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Valuing Small Businesses: Application of Real Options Analysis

INTRODUCTION

Business valuation is a process and a set of procedures used to estimate the economic value of an owner's interest in a business. The value of an asset is the present value of its expected returns. In order to calculate the value of a firm we need to know its expected cash flows and its required rate of return. Firm's future cash flow could be estimated by forecasting future earnings on the basis of firm's historical earnings and the expected growth of both the firm and the market. The required rate of return that is used to discount the firm's estimated future cash flow has to reflect the risk of those cash flows.

Non traded or unlisted firms play a vital role in a country's economy. They primarily form the small and medium size sector. According to the ministry of micro, small and medium enterprise, Government of India, there are 13 million SMEs in the country. That account for 80% of all SMEs in India. These entities play an important role in economic growth in terms of employment and GDP. In India SMEs contribute 8-9% to GDP and employ over 41 million people.

LITREATURE REVIEW

Modigliani and Miller (1958) studied the effect of leverage on the firm's value. Modigliani and Miller (1958) proposition 1 states that, in the absence of taxes, the firm's value is independent of its debt, i.e., $E + D = V_u$, if $T = 0$. E is the equity value; D is the debt value, V_u is the value of the unlevered company and T is the tax rate. In the presence of taxes, Modigliani and Miller (1958) second proposition states that the required return on equity flows (K_e) increases at a rate that is directly proportional to the debt to equity ratio (D/E) at market value:

$$K_e = K_u + \frac{D}{E}(1-t)(K_u - K_d) \qquad \text{.......1}$$

In the presence of taxes and for the case of perpetuities, Modigliani and Miller (1963) first proposition is transformed into:

$$E_O + D_O = V_u + D_t \qquad \text{..............2}$$

where D_t is the value of the tax shield (V_{TS}) for perpetuities. But it is important to note that Modigliani and Miller (1963) arrive at the value of the tax shield (V_{TS}) by discounting the present value of the tax savings due to interest payments of a risk-free debt (TD_{RF}) at the risk-free rate (R_F). Modigliani and Miller (1963) also state in their paper that, in an investment that can be financed totally by debt, the required return on the debt must be equal to the required return on the asset flows: if D / (D+E) = 100%, $K_d = K_u$.

The purpose of Modigliani and Miller (1963) was to illustrate the tax impact of debt on value. They never addressed the issue of the riskiness of the taxes and only dealt with perpetuities. If we relax the no-growth assumption, then new formulas are needed. In the case of dividends, Modigliani and Miller (1963) said that they were irrelevant if the taxes on dividends and capital gains were the same. Given equal taxes, the shareholder would have no preference between receiving dividends or selling shares.

Modigliani & Miller (1963) give a number of valuation formulas:

$$WACC = Ku\{(1-t) \times [D/(D+E)]\} \qquad \text{..........3}$$

$$WACC_{BT} = Ku - \frac{[D \times t \times (K_u - K_d)]}{E + D} \qquad \text{..........4}$$

However, in their last equation, Modigliani & Miller (1963) propose calculating the company's target financial structure [D/ (D+E)] using book values for D and E, instead of market values.

Damodaran (1994) argues that if the business's full risk is borne by the equity, then the formula that relates levered beta (β_L) to asset beta (β_U) is: $\beta_L = \beta_U + (D/E)\ \beta_U\ (1 - T)$. This expression is obtained from the relationship between levered beta, asset beta, and debt beta according to Fernández (2004), eliminating the debt beta. It is important to realize that eliminating the debt beta is not the same as assuming it is zero (Damodaran, 1994). According to Hamada (1972) $\beta_m = \beta_u[1 + \frac{D_t}{E_t}(1-\tau)]$; where is β_m is the market β, β_u is the â of the corresponding firm without leverage, E_t is the market value of equity at period t, D_t is the market value of debt at period t and τ is the corporate tax rate. This formula has proven to be useful in many applications. The classical case is the evaluation of unlisted firms, where Hamada's formula allows the â coefficient to be obtained from market data on comparable firms while controlling for differences in the financial structure (Eric de Bodt and Michel Levasseur, 2007)

The value of tax shields (VTS) defines the increase in the company's value as a result of the tax saving obtained by the payment of interest. However, there is no consensus in the existing literature regarding the correct way to compute the VTS. Modigliani and Miller (1963), Myers (1974), Luehrman (1997), Brealey and Myers (2000) and Damodaran (2006) propose to discount the tax savings due to interest payments on debt at the cost of debt (R_d), whereas Harris and Pringle (1985) and Ruback (1995, 2002) propose discounting these tax savings at the cost of capital for the unlevered firm (R_a). Miles and Ezzell (1985) propose discounting these tax savings the first year at the cost of debt and the following years at K_u.

