Illustration 25.4: Valuing Synergy: Compaq and Digital

Returning to the Compaq/Digital merger, note that synergy was one of the stated reasons for the acquisition. To value this synergy, we needed to first value Compaq as a stand-alone firm. To do this, we made the following assumptions.

- Compaq had earnings before interest and taxes of $2,987 million on revenues of $25,484 million. The tax rate for the firm is 36%.
- The firm had capital expenditures of $ 729 million and depreciation of $545 million in the most recent year; working capital is 15% of revenues.
- The firm had a debt to capital ratio of 10%, a beta of 1.25, and an after-tax cost of debt of 5%.
- The operating income, revenues and net capital expenditures are all expected to grow 10% a year for the next 5 years.
- After year 5, operating income and revenues are expected to grow 5% a year forever, and capital expenditures are expected to be 110% of depreciation. In addition, the firm will raise its debt ratio to 20%, the after-tax cost of debt will drop to 4% and the beta will drop to 1.00.

Based upon these inputs, the value of the firm can be estimated as follows.

Year	*EBIT (1-t)*	*Net Cap Ex*	*Chg in WC*	*FCFF*	*Terminal Value*	*PV*
1	$2,102.85	$202.40	$382.26	$1,518.19		$1,354.47
2	$2,313.13	$222.64	$420.49	$1,670.01		$1,329.24
3	$2,544.45	$244.90	$462.53	$1,837.01		$1,304.49
4	$2,798.89	$269.39	$508.79	$2,020.71		$1,280.19
5	$3,078.78	$296.33	$559.67	$2,222.78	$56,654.81	$33,278.53
Terminal Year	$3,232.72	$92.16	$307.82	$2,832.74		$38,546.91

The value of Compaq is $38.547 billion.

The value of the combined firm (Compaq+Digital), with no synergy, should be the sum of the values of the firms valued independently. To avoid double counting the value of control, we add the value of Digital, optimally managed, that we estimated in Illustration 25.2, to the value of Compaq to arrive at the value of the combined firm:

Value of Digital (optimally managed)= $4,531.59 million

Value of Compaq (status quo) = $38,546.91 million

Value of combined firm = $43,078.50 million

This would be the value of the combined firm in the absence of synergy.

To value the synergy, we made the following assumptions about the way in which synergy would affect cash flows and discount rates at the combined firm.

- The combined firm will have some economies of scale, allowing it to increase its current after-tax operating margin slightly. The annual dollar savings will be approximately $100 million. This will translate into a slightly higher pre-tax operating margin.
  - Current Operating Margin $= \frac{EBIT_{Compaq} + EBIT_{Digital}}{Sales_{Compaq} + Sales_{Digital}} = \frac{2987 + 522}{25484 + 13046} = 9.11\%$
  - New Operating Margin $= \frac{2987 + 522 + 100}{25484 + 13046} = 9.36\%$
- The combined firm will also have a slightly higher growth rate of 10.50% over the next 5 years, because of operating synergies.
- The beta of the combined firm was computed in three steps. We first estimated the unlevered betas for Digital and Compaq.

  Digital's Unlevered Beta $= \frac{1.25}{1 + (1 - 0.36)(0.25)} = 1.07$

  Compaq's Unlevered Beta $= \frac{1.25}{1 + (1 - 0.36)(0.10/0.90)} = 1.17$

We then weighted these unlevered betas by the values of these firms to estimate an unlevered beta for the combined firm; Digital has a firm value[6] of $4.5 billion and Compaq's firm value was $38.6 billion.

$$\text{Unlevered Beta for combined firm} = (1.07)\left(\frac{4.5}{43.1}\right) + (1.17)\left(\frac{38.6}{43.1}\right) = 1.16$$

We then used the debt to equity ratio for the combined firm to estimate a new levered beta and cost of capital for the firm. The debt to equity ratio for the combined firm, estimated by cumulating the outstanding debt and market value of equity at the two firms is 13.64%.

