy in which it operates. This growth rate, labeled stable growth, can be sustained in perpetuity, allowing you to estimate the value of all cash flows beyond that point as a terminal value. The key question that you confront in this chapter is the estimation of when and how this transition to stable growth will occur for the firm that you are valuing. Will the growth rate drop abruptly at a point in time to a stable growth rate or will it occur more gradually over time? To answer these questions, you will look at a firm's size (relative to the market that it serves), its current growth rate, and its competitive advantages.

In the second part of the chapter, you examine how to incorporate the value of cash, marketable securities and other non-operating assets into the value of the firm. Cross holdings in other companies can pose problems in valuation, partly because of the way these holdings are reflected in accounting statements.

Closure in Valuation

In theory, at least, publicly traded firms can have infinite lives. Since you cannot estimate cash flows forever, you generally impose closure in discounted cash flow valuation, by stopping your estimation of cash flows sometime in the future and then computing a terminal value that reflects the value of the firm at that point.

$$\text{Value of a Firm} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+k_c)^t} + \frac{\text{Terminal Value}_n}{(1+k_c)^n}$$

You can find the terminal value in one of three ways. One is to apply a multiple to estimate the value in the terminal year. The second is to assume a liquidation of the firm's assets in the terminal year, and estimate what other would pay for the assets that the firm has accumulated at that point. The third is to assume that the cash flows of the firm will grow at a constant rate forever – a stable growth rate. With stable growth, the terminal value can be estimated using a perpetual growth model.

Multiple Approach

In this approach, the value of a firm in a future year is estimated by applying a multiple to the firm's earnings or revenues in that year. For instance, a firm with expected revenues of $ 6 billion ten years from now will have an estimated terminal value in that year of $ 12 billion, if a value to sales multiple of 2 is used. While this approach has the virtue of simplicity, the multiple has a huge effect on the final firm value and where it is obtained can be critical. If, as is common, the multiple is estimated by looking at how comparable firms in the business today are priced by the market, the valuation becomes a relative valuation, rather than a discounted cash flow valuation. If the multiple is estimated using fundamentals, it converges on the stable growth model that will be described in the next section.

All in all, using multiples to estimate terminal value, when those multiples are estimated from comparable firms, results in a dangerous mix of relative and discounted cash flow valuation. While there are advantages to relative valuation, and you will consider these in a later chapter, a discounted cash flow valuation should provide you with an estimate of intrinsic value, not relative value. Consequently, the only consistent way of estimating terminal value in a discounted cash flow model is to use either a liquidation value or to use a stable growth model.

Liquidation Value

In some valuations, you can assume that the firm will cease operations at a point in time in the future and sell the assets it has accumulated to the highest bidders. The estimate that emerges is called a liquidation value. There are two ways in which the liquidation value can be estimated. One is to base it on the book value of the assets, adjusted for any inflation during the period. Thus, if the book value of assets ten years from now is expected to be $ 2 billion, the average age of the assets at that point is 5 years and the expected inflation rate is 3%, the expected liquidation value can be estimated as:

Expected Liquidation value = Book Value of $\text{Assets}_{\text{Term yr}}$ (1+ inflation rate)$^{\text{Average life of assets}}$

$$= \$ 2 \text{ billion } (1.03)^5 = \$2.319 \text{ billion}$$

The limitation of this approach is that it is based upon accounting book value and does not reflect the earning power of the assets.

The alternative approach is to estimate the value based upon the earning power of the assets. To make this estimate, you would first have to estimate the expected cash flows from the assets and then discount these cash flows back to the present, using an appropriate discount rate. In the example above, for instance, if you assumed that the assets in question could be expected to generate $ 400 million in after-tax cash flows for 15 years (after the terminal year) and the cost of capital was 10%, your estimate of the expected liquidation value would be:

$$\text{Expected Liquidation value} = \$400 \text{ million } \frac{(1-\frac{1}{(1.10)^{15}})}{.10} = \$ 3.042 \text{ billion}$$

Stable Growth Model

In the liquidation value approach, you are assuming that your firm has a finite life and that it will be liquidated at the end of that life. Firms, however, can reinvest some of their cash flows back into new assets and extend their lives. If you assume that cash flows,

beyond the terminal year, will grow at a constant rate forever, the terminal value can be estimated as follows:

$$\text{Terminal value}_n = \text{Free Cashflow to Firm}_{n+1} / (\text{Cost of Capital}_{n+1} - g_n)$$

where the cost of capital and the growth rate in the model are sustainable forever. It is this fact, i.e., that they are constant forever, that allows you to put some reasonable constraints on the growth rate. Since no firm can grow forever at a rate higher than the growth rate of the economy in which it operates, the constant growth rate cannot be greater than the overall growth rate of the economy. This constant growth rate is called a *stable growth rate*. In fact, constraining the stable growth rate to be less than or equal to the growth rate of the economy will also ensure that the growth rate will always be less than the cost of capital[1].

Key Assumptions about Stable Growth

In every discounted cash flow valuation, there are three critical assumptions you need to make on stable growth. The first relates to when the firm that you are valuing will become a stable growth firm, if it is not one already. The second relates to what the characteristics of the firm will be in stable growth, in terms of return on capital and cost of capital. The final assumption relates to how the firm that you are valuing will make the transition from high growth to stable growth.

I. Length of the High Growth Period

The question of how long a firm will be able to sustain high growth is perhaps one of the more difficult questions to answer in a valuation, but two points are worth making. One is that it is not a question of whether but when firms hit the stable growth wall. All

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[1] The cost of capital includes a nominal riskless rate, which should reflect both expected inflation in the economy and real growth. Thus, if the nominal growth rate of the economy is 5% in the long term, the long term nominal riskless rate should be at least that number.

firms ultimately become stable growth firms, in the best case, because high growth makes a firm larger, and the firm's size will eventually become a barrier to further high growth. In the worst case scenario, firms may not survive and will be liquidated. The second is that high growth in valuation, or at least high growth that creates value[2], comes from firms earning high returns on their marginal investments. In other words, increased value comes from firms having a return on capital that is well in excess of the cost of capital. Thus, when you assume that a firm will experience high growth for the next 5 or 10 years, you are also implicitly assuming that it will earn excess returns (over and above the cost of capital) during that period. In a competitive market, these excess returns will eventually draw in new competitors, and the excess returns will disappear.

You should look at three factors when considering how long a firm will be able to maintain high growth.

1. *Size of the firm*: Smaller firms are much more likely to earn excess returns and maintain these excess returns than otherwise similar larger firms. This is because they have more room to grow and a larger potential market. Ariba and Amazon are small firms in large markets and should have the potential for high growth (at least in revenues) over long periods. The same can be said about Rediff.com. When looking at the size of the firm, you should look not only at its current market share, but also at the potential growth in the total market for its products or services. Cisco may have a large market share of its current market, but it may be able to grow in spite of this because the entire market is growing rapidly
2. *Existing growth rate and excess returns:* Momentum does matter, when it comes to projecting growth. Firms that have been reporting rapidly growing revenues are more likely to see revenues grow rapidly at least in the near future. Firms that are

[2] Growth without excess returns will make a firm larger but not more valuable.

earnings high returns on capital and high excess returns in the current period are likely to sustain these excess returns for the next few years.