Real options analysis arose due to the need to introduce flexibility into managerial decision making processes and the limitations of capital budgeting technique (Schwartz and Trigeorgis, 2004). Early critics (e.g., Dean (1951), Hayes and Abernathy (1980), Hayes and Garvin (1982)) argued that standard discounted cash flow (DCF) analysis may lead to undervaluation of investment opportunities as strategic considerations associated with a project were overlooked. Decision scientists (Hertz (1964), Magee (1964)) thought the problem was the application of incorrect valuation methods and used decision tree analysis to capture the additional value from flexibility in decision making. Myers (2004) argued that undervaluation of investments was a combination of mis-specified DCF analysis and the inability of DCF analysis to value investments with a range of operating or strategic options. Real options provide a framework for decision making under uncertainty where the value of an investment is enhanced by the flexibility of future options i.e. decisions that can be delayed or rescinded to enhance upside potential and/or contain downside losses of the investment. Real option approaches have been posited as both an analytical tool to value specific opportunities, that is real options valuation (ROV) (Trigeoris, 1998), and a strategic heuristic to aid decision making under conditions of uncertainty often referred to as "real options thinking" (McGrath, 1997).

VALUATION MODELS

The cost of equity capital is an important measure for purposes including valuation, capital expenditure assessment, regulatory determinations and performance analysis. The standard approach to estimating the cost of equity capital is the Capital Asset Pricing Model, whose key variable is beta (systematic risk). The CAPM builds on the model of portfolio choice developed by Harry Markowitz (1959). Sharpe (1964) and Lintner (1965) add two key assumptions to the Markowitz model to identify a portfolio that must be mean-variance-efficient. CAPM states that in equilibrium, assets should be priced in such a way that the expected return is equal to the risk free rate of interest plus a risk premium. The risk premium is equal to the beta of the asset (a measure of the sensitivity of the return of the assets in terms of the market return) multiplied by the market risk premium (Market return, R_m minus risk free rate, R_f). The CAPM is used as an *ex ante* model. This means that it is used to make point estimation for the future return. To do this we have to plug into the model the expected values of the risk free rate, the market return and the beta for the asset. Usually we use the historical values for these parameters (Ignacio Velez-Pareja, 2005).

For a publicly listed company with sufficient data, the most common way to estimate beta is to regress a company's returns against the returns to the market. For all other cases, an alternative approach is needed to estimate beta. The most common approach for estimating the beta of a non-traded firm or for a division is to use the average of the betas of comparable publicly listed companies (comparable company analysis) as a proxy (Robert G. Bowman and Susan R. Bush, 2004)

For perpetuities with a constant growth rate (g), the relationship between expected values of the free cash flow (FCF) and the equity cash flow (ECF) is:

$$ECF_0(1+g) = FCF_0(1+g) - D_0R_d(1-t_c) + gD_0 \quad ......5$$

The value of the equity today (E) is equal to the present value of the expected equity cash flows. If R_e is the average appropriate discount rate for the expected equity cash flows, then $E = ECF_0 \frac{1+g}{R_e-g}$ and equation 5 is equivalent to:

And the general equation for the R_e is:

$$R_e = R_a + \frac{D}{E}[R_a - R_d(1-t_c) - \frac{VTS}{E}(R_a = g) \quad ....6$$

is equivalent to equation (10) of Farber *et al* (2006) because $VTS \frac{DRdTc}{R_{ts}-g}$

The WACC is the appropriate discount rate for the expected free cash flows (Pablo Fernandez, 2006), such that

$$D_0 + E_0 \frac{FCF_0(1+g)}{(WACC-g)} \quad ....7$$

Discounted Cash Flow Model

DCF method involves forecasting a set of future cash flows and discounting them at appropriate discount rate. In corporate finance, free cash flow (FCF) is cash flow available for distribution among all the securities holders of a company. They include equity holders, debt holders, preferred stock holders, convertible security holders, and so on.