3. New Levered Beta $= 1.16(1 + (1 - 0.36)(0.1364)) = 1.26$
4. Cost of Capital = 12.93% (0.88) + 5% (0.12) = 11.98%

Based on these assumptions, the cash flows and value of the combined firm, with synergy, can be estimated.

Year	*EBIT (1-t)*	*Net Cap Ex*	*Chg in WC*	*FCFF*	*Terminal Value*	*PV*
1	$2,552.28	$218.79	$606.85	$1,726.65		$1,541.95
2	$2,820.27	$241.76	$670.57	$1,907.95		$1,521.59
3	$3,116.40	$267.15	$740.98	$2,108.28		$1,501.50
4	$3,443.63	$295.20	$818.78	$2,329.65		$1,481.68
5	$3,805.21	$326.19	$904.75	$2,574.26	$66,907.52	$39,463.87
Terminal Year	$3,995.47	$174.02	$476.07	$3,345.38		$45,510.58

The value of the combined firm, with synergy, is $45,510.58 million. This can be compared to the value of the combined firm, without synergy, of $43,078.50 million, and the difference is the value of the synergy in the merger.

Value of combined firm (with synergy) = $45,510.58 million

[6] The values that we used were the values immediately before the acquisition announcement. This is to prevent the biases that may be created when target prices increase once an acquisition is announced.

Value of combined firm (with no synergy) = $43,078.50 million

Value of Synergy = $ 2,422.08 million

This valuation is based on the presumption that synergy will be created instantaneously. In reality, it can take years before the firms are able to see the benefits of synergy. A simple way to account for the delay is to consider the present value of synergy. Thus, if it will take Compaq and Digital three years to create the synergy, the present value of synergy can be estimated, using the combined firm's cost of capital as the discount rate.

$$\text{Present Value of Synergy} = \frac{\$2{,}422 \text{ million}}{1.1198^3} = \$1724.86 \text{ million}$$

synergy.xls: This spreadsheet allows you to estimate the approximate value of synergy in a merger or acquisition.

d. Valuing Financial Synergy

Synergy can also be created from purely financial factors. We will consider three legitimate sources of financial synergy - a greater "tax benefit" from accumulated losses or tax deductions, an increase in debt capacity and therefore firm value and better use for "excess" cash or cash slack. We will begin the discussion, however, with diversification, which though a widely used rationale for mergers, is not a source of increased value by itself.

Diversification

A takeover motivated only by diversification considerations has no effect on the combined value of the two firms involved in the takeover, when the two firms are both publicly traded and when the investors in the firms can diversify on their own. Consider the following example. Dalton Motors, which is in an automobile parts manufacturing firm in a cyclical business, plans to acquire Lube & Auto, which is an automobile service firm whose business is non-cyclical and high growth, solely for the diversification benefit. The characteristics of the two firms are as follows:

	Lube & Auto	*Dalton Motors*
Current Free cash flow to the firm	$100 million	$200 million
Expected growth rate -next 5 years	20%	10%

Expected growth rate – after year 5	6%	6%
Debt /(Debt + Equity)	30%	30%
After-tax cost of debt	6%	5.40%
Beta for equity - next 5 years	1.20	1.00
Beta for equity - after year 5	1.00	1.00

The treasury bond rate is 7% and the market premium is 5.5%. The calculations for the weighted average cost of capital and the value of the firms are shown in Table 25.2.

