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Valuation of Selected Indian Stocks Using Discounted Cash Flow Technique

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ABSTRACT: *The present paper aims at using a valuation model based on Discounted Cash Flow Method. Quarterly intrinsic values for the year 2010 are calculated by this model. The calculated Intrinsic values are compared with the corresponding market values in order to know whether the model is capable enough to capture the market price or not. Welch's t-test is conducted to check the significance level between the two values and robustness of the model. Selected "A" category companies are taken for the study and the time period of the study is from 1st January, 2001 to 31st December, 2010.*

KEYWORDS: *Stock valuation, EFCF Model, Intrinsic value*

I. INTRODUCTION

The intrinsic value of an equity share depends on a multitude of factors. The earnings of the company, the growth rate and the risk exposure of the company have a direct bearing on the price of the share. In real world, analysts have been grouped into either Technical or Fundamental camps for many years but if truth be told there are very few pure technicians or fundamentalists exist. Fundamental analysts cannot really ignore the effect and timing of economic announcements and technical analysts cannot really ignore various signals derived from the study of historic prices and volatility. It is fairly difficult to take into account all the different economic announcements as well as the political and social situations that affect an economy particularly in today's global market. However by understanding the basics and delving deeper into the various fundamentals of the economies, one will likely create a valuation model that can capture the true value of securities that are traded in market.

II. LITERATURE REVIEW

The value of an asset is the present value of all its future cash flows. In other words the future cash flows generated by the asset should be discounted at the required rate in order to know its present intrinsic value. Keeping this logic in mind, generally the cash flow based valuation techniques are much in use.
Cash flow based valuation approach is divided into two parts.
1) Dividend Discount Model and
2) Discounted Cash Flow (DCF) Model.

Penman and Sougiannis (1998) and Francis, Olsson and Oswald (2000) do not take into account the fact that the same assumptions must be applied to the models so that they yield identical valuations. The use of simplifying assumptions in both studies makes the link between the forecasted financial statements and the input in the different valuation approaches most likely inconsistent. Based on these distinct assumptions, both studies suggest that RIM is superior to the other models. Therefore, these two studies indicate that if the internal coherence between the three valuation models is violated, the RIM yields more accurate firm value estimates than the FCF or the DDM, most likely due to the use of different assumptions.Several authors have shown that there is a theoretical equivalence between the free cash flow model, the dividend discount model and the residual income model. Penman (2000) states that these valuation techniques should give consistent and identical estimates of intrinsic firm value, provided that all the forecasts of the different items are consistent with each other within a clean surplus relationship and all the assumptions are identical. Moreover, for all sets of accounting rules, these models produce the same valuation when infinite-horizon forecasts are used. Thus, the dividend, cash flow and residual the study assumes different circumstances for beta coefficient as well as the growth rate estimates. First, the study assumes that the growth rate is unified in the DDM and the CFM and then it will be different. Second, the study assumes that the fundamental attributes will be discounted by the cost of equity based on firm's beta and then they will be discounted by the cost of equity based on firm industry's beta. Gentry et al (2003) provide an integrated valuation system (IVS) that allows for academia and practitioners to simulate changes in the firm's financial strategy and the effects of these changes on the value of a stock. Moreover, they introduce theoretically the conditions when the DDM value estimates are equal to the CFM value estimates.

They state that the only time for the equivalent condition is when the payout ratio is equal to one as well as the return on investment equals the cost of equity.The two popular valuation techniques, dividend discount model (DDM) and free cash flow model (CFM) are examined by Walid Saleh et al (2008) with the aim to assess the performance of these valuation models under different circumstances taking cost of equity as well as growth rate into consideration and compared the actual traded prices with calculated intrinsic values. Their study used two approaches, portfolio analysis approach and individual securities approach. They found that the DDM approach outperforms the CFM approach in all metrics and proves its superiority in valuation methods.
Adams et al (2009) argue that traditional approaches like DDM do not reflect the metrics of a majority of young entrepreneurial firms as the theory of modern corporate finance was not developed with the small business in mind, even when the company is publicly traded. According to them DDM approach is not applicable to the firms that do not pay dividends. So, they had taken the Residual Income Model (RIM) and method of comparables approach and examined by taking 5000 privately traded firms ranging from in value from $10 MM to $250MM.