Free Cash Flow = $EBIT_t(1-t_c) + Dep_t$ & $Amort_t$ – CAPEX ± rWC 8

$$DCF\,Valuation = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + ... \frac{CF_n}{(1+r)^n} \quad ....9$$

where,

CF = Cash Flow

r = discount rate (WACC)

AIS reflects a two stage growth model in its future growth trajectory.

Relative Valuation / Comparable Method

Relative valuation also known as comparable method, uses market prices from observed transactions to impute the value of a firm or investment opportunity. It involves using a price multiple to evaluate whether an asset is relatively fairly valued, relatively undervalued, or relatively overvalued in relation to a benchmark value of the multiple. Choices for the benchmark value of a multiple include the multiple of a closely matched individual stock and the average or median value of the multiple for the stock's peer group of companies or industry. The economic rationale underlying the method of comparables is the law of one price—the economic principle that two identical assets should sell at the same price.

This method assumes similar assets should sell at similar prices. The critical assumption underlying the approach is that the "comparable" assets/transactions are truly comparable to the investment being evaluated. The method of comparables is perhaps the most widely used approach for analysts reporting valuation judgments on the basis of price multiples. The choice of the multiple is very critical for getting accurate estimates from this model as the choice of multiple is based on the nature of the industry and its fundamentals and the common practices prevalent therein.

The loose definition of a multiple, theoretically, allows calculating a huge number of different multiples for a given firm. In order to analyze specific characteristics of a certain types of multiples, a two dimensional categorization scheme, as shown in Equation 14, is beneficial. In the first dimension, the scheme focuses on the numerator of a multiple and differentiates between equity value and equity value multiples. Equity value multiples are based on the stock price or the market capitalization of a firm, whereas entity value multiples are based on the enterprise value of the firm. Formally an equity value multiple, $\lambda_{i,t}^{equity} = \frac{p_{i,t}^{equity}}{x_{i,t}}$ 14

Where $p_{i,t}^{equity}$ is the current market value of common equity and $x_{i,t}$, is the underlying value driver of the multiple. Similarly, an equity value multiple $\lambda_{i,t}^{equity}$ of the same firm at time t can be written as

$$\lambda_{i,t}^{equity} = \frac{p_{i,t}^{equity}}{x_{i,t}} = \frac{p_{i,t}^{equity} + \hat{p}_{i,t}^{net\ debt}}{x_{i,t}} \quad \text{.......15}$$

Where is the current enterprise value which equals the sum of the market value of common equity and an estimator of the market value of net debt , and is again the value driver. The origin of the value driver in the financial statement constitutes the main differentiation criteria for the second dimension of the categorization framework, where we distinguish accrual flow, book value, cash flow, knowledge-related, and forward-looking multiples. Together, the first three types of multiples are also referred to as traditional or trailing multiples.

Real Option Analysis

The real options method applies financial options theory to quantify the value of management flexibility in a world of uncertainty. Similar to a financial option - that gives the holder to right, but not the obligation, to buy or sell a share at a particular date at a specified price - a real option gives the holder the right to take decisions regarding a physical asset at a pre-specified cost or prespecified time over the life of the option. Real options analysis allows decision makers to increase project value by identifying and taking advantage of opportunities to maximise gains or minimise losses in a dynamic marketplace.

Table 1: Mapping an investment opportunity into a Call option

Project	*Variable*	*Call Option*
Expenditures required to acquire assets	X	Exercise Price
Value of the operating assets to be acquired	S	Stock Price
Length of time decision may be deferred	T	Time to expiration
Riskiness of the underlying operating assets	σ^2	Variance of stock returns
Time value of money	R	Risk-free rate of return

Source: Investment options as real opportunities: Getting started with numbers, Timothy A. Luerhman, HBR (July- August 1998)

Owing to this mapping we can apply the Black schools option pricing model (BSOPM). In 1973 Fischer Black and Myron Scholes published the Black Scholes formula for the valuation of financial options. They established that the value of an option could be estimated by constructing a replicating portfolio consisting of a number of shares in the underlying asset and a number of risk free bonds. Prices of bonds and underlying shares are directly observable in the financial market so the value of the replicating portfolio can be directly observed. The existence of a replicating portfolio implies there is a combination of the option and underlying asset that is risk free. Therefore the risk free rate can be used during the option pricing calculation and is usually taken as the interest rate on a government guaranteed financial instrument like a Commonwealth Treasury Bond.