Table 25.2: Value of Lube & Auto, Dalton Motors and Combined Firm

	Lube & Auto	*Dalton Motor*	*Lube & Auto + Dalton Motor*	*Combined Firm*
Debt (%)	30%	30%		30%
Cost of debt	6.00%	5.40%		5.65%
Equity (%)	70%	70%		70%
Cost of equity	13.60%	12.50%		12.95%
Cost of capital - Yr 1	11.32%	10.37%		10.76%
Cost of capital- Yr 2	11.32%	10.37%		10.76%
Cost of capital- Yr 3	11.32%	10.37%		10.77%
Cost of capital- Yr 4	11.32%	10.37%		10.77%
Cost of capital- Yr 5	11.32%	10.37%		10.77%
Cost of capital after	10.55%	10.37%		10.45%
FCFF in year 1	$120.00	$220.00		$340.00
FCFF in year 2	$144.00	$242.00		$386.00
FCFF in year 3	$172.80	$266.20		$439.00
FCFF in year 4	$207.36	$292.82		$500.18
FCFF in year 5	$248.83	$322.10		$570.93
Terminal Value	$5,796.97	$7,813.00		$13,609.97
Present Value	$4,020.91	$5,760.47	$9,781.38	$9,781.38

The cost of equity and debt for the combined firm is obtained by taking the weighted average of the individual firm's costs of equity (debt); the weights are based

upon the relative market values of equity (debt) of the two firms. Since these relative market values change over time, the costs of equity and debt for the combined firm also change over time. The value of the combined firm is exactly the same as the sum of the values of the independent firms, indicating that there is no value gain from diversification.

This equality does not imply, however, that the shareholders in the bidding and target firms are indifferent about such takeovers, since the bidding firm pays a significant premium over the market price. To the extent that these firms were correctly valued before the merger (Market Value of Lube & Auto = $4,020.91, Market Value of Dalton Motors = $5,760.47), the payment of a premium over the market price will transfer wealth from the bidding firm to the target firm.

The absence of added value from this merger may seem puzzling, given the fact that the two firms are in unrelated businesses and thus should gain some diversification benefit. In fact, if the earnings of the two firms are not highly correlated, the variance in earnings of the combined firm should be significantly lower than the variance in earnings of the individual firms operating independently. This reduction in earnings variance does not affect value, however, because it is firm-specific risk, which is assumed to have no effect on expected returns. (The betas, which are measures of market risk, are always value-weighted averages of the betas of the two merging firms.) But what about the impact of reduced variance on debt capacity? Firms with lower variability in earnings can increase debt capacity and thus value. This can be a real benefit of conglomerate mergers, and we consider it separately later in this section.

Cash Slack

Managers may reject profitable investment opportunities if they have to raise new capital to finance them. Myers and Majluf (1984) suggest that since managers have more information than investors about prospective projects, new stock may have to be issued at less than true value to finance these projects, leading to the rejection of good projects and to capital rationing for some firms. It may therefore make sense for a company with excess cash and no investment opportunities to take over a cash-poor firm with good investment opportunities, or vice versa. The additional value of combining these two

firms is the present value of the projects that would not have been taken if they had stayed apart, but can now be taken because of the availability of cash.

Cash slack can be a potent rationale for publicly traded firms that have more access to capital and want to acquire small, private firms that have capital constraints. It may also explain why acquisition strategies concentrating on buying smaller, private firms have worked fairly well in practice. Blockbuster video (video rental), Browning and Ferris (waste disposal) and Service Merchandise (funeral homes) are good examples.

Tax Benefits

Several possible tax benefits accrue from takeovers. If one of the firms has tax deductions that it cannot use because it is losing money, whereas the other firm has income on which it pays significant taxes, combining the two firms can result in tax benefits that can be shared by the two firms. The value of this synergy is the present value of the tax savings that result from this merger. In addition, the assets of the firm being taken over can be written up to reflect new market values in some forms of mergers, leading to higher tax savings from depreciation in future years.

Illustration 25.5: Tax Benefits of writing up Asset Values after Takeover: Congoleum Inc.

One of the earliest leveraged buyouts (LBOs) occurred in 1979 and involved Congoleum Inc., a diversified firm in ship building flooring, and automotive accessories. Congoleum's own management bought out the firm. The favorable treatment that would be accorded the firm's assets by tax authorities was a major reason behind the takeover. After the takeover –– estimated to cost approximately $400 million — the firm was allowed to write up its assets to reflect their new market values and to claim depreciation on these new values. The estimated change in depreciation and the present value effect of this depreciation based on a tax rate of 48%, discounted at the firm's cost of capital of 14.5%, are shown in Table 25.3.

