How to Price a Share for Acquisition

Malay Kanti Roy

Although take-overs are becoming important means of diversification, there is no established technique which incorporates uncertainties involved and gives a range of values of a target firm which can form the basis for offering a price.

Using a model of the firm's cash flows after acquisition, Malay Kanti Roy simulates the likely cash flow streams from the acquisition of India Cements for various values of the key variables such as growth rate and earnings before interest and taxes. He shows how such models and simulation analyses can help negotiators set upper and lower limits for a take-over bid.

Malay Kanti Roy is a faculty member at the Department of Commerce, North Bengal University.

The attempt by the cigarettes and hoteliering giant, Indian Tobacco Company Limited (ITC), to take over India Cements in the year 1982 was debated for a long time in the corporate sector. This take-over attempt, like many others, was not successful. It created a controversy because ITC had already concluded an in-camera deal with the Industrial Development Bank of India (IDBI) and other public financial institutions, which owned roughly 51 per cent of the company's share capital. ITC bought up almost 33 per cent of the share capital of India Cements for an estimated Rs. 10 crore, paying an attractive Rs. 30 per share (face value: Rs 5) for the controlling interest. The market price of India Cements shares at the time of acquisition was Rs 3.50 approximately.

Had ITC run the risk of either buying an economically unattractive company or paying too much for an attractive one? What price should it have offered? This is an important issue in any take-over bid.

Take-over as a means of diversification has been gaining in importance in India. In a period of a little more than a year, at least nine major corporations with combined sales of over Rs. 600 crore (for instance, ITC/India Cements, Goenka/Premier Auto, Thaper/Scindia Steamship) and scores of smaller companies and sick units were involved in acquisition moves. Besides, there is a strong belief that due to capital market imperfections, shares of many well-established companies are "undervalued" in the market, thus making it cheaper and faster to grow through acquisition rather than through internal growth. However, the path has not been a smooth one, and some of the recent failures have rendered such a strategy unattractive to some extent. Only a limited number of candidates are available at the prices that enable the acquirer to earn an acceptable return on investment. Therefore, we need a financial programme that can incorporate the uncertainties involved and give a range of values of a target firm which can form the basis for

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selection and negotiation. This article is an attempt to develop such a programme which is explained with the help of the example of the takeover attempt of India Cements by ITC. Implications are drawn for the managers.

**Framework for Acquisition Analysis**

From a purely theoretical point of view, diversification per se by a company does not create any additional value for its shareholders, for the shareholders can achieve this by diversifying their own portfolio. A company resorting to diversification strategy can create value for its shareholders only when the combination of skills and resources of the two businesses satisfies at least one of the following conditions (See Saltz, 1978):

- an income stream greater than what could be realized from a portfolio investment in the two companies, and
- a reduction in the variability of the income stream greater than what could be realized from a portfolio investment in the two businesses.

The underlying meaning is that when determining the value of the targeted company—and thereby its share—the post-merger expected benefit, commonly known as synergism, is to be taken into account. So we need a technique that can incorporate the above conditions and guide the acquirers in the following areas:

- the criterion for choosing target companies,
- the maximum price per share that can be paid for the targeted company, and
- explicit consideration of principal risk areas.

The discounted cash flow (DCF) technique, which is extensively used for project evaluation, can be used for valuation of a firm. The boxed item gives an introduction to the DCF technique.

It can be said that an acquirer can invest in the target company if the cost of acquisition is less than the present value of the firm.

Under efficient capital market conditions, there cannot be any difference between the acquisition cost and value, as these two will adjust rapidly to every bit of new information about the specific company, general economy, and financial market. It is due to imperfections that this gap between value and price emerges, and the strong belief that the market is "undervaluing" scrips of many established companies leads the bidder to offer a substantial amount of premium above the pre-merger market price of the targeted company. In the Indian context, there is a reason to doubt the validity of the efficient market theory—as Sharma and Kennedy (1977) have shown*—because of the presence of certain features which are detrimental to the efficient functioning of the market.