Their study suggests that earnings, book value and spread between cost of capital and ROE provide important incremental information in predicting price. Moreover they marked employing the median multiple yields a more accurate firm equity pricing model. S.N.Kaplan and R.S. Ruback. (1995) compare the market value of highly leveraged transactions to the discounted value of their corresponding cash flow forecasts. For the authors' sample of 51 highly leveraged transactions completed between 1983 and 1989, the valuations of discounted cash flow forecasts are within 10 percent on average of the market values of the completed transactions. Their valuations perform at least as well as valuation methods using comparable companies and transactions. The authors also invert their analysis by estimating the risk premium implied by transaction values and forecast cash flows and relating those risk premiums to firm and industry betas, firm size, and firm book-to-market ratios. Because of some basic limitations, the study has not taken DDM approach into consideration and has used Discounted Cash Flow Model.

III. OBJECTIVES OF THE STUDY

Many analysts believe that market behaves irrationally. So, it cannot capture the true value of the stocks and as a result some stocks are over-valued and some are under-valued. The present paper tries to find out whether the fundamental value is reflected in the market share price or not. So, the objectives are set as follows

1. To make a fundamental Analysis of selected firms.
2. To identify the variables for the intrinsic value of the firm's equity.
3. To use various models using the variables identified above to determine the probable intrinsic value.
4. To compare the calculated intrinsic values with their corresponding market values.

IV. RESEARCH METHODOLGY

4.1. Selection of companies

The present study has used 5 different companies from 5 different Industries. Only Manufacturing sectors are taken into consideration as service sector is more affected by the global factors. Selection of sample companies is based on two criteria. First, they all are index companies and second, these companies are NSE "A" category companies. So, the selected companies are as follows.

1. Automobile Industry- HeroMotoCo.
2. Pharmaceutical Industry- Cipla
3. Heavy Industry- SAIL
4. Petrochemical Industry- ONGC
5. FMCG Industry- HUL

4.2. Data & Time period of the study

All data are secondary in nature. To calculate the intrinsic values of the selected companies, all financial values are taken from Prowess Database and CMIE Database. To calculate the market price of the selected companies' shares, corresponding closing prices are taken from the official website of NSE i.e. www.nseindia.com. Time period of the study covers 10 years i.e. from 1st January, 2001 to 31st December, 2010. To provide us enough data point for a meaningful analysis a period of 10 years is taken for the study.

4.3. Methodology

In this study, a Discounted Cash Flow based valuation model is used i.e. Equity Free Cash Flow Model (EFCF Model). In this model, quarterly financial values of the year 2010 are used. To forecast the cash flow to future year, growth rate "g" has been used. Growth rate is calculated by multiplying ROE with retention ratio. Using

the growth rate, the calculated cash flow is forecasted to each quarter of 2011. Then using cost of equity this cash flow is discounted to each quarter of 2010. To compute cost of equity, CAPM Model is used.

4.4. Statistical tools used for the study

In the present study, to test the significance level of the difference between the calculated intrinsic value and its corresponding market value, Welch's t-test is conducted. This test is an adaptation of Student's t-test. In this test, two mean values are compared and it is applied where the sample sizes are not overlapping in nature. As in the study, the calculated intrinsic values and the market value, behave independently, this Statistical tool is used.

V. RESEARCH DESIGN

The present study has used Equity Free Cash Flow Model which is based on the principle that the future cash flow of a company should be free to be distributed among the share holders. Broadly speaking, Equity Free Cash Flow (EFCF) is the cash flow available to the company's suppliers of equity capital or equity shareholders, after meeting all operating expenses (including interest and tax), principal payment and necessary investments into short term assets i.e. Working capital and long term assets i.e. Capital Expenditure (Damodaran, 2004). The following formula is used for the model.

Vo = EFCF 1 / (1+ Ke)

Where Vo = the value of the stock
EFCF = Equity Free Cash Flow and
Ke = Cost of Equity

The above mentioned formula is divided into two parts. The nominator part and the denominator part.