Table 25.3: Depreciation Tax Benefits: Before and After Leveraged Buyout

Year	*Depreciation before*	*Depreciation after*	*Change in Depreciation*	*Tax Savings*	*Present Value*
1980	$8.00	$35.51	$27.51	$13.20	$11.53
1981	$8.80	$36.26	$27.46	$13.18	$10.05

1982	$9.68	$37.07	$27.39	$13.15	$8.76
1983	$10.65	$37.95	$27.30	$13.10	$7.62
1984	$11.71	$21.23	$9.52	$4.57	$2.32
1985	$12.65	$17.50	$4.85	$2.33	$1.03
1986	$13.66	$16.00	$2.34	$1.12	$0.43
1987	$14.75	$14.75	$0.00	$0.00	$0.00
1988	$15.94	$15.94	$0.00	$0.00	$0.00
1989	$17.21	$17.21	$0.00	$0.00	$0.00
1980-89	*$123.05*	*$249.42*	*$126.37*	*$60.66*	*$41.76*

Note that the increase in depreciation occurs in the first seven years, primarily as a consequence of higher asset values and accelerated depreciation. After year seven, however, the old and new depreciation schedules converge. The present value of the additional tax benefits from the higher depreciation amounted to $41.76 million, about 10% of the overall price paid on the transaction.

In recent years, the tax code covering asset revaluations has been significantly tightened. While acquiring firms can still reassess the value of the acquired firm's assets, they can do so only up to fair value.

Debt Capacity

If the cash flows of the acquiring and target firms are less than perfectly correlated, the cash flows of the combined firm will be less variable than the cash flows of the individual firms. This decrease in variability can result in an increase in debt capacity and in the value of the firm. The increase in value, however, has to be weighed against the immediate transfer of wealth to existing bondholders in both firms from the stockholders of both the acquiring and target firms. The bondholders in the pre-merger firms find themselves lending to a safer firm after the takeover. The coupon rates they are receiving are based upon the riskier pre-merger firms, however. If the coupon rates are not renegotiated, the bonds will increase in price, increasing the bondholders' wealth at the expense of the stockholders.

There are several models available for analyzing the benefits of higher debt ratios as a consequence of takeovers. Lewellen analyzes the benefits in terms of reduced default

risk, since the combined firm has less variable cash flows than do the individual firms. He provides a rationale for an increase in the value of debt after the merger, but at the expense of equity investors. It is not clear, therefore, that the value of the firm will increase after the merger. Stapleton evaluates the benefits of higher debt capacity after mergers using option pricing. He shows that the effect of a merger on debt capacity is always positive, even when the earnings of the two firms are perfectly correlated. The debt capacity benefits increase as the earnings of the two firms become less correlated and as investors become more risk averse.

Consider again the merger of Lube & Auto and Dalton Motor. The value of the combined firm was the same as the sum of the values of the independent firms. The fact that the two firms were in different business lines reduced the variance in earnings, but value was not affected, because the capital structure of the firm remain unchanged after the merger, and the costs of equity and debt were the weighted averages of the individual firms' costs.

The reduction in variance in earnings can increase debt capacity, which can increase value. If, after the merger of these two firms, the debt capacity for the combined firm were increased to 40% from 30% (leading to an increase in the beta to 1.21 and no change in the cost of debt), the value of the combined firm after the takeover can be estimated as shown in Table 25.4.