**Discounted Cash Flow Technique**

The DCF technique is suggested for acquisition analysis, even though acquisition involves considerably more complex set of managerial problems than the purchase of an ordinary asset such as a machine or a plant because the economic substance of these transactions is the same. Each case involves current outlay in anticipation of a stream of future cash flows. The major difference is that with acquisition the initial cost itself needs to be established. An essential feature of the DCF technique is that it considers a rupee received today to be worth more than a rupee received a year hence.

The DCF technique seeks to discount the future stream of net cash inflows at the required rate to determine the present value of the targeted firm. We need information on the following items to arrive at the value of the firm:

- the incremental cash flows expected to be generated by acquisition, and
- the minimum acceptable rate of return required by the market for new investments by the company.

The valuation model can be expressed as:

\[
V = \sum_{j=1}^{n} \frac{C_j}{(1+r)^j}
\]

where \(V\) = the acquirer's valuation of the investment, \(C\) = the future cash flows from the investment expected by the investor, \(r\) = the acquirer's acceptable rate of return, and \(n\) = the time horizon of the investor.

Dominance by a few institutional investors, the segmentation of the market into two tiers—actively traded shares and inactive shares, and the lack of a corpus of professional analysis characterize the Indian stock market which raise doubts about the applicability of the efficient market theory to Indian conditions.
Estimating Cash Flows

Estimating the value of a firm requires the estimation of the future cash flow. The future cash flow of the targeted company can be calculated as follows:

\[ CF_t = S_{t-1} (1 + g_t) P_t (1 - T_t) - (S_t - S_{t-1}) x (F_t + W_t) \]

where \( CF = \) cash flow,
\( S_t = \) sales, in time period \( t \),
\( g = \) annual growth rate in sales,
\( P = \) earnings before interest and taxes (EBIT) as a percentage of sales,
\( T = \) income-tax rate,
\( F = \) capital investment required per rupee of sales increase,
\( W = \) cash required for net working capital per rupee of sales increase, and
\( n = \) cash flow projection period in years (\( t = 1, 2, \ldots, n \)).

Cash flows are projected for a period \( t \) until the level of uncertainty makes management feel too "uncomfortable" to go any further. While practice differs with industry setting, management policy, and the special circumstances of the acquisition, considering growing environmental uncertainty, limited predictive ability, and time value of money, ten to fifteen years appear to be a reasonable time period, the period which is considered in many situations (for instance, see Rappaport, 1979). The residual value at the horizon date can be taken as the present value of the resulting cash flow beginning one year after the horizon date to perpetuity.

The major problem that arises in the cash flow projection (in any take-over bid including India Cements/ITC) is the estimation of the five variables \( g, P, F, W, \) and \( T \). The estimation has to be based on a subjective judgement of the managers about the company's prospects and the past performance. Each assumption involves a degree—often a high one—of uncertainty. Taken together, the combined uncertainties can multiply into a total uncertainty of critical proportion.

One way to make an educated guess about the variables under consideration is to consider a range of values, instead of trying to find out one single best estimate for each variable based on the past data. It is easier to provide a range with some accuracy than one specific value.

Sales growth (\( g \)). The growth of sales of India Cements was about 10 per cent per year, except for an unusual rate of 32 per cent in one year. Based on (i) the synergy effect of take-over by ITC, (ii) the growth rate in the cement industry, and (iii) inflation, we can expect the future rate of growth to be higher than 10 per cent. However, several rates of growth are possible. To each, we can assign a probability. These are subjective estimates. The probabilities assigned to each of the several rates are given in Exhibit 1. For example, a 20 per cent chance is assigned to the growth rate \( g \) taking a value of 0.16 (or 16 per cent) and 0.18 (or 18 per cent).