3. *Magnitude and Sustainability of Competitive Advantages*: This is perhaps the most critical determinant of the length of the high growth period. If there are significant barriers to entry and sustainable competitive advantages, firms can maintain high growth for longer periods. If, on the other hand, there are no or minor barriers to entry, or if the firm's existing competitive advantages are fading, you should be far more conservative about allowing for long growth periods. The quality of existing management also influences growth. Some top managers[3] have the capacity to make the strategic choices that increase competitive advantages and create new ones.

Illustration 6.1: Length of High Growth Period

To examine how long high growth will last at each of the five firms, their standings on each of the above characteristics is assessed in Table 6.1:

Table 6.1: Assessment of length of High Growth Period

	Firm Size/ Market Size	*Current Growth/ Competitive Advantages*	*Length of High Growth Period*
Amazon	Firm has a very small market share of a very large market (specialty retailing). There is ample potential for growth (at least in revenues)	Firm is losing money currently but has a first-mover advantage as one of the first e-tailers. Amazon also has a small technological edge in the processing of online orders.	10 years
Ariba	Firm has small revenues in a small and fast-growing market (if you define the market as B2B commerce). However, the potential market is huge.	Ariba is losing money but it is in a technological battle for this market. If Ariba's technology wins, it could earn excess returns for an extended	10 years

[3] Jack Welch at GE and Robert Goizueta at Coca Cola are good examples of CEOs who made a profound difference in the growth of their firms.

		period	
Cisco	Firm has a large market share of a fast-growing market.	Firm has a technological edge on its rivals and a knack of succeeding with its acquisition strategy. Firm is earning significant excess returns now.	12 years
Motorola	Firm has a small market share of a growth market that is maturing (semi conductors) and a significant market share of a growing market (telecommunication equipment)	Motorola's research has provided it with technological advantages as well as patents. It is not the technological leader in any of its markets, though. Firm has anemic returns currently.	5 years
Rediff.com	Has a small market share of a small market (Indian internet users) that could grow exponentially.	Local language capabilities give its portals an advantage over foreign competitors.	10 years

There is clearly a strong subjective component to making a judgment on how long high growth will last. Much of what was said about the interrelationships between qualitative variables and growth towards the end of chapter 5 has relevance for this discussion as well.

II. Characteristics of Stable Growth Firm

As firms move from high growth to stable growth, you need to give them the characteristics of stable growth firms. A firm in stable growth is different from that same firm in high growth on a number of dimensions. For instance,

1. High growth firms tend to be *more exposed to market risk* (and have higher betas) than stable growth firms. Thus, although it might be reasonable to assume a beta of 1.8 in high growth, it is important that the beta be lowered, if not to one, at least toward one in stable growth[4].

[4] As a rule of thumb, betas above 1.2 or below 0.8 are inconsistent with stable growth firms. Two-thirds of all US firms have betas that fall within this range.

2. High growth firms tend to have *high returns on capital and earn excess returns*. In stable growth, it becomes much more difficult to sustain excess returns. There are some who believe that the only assumption consistent with stable growth is to assume no excess returns; the return on capital is set equal to the cost of capital. While, in principle, excess returns in perpetuity are not feasible, it is difficult in practice to assume that firms will suddenly lose the capacity to earn excess returns. Since entire industries often earn excess returns over long periods, assuming a firm's return on capital will move towards its industry average will yield more reasonable estimates of value.
3. Finally, high growth firms tend to *use less debt* than stable growth firms. As firms mature, their debt capacity increases. The question whether the debt ratio for a firm should be moved towards a more sustainable level in stable growth cannot be answered without looking at the incumbent managers' views on debt, and how much power stockholders have in these firms. If managers are willing to change their debt ratios, and stockholders retain some power, it is reasonable to assume that the debt ratio will move to a higher level in stable growth; if not, it is safer to leave the debt ratio at existing levels.
4. Finally, stable growth firms tend to reinvest less than high growth firms. In fact, you can estimate how much a stable growth firm will need to reinvest, using the relationship developed in chapter 5 between growth rates, reinvestment needs and returns on capital.

$$\text{Reinvestment Rate in stable growth} = \text{Stable growth rate} / ROC_n$$

where the ROC_n is the return on capital that the firm can sustain in stable growth. This reinvestment rate can then be used to generate the free cash flow to the firm in the first year of stable growth.

Linking the reinvestment rate to the stable growth rate also makes the valuation less sensitive to assumptions about stable growth. While increasing the stable growth rate,

holding all else constant, can dramatically increase value, changing the reinvestment rate as the growth rate changes will create an offsetting effect. The gains from increasing the growth rate will be partially or completely offset by the loss in cash flows because of the higher reinvestment rate. Whether value increases or decreases as the stable growth increases will entirely depend upon what you assume about excess returns. If the return on capital is higher than the cost of capital in the stable growth period, increasing the stable growth rate will increase value. If the return on capital is equal to the stable growth rate, increasing the stable growth rate will have no effect on value. This can be proved quite easily:

$$\text{Terminal Value} = \frac{EBIT_{n+1}(1-t)\ (1-\ \text{Reinvestment Rate})}{\text{Cost of Capital}_n - \ \text{Stable Growth Rate}}$$

Substituting in the stable growth rate as a function of the reinvestment rate, from above, you get:

$$\text{Terminal Value} = \frac{EBIT_{n+1}(1-t)\ (1-\ \text{Reinvestment Rate})}{\text{Cost of Capital}_n - \ (\text{Reinvestment Rate} \ * \ \text{Return on Capital})}$$

Setting the return on capital equal to the cost of capital, you arrive at:

$$\text{Terminal Value} = \frac{EBIT_{n+1}(1-t)\ (1-\ \text{Reinvestment Rate})}{\text{Cost of Capital}_n - \ (\text{Reinvestment Rate} \ * \ \text{Cost on Capital})}$$

Simplifying, the terminal value can be stated as:

$$\text{Terminal Value}_{ROC=WACC} = \frac{EBIT_{n+1}(1-t)}{\text{Cost of Capital}_n}$$

Illustration 6.2: Stable Growth Inputs

In chapter 5, reinvestment rates and reinvestment rates were calculated for the five firms that are being valued, and in chapter 4, the costs of capital were estimated. These estimates will now be revisited and revised for the firms in their stable growth periods in Table 6.2:

Table 6.2: Stable Growth Estimates

	Amazon		*Ariba*		*Cisco*		*Motorola*		*Rediff.com*	
	High	*Stable*	*High*	*Stable*	*High*	*Stable*	*High*	*Stable*	*High*	*Stable*