5.1. Calculation of Nominator

Economically, the relevant cash flow to investors is the amount of money available for distribution to shareholders. This amount is popularly known as Equity Free Cash Flow. It adds back all non-cash charges to net income and accounts for future reinvestment needs such as capital expenditures and necessary investments in working capital. For this reason it is the relevant cash flow to discount. (Damodaran, 1996 and 2004). The calculation of EFCF would be as follows.

EFCF = Net Income +/- Changes in Working capital + Depreciation & Amortization – CAPEX

Where, EFCF = Equity Free Cash Flow
CAPEX = Capital Expenditure

Net Income is the most important input for calculating Equity Free Cash Flow. Net income is the major contributor to this free cash flow that is ready to be distributed among the shareholders of the company. For the present research net income of each sample company is taken from their corresponding income & expenditure statement. Prowess data base has been used for this purpose.Investment in working capital keeps the businesses go smoothly without any interruption in its performance. So, in the second step to calculate EFCF, the change in working capital should be added or subtracted from these earnings depending on whether more or less short term capital must be contained in the business to deal with future economic growth (Damodaran,2004). Change in working capital is taken from the funds flow statement of the company and used in this current work.

In the next step all non-cash expenses like depreciation and amortization are added back and future capital expenditure needs are subtracted (Damodaran , 2004). Depreciation and amortization expense is recorded against earnings on the income statement in order to spread the initial purchase price of a fixed asset. That is the reason they are added back with the net income of the company. For the research, these values are taken from the prowess database and used to calculate the intrinsic value of the sample companies.To sustain a firm's productive capacity and provide for growth in future cash flows, the firm must periodically make investments in new fixed assets like plant, land and building. These expenditures are referred to as capital expenditure (CAPEX). These expenditures create future benefits for the company. It yields benefits normally for a longer period of time. So, the sum of Net Income, working capital changes, depreciation and amortization and subtracting capital expenditure equals the Equity Free Cash Flow of any year. As the objective of the study is to calculate the intrinsic value of one stock, no of floating shares are divided from EFCF value. Once the value of EFCF is calculated for the year 2010 , using growth rates, it is forecasted for the year 2011. Having calculated EFCF for a given year, the most challenging task is to forecast it to some future period. In order to forecast it for some future time, growth rate is required. In the present study sustainable growth rate (g) i.e. ROE × b is used to forecast the EFCF for the year 2011.

Sustainable growth rate is the rate of earnings growth of a company that can sustain for a given level of return on equity keeping the capital structure constant. It is calculated by multiplying retention rate (b) with return on equity (ROE).

5.2. Calculation of Denominator

The Discounted Cash Flow Model is based on the principle that all future cash flows should be discounted at a required rate of return and that is the cost of equity. There are generally two methods of estimating the cost of equity. First, Rate of return model and second, CAPM. In Implied rate of return method it is assumed that the market price is right and cash flow to equity i.e. the expected dividend can be estimated on the stock by solving it for an internal rate of return that would make the present value of the cash flows equal to the stock price. This internal rate of return is the cost of equity.The CAPM can be expressed as the following expression that relates the required expected return of an investment to systematic risk and the relevant cost of equity is simply the rate of return investors expect from investing in the firm's stock.

So, **$Ke = Rf + \beta (Rm-Rf)$**

Where, Ke = Cost of Equity
Rf = Risk free rate
β = Systematic risk of an ordinary share of a company in particular
Rm = Expected market return and
Rm-Rf = Market risk premium