Table 25.4: Value of Debt Capacity – Lube & Auto and Dalton Motors

	Firm A	*Firm B*	*AB -No new debt*	*AB - Added Debt*
Debt (%)	30%	30%	30%	40%
Cost of debt	6.00%	5.40%	5.65%	5.65%
Equity(%)	70%	70%	70%	60%
Cost of equity	13.60%	12.50%	12.95%	13.65%
Cost of Capital- Yr 1	11.32%	10.37%	10.76%	10.45%
Cost of Capital- Yr 2	11.32%	10.37%	10.76%	10.45%
Cost of Capital- Yr 3	11.32%	10.37%	10.77%	10.45%
Cost of Capital- Yr 4	11.32%	10.37%	10.77%	10.45%
Cost of Capital- Yr 5	11.32%	10.37%	10.77%	10.45%

Cost of Capital after	10.55%	10.37%	10.45%	9.76%
FCFF in year 1	$120.00	$220.00	$340.00	$340.00
FCFF in year 2	$144.00	$242.00	$386.00	$386.00
FCFF in year 3	$172.80	$266.20	$439.00	$439.00
FCFF in year 4	$207.36	$292.82	$500.18	$500.18
FCFF in year 5	$248.83	$322.10	$570.93	$570.93
Terminal Value	$5,796.97	$7,813.00	$13,609.97	$16,101.22
Present Value	$4,020.91	$5,760.47	$9,781.38	$11,429.35

As a consequence of the added debt, the value of the firm will increase from $9,781.38 million to $11,429.35 million.

Increase Growth and Price-Earnings Multiples

Some acquisitions are motivated by the desire to increase growth and price-cash flow (or price-earnings) multiples. Though the benefits of higher growth are undeniable, the price paid for that growth will determine whether such acquisitions make sense. If the price paid for the growth exceeds the fair market value, the stock price of the acquiring firm will decline even though the expected future growth in its cash flows may increase as a consequence of the takeover.

This can be seen in the previous example. Dalton Motor, with projected growth in cash flows of 10%, acquires Lube & Auto, which is expected to grow 20%. The fair market value for Lube & Auto is $4,020.91. If Dalton Motor pays more than this amount to acquire Lube & Auto, its stock price will decline, even though the combined firm will grow at a faster rate than Dalton Motor alone. Similarly, Dalton Motor, which sells at a lower multiple of cash flow than Lube & Auto, will increase its value as a multiple of cash flow after the acquisition, but the effect on the stockholders in the firm will still be determined by whether or not the price paid on the acquisition exceeds the fair value.

How often does synergy actually show up?

McKinsey and Co. examined 58 acquisition programs between 1972 and 1983 for evidence on two questions: (1) Did the return on the amount invested in the acquisitions

exceed the cost of capital? (2) Did the acquisitions help the parent companies outperform the competition? They concluded that 28 of the 58 programs failed both tests, and six failed at least one test. In a follow-up study[7] of 115 mergers in the U.K. and the U.S. in the 1990s, McKinsey concluded that 60% of the transactions earned returns on capital less than the cost of capital and that only 23% earned excess returns. In 1999, KPMG examined 700 of the most expensive deals between 1996 and 1998 and concluded that only 17% created value for the combined firm, 30% were value neutral and 53% destroyed value[8].

A study[9] looked at the eight largest bank mergers in 1995 and concluded that only two (Chase/Chemical, First Chicago/NBD) subsequently outperformed the bank-stock index. The largest, Wells Fargo's acquisition of First Interstate, was a significant failure. Sirower (1996) takes a detailed look at the promises and failures of synergy and draws the gloomy conclusion that synergy is often promised but seldom delivered.

The most damaging piece of evidence on the outcome of acquisitions is the large number of acquisitions that are reversed within fairly short time periods. Mitchell and Lehn note that 20.2% of the acquisitions made between 1982 and 1986 were divested by 1988. Studies that have tracked acquisitions for longer time periods (ten years or more) have found the divestiture rate of acquisitions rises to almost 50%, suggesting that few firms enjoy the promised benefits from acquisitions. In another study, Kaplan and Weisbach (1992) found that 44% of the mergers they studied were reversed, largely because the acquirer paid too much or because the operations of the two firms did not mesh.