The Black Scholes formula estimates values for a call price (c) or put price (p) as follows:

$$C(S,t)=S\Phi(d_1)-Ke^{-rt}\Phi(d_2) \quad \ldots\ldots\ldots\ldots 16$$

$$P(S,t)=Ke^{-rt}\Phi(-d_2)-S\Phi(-d_1) \quad \ldots\ldots\ldots\ldots 17$$

$$d_1=\frac{\log\left(\frac{S}{K}\right)+\left(r+\frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}} \quad \ldots\ldots\ldots\ldots 18$$

$$d_2=d_1-\sigma\sqrt{t} \quad \ldots\ldots\ldots\ldots 19$$

Here, log denotes the natural logarithm, and:

S = the price of the underlying stock

K= the strike price

r = the continuously compounded risk free rate

t = the time in years until the expiration of the option

σ = the implied volatility for the underlying stock

Φ = the standard normal cumulative distribution function

DCF methods of valuation face significant problems. Apart from the difficulty of estimating future cash flows, traditional discounted cash flow (DCF) methods have long been recognised as having two main flaws when it comes to evaluating risky enterprises (Hodder & Riggs, 1985). The first problem is that they normally assume a constant discount rate, and therefore do not account for the time-varying risk profile typical of most real new venture situations. A related problem is to determining how to adjust the discount rate to take account of perceived risk. The second problem with DCF methods is that they fail to capture the value created by future managerial flexibility – whereby the upside of opportunities can be seized, and the downside of possible risks can be minimised.

Real option analysis (ROA) to valuation has emerged as a promising method for addressing both of these shortcomings of traditional DCF methods. To address the first problem, ROA accounts for risk using market-based volatilities. Hence the contentious issue of determining a discount rate to account for risk is avoided. In dealing with the second problem, ROA explicitly accounts for the option value inherent in new technologies - that is, the flexibility of future decisions increases the value of the technology. This will normally occur for technology investments because investments are incremental and sequential in nature (such as stages of technology development, commercialisation, market launch), and the decision maker has the option available to abandon certain paths (i.e. has no obligation to make investment in future stages). Decisions are made in an uncertain environment, and uncertainty decreases over time as more information is obtained. Hence, better, more informed decisions can be made about further investment (or not) at later points in time (Steffens Paul R. and Douglas Evan J, 2007).

Discounts and adjustments

Most of the non trading firms' investors might not be diversified. On the other hand, some procedures catch total risk (systematic and non systematic), while others catch only systematic risk. The methods that include total risk are those based on subjective assessment of risk and those based on analysis of historical data include only systematic risk. McMahon and Stanger (1995) say that the financial objective function for small enterprises has to be redefined taking into account several dimensions: Return, Risk, Liquidity, Diversification, Transferability, Flexibility, Control and Accountability. They recognize that some returns might be pecuniary and others will be non pecuniary. Because of the difficulty of estimating the cost of capital of small illiquid businesses, venture capital companies which specializes in buying and selling small illiquid businesses, will often use a discount rate of 20-50% for the cost of equity capital" (Heaton, 1995). There is evidence that non traded firms and even traded firms in emerging markets bear some non diversifiable risk that has to be included in total risk measurements.

BACKGROUND OF THE COMPANY

All in Smoke Ltd is a cigarette manufacturing plant. It is a wholly owned subsidiary of one of the largest cigarette manufacturing firms in the country. Till 2002 it used to sell tobacco to players other than its parent company also but thereafter it has been exclusively manufacturing for its parent company. It had considered going public in recent times whereby it could have easily raised somewhere around 2000 crores from the market but that did not materialize due to inside reasons. The firm has a peculiar business model which renders it fundamentally different from other industry players. The revenues of this company are manufacturing fee based; raw material is being provided by the parent company at their own cost since 2002; the profits of this company have been diverted to its holding company in recent times; further this company bears no marketing expenses.

Cigarette Industry is a dynamic arm of FMCG where the inventory is pretty fast moving unlike common FMCG products. The demand for cigarettes is ever increasing and due to it being addictive product things like recession, slowdown etc hardly affects the sales of this industry. The following key statistics are from its financial statements for fiscal year 2008:

- Fiscal Year Ends: 31st March
- Total Debt/Equity: 0
- Licensed Cigarette Capacity: 10,000 Million
- Installed Cigarette Capacity: 7209 Million
- Annual Production: 9121 Million
- Public Issue: Nil
- Turnover: 338.835 crores
- Total number of Equity shares: 100,000 of Rs 100 each (99,994 shares are held by ABC Ltd and 6 shares are held by individuals as nominees of the company)
- Earnings per share: Rs 64.42

The cigarette industry in India has five firms listed at BSE.