Risk free return is the rate of return on an investment with zero risk. This rate is expected by the investors from absolutely risk free investments. So, generally the rate on a Treasury bill is taken as the risk free rate. In India the risk free rate is generally the rate on a three month Treasury bill. This rate is fixed by the Reserve Bank of India's (RBI) central board of directors. For the year 2011, the risk free rate is 6.47% and in this present study the rounded value 6.5% is used. Beta (β), is the systematic risk of a company's common equity, which is estimated from a regression of a stock's return minus the risk free rate on a market return, such as S&P Nifty return or Sensex return minus the risk free rate. A company's beta represents the sensitivity of its equity returns to variations in the rates of return on the overall market portfolio. In this present work beta value of the sample companies for the year 2011 has been taken from the prowess database. Market risk premium is the value we get by deducting risk free return from market return. In security market line (SML) this is equal to the slope of SML line. In India , till 2007 , the market risk premium was around 12% (Pitabasa Mohanty , 2011) , but in 2008 , financial crisis affected the overall financial market and as a result the risk premium in 2010 was 6.1.. In this study, market risk premium for the year 2010 is 6.1 and this value is used to calculate the cost of equity.In order to calculate the market value of the sample companies' shares, their corresponding closing prices are taken and quarterly average is calculated. Next step includes testing the significance level between the calculated intrinsic values and the market values. Welch's t-test is conducted for this reason and null hypothesis is set accordingly. Given below the formula for t-test.

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}$$

$\bar{X}$ = Sample Mean
s^2 = Sample variance and
N1 = Sample size
To test the deviation between the intrinsic and the market value, the null hypothesis is as follows.

5.3. Null Hypothesis

$H0_{EFCF}$:μ , The difference between the calculated Fundamental value derived using the EFCF Model and Market value, is not significant.

VI. ANALYSIS & INTREPRETATION OF RESULT

6.1. HeroMotoCo

Cost of equity of the company (table 1) is 8.8%. Table 2 shows the forecasted cash flow of the company to each quarter of 2011. After discounting it to 2010, the calculated intrinsic values are as follows. Intrinsic values are given in table 7.

- The calculated intrinsic value of Hero Honda for the 1st quarter is 1995.89.Market value for this time period is 1820. So, the deviation between these two values is 8.81%.
- The calculated intrinsic value of Hero Honda share for the 2nd quarter of 2010 is 2011. Market value for this time period is 1902 and the deviation between the values is 5.42%.
- For the third quarter of 2010 the calculated value per share is 2002.Market value for this time period is 1920 and the deviation between the values is 4.09%.
- For the 4th quarter calculated intrinsic value per share for the 4th quarter of 2010 is 2085 .Market price of the company for this time period is 1956 and the deviation between the values is 6.18%.
- For Hero Honda, in EFCF Model, the t value using Welch's t-test (table 12) rejects the null hypothesis.

6.2. Cipla

Calculated cost of equity of the company (table 1) is 8.7%. Table 3 shows the details of the forecasted cash flow status to each quarter of the year 2011. The calculated intrinsic values are given table 8. Findings are as follows.

- The calculated intrinsic value of the share in the 1st quarter is 338.62. Market value is 334.2 and the deviation is 1.30%.
- In the second quarter, intrinsic value per share in this quarter is 322 and market value is 331. So, the deviation between these two values is 2.8%.
- In the 3rd quarter, the calculated intrinsic value per share in this quarter is 333 and the market value is 321. The deviation between the intrinsic and the market value is 3.6%.
- The calculated intrinsic value of Cipla share in 4th quarter of 2010 is 341 and the market value for this time period is 338. The deviation between the intrinsic value and the market value is 8.79%.
- In Welch's t-test (table 12) that is conducted for testing the significance level of the deviation between the market price and the intrinsic value, the t value is 0.466. It is less than the table value. So, in case of Cipla, the null hypothesis is accepted.

6.3.SAIL

According to table 1, the calculated cost of equity of the company is 11.7%. Table 4 gives the details of the forecasted cash flow status to each quarter of 2011 and table 9 shows the calculated intrinsic values for the year 2010. The findings are as follows.

- The intrinsic value of SAIL share in 1st quarter of 2010 is 231.4. The market share price is 260 which are 13% more than the intrinsic value.
- In the second quarter, the intrinsic value is 215. Market value is 225. Deviation between the values is 4.65%.
- In the 3rd quarter, the share price is moving between 185 and 225. Market price in this quarter is
- The intrinsic value in the 4th quarter of 2010 is 223 and the average market price of the share is 230. Deviation between the values is 3.13%.
- T-test result shows that the calculated t-value between the intrinsic and the market value is -1.269 which is less than the table value i.e. 3.182 .So , here null hypothesis is accepted that supports the performance of the EFCF Model.