Takeover Valuation: Biases and Common Errors

The process of takeover valuation has potential pitfalls and biases that arise from the desire of the management of both the bidder and target firms to justify their points of

[7] This study was referenced in an article titled "Merger Mayhem" that appeared in Barrons on April 20, 1998.
[8] KPMG measured the success at creating value by comparing the post-deal stock price performance of the combined firm to the performance of the relevant industry segment for a year after the deal was completed.
[9] This study was done by Keefe, Bruyette and Woods, an investment bank. It was referenced in an article titled "Merger Mayhem" in Barrons, April 20, 1998.

view to their stockholders. The bidder firm aims to convince its stockholders that it is getting a bargain (i.e., that it is paying less than what the target firm is truly worth). In friendly takeovers, the target firm attempts to show its stockholders that the price it is receiving is a fair price (i.e., it is receiving at least what it is worth). In hostile takeovers, there is a role reversal, with bidding firms trying to convince target firm stockholders that they are not being cheated out of their fair share and target firms arguing otherwise. Along the way, there are a number of common errors and biases in takeover valuation.

Use of Comparable Firms and Multiples

The prices paid in most takeovers are justified using the following sequence of actions: the acquirer assembles a group of firms comparable to the one being valued, selects a multiple to value the target firm, computes an average multiple for the comparable firms and then makes subjective adjustments to this "average". Each of these steps provides an opening for bias to enter into the process. Since no two firms are identical, the choice of comparable firms is a subjective one and can be tailored to justify the conclusion we want to reach. Similarly, in selecting a multiple, there are a number of possible choices - price-earnings ratios, price-cash flow ratios, price-book value ratios, and price-sales ratios, among others - and the multiple chosen will be the one that best suits our biases. Finally, once the average multiple has been obtained, subjective adjustments can be made to complete the story. In short, there is plenty of room for a biased firm to justify any price, using reasonable valuation models.

In some acquisition valuation, only firms that have been target firms in acquisitions are used as comparable firms, with the prices paid on the acquisitions being used to estimate multiples. The average multiple paid, which is called a transaction multiple, is then used to justify the price paid in an acquisition. This clearly creates a biased sample and the values estimated using transactions multiples will generally be too high.

Mismatching Cash Flows and Discount Rates

One of the fundamental principles of valuation is that cash flows should be discounted using a consistent discount rate. Cash flows to equity should be discounted at the cost of equity and cash flows to the firm at the cost of capital, nominal cash flows

should be discounted at the nominal discount rate and real cash flows at the real rate, after-tax cash flows at the after-tax discount rate, and pre-tax cash flows at the pre-tax rate. The failure to match cash flows with discount rates can lead to significant under or over valuation. Some of the more common mismatches include:

(1) *Using the bidding firm's cost of equity or capital to discount the target firm's cash flows:* If the bidding firm raises the funds for the takeover, it is argued, its cost of equity should be used. This argument fails to take into account the fundamental investment principle that it is not who raises the money that determines the cost of equity as much as what the money is raised for. The same firm will face a higher cost of equity for funds raised to finance riskier projects and a lower cost of equity to finance safer projects. Thus, the cost of equity in valuing the target will reflect that firm's riskiness, i.e., it is the target firm's cost of equity. Note, also, that since the cost of equity, as we have defined it, includes only non-diversifiable risk, arguments that the risk will decrease after the merger cannot be used to reduce the cost of equity, if the risk being decreased is firm-specific risk.

(2) *Using the cost of capital to discount the cash flows to equity:* If the bidding firm uses a mix of debt and equity to finance the acquisition of a target firm, the argument goes, the cost of capital should be used in discounting the target firm's cash flows to equity (cash flows left over after interest and principal payments). By this reasoning, the value of a share in IBM to an investor will depend upon how the investor finances his or her acquisition of the share - increasing if the investor borrows to buy the stock (since the cost of debt is less than the cost of equity) and decreasing if the investor buys the stock using his or her own cash. The bottom line is that discounting the cash flows to equity at the cost of capital to obtain the value of equity is always wrong and will result in a significant overvaluation of the equity in the target firm.