	Growth	*Growth*	*Growth*	*Growth*	*Growth*	*Growth*	*Growth*	*Growth*	*Growth*	*Growth*
Beta	1.74	1.10	1.78	1.20	1.43	1.00	1.21	1.00	1.90	1.20
Cost of Equity	12.94%	10.40%	13.12%	10.80%	11.72%	10.00%	10.85%	10.00%	25.82%	18.52%
After-tax Cost of Debt	8.00%	4.55%	9.25%	4.55%	4.03%	4.03%	4.23%	4.23%	10.00%	4.31%
Debt Ratio	7.81%	15.00%	0.15%	10.00%	0.18%	10.00%	6.86%	6.86%	0.00%	20.00%
Cost of Capital	12.56%	9.52%	13.11%	10.18%	11.71%	9.40%	10.39%	9.60%	25.82%	15.67%
Return on Capital	-7.18%	16.94%	-218.1%	20.00%	34.07%	16.52%	17.22%	17.22%	-73.69%	25.00%
Reinvestment Rate	NMF	29.52%	NMF	25.00%	106.8%	30.27%	52.99%	29.04%	NMF	20.00%
Expected Growth Rate	NMF	5.00%	NMF	5.00%	36.39%	5.00%	13.22%	5.00%	NMF	5.00%

The betas for all of the firms are adjusted down toward one. For Amazon, the average beta of stable specialty retailers (1.10) is used as the stable period beta. For Cisco and Motorola, you moved the beta to the average for the market since the sectors to which they belong are still in high growth and have higher betas. For Ariba and Rediff, a stable beta of 1.20 is used to reflect the fact that even in stable growth, these firms are likely to be riskier than the average firm in the market. The debt ratio for all of the firms is adjusted upwards, moving Amazon's up to the average for the specialty retailing sector (15%) and Ariba and Rediff to a debt ratio (10%) that is sustainable given their operating incomes in 10 years. Cisco's debt ratio was also moved up to 10% in stable growth[5], but Motorola's debt ratio was left at its current levels. The firm has had the capacity to borrow money for the last few years and it has not used it, reflecting management's aversion to debt.

[5] The optimal debt ratio for Cisco currently is 10%. The details of the calculation will be provided in a later chapter.

For all of the firms, a stable growth rate of 5% is used. While Rediff is an Indian internet portal, the valuation is in the U.S. dollars and the stable growth rate is therefore set at the same level as the other firms that you are valuing[6]. The reinvestment rate in stable growth is estimated, using the following equation:

Reinvestment Rate = Expected Growth Rate / Return on Capital

Note that the reinvestment rate is lower for firms with higher returns on capital in stable growth. To estimate the return on capital in stable growth, the industry average for specialty retailers (16.96%) is used for Amazon and of comparable firms (16.52%) is used for Cisco. For Motorola, the return on capital in stable growth is left unchanged from the high growth phase level of 17.22%, which was estimated as the mid-point between the firm's current return on capital and the industry average. For Ariba, the return on capital is moved to 20% in stable growth, which is slightly lower than the current industry average of 23.96%[7]. Finally, for Rediff.com, a return on capital of 25% is used, based upon the estimate of operating income and capital invested in the firm in ten years[8].

For all of the firms, it is worth noting that you are assuming that excess returns continue in perpetuity by setting the return on capital above the cost of capital. While this is potentially troublesome, the competitive advantages that these firms have built up historically or will build up over the high growth phase will not disappear in an instant.

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[6] An argument can be made that real growth in India will be higher in the long term than for the rest of the world. If we subscribed to this argument, we would use a slightly higher expected growth rate.

[7] As the industry itself matures, we would expect to see the return on capital drift down.

[8] While this may seem high, it has to reflect the fact that we defined operating income as income before selling expenses, and that a significant portion of the capital will be capitalized selling expenses. In

The excess returns will fade over time, but moving them to or towards industry averages in stable growth seems like a reasonable compromise.

 eva.xls*: This dataset on the web summarizes the returns on capital, costs of capital and excess returns, by industry group, for firms in the United States.III. The Transition to Stable Growth*

Once you have decided that a firm will be in stable growth at a point in time in the future, you have to consider how the firm will change as it approaches stable growth. There are three distinct scenarios. In the first, the firm will be maintain its high growth rate for a period of time and then become a stable growth firm abruptly; this is a two-stage model. In the second, the firm will maintain its high growth rate for a period and then have a transition period where its characteristics change gradually towards stable growth levels; this is a three stage model. In the third, the firm's characteristics change each year from the initial period to the stable growth period; this can be considered an n-stage model.

Which of these three scenarios gets chosen depends upon the firm being valued. Since the firm goes in one year from high growth to stable growth in the two-stage model, this model is more appropriate for firms with moderate growth rates, where the shift will not be too dramatic. For firms with very high growth rates in operating income, a transition phase allows for a gradual adjustment not just of growth rates but also of risk characteristics, returns on capital and reinvestment rates towards stable growth levels. For very young firms or for firms with negative operating margins, allowing for changes in each year (in an n-stage model) is prudent.

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addition, we also use a much higher cost of capital for Rediff, because of the country risk premium associated with India.

Illustration 6.3: Choosing a Growth Pattern

For Motorola, the high growth rate during the next 5 years is mostly due to the improvement expected in the return on capital; without the adjustment, the growth rate would have been about 6%, while with the improvement, it is 13.63%. Once the return improvements end, the firm will be close to stable growth. Consequently, you will use a 2-stage model and assume that stable growth begins after year 5.

For Cisco, the estimated growth rate is 36.39%, as a consequence of its phenomenal reinvestment rate (106.81%) and its high return on capital (34.07%). While the firm is expected to maintain its current reinvestment rate and return on capital for the next few years, the return on capital will be difficult to sustain as the firm becomes larger and competition increases. As a result, the growth period of 12 years is divided into a high growth phase (6 years) and a transition phase (6 years). During the transition phase, the beta, debt ratio, reinvestment rate and growth rates of the firm adjust towards stable growth levels. In practical terms, you are assuming that Cisco will maintain its current acquisition pace for the next 6 years, and that both the pace and the returns will begin slowing down after year 6. Table 6.3 summarizes the values of each in years 7 through 12.

Table 6.3: Cisco's Transition to Stable Growth

Year	*Yrs 1-6*	*7*	*8*	*9*	*10*	*11*	*12*
Expected Growth	36.39%	31.16%	25.93%	20.70%	15.46%	10.23%	5.00%
Reinvestment Rate	106.81%	94.05%	81.29%	68.54%	55.78%	43.02%	30.27%
Beta	1.43	1.36	1.29	1.22	1.14	1.07	1.00
Debt Ratio	0.18%	1.81%	3.45%	5.09%	6.73%	8.36%	10.00%
Cost of Capital	11.71%	11.32%	10.94%	10.55%	10.17%	9.79%	9.40%

Note that the adjustment over the transition period is linear, making estimation more straightforward.