6.3.ONGC

Cost of equity (table 1) of the company is 9.4%. Table 5 shows the details of the forecasted cash flow position for each quarter of the year 2011 and table 10 shows the calculated intrinsic values for the year 2010. Findings are as follows.

- Intrinsic value of ONGC, in the 1st quarter of 2010 is 1002. Market value in this quarter is 1023 and the deviation between the values is 2.09%.
- In the second quarter, the calculated intrinsic value is 1123, market value is 1211 and deviation is 7.83%.
- For the 3rd quarter, the calculated intrinsic value of ONGC is 1145. Market value for this time period is 1225 and deviation is 7%.
- In the 4th quarter, the intrinsic value is 1121.Market value in this quarter is 1226. So, the deviation between the prices is 9.36%.
- T-test result (table 12) of ONGC accepts the null hypothesis and supports the performance of the Valuation Model.

6.4. HUL

Cost of equity (table 1) of the company is 8.7%. Table 6 provides detailed forecasted cash flow position for the year 2011 and table 11 shows the calculated intrinsic values for the year 2010. Findings are as follows.

- In the 1st quarter, the calculated intrinsic value of HUL is 226. The average market price is 231.
- In the second quarter, the calculated intrinsic value is 219 and average market price is 230.
- In the 3rd quarter, the intrinsic value is 221 and the market value is 232. Deviation between the values is 4.97%.
- The calculated intrinsic value of HUL for 4th quarter of 2010 is 229, market value is 235 and the deviation between the values is 2.62%.
- T-test result (table 12) for HUL accepts the null hypothesis and supports the performance of this model in estimating the true value of the shares.

VII. CONCLUSION

In the present study, the aim was to calculate the fundamental or the intrinsic value of the selected companies' shares. EFCF Model has been used for this purpose. Using this model, the quarterly intrinsic values of the sample companies' share is calculated. Average quarterly market value is calculated by taking the average of the closing prices of the concerned company's share price. Then the calculated intrinsic value is compared with the corresponding market value. Deviation is expressed in percentage. A t-test is conducted to check the significance level of the deviation between the calculated intrinsic value and the market value. Accordingly the null hypothesis is set. Analyzing the t-test result, it is found that out of 5 t -values in EFCF Model, 4 t-values (except Hero Honda) are accepting the null hypothesis and supports the robustness of the EFCF Model. Taking the result into consideration, it can be safely concluded that "Valuation is not a total mystery. With correct values and right technique, the true value can be estimated".

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WEBSITES

- (http://www.scribd.com/doc/32121177/Market-Risk-Premium-Used-in-2010-by-Analysts-and-Companies)

VIII. ANNEXURE

Table 1: Calculation of cost of equity of sample companies

Company Name	Risk Free Rate (Rf)	β value	Market risk premium	Ke (Cost of Equity)
Hero Honda	**6.5%**	**0.39**	**6.1**	**8.8%**
Cipla	**6.5%**	**0.36**	**6.1**	**8.7%**
SAIL	**6.5%**	**0.86**	**6.1**	**11.7%**
ONGC	**6.5%**	**0.48**	**6.1**	**9.4%**
HUL	**6.5%**	**0.37**	**6.1**	**8.7%**

Table 2: Forecasted Equity Free Cash Flow of HeroMotoCo for each quarter of the year 2011

Quarters	Net Income	Changes in w.c.	Depreciation & amortization	Capital Expenditure	"g" (ROE×b)	Forecasted EFCF
Q1	**2180**	**902**	**927**	**2105**	**23.1%**	**2342.2**
Q2	**2197**	**911**	**987**	**2114**	**23.17%**	**2436.5**
Q3	**2213.2**	**925**	**1002**	**2205**	**23.13%**	**2380.56**
Q4	**2231.83**	**933.64**	**1092.2**	**2245.67**	**23.27%**	**2473.56**

(Values are expressed in crores)

Table 3: Forecasted Equity Free Cash Flow of Cipla for each quarter of the year 2011