DATA & METHODOLOGY

Data available:

Primary Data:

- Annual Reports of the closely held, unlisted private firm
- Future plans of the management

Secondary Data:

- Annual reports of industry peers
- Macroeconomic data

Management Perspective

- The plant is expected to undergo a Rs 50 crore approx expansion in 2013

Methodology Adopted

Estimating Beta

Step 1	Identify comparable companies
Step 2	Obtain estimates of the equity betas of the firms
Step 3	Unlevel the equity betas
Step 4	Estimate the average asset beta
Step 5	Relever the average asset beta to obtain an equity beta estimate for the subject firm

Identifying comparable companies is often the most critical step, as it involves judgment. The major advantage here is that it is objective. One drawback is that the beta of a diversified firm may not be representative of the beta of the industry. Although comparable companies may be similar in business risk, financial leverage will differ, directly impacting firm systematic risk. An unlevering process removes the risk associated with financial leverage. There are several possible ways to unlever an equity beta. Most corporate finance textbooks follow Hamada (1972) and Rubinstein (1973) to identify the impact of financial leverage on the beta of a levered firm. When all the companies' betas have been unlevered, calculate a simple average of all comparable firm asset betas in an industry to make an estimate of the asset beta for the test firms in that industry. The asset beta relevered to reach a levered beta estimate for that firm is the comparable estimate of a test firm's equity beta.

Discounted Cash Flow Model

Step 1	Calculate "Cost of Equity" using CAPM model
Step 2	Calculate FCFs from past available data
Step 3	Forecast different components of cash flow
Step 4	Apply DCF Model for two-stage growth

For forecasting the future cash flows we use Regression technique and build equations for different components of free cash flows. Then "FORECAST" function of Excel® spreadsheet has been used for forecasting the independent components of different regression equations.

This function Hide All calculates, or predicts, a future value by using existing values.

Real Option Analysis Model

Step 1	Calculate FCFs without expansion and calculate their PV using DCF model.
Step 2	Segregate cash flows for expansion. Develop the cash flows for the Expansion Option, assuming it as an upcoming project, separate from the existing one.
Step 3	Calculate volatility of the asset returns for future expansion; Calculate the volatility in the returns of the stocks of the holding company
Step 4	Use Black Scholes model to evaluate the expansion project
Step 5	Sum up the total firm value

Total firm value = Present value of firm without expansion (using DCF) + Present value of expansion using BSOPM (Black Scholes option pricing model)

Relative valuation Model

Step 1	Identify comparable firms and recent market prices of the same
Step 2	Calculate a "valuation metric" for use in valuing the asset; This is Market capitalization to Installed Capacity in our case.
Step 3	Calculate an initial estimate of the value of the firm.
Step 4	Refine or tailor the initial estimate to the specific characteristics of the investment; done using appropriate Illiquidity discount

ANALYSIS AND RESULTS

Table 10.1 and 10.2 depict the calculation results of Bottom up Beta and the final figures of WACC using CAPM model. The detailed regression equations for each component of income statement are shown in table 10.3 also showing coefficient of determination and p value for each regression equation. Table 10.4 provides the spreadsheet view of projected free cash flows and gives the valuation using DCF method to be 529.86 crores. The details of Real option analysis are shown in table 10.5 whereby the value of expansion comes out to be 45.55 crores and the value of firm without expansion is 511.19 crores giving a total value of 556.74 crores. Relative/ comparable method is shown in table 10.6 which gives the final figures as 761.61 crores.

CONCLUSION

Financial models provide a starting point from which to judge a company's value and make decisions. For years, corporate executives and portfolio managers have been using value based metrics like DCF and EVA, to help explain a firm's performance and determine its value. Each measure provides unique advantages over traditional, non-economic metrics, such as EPS and ROE.

In the end, with the evolution of financial concepts and improvements, there is no single approach that should be totally ignored. It is important to genuinely understand the assumption behind each metric to avoid conclusions that are driven by a model's assumptions, rather than the economic facts of the problem. In the future and maybe for the time being, there is new research and new models that will possibly further improve the financial concepts. The eventual answer could be that there is no single financial model that can totally replace another and be the panacea. Each of them applies different assumptions and yields a different conclusion. Each framework will generate different answers when applied to real world situations. A manager or on analyst might need multiple points of view in order to make a wise decision.