EBIT as a percentage of sales (\( P \)). India Cements was earning about 4 per cent before interest and taxes on sales. The probability assessment for future earnings are as follows: a 30 per cent chance of earning 12 per cent and a 30 per cent chance of earning 16 per cent. Only 10 per cent chance is assigned to earning 4 per cent—the same as at present. A small one per cent chance is assigned to earning as high as 28 per cent. The range considered for this variable is from 4 per cent to 28 per cent. (See Exhibit 1.)

Capital investment per rupee sales increase (\( F \)). In the past, capital investment per rupee of sales increase was Re 0.21. The range of values considered for this variable is from Re 0.15 to Re 0.50. The highest chance of 25 per cent is assigned to \( F \) taking the value of Re 0.40 and 20 per cent to Re 0.35. (See Exhibit 1.)

Working capital requirement per rupee of sales increase (\( W \)). In the past, the working capital requirement was Re 0.05 for rupee of sales increase. The range of values considered for this variable is Re 0.03 to Re 0.21. The highest chance of 25 per cent has been assigned to Re 0.07. A 20 per cent chance, has been assigned Re 0.09. (See Exhibit 1.)

Income-tax rate-(\( T \)). A fixed income-tax rate of 50 per cent has been assumed.

Cash flow projection period (\( n \)). As explained earlier, a period beyond 15 years may be regarded as "uncomfortable" for estimation. The cash flow projection period is treated as a variable. In each simulation run, the cash flow projections are made for the period chosen with a residual or terminal value at the end of that period. Forty per cent of the time, the period selected, was ten years, and 30 per cent of the time cash flows were projected for a period of 12 years. The range of values considered was from 8 to 16 years. (See Exhibit 1.)
Simulation

For each given set of values of I, P, F, W, T, and n, we can determine the cash flow stream associated with it. However, what we have is a range of values for each variable and the probability of its occurrence.

Given these probability distributions, we can arrive at a number of cash flow streams by simulating various combinations of values for these variables. A flow chart for simulation is shown in Exhibit 2. We start by providing the initial value of sales and the probability distributions of the variables. Then the values for the five variables are randomly chosen from the probability distributions from Exhibit 1. They are substituted in the equation mentioned above to estimate the cash flow. This will give the cash flow stream for n years, given a particular set of values of the variables. Applying the discount rate, one can arrive at the present value of the cash flow. This process was repeated 400 times. With these values, a likely distribution of the value of the firm can be estimated. This procedure is called the simulation method. (See Hertz, 1979.)

Minimum Acceptable Rate of Return

The cost of capital of the acquiring firm is the minimum acceptable rate of return on new investment made by the firms from the viewpoint of creditors and investors in the firm's securities. The basic assumption in using the average cost of capital of the acquiring firm is that the new investment under consideration has the same risk as the typical or average investments undertaken historically by the firm. It means the average cost of capital is not appropriate for investments of differing risks. For investments with differing risks, specific riskiness of each prospective candidate should be taken into account in settling the discount rate, with higher rates for more risky investments.

Estimating the Cost of Capital

The cost of capital is the weighted average cost of equity capital and debt, the weights being the proportion of debt and equity in the total capital. The cost of debt can be found out from the annual interest payments on the total debt obligation. The cost of equity consists of the riskless rate of return plus a return commensurate with the risk of the share. The computation of the risk and the commensurate return are explained in the Appendix. The cost of equity for ITC was estimated to be 16 per cent. The risk adjusted weighted cost of capital of ITC is given in Table 1.

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Table 1

Risk Adjusted Weighted Cost of Capital of ITC

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Cost</th>
<th>Weighted Cost (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>0.20</td>
<td>0.75</td>
<td>1.5</td>
</tr>
<tr>
<td>Equity</td>
<td>0.37</td>
<td>0.16</td>
<td>5.92</td>
</tr>
<tr>
<td>Retained Earning</td>
<td>0.43</td>
<td>0.16</td>
<td>6.88</td>
</tr>
</tbody>
</table>

Risk adjusted weighted cost of capital = 14.30 or 14% approx.