Quarters	Net Income	Changes in w.c.	Depreciation & amortization	Capital Expenditure	"g" (ROE×b)	Forecasted EFCF
Q1	**1081.49**	**645**	**192**	**737**	**15.23%**	**1358.56**
Q2	**1108**	**554**	**123**	**742**	**15.17%**	**1199**
Q3	**1123**	**642**	**185**	**778**	**15.43%**	**1347.7**
Q4	**1208**	**668**	**190**	**825**	**15.82%**	**1427**

(Values are expressed in crores)

Table 4: Forecasted Equity Free Cash Flow of SAIL for each quarter of the year 2011

Quarters	Net Income	Changes in w.c.	Depreciation & amortization	Capital Expenditure	"g" (ROE×b)	Forecasted EFCF
Q1	**6754**	**3200**	**1337**	**6169**	**11.12%**	**5685**
Q2	**6542**	**3100**	**1205**	**6245**	**11.27%**	**5108**
Q3	**6781**	**3002**	**1206**	**6245**	**11.23%**	**5265.23**
Q4	**6823**	**3104**	**1312**	**6512**	**11.45%**	**5247**

(Values are expressed in crores)

Table 5: Forecasted Equity Free Cash Flow of ONGC for each quarter of the year 2011

Quarters	Net Income	Changes in w.c.	Depreciation & amortization	Capital Expenditure	"g" (ROE×b)	Forecasted EFCF
Q1	**16767.56**	**1126**	**8567**	**11057**	**13.21%**	**28864.5**
Q2	**15667**	**1012**	**8123**	**11058**	**13.23%**	**15530**
Q3	**16412**	**1023**	**8231**	**11123**	**13.49%**	**16433**
Q4	**16856**	**1056**	**8456**	**11212**	**13.47%**	**17126.2**

(Values are expressed in crores)

Table 6: Calculation of Forecasted Equity Free Cash Flow of HUL for each quarter of the year 2011

Quarters	Net Income	Changes in w.c.	Depreciation & amortization	Capital Expenditure	"g" (ROE×b)	Forecasted EFCF
Q1	2202.03	356	534	1308	7.28%	1908.2
Q2	2226	326	521	1309	7.29%	1887.6
Q3	2256	321	514	1312	7.24%	1903.5
Q4	2314	347	521	1356	7.3%	1953.8

(Values are expressed in crores)

Table 7: Calculated intrinsic value of HeroMotoCo for the year 2010 and comparison with market value

Quarters	intrinsic value per share	Market value	Deviation
Q1	1995.89	1820	8.81%
Q2	2011	1902	5.42%
Q3	2002	1920	4.09%
Q4	2085	1956	6.18%

Table 8: Calculated intrinsic value of Cipla for the year 2010 and comparison with market value

Quarters	Intrinsic value per share	Market value	Deviation
Q1	338.62	334.2	1.30%
Q2	322	331	2.8%
Q3	333	321	3.6%
Q4	341	338	8.79%

Table 9: Calculated intrinsic value of SAIL for the year 2010 and comparison with market value

Quarters	Intrinsic value per share	Market value	Deviation
Q1	231.4	228.67	1.17%
Q2	215	225	4.65%
Q3	219	231	5.47%
Q4	223	230	3.13%

Table 10: Calculated intrinsic value of ONGC of each quarter for the year 2010 and comparison with market value

Quarters	Intrinsic value per share	Market value	Deviation
Q1	1002	1023	2.09%
Q2	1123	1211	7.83%
Q3	1145	1225	7%
Q4	1121	1226	9.36%

Table 11: Calculated intrinsic value of HUL for the year 2010 and comparison with market value

quarters	Intrinsic value per share	Market value	Deviation
Q1	226	231	2.21%
Q2	219	230	5.02%
Q3	221	232	4.97%
Q4	229	235	2.62%

Table 12: Result of Welch's t-test

Name of the Company	t-test value in EFCF Model
Hero Honda	**3.494**
Cipla	**0.466**
SAIL	**-1.269**
ONGC	**-1.242**
HUL	**-3.262**