In this project, DCF, ROA and Relative valuation model have been used in valuation and there are many more financial models that have merit. Tracking companies and comparing the performance among different companies and industries were not studied. They represent topics that are available for future research. The intention is to see how these models track companies and maybe some models are more suitable for certain industries. The final goal is to understand better each of these models, and by that having a better understanding of value of a company.

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ANNEXURE

Table 1: Key variables of Company and Market

Parameter	Value
Risk-Free Rate, R_f	4.51%
Market Return	12.63%
Beta, β	0.58912016
Equity Risk Premium, R_p	8.13%
Cost of Equity	9.293%
Cost of Debt (Before Tax)	NA
Cost of Debt (After Tax)	NA
Capital Structure, % Equity	100.00%
Base WACC	9.29%
Average ROIC	16.14%
Average ROE	4.15%
Growth rate of firm	4.15%

Table 2: Calculation of Bottom-up Beta and WACC

Firm	Regression Beta	D/E Ratio	Effective tax rate (in %)
Rosser Ltd	0.22	1.07	12.66%
Lifton Ltd	0.56	0.01	40.22%
Skelly Ltd	0.78	0.21	6.54%
Industry Average	0.52	0.43	19.80%
All in Smoke Ltd	NA	0	39.46%
Unlevered Industry Beta	0.3866		
Levered Beta of AIS	0.3866		
Adjusted beta of AIS	0.5890		
WACC	0.0929		

Table 3: Regression model

Parameter	Equation	C Co efficient of determination, R^2	Adjusted R^2	P Value (α=0.05)
Revenues	Revenue = (3.33*GPI Sales) -(0.144* Tobacco Industry)-(0.18*Plant capacity) + (0.27* Expansion) -(11.17*GDPgrowth) + 21089.11	0.77	0.20	0.47
Operating Expenses	Operating Exp= (1.82* Fuel cost) + (1.55* Labour cost) + (1.05* Rent) -(0.84* Repair & maintenance) + 703.99	0.81	0.56	0.18
Depreciation	Depreciation= (0.03* Plant & Mach) + (0.16* Elect equip) -(0.52* Motor vehicles)-(0.004* Buildings)+ 121.67	0.94	0.88	0.02
Working Capital	Working capital=(0.88*Inventory)+(3.52*Cash & bank balances) + (0.15* Loans & advances)+ (1.08*Current Liab) + 12.52	0.99	0.98	0.0007
Capital Expenditure	CAPEX= (0.88* Expansion)+(0.42* Repair & maintenance)- 2.73	0.97	0.95	0.0002

Table 4: Calculations of DCF approach

Projected FCFs with Expansion (in Rs lacs)	**2008 (t=0)**	**2009 (t=1)**	**2010 (t=2)**	**2011 (t=3)**	**2012 (t=4)**	**2013 (t=5)**	**2014 (t=6)**	**2015 (t=7)**	**2016 (t=8)**
Net Revenues	3388.35	**3089.07**	**3343.61**	**3492.57**	**3657.50**	**3769.44**	**5079.45**	**4598.00**	**4873.87**
Miscellaneous Income	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Revenues	3338.35	3089.07	3343.61	3492.57	3657.50	3769.44	5079.45	4598.00	4873.87
Revenue Growth Rate	17.25%	-7.47%	8.24%	4.45%	4.72%	3.06%	34.75%	-9.48%	6.00%
EBIT	52.26	521.98	776.52	697.10	691.32	577.47	1744.51	1093.23	1219.62
Cash Tax Rate	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%
Income Taxes	19.33	193.15	287.34	257.95	255.82	213.68	645.53	404.54	451.30
PAT	32.92	328.83	489.18	439.15	435.51	363.78	1098.98	688.70	768.32
Add: Depreciation	269.07	174.33	231.49	186.05	241.48	213.18	183.22	205.63	145.74
Less: Increase in Working capital	-161.69	-159.77	-223.41	-223.41	-116.44	-242.51	-8927.56	-170.37	-4581.99
Less: Capital Expenditures	819.95	819.95	899.66	991.77	1078.45	5123.66	549.17	616.05	684.24
Free Cash Flow	24.89	-157.03	44.42	-143.17	-285.02	-4304.19	9660.58	448.65	4811.80
Terminal Value									97443.58
WACC	9.29%								
Discount Factor		0.91	0.84	0.77	0.70	0.64	0.59	0.54	0.49
Present value of FCFs(inc terminal Value in 2016)	24.89	-143.68	37.18	-109.67	-199.76	-2760.64	5668.26	240.86	50228.30
Total Value(in Rs crores)	**529.86**								