For Amazon, Ariba and Rediff.com, the operating margins, reinvestment rates and returns on capital change each year during the high growth period. The betas, debt ratios and costs of capital change only in the second half of the high growth period for each of these firms.

Valuing Operating Assets

Now that you have estimated the basic inputs to the discounted cash flow valuation model – the discount rates, cash flows, high growth period and characteristics in stable growth – you are in a position to value the operating assets in these firms. In summary, the value of the operating assets of a firm should be the present value of the expected cash flows to the firm, discounted at the cost of capital, added to the present value of the terminal value estimated as described in the last section.

fcffginzu.xls: This spreadsheet allows you to value the operating assets of a firm, allowing for a high growth and a transition phase.

Illustration 6.4: Valuation of Amazon.com's Operating Assets

The assumptions about Amazon are summarized and presented in table 6.4 below.

Table 6.4: Assumptions for Valuing Amazon

Input	Assumptions
Revenue Growth	Compounded average growth rate over next 10 years = 40% Growth rate decreases from 120% next year to 5% in year 10.
Operating Margin	Operating margin improves from current level of – 16.27% to a target margin of 9.32% (which is the average for specialty retailers) in year 10.
Reinvestment needs	The reinvestment each year is estimated based upon the assumption that the sales to capital ratio will be 3.02; For every dollar of additional capital invested, there will be $3.02 in additional sales.
Beta	The beta of the firm is 1.74 for the first 5 years, and decreases

	gradually to a stable period beta of 1.10. (The riskfree rate is 6% and the market risk premium is 4%.)
Debt Ratio	The debt ratio for the next 5 years remains at current levels (7.81%) and increases gradually to 15% by year 10.

The details of these assumptions have been discussed through the last three chapters. Using these inputs, you generate the expected cash flows and costs of capital for Amazon in table 6.5.

To compute the value of Amazon at the end of the high growth period, you use the expected cash flow to the firm in the terminal year, the cost of capital in that year and the stable growth rate:

Terminal value for Amazon (in year 10) = $2,126 (.0952- .05) = $47,016 million

The value of Amazon's operating assets is the sum of the present values of the cash flows during the high growth phase and the present value of the terminal value[9]:

PV of FCFF during high growth phase =	$	(1,760) million
PV of Terminal Value = $47,016/2.9888 =	$	15,731 million
Value of Operating Assets for Amazon =	$	13,971 million

Illustration 6.5: Valuation of Ariba's Operating Assets

The assumptions underlying the Ariba valuation are summarized in table 6.6 below.

Table 6.6: Assumptions for Valuing Ariba

Input	Assumptions
Revenue Growth	Compounded average growth rate over next 10 years = 82.39% Growth rate decreases from 400% next year to 5% in year 10.
Operating Margin	Operating margin improves from current level of – 160% to a

[9] The present value is computed using the compounded cost of capital over time. For example, the compounded cost of capital in year 6 = (1.1256)(1.1256)(1.1244)(1.1234)(1.1234)(1.1175) = 2.0090.

	target margin of 16.36% (which is the average for comparable firms) in year 10.
Reinvestment needs	The reinvestment each year is estimated based upon the assumption that the sales to capital ratio will be 2.50; For every dollar of additional capital invested, there will be $2.50 in additional sales.
Beta	The beta of the firm is 1.78 for the first 5 years, and decreases gradually to a stable period beta of 1.20. (The riskfree rate is 6% and the market risk premium is 4%.)
Debt Ratio	The debt ratio for the next 5 years remains at current levels (0.15%) and increases gradually to 10% by year 10.

The expected cash flows and costs of capital for Ariba are summarized in table 6.7.

The value of Ariba when high growth ends in ten years is estimated using the free cash flow to the firm in the terminal year and the stable growth rate:

Terminal value for Ariba (in year 10) = $3,159/(.1018-.05) = $61,034 million

The value of Ariba's operating assets is the sum of the present values of the cash flows during the high growth phase and the present value of the terminal value estimated above:

PV of FCFF during high growth phase =	$	(1,367)
PV of Terminal Value = $61,034/3.1816 =	$	19,184
Value of Operating Assets for Ariba =	$	17,816

Illustration 6.6: Valuation of Cisco's Operating Assets

The inputs in the Cisco valuation are summarized in Table 6.8 below:

Table 6.8: Assumptions for Valuing Cisco

	High Growth	*Transition*	*Forever*
Length of period	6 years	6 years	Past year 12
Growth Rate	36.39%	Decreases linearly from 36.39% to 5%	5.00%
Debt Ratio	0.18%	Increases linearly from 0.18% to 10%	10.00%
Beta	1.43	Decreases linearly from 1.43 to 1.00.	1.00

Pre-tax cost of debt	6.20%	6.20%	6.20%
Tax Rate	35.00%	35.00%	35.00%
Return on Capital	34.07%	Decreases from 34.07% to 16.52%.	16.52%
Reinvestment Rate	106.81%	Decreases from 106.81% to 30.27%	30.27%

A riskfree rate of 6% and a market risk premium of 4% are used in the valuation. The expected cash flows and costs of capital are summarized in table 6.9.

Cisco's terminal value at the end of year 12, when high growth ends, is estimated using the free cash flows to the firm in the terminal year (year 13), the cost of capital in that year and the stable growth rate:

Free Cash Flow to $Firm_{13}$ = After-tax Operating $income_{13}$ (1- $Reinvestment\ Rate_{Stable}$)

= \$61,028 (1-.3027) = \$42,557 million

Terminal value for Cisco (in year 12) = \$42,557/(.094-.05) = \$966,545

The value of Cisco's operating assets is the sum of the present values of the cash flows during the high growth phase and the present value of the terminal value estimated above:

Present Value of FCFF in high growth phase = \$34,779 million

Present Value of Terminal Value of Firm = \$966,545/3.5104 = \$275,336 million

Value of operating assets of the firm = \$310,115 million

Illustration 6.7: Valuation of Motorola's Operating Assets

To value Motorola, the assumptions are summarized in table 6.10 below:

Table 6.10: Assumptions for valuing Motorola

	High Growth Period	*Stable Growth Phase*
Length of High Growth Period =	5	Forever
Growth Rate =	13.63%	5.00%
Debt Ratio =	6.86%	6.86%
Beta used for stock =	1.21	1.00
Cost of Debt =	6.50%	6.50%
Tax Rate =	35.00%	35.00%

Return on Capital =	Improves from 12.18% to 17.22%	17.22%
Reinvestment Rate =	52.99%	29.04%

A riskfree rate of 6% and a market risk premium of 4% are used in the valuation. The expected cash flows and costs of capital over the high growth period are summarized in table 6.11.