Subsiding the Target Firm

The value of the target firm should not include any portion of the value that should be attributed to the acquiring firm. For instance, assume that a firm with excess debt capacity or a high debt rating uses a significant amount of low-cost debt to finance an acquisition. If we estimated a low cost of capital for the target firm, with a high debt ratio

and a low after-tax cost of debt, we would over estimate the value of the firm. If the acquiring firm paid this price on the acquisition, it would represent a transfer of wealth from the acquiring firm's stockholders to the target firm's stockholders. Thus, it is never appropriate to use the acquiring firm's cost of debt or debt capacity to estimate the cost of capital for the target firm.

Structuring the Acquisition

Once the target firm has been identified and valued, the acquisition moves forward into the structuring phase. There are three interrelated steps in this phase. The first is the decision on how much to pay for the target firm, given that we have valued it, with synergy and control built into the valuation. The second is the determination of how to pay for the deal, i.e., whether to use stock, cash or some combination of the two, and whether to borrow any of the funds needed. The final step is the choice of the accounting treatment of the deal because it can affect both taxes paid by stockholders in the target firm and how the purchase is accounted for in the acquiring firm's income statement and balance sheets

Deciding on an Acquisition Price

In the last section, we explained how to value a target firm, with control and synergy considerations built into the value. This value represents a ceiling on the price that the acquirer can pay on the acquisition rather than a floor. If the acquirer pays the full value, there is no surplus value to claim for the acquirer's stockholders and the target firm's stockholders get the entire value of the synergy and control premiums. This division of value is unfair, if the acquiring firm plays an indispensable role in creating the synergy and control premiums.

Consequently, the acquiring firm should try to keep as much of the premium as it can for its stockholders. Several factors, however, will act as constraints. They include

1. *The market price of the target firm, if it is publicly traded, prior to the acquisition*: Since acquisitions have to based on the current market price, the greater the current market value of equity, the lower the potential for gain to the acquiring firm's stockholders. For instance, if the market price of a poorly managed firm already

reflects a high probability that the management of the firm will be changed, there is likely to be little or no value gained from control.

2. *The relative scarcity of the specialized resources that the target and the acquiring firm bring to the merger*: Since the bidding firm and the target firm are both contributors to the creation of synergy, the sharing of the benefits of synergy among the two parties will depend in large part on whether the bidding firm's contribution to the creation of the synergy is unique or easily replaced. If it can be easily replaced, the bulk of the synergy benefits will accrue to the target firm. If it is unique, the benefits will be shared much more equitably. Thus, when a firm with cash slack acquires a firm with many high-return projects, value is created. If there are a large number of firms with cash slack and relatively few firms with high-return projects, the bulk of the value of the synergy will accrue to the latter.
3. *The presence of other bidders for the target firm*: When there is more than one bidder for a firm, the odds are likely to favor the target firm's stockholders. Bradley, Desai, and Kim (1988) examined an extensive sample of 236 tender offers made between 1963 and 1984 and concluded that the benefits of synergy accrue primarily to the target firms when multiple bidders are involved in the takeover. They estimated the market-adjusted stock returns around the announcement of the takeover for the successful bidder to be 2% in single bidder takeovers and -1.33% in contested takeovers.

Payment for the Target Firm

Once a firm has decided to pay a given price for a target firm, it has to follow up by deciding how it is going to pay for this acquisition. In particular, a decision has to be made about the following aspects of the deal.

1. *Debt versus Equity*: A firm can raise the funds for an acquisition from either debt or equity. The mix will generally depend upon both the excess debt capacities of the acquiring and the target firm. Thus, the acquisition of a target firm that is significantly under levered may be carried out with a larger proportion of debt than the acquisition of one that is already at its optimal debt ratio. This, of course, is reflected in the value of the firm through the cost of capital. It is also possible that the acquiring firm has

excess debt capacity and that it uses its ability to borrow money to carry out the acquisition. Although the mechanics of raising the money may look the same in this case, it is important that the value of the target firm not reflect this additional debt. As we noted in the last section, the cost of capital used in valuing the acquisition should not reflect this debt raised. The additional debt has nothing to do with the target firm and building it into the value will only result in the acquiring firm paying a premium for a value enhancement that rightfully belongs to its own stockholders.