1 Weight has been calculated by taking the present capital structure as revealed in the annual report of ITC.
2 Cost of debt on an average has been assumed to be 15%, and tax rate, 50%.
3 Cost of retained earnings has been assumed equal to that of cost of equity.

ITC should expect at least 14 per cent return on its investment in India Cements.

Computation of Cash Price Per Share

If this rate of 14 per cent is applied every time to discount cash flows, several net present values are obtained for a probability distribution of the economic value of India Cements. The average expectation is the average of the values of all outcomes weighted by the chances of each occurring.

At 14 per cent cost of capital and values of the variables as estimated above, the value of India Cements will vary as shown in Table 2.

The mean value of the firm is Rs. 35 crore and debt outstanding is Rs. 3 crore so that the value attributable to equity shares is Rs. 32 crore. The total number of shares of India Cements is 98 lakh, so that the average price per share is Rs. 33 approxi-

mately. In 162 of the 400 simulations, or over 40 per cent of the time, the value of the firm was between Rs. 17 crore and Rs. 38 crore. The most likely value of the firm is mid-way at about Rs. 28 crore, which gives a per share value of around Rs. 28. Given our assessments of the five variables, g, P, T, F, and W and the period of assessment n, there is about 5 per cent chance that the value of the firm lies above Rs. 80 crore giving a per share price of Rs. 80.

The value of India Cements was assessed for two other discount rates, 15 and 16 per cent. The results are summarized in Table 3. A graphic representation of the distribution of the value of firm for the three rates is given in Figure 1.

Figure 1

Distribution of the Value of India Cements for Three Different Rates of Cost of Capital

Table 2

Frequency Distribution of Value of India Cements at 14 Per Cent Cost of Capital

<table>
<thead>
<tr>
<th>Value of Firm (In Rs. crore)</th>
<th>Frequency of Occurrence out of 400 Simulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
</tr>
<tr>
<td>-3.46</td>
<td>17.35</td>
</tr>
<tr>
<td>17.35</td>
<td>36.17</td>
</tr>
<tr>
<td>38.17</td>
<td>56.98</td>
</tr>
<tr>
<td>58.98</td>
<td>79.80</td>
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<td>79.80</td>
<td>100.61</td>
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<td>100.61</td>
<td>121.43</td>
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<tr>
<td>121.43</td>
<td>142.24</td>
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<tr>
<td>142.24</td>
<td>163.06</td>
</tr>
<tr>
<td>183.06</td>
<td>183.87</td>
</tr>
<tr>
<td>183.87</td>
<td>204.69</td>
</tr>
</tbody>
</table>

Table 3

Price per Share at Different Discount Rates

<table>
<thead>
<tr>
<th>Discount Rate (%)</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Value of Firm (In Rs crore)</td>
<td>35.03</td>
<td>30.12</td>
<td>25.99</td>
</tr>
<tr>
<td>Debt (In Rs crore)</td>
<td>2.94</td>
<td>2.94</td>
<td>2.94</td>
</tr>
<tr>
<td>Mean Value per Share (Rs)</td>
<td>33</td>
<td>28</td>
<td>24</td>
</tr>
</tbody>
</table>
Conclusion

A model was developed for valuation of shares to help management in the bargaining process for acquisition of shares of the targeted company. In mergers and in most other valuation situations, the final determination of value is a part of bargaining process. Values derived by the use of models such as the one described, can play a significant role in setting "rational limits" for negotiations.

The price ITC offered for the shares of India Cements was Rs. 30, which is between the most likely and the mean value of the share at 14 per cent discount rate. At the price offered and the assumptions made, the deal would have, in all likelihood, created additional value for the shareholders of ITC. If ITC demands a higher return on investment, the corresponding price it can offer decreases. At 16 per cent, the mean value drops to Rs. 24 per share.