Motorola's value in year 5 is estimated using the free cash flows to the firm in year 6, the cost of capital in that year and the stable growth rate:

Free Cash Flow to $Firm_6$ = After-tax Operating $income_6$ (1- Reinvestment $Rate_{Stable}$)

= $ 6,075 (1-.2904) = $ 4,311 million

Terminal value for Motorola (in year 5) = $4,311/(.096-.05) = $93,641 million

The value of Motorola's operating assets is the sum of the present values of the cash flows during the high growth phase and the present value of the terminal value estimated above:

Present Value of FCFF in high growth phase =		$7,980
Present Value of Terminal Value of Firm =	$93,641/1.6394 =	$58,159
Value of operating assets of the firm =		$66,139

Illustration 6.8: Valuation of Rediff's Operating Assets

The assumptions for valuing Rediff.com are contained in table 6.12 below:

Table 6.12: Assumptions for Valuing Rediff.com

Input	Assumptions
Revenue Growth	Compounded average growth rate over next 10 years = 104.57% Growth rate decreases from 500% next year to 5% in year 10.
Operating Margin	Operating margin improves from current level of – 113% to a target margin of 40.00% (which is the average for comparable firms) in year 10.
Reinvestment needs	The reinvestment each year is estimated based upon the

	assumption that the sales to capital ratio will be 1.00; For every dollar of additional capital invested, there will be $1.00 in additional sales.
Beta	The beta of the firm is 1.90 for the first 5 years, and decreases gradually to a stable period beta of 1.20. The riskfree rate is 6% (since the valuation is in U.S $). To estimate the risk premium, a mature market premium of 4% is added to a country risk premium for India of 6.43%.
Debt Ratio	The debt ratio for the next 5 years remains at current levels (0%) and increases gradually to 20% by year 10.

The expected cash flows and costs of capital are summarized in table 6.13. Implicit in these estimates is the assumption that Rediff.com will remain an internet portal for the bulk of this period. If, in fact, Rediff chooses a different route (business mix), the estimates will have to change, as will the value.

Rediff's value at the end of its high growth period (ten years) is estimated using the cash flows in the terminal year, the cost of capital in that year and the stable growth rate:

Terminal value (in '000s) for Rediff (in year 10) = $505,602/(.1567-.05) = $ 4,736,851

The value of Rediff's operating assets is the sum of the present values of the cash flows during the high growth phase and the present value of the terminal value estimated above:

PV of FCFF during high growth phase =	$ (140,793)
PV of Terminal Value = $ 4,736,851/7.8479 =	$ 603,585
Value of Operating Assets of the firm =	$ 462,792

Table 6.5: Expected Cash Flows and Discount Rates: Amazon (in millions)

	Base	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Terminal Year*
Revenue Growth		120.00%	90.00%	75.00%	50.00%	30.00%	25.20%	20.40%	15.60%	10.80%	5.00%	5%
Revenues	$1,640	$3,608	$6,855	$11,997	$17,995	$23,393	$29,288	$35,263	$40,764	$45,167	$47,425	$49,797
Operating Margin	-16.27%	-3.48%	2.92%	6.12%	7.72%	8.52%	8.92%	9.12%	9.22%	9.27%	9.30%	9.32%
EBIT	-$267	-$125	$200	$734	$1,389	$1,993	$2,613	$3,216	$3,758	$4,187	$4,408	$4,641
Taxes	$0	$0	$0	$135	$486	$698	$914	$1,126	$1,315	$1,465	$1,543	$1,624
EBIT(1-t)	-$267	-$125	$200	$599	$903	$1,296	$1,698	$2,090	$2,443	$2,722	$2,865	$3,017
+ Depreciation	$67	$101	$131	$165	$198	$229	$254	$267	$280	$294	$309	$324
- Capital Exp.	$275	$694	$1,109	$1,713	$2,004	$1,855	$2,029	$2,066	$1,936	$1,620	$989	$1,143
- Chg WC	-$309	$59	$97	$154	$180	$162	$177	$179	$165	$132	$68	$71
FCFF	-$166	-$777	-$875	-$1,103	-$1,083	-$492	-$254	$112	$621	$1,264	$2,118	$2,126
NOL	$423	$549	$348	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rate	0.00%	0.00%	0.00%	18.40%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%
Debt Ratio	7.81%	7.81%	7.81%	7.81%	7.81%	7.81%	9.24%	9.60%	10.20%	11.40%	15.00%	15.00%
Beta	1.74	1.74	1.74	1.74	1.74	1.74	1.61	1.48	1.35	1.23	1.10	1.10
Cost of Equity	12.94%	12.94%	12.94%	12.94%	12.94%	12.94%	12.43%	11.93%	11.42%	10.91%	10.40%	10.40%
Cost of Debt	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	7.80%	7.75%	7.67%	7.50%	7.00%	7.00%
After-tax cost of debt	8.00%	8.00%	8.00%	6.53%	5.20%	5.20%	5.07%	5.04%	4.98%	4.88%	4.55%	4.55%
Cost of Capital	12.56%	12.56%	12.56%	12.44%	12.34%	12.34%	11.75%	11.26%	10.76%	10.22%	9.52%	9.52%
Cumulative WACC		1.1256	1.2669	1.4245	1.6003	1.7977	2.0090	2.2353	2.4759	2.7289	2.9887	
Present Value of FCFF		$ (690)	$ (691)	$ (774)	$ (677)	$ (274)	$ (126)	$ 50	$ 251	$ 463	$ 708	

Table 6.7: Expected Cash Flows and Discount Rates at Ariba (in millions)