2. *Cash versus Stock*: There are three ways in which a firm can use equity in a transaction. The first is to use cash balances that have been built up over time to finance the acquisition. The second is to issue stock to the public, raise cash and use the cash to pay for the acquisition. The third is to offer stock as payment for the target firm, where the payment is structured in terms of a stock swap – shares in the acquiring firm in exchange for shares in the target firm. The question of which of these approaches is best utilized by a firm cannot be answered without looking at the following factors.

· *The availability of cash on hand*: Clearly, the option of using cash on hand is available only to those firms that have accumulated substantial amounts of cash.

· *The perceived value of the stock*: When stock is issued to the public to raise new funds or when it is offered as payment on acquisitions, the acquiring firm's managers are making a judgment about what the perceived value of the stock is. In other words, managers who believe that their stock is trading at a price significantly below value should not use stock as currency on acquisitions, since what they gain on the acquisitions can be more than what they lost in the stock issue. On the other hand, firms that believe their stocks are overvalued are much more likely to use stock as currency in transactions. The stockholders in the target firm are also aware of this and may demand a larger premium when the payment is made entirely in the form of the acquiring firm's stock.

· *Tax factors*; When an acquisition is a stock swap, the stockholders in the target firm may be able to defer capital gains taxes on the exchanged shares. Since this benefit can be significant in an acquisition, the potential tax gains from a stock swap may be large enough to offset any perceived disadvantages.

The final aspect of a stock swap is the setting of the terms of the stock swap, i.e., the number of shares of the acquired firm that will be offered per share of the acquiring firm. While this amount is generally based upon the market price at the time of the acquisition, the ratio that results may be skewed by the relative mispricing of the two firm's securities, with the more overpriced firm gaining at the expense of the more underpriced (or at least, less overpriced) firm. A fairer ratio would be based upon the relative values of the two firm's shares. This can be seen quite clearly in the illustration below.

Illustration 25.6: Setting the Exchange Ratio

We will begin by reviewing our valuation for Digital in Figure 25.5. The value of Digital with the synergy and control components is $6,964 million. This is obtained by adding the value of control of $2422 million and the value of synergy of $2421 million to the status quo value of $2,110 million. Digital also has $1,006 million in debt and 146.789 million shares outstanding. The maximum value per share for Digital can then be estimated.

$$\text{Maximum value per share for Digital} = \frac{\text{Firm Value} - \text{Debt}}{\text{Number of shares outstanding}}$$

$$= \frac{\$6{,}964 - \$1{,}006}{146.789}$$

$$= \$40.59$$

The estimated value per share for Compaq is $27, based upon the total value of the firm of $38,546.91 million, the debt outstanding of $3.2 billion and 1,305.76 million shares.

$$\text{Value per share for Compaq} = \frac{38{,}546.91 - 3{,}200}{1{,}305.76} = \$27.00$$

The appropriate exchange ratio, based upon value per share, can be estimated.

$$\text{Exchange ratio}_{\text{Compaq, Digital}} = \frac{\text{Value per share}_{\text{Digital}}}{\text{Value per share}_{\text{Compaq}}}$$

$$= \frac{\$40.59}{\$27.00}$$

$$= 1.50 \text{ Compaq shares/Digital share}$$

If the exchange ratio is set above this number, Compaq stockholders will lose at the expense of Digital stockholders. If it is set below, Digital stockholders will lose at the expense of Compaq stockholders.

In fact, Compaq paid $ 30 in cash and offered 0.945 shares of Compaq stock for every Digital share. Assessing the value of this offer,

Value per Digital share (Compaq offer) = $ 30 + 0.945 ($27.07) =	$55.58
Value per Digital share (Assessed value) =	$40.59
Over payment by Compaq =	$14.99

Based on our assessments of value and control, Compaq over paid on this acquisition for Digital.

exchratio.xls: This spreadsheet allows you to estimate the exchange ratio on an acquisition, given the value of control and synergy.