Table 5: Calculations of Real Option Approach

Projected FCFs without Expansion									
(in Rs lacs)	***2008 (t=0)***	***2009 (t=1)***	***2010 (t=2)***	***2011 (t=3)***	***2012 (t=4)***	***2013 (t=5)***	***2014 (t=6)***	***2015 (t=7)***	***2016 (t=8)***
Net Revenues	3388.35	3089.07	3343.61	3492.57	3657.50	3769.44	3941.10	4028.83	4142.07
Miscellaneous Income	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Revenues	3338.35	3089.07	3343.61	3492.57	3657.50	3769.44	3941.10	4028.83	4142.07
Revenue Growth Rate	17.25%	-7.47%	8.24%	4.45%	4.72%	3.06%	4.55%	2.23%	2.81%
EBIT	52.26	121.69	776.52	697.10	691.32	577.47	606.17	524.06	487.83
Cash Tax Rate	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%	37.00%
Income Taxes	19.33	45.03	287.34	257.95	255.82	213.68	224.30	193.92	180.51
PAT	32.92	76.66	489.18	439.15	435.51	363.78	381.86	330.14	307.31
Add: Depreciation	269.07	174.33	231.49	186.05	241.48	213.18	235.08	257.49	223.53
Less: Increase in Working capital	-423.93	-161.70	-159.77	-223.41	-116.44	-242.51	-8927.56	-170.37 -	-4581.99
Less: Capital Expenditures	701.03	819.95	899.66	991.77	1078.45	491.38	549.17	616.05	684.24
Free Cash Flow	24.89	-407.26	-19.23	-143.17	-285.02	328.10	8995.33	141.95	4428.59
WACC	9.29%	9.29%	9.29%	9.29%	9.29%	9.29%	9.29%	9.29%	9.29%
Discount Factor		0.91	0.84	0.77	0.70	0.64	0.59	0.54	0.49
Terminal Value									97443.58
Present Value of FCF (inc terminal value in 2016)	24.89	-372.64	-16.10	-109.67	-199.76	210.40	5277.93	76.21	50228.30
Total value (in Rs Lacs)	51119.387								

Particular	Value (in Rs crores)
S, Present value of DCF of Phase 2	45.55
PV(x)	
CAPEX Phase 2	46.32
WC Phase 2	0
Hence PV(x)	39.36
NPV_q .i.e (S ÷ PV(X))	1.157033243
Volatility, St dev	9.0972
Time	5 Years
d_1	10.1780497
d_2	-10.16370884
$\Phi (d_1)$	1
$\Phi (d_2)$	0
Value of call option i.e. expansion	45.55
Total Value without expansion	511.19
Total Value of the firm	556.74

Projected FCF's for Expansion				
(in Rs lacs)	***2013 (t=5)***	***2014 (t=6)***	***2015 (t=7)***	***2016 (t=8)***
Initial Inv in CAPEX	4632.28			
Free Cash Flow	0	665.255	306.697	383.212
WACC	0	0.093	0.0929	0.0929
Discount Factor	0	0.586	0.536	0.491
Present Value of FCFs	0	390.332	164.651	188.235
Total PV of FCFs, S	4555.16			
Initial Investment, X	4632.29			
Present value of X, PV(X) @ risk free rate, R_f	3936.94			
Time to Expansion, t	5 years			
Volatility, б	9.0972			
Value of the project using BSOPM (in Rs Lacs)	4555.16			
Total Firm value (in Rs crores)	**556.74**			

Table 6: Calculations of Relative Valuation Method

Firm	**Capacity in 2008 (in million units)**	**Market Cap (in Rs Crores)**	**Market Cap to Capacity Ratio**
Rosser Ltd	25318	5700	0.2251
Lifton Ltd	17322	790	0.0456
Skelly Ltd	13200	1150	0.0871
Our Firm	7209	Nil	Nil

Average Multiple	0.0000119
Estimated Market Value of our firm (in Rs crores)	1088.02
After Illiquidity discount @ 30%	**761.61**