	Base	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Terminal Year*
Revenue Growth Rate		400.00%	200.00%	150.00%	100.00%	75.00%	60.00%	40.00%	20.00%	10.00%	5.00%	5%
Revenues	$93	$463	$1,388	$3,471	$6,942	$12,149	$19,438	$27,213	$32,655	$35,921	$37,717	$39,603
Operating Margin	-160%	-71.74%	-27.69%	-5.67%	5.35%	10.85%	13.61%	14.98%	15.67%	16.02%	16.19%	16.36%
EBIT	-$148	-$332	-$384	-$197	$371	$1,319	$2,645	$4,077	$5,118	$5,753	$6,106	$6,479
Taxes	$0	$0	$0	$0	$0	$263	$926	$1,427	$1,791	$2,014	$2,137	$2,268
EBIT(1-t)	-$148	-$332	-$384	-$197	$371	$1,055	$1,719	$2,650	$3,326	$3,739	$3,969	$4,211
+ Depreciation	$7	$15	$26	$42	$58	$70	$77	$81	$85	$89	$93	$98
- Capital Expenditures	$81	$144	$350	$770	$1,273	$1,892	$2,628	$2,802	$1,990	$1,232	$722	$1,057
- Chg WC	-$33	$19	$46	$104	$174	$260	$364	$389	$272	$163	$90	$94
FCFF	-$189	-$480	-$755	-$1,030	-$1,017	-$1,027	-$1,196	-$460	$1,149	$2,433	$3,250	$3,159
NOL	$24	$356	$741	$937	$566	$0	$0	$0	$0	$0	$0	$0
Tax Rate	0.00%	0.00%	0.00%	0.00%	0.00%	19.98%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%
Debt Ratio	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	2.12%	2.62%	3.44%	5.08%	10.00%	10.00%
Beta	1.78	1.78	1.78	1.78	1.78	1.78	1.66	1.55	1.43	1.32	1.20	1.20
Cost of Equity	13.12%	13.12%	13.12%	13.12%	13.12%	13.12%	12.66%	12.19%	11.73%	11.26%	10.80%	10.80%
Cost of Debt	9.25%	9.25%	9.25%	9.25%	9.25%	9.25%	8.80%	8.69%	8.50%	8.13%	7.00%	7.00%
After-tax cost of debt	9.25%	9.25%	9.25%	9.25%	9.25%	7.40%	5.72%	5.65%	5.53%	5.28%	4.55%	4.55%
Cost of Capital	13.11%	13.11%	13.11%	13.11%	13.11%	13.11%	12.51%	12.02%	11.51%	10.96%	10.18%	10.18%
Cumulative WACC		1.1311	1.2795	1.4473	1.6371	1.8517	2.0833	2.3338	2.6025	2.8877	3.1816	
Present Value of FCFF		-$424.46	-$589.85	-$711.47	-$621.35	-$554.86	-$574.32	-$196.99	$441.67	$842.62	$1,021.58	

Table 6.9: Expected Cash Flows and Discount Rates at Cisco (in millions)

	Current	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Expected Growth		36.39%	36.39%	36.39%	36.39%	36.39%	36.39%	31.16%	25.93%	20.70%	15.46%	10.23%	5.00%
Cumulated Growth		136.39%	186.03%	253.73%	346.08%	472.03%	643.81%	844.43%	1063.38%	1283.47%	1481.95%	1633.59%	1715.27%
Reinvestment Rate		106.81%	106.81%	106.81%	106.81%	106.81%	106.81%	94.05%	81.29%	68.54%	55.78%	43.02%	30.27%
EBIT * (1 - t)	$3,388	$4,622	$6,304	$8,598	$11,727	$15,995	$21,816	$28,614	$36,033	$43,490	$50,216	$55,354	$58,122
- Net Cap Ex	$3,741	$4,638	$6,325	$8,628	$11,767	$16,050	$21,891	$25,265	$27,496	$28,001	$26,382	$22,571	$16,921
-Chg. Wk Cap	($122)	$299	$407	$555	$758	$1,033	$1,409	$1,646	$1,796	$1,806	$1,628	$1,244	$670
FCFF	($231)	($315)	($429)	($585)	($798)	($1,089)	($1,485)	$1,703	$6,741	$13,684	$22,206	$31,539	$40,530
Cost of Capital		11.71%	11.71%	11.71%	11.71%	11.71%	11.71%	11.32%	10.94%	10.55%	10.17%	9.79%	9.40%
Cumulated WACC		1.1171	1.2478	1.3939	1.5571	1.7394	1.9430	2.1630	2.3996	2.6529	2.9227	3.2087	3.5104
Present Value		($282)	($344)	($420)	($513)	($626)	($764)	$787	$2,809	$5,158	$7,598	$9,829	$11,546

Table 6.11: Expected Cash Flows and Discount Rates: Motorola (in millions)

	Current	*1*	*2*	*3*	*4*	*5*
Expected Growth		13.63%	13.63%	13.63%	13.63%	13.63%
Reinvestment Rate		52.99%	52.99%	52.99%	52.99%	52.99%
EBIT * (1 - t)	$3,110.00	$3,533.89	$4,015.56	$4,562.88	$5,184.80	$5,891.49
- Net Cap Ex	$1,521.60	$1,525.28	$1,733.17	$1,969.40	$2,237.83	$2,542.85
-Chg. Wk Cap	$126.23	$347.16	$394.47	$448.24	$509.34	$578.76
FCFF	$1,462.17	$1,661.46	$1,887.92	$2,145.24	$2,437.63	$2,769.88
Cost of Capital		10.39%	10.39%	10.39%	10.39%	10.39%
Present Value		$1,505.05	$1,549.19	$1,594.62	$1,641.38	$1,689.52

Table 6.13: Expected Cash Flows and Discount Rates: Rediff.com (in thousands)

	Base	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Terminal Year*
Revenue Growth		500.00%	300.00%	200.00%	125.00%	100.00%	75.00%	50.00%	25.00%	15.00%	5.00%	5%
Revenues	$1,906	$11,436	$45,744	$137,232	$308,772	$617,544	$1,080,702	$1,621,053	$2,026,316	$2,330,264	$2,446,777	$2,569,116
Operating Margin	-113.1%	-36.55%	1.73%	20.86%	30.43%	35.22%	37.61%	38.80%	39.40%	39.70%	39.85%	40.00%
EBIT	-$2,156	-$4,180	$789	$28,630	$93,963	$217,472	$406,429	$629,032	$798,408	$925,137	$975,053	$1,027,646
Taxes	$0	$0	$0	$9,714	$36,176	$83,727	$156,475	$242,177	$307,387	$356,178	$375,395	$395,644
EBIT(1-t)	-$2,156	-$4,180	$789	$18,916	$57,787	$133,745	$249,954	$386,855	$491,021	$568,960	$599,657	$632,002
+ Depreciation	$746	$1,678	$3,356	$5,872	$8,808	$11,010	$12,662	$13,295	$13,960	$14,658	$15,390	$16,160
- Cap Ex	$7,026	$10,731	$35,948	$92,786	$171,771	$304,344	$452,662	$526,628	$398,960	$303,408	$126,078	$136,444
- Chg WC	$496	$477	$1,715	$4,574	$8,577	$15,439	$23,158	$27,018	$20,263	$15,197	$5,826	$6,117
FCFF	-$8,932	-$13,710	-$33,519	-$72,572	-$113,753	-$175,027	-$213,204	-$153,496	$85,758	$265,012	$483,144	$505,602
NOL	$9	$4,188	$3,399	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rate	0.00%	0.00%	0.00%	33.93%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%	38.50%
Debt Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.00%	5.00%	6.67%	10.00%	20.00%	20.00%
Beta	1.90	1.90	1.90	1.90	1.90	1.90	1.76	1.62	1.48	1.34	1.20	1.20
Cost of Equity	25.82%	25.82%	25.82%	25.82%	25.82%	25.82%	24.36%	22.90%	21.44%	19.98%	18.52%	18.52%
Cost of Debt	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	9.40%	9.25%	9.00%	8.50%	7.00%	7.00%
After-tax cost of debt	10.00%	10.00%	10.00%	6.61%	6.15%	6.15%	5.78%	5.69%	5.54%	5.23%	4.31%	4.31%
Cost of Capital	25.82%	25.82%	25.82%	25.82%	25.82%	25.82%	23.61%	22.04%	20.38%	18.50%	15.67%	15.67%
Cumulative WACC		1.2582	1.5830	1.9917	2.5059	3.1528	3.8973	4.7561	5.7252	6.7845	7.8479	
Present Value of FCFF		-$10,897	-$21,174	-$36,438	-$45,395	-$55,515	-$54,706	-$32,273	$14,979	$39,062	$61,564	

The Survival Issue

Implicit in the use of a terminal value in discounted cash flow valuation is the assumption that the value of a firm comes from it being a going concern with a perpetual life. For many risky firms, there is the very real possibility that they might not be in existence in 5 or 10 years, with volatile earnings and shifting technology. Should the valuation reflect this chance of failure and if so, how can the likelihood that a firm will not survive be built into a valuation?