Limitations

The model has been presented here in a simple way. One would face considerable difficulties in applying it. When the targeted company is a sick unit, estimation of sales and EBIT will pose a major problem. It would require considerable skill and predictive ability. Difficulties also arise in estimating the synergy effect in the future cash flow. The model presented cannot be used for small and closely held companies whose shares are not actively traded in the share market. It assumes that the target company will be a "going concern." If the intention is to acquire the company and liquidate its assets so as to realize cash, the valuation approach presented above loses its relevance.

Appendix

Cost of Capital Estimation

According to the Capital Asset Pricing Model (CAPM), the total risk involved in holding a stock comprises systematic and unsystematic risks. Systematic risk, common to all, is due to the overall market risk determined by economic and other factors. The unsystematic risk is unique to the company and this risk can be reduced and even eliminated by efficient diversification. The premium on a security is determined by the systematic risk borne by it.

A security’s systematic risk is measured by the volatility of its rate of return to changes in market rate of return. This measure is called $\beta$ and given by:

$$\beta = \frac{\text{Corr}(i, m) SD_i}{SD_m}$$

It is equal to the product of the standard deviation of the returns on security $i$ and the correlation between the rate of return on the market portfolio $m$, and that of $i$, divided by the standard deviation of the rate of return on the "market portfolio." $SD_m$ is the standard measure of systematic risk. It measures the tendency of the security to move in line with the stock market as a whole. A stock with a $\beta$ of 1.00 implies that the rate of return on the security rises and falls at the same rate as the market itself. Stocks with $\beta$ greater than 1.00 tend to rise and fall by a greater percentage than the market, i.e., they have a high level of systematic risk and are very sensitive to market changes and thus would be expected to have a risk premium.

The empirical estimation of systematic risk ($\beta$) for the share is obtained from time-series least-square regression within the framework of CAPM. The equation posited is:

$$rit = \alpha_i + \beta_i r_{mt} + e_{it} \quad (t = 1 \ldots T)$$

where $rit$ = ex-post facto return on the $ith$ share minus the risk-free rate $Rft$ in period $t$

$r_{mt}$ = ex-post facto return on market portfolio minus the risk-free rate $Rft$ in period $t$;

$\alpha_i, \beta_i$ = intercept and slope respectively of the characteristic line;

$e_{it}$ = random error term; and

$t, T$ = observational interval and time horizon respectively.

The excess form is used to reduce "noise" from the data. The basic data used are: (i) week-end price of the share covering the period from January 1979 to December 1981 obtained from daily official quotation lists of Madras Stock Exchange, (ii) monthly equity price indices for the same period collected from different issues of the Reserve Bank of India Bulletin, and (iii) monthly yield rates on 6.5 per cent govern-

ment loan 1983, also from the Reserve Bank of India Bulletins.

The ex-post facto returns are calculated from Naperian logarithm of monthly price relatives for both individual share and the market portfolio. For convenience, the returns
are not adjusted for dividends or issue of bonus/rights shares. The risk-free rate is obtained by converting the published monthly yield figures into equivalent continuously compounded rates of return from the point of time of consideration till the end of the maturity period. Once \( \beta \) is determined, the cost of equity can be computed as:

\[
K_E = R_F + \beta (R_M - R_F)
\]

where \( K_E \) = cost of equity capital
\( R_F \) = risk-free rate
\( \beta \) = the \( \beta \) coefficient
\( R_M \) = return on the representative market index.

**Computation for ITC**

The \( \beta \) for ITC was estimated as 2.609, significant at 1 per cent level. Taking this \( \beta \) value, the cost of equity capital for ITC works out to be 16 per cent as shown below:

\[
K_E = 0.065 + 2.609 (.10 - .065) = .1563 \approx 16\% 
\]

approximately

where \( R_F = .065, \beta = 2.609, R_M = .10 \) (assumed).

**References**