Life Cycle and Firm Survival

There is a link between where a firm is in the life cycle and survival. Young firms with negative earnings and cash flows can run into serious cash flow problems and end up being acquired by firms with more resources at bargain basement prices. Why are new technology firms more exposed to this problem? The negative cash flows from operations, when combined with significant reinvestment needs, can result in rapid depletion of cash reserves. When financial markets are accessible and additional equity can be raised at will; raising more funds to meet these funding needs is not a problem. However, when stock prices drop and access to markets becomes more limited, these firms can be in trouble.

A widely used measure of the potential for a cash flow problem for firms with negative earnings is the cash-burn ratio, which is estimated as the cash balance of the firm divided by its earnings before interest, taxes and depreciation (EBITDA).

Cash Burn Ratio = Cash Balance / EBITDA

Thus, a firm with a cash balance of $ 1 billion and EBITDA of -$1.5 billion will burn through its cash balance in 8 months.

Likelihood of Failure and Valuation

` One view of survival is that the expected cash flows that you use in a valuation reflect cash flows under a wide range of scenarios from very good to abysmal and the probabilities of the scenarios occurring. Thus, the expected value already has built into it the likelihood that the firm will not survive. Any market risk associated with survival or failure is assumed to be incorporated into the cost of capital. Firms with a high likelihood of failure will therefore have higher discount rates and lower present values.

Another view of survival is that discounted cash flow valuations tend to have an optimistic bias and that the likelihood that the firm will not survive is not considered adequately in the value. With this view, the discounted cash flow value that emerges from the analysis in the prior section overstates the value of operating assets and has to be adjusted to reflect the likelihood that the firm will not survive to deliver its terminal value or even the positive cash flows that you have forecast in future years.

Should you or should you not discount value for survival?

For firms like Cisco and Motorola that have substantial assets in place and relatively small probabilities of distress, the first view is the more appropriate one. Attaching an extra discount for non-survival is double counting risk.

For firms like Ariba and Rediff.com, it is a tougher call and depends upon whether expected cash flows consider the probability that these firms may not make it past the first few years. If they do, the valuation already reflects the likelihood that the firms will not survive past the first few years. If they do not, you do have to discount the value for the likelihood that the firm will not survive the near future. One way to estimate this discount is to use the cash burn ratio, described earlier, to estimate a probability of failure, and adjust the operating asset value for this probability:

Adjusted Value = DCF Value of Operating Assets (1 – Probability of distress)

+ Distressed Sale Value (Probability of distress)

For a firm with a discounted cash flow value of $ 1 billion on its assets, a distress sale value of $ 500 million and a 20% probability of default, the adjusted value would be $ 900 million:

Adjusted Value = $ 1,000 (.8) + $500 (.2) = $ 900 million

There are two points worth noting here. It is not the failure to survive per se that causes the loss of value but the fact that the distressed sale value is at a discount on the true value. The second is that this approach revolves around estimating the probability of failure. This probability is difficult to estimate because it will depend upon both the magnitude of the cash reserves of the firm (relative to its cash needs) and the state of the market. In buoyant equity markets, even firms with little or no cash can survive because they can access markets for more funds. Under more negative market conditions, even firms with significant cash balances may find themselves under threat.

There will be no discount for failure for any of the firms being valued for two reasons. One is that you are using expected cash flows that adequately reflect the likelihood of failure. The other is that each of these firms has a valuable enough niche in the market, that even in the event of failure, there will be other firms interested in buying their assets at a fair value.

Cash and Non-operating Assets

The operating income is the income from operating assets, and the cost of capital measures the cost of financing these assets. When the operating cash flows are discounted to the present, you have valued the operating assets of the firm. Firms, however, often have significant amounts of cash and marketable securities on their books, as well as holdings in other firms and non-operating assets. The value of these assets should be added to the value of the operating assets to arrive at firm value. Some analysts prefer to consider the income from cash and marketable securities in their cash flows and adjust

the discount rate[10] to reflect the safety of these assets. When done right, this approach should yield the same firm value.

Cash and Marketable Securities

Firms often hold substantial amounts in cash and other marketable securities. When valuing firms, you should add the value of these holdings to the value of the other operating assets to arrive at the firm value. In this section, you first consider how to deal with cash and near cash investments (such as government securities) and then consider holdings of more risky marketable securities.

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. When valuing a firm, you add the value of cash balances and near-cash investments to the value of operating assets.

There is, however, one consideration that may affect how cash is treated. If a firm needs cash for its operations – an operating cash balance – you should consider such cash part of working capital requirements rather than as a source of additional value. Any cash and near-cash investments that exceed the operating cash requirements can be then added on to the value of operating assets. How much cash does a firm need for its operations? The answer depends upon both the firm, and the economy in which the firm operates. A small retail firm in an emerging market, where cash transactions are more common than credit card transactions, may require an operating cash balance that is substantial. In contrast, a manufacturing firm in a developed market may not need any operating cash. In fact, if the cash held by a firm is interest-bearing, and the interest earned on the cash

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[10] When a firm has cash and marketable securities the unlevered beta has to be adjusted downwards to reflect the safety of these assets.

reflects a fair rate of return[11], you would not consider that cash to be part of working capital. Instead, you would add it to the value of operating assets to value the firm.

Other Marketable Securities

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. You have three ways of accounting for marketable securities:

- The simplest and most direct approach is to estimate the current market value of these marketable securities and add the value on 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.
- 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 capital gains tax bite depends upon how much was paid for these assets at the time of the purchase and the value today. This is the best way of estimating value when valuing a firm on a liquidation basis.
- 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 value of these securities. This approach tends to work best for firms that have relatively few, but large, holdings in other publicly traded firms.

Illustration 6.9: Cash and Marketable Securities

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[11] Note that if the cash is invested in riskless assets such as treasury bills, the riskless rate is a fair rate of return.

Each of the five firms that you are valuing holds cash and near-cash investments. In addition, Cisco, Motorola and Amazon own stock in other publicly traded firms. Table 6.14 summarizes these holdings at each of the five firms:

Table 6.14: Cash, Near-cash investments and Marketable Securities

	Amazon	*Ariba*	*Cisco*	*Motorola*	*Rediff*
Cash & Near-cash Investments	$ 117	$ 50	$ 827	$ 3,345	$ 12
Other Marketable Securities	$ 589	$ 48	$ 1,189	$ 699	$ -
Total	$ 706	$ 98	$ 2,016	$ 4,044	$ 12

Note that you have used the current market value of the securities owned by the firms and you have not netted out the capital gains taxes in these holdings, since you are valuing these firms on a going concern basis.

Holdings in Other Firms

In this category, you consider a broader category of non-operating assets, where you look at holdings in other companies, public as well as private. You 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 these assets are valued depends upon the way the investment is categorized and the motive behind the investment. In general, an investment in the securities of 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 upon the categorization.

Minority, Passive Investments

If the securities or assets owned in another firm represent less than 20% 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 sub-categorized 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.

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

Firms are allowed an element of discretion in the way they classify investments and through this choice, 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% and 50% 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 upon 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% of the overall ownership of that firm, an investment is treated as a majority active investment[12]. 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 active 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

Given that the holdings in other firms can accounted for in three different ways, how do you deal with each in valuation?

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

1. If the holdings are treated as minority, passive investments, and the investments are reported in the balance sheet at the original cost or book value, you would value the firm in which these holdings are, and consider the proportion of the value that comes from the holding. For instance, assume that a firm owns 20% of another firm that has an estimated value of $ 500 million. The estimated value of this holding is $ 100 million.
2. If the holdings are minority, passive investments and the investments are recorded at market value, you have one of two choices. You can assume that the market is correct and use the assessed market value of these cross-held assets to value the firm. Alternatively, you can value the companies in which the investments have been made and add the estimated value of the holdings to the value of operating assets.
3. If the holdings are minority active interests, you need to value the firms in which these holdings are, and add the proportion of that value to the value of the operating assets of the firm.
4. If the holdings are majority, active interests, the income statements are consolidated. Consequently, the operating income of the firm includes the total operating income from the subsidiary, rather than the firm's share of the subsidiary. You estimate the value of the subsidiary and add on the portion of the value that accrues to the parent company. Where, you might ask, is the minority interest that you see on the parent company's balance sheet? You do not use it directly, since it reflects the book value of the holdings of others in the subsidiaries rather than market value.

Other Non-Operating Assets

Firms can have other non-operating assets, but they are likely to be of less importance than those listed above. 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 upon 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 generate any cash flow for the firm yet. 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 it. The more realistic approach would be to add the after-tax portion of the excess funds into the valuation.

Illustration 6.10: Value of Other Non-Operating Assets

The value of other non-operating assets at the five firms that you are valuing are reported in table 6.15:

Table 6.15: Cash and Non-operating Assets

	Amazon	*Ariba*	*Cisco*	*Motorola*	*Rediff.com*
Majority Active Interests	$ -	$ -	$ -	$ -	$ -
Minority Active Interests	$ -	$ -	$ -	$ -	$ -
Minority Passive Interests	$ 371	$ 54	$ 7,032	$ 5,200[b]	$ -
Unutilized Assets	$ -	$ -	$ -	$ -	$ -
Pension Fund Overfunding	$ -	$ -	$ -	$ -	$ -
Total	$ 371	$ 54	$ 7,032	$ -	$ -

[b]Motorola's holdings represent 16% of Nextel.

You should note that while there is no mention of unutilized assets in the financial statements, there well might well be such assets at each of these firms.

cash.xls: There is a dataset on the web that summarizes the value of cash and marketable securities by industry group in the United States for the most recent quarter.

Firm Value and Equity Value

Once you have estimates of the values of the operating assets, cash and marketable securities and the other non-operating assets owned by a firm, you can estimate the value of the firm as the sum of the three components.

To get to the value of the equity from the firm value, you subtract out the non-equity claims on the firm. Non-equity claims would include debt and preferred stock, though the latter are often treated as equity in financial statements. What debt should you subtract out? The debt that you considered in computing the cost of capital will be the debt that you should be netting out from firm value to get to the value of equity. To be consistent, therefore, you should consider both interest bearing liabilities and leases (in present value terms) to be debt, and use the estimated market value for both.

If the firm you are valuing has preferred stock, you would use the market value of the stock (if it is traded) or estimate a market value[13] (if it is not) and deduct it from firm value to get to the value of common equity.

Illustration 6.11: Firm Value and Equity Value

The values of the five firms and the estimated values of equity in these firms are summarized in table 6.16:

Table 6.16: Firm and Equity Values

	Amazon	*Ariba*	*Cisco*	*Motorola*	*Rediff.com*
Value of Operating Assets	$13,971	$17,816	$310,115	$66,139	$463
+ Cash, Near Cash & Marketable Securities	$706	$98	$2,016	$4,044	$12
+ Value of Operating Assets	$371	$54	$7,032	$5,200	$0

[13] Estimating market value for preferred stock is relatively simple. Preferred stock generally is perpetual, and the estimated market value of the preferred stock is therefore:

Value of preferred stock = Preferred Dividend / Cost of preferred stock

Firm Value	$15,048	$17,968	$319,163	$74,253	$474
- Debt	$1,459	$28	$827	$5,426	$0
- Preferred Stock	$0	$0	$0	$0	$0
Value of Equity	$13,589	$17,941	$318,336	$69,957	$474

The firm value incorporates both the operating and non-operating assets owned by these firms.

Summary

The value of a firm is the present value of its expected cash flows over its life. Since firms have infinite lives, you apply closure to a valuation by estimating cash flows for a period and then estimating a value for the firm at the end of the period – a terminal value. Many analysts estimate the terminal value using a multiple of earnings or revenues in the final estimation year. If you assume that firms have infinite lives, an approach which is more consistent with discounted cashflow valuation is to assume that the cash flows of the firm will grow at a constant rate forever beyond a point in time. When the firm that you are valuing will approach this growth rate, which you label a stable growth rate, is a key part of any discounted cash flow valuation. Small firms that are growing fast and have significant competitive advantages should be able to grow at high rates for much longer periods than larger and more mature firms, without these competitive advantages. If you do not want to assume an infinite life for a firm, you can estimate a liquidation value, based upon what others will pay for the assets that the firm has accumulated during the high growth phase.

Once the terminal values and operating cash flows have been estimated, they are discounted back to the present to yield the value of the operating assets of the firm. To

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The cost of preferred stock should be higher than the pre-tax cost of debt, since debt has a prior claim on the cash flows and assets of the firm.

this value, you add the value of cash, near-cash investments and marketable securities as well as the value of holdings in other firm to arrive at the value of the firm. Subtracting out the value of non-equity claims yields the value of equity in the firm.