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Corporate Valuation: Theoretical Postulates and Empirical Evidence from SENSEX Firms in India

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Shri Dharmasthala Manjunatheshwara
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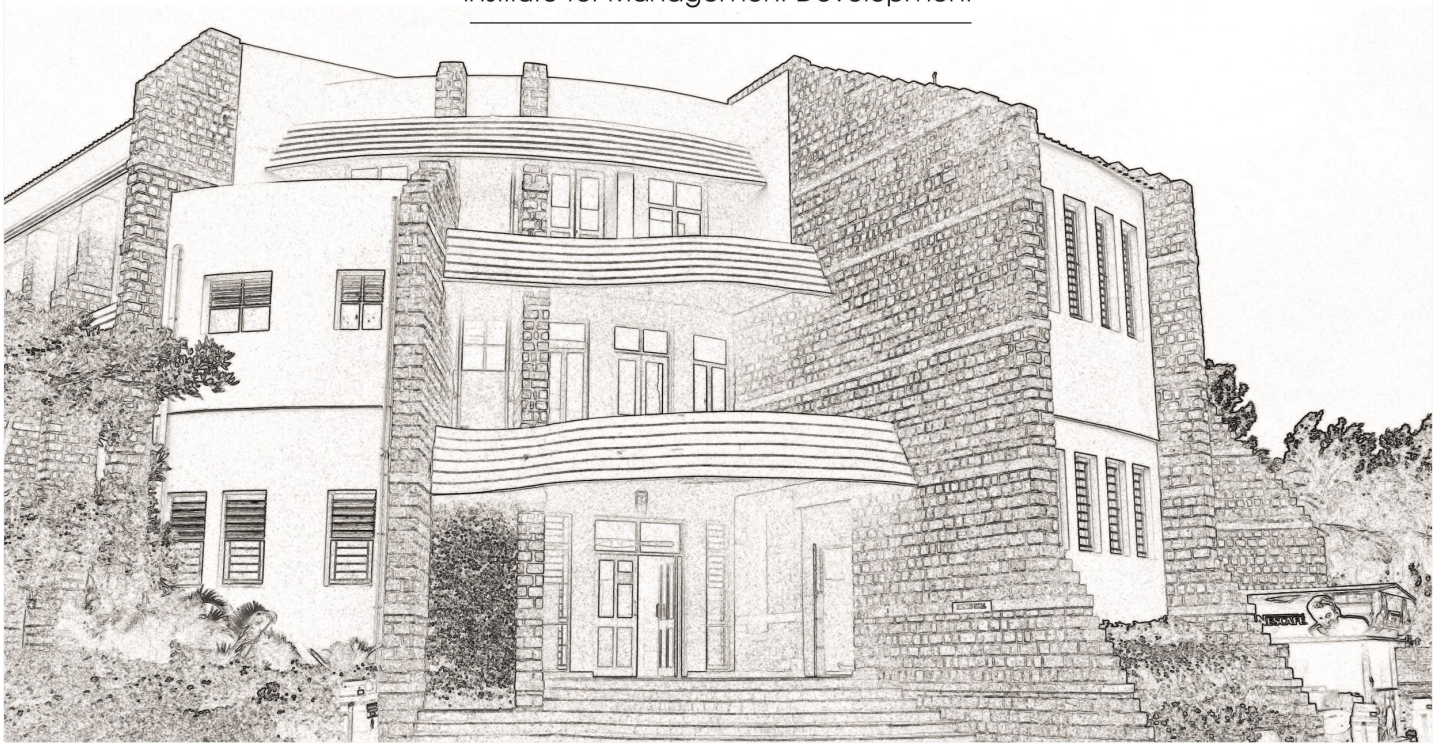

Corporate valuation: theoretical postulates and empirical evidence from SENSEX firms in India

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Note:

All views expressed in this work are that of the author(s). SDM RCMS does not take any responsibility for the views expressed herein by the author(s).

Preface

Research Center for Management Studies (RCMS), which was created five years ago at SDMIMD, has endeavoured to promote research in the field of management education in the Institute, in various ways. The Research Centre has encouraged faculty and students to actively take part in research activities jointly, collate and disseminate findings of the research activities through various types of projects to contribute to the body of knowledge to the academic fraternity in general, and management education in particular.

In this direction, keeping in line with the philosophy of promoting active research in the field of management to capture live situations and issues, the Research Center has taken a unique initiative to sponsor and encourage faculty members to carry out Applied Research Projects in various areas of management.

The duration of these projects is between four to eight months. At the end of the project, after peer review, a publication is taken out with an ISBN number by the institute. The projects help the faculty members, and the students, who work under the supervision of the faculty members for these projects, to identify issues of current importance in the field of management in various sectors. Data is collected mostly through primary research, through interviews and field study.

The institute takes into account the time and resources required by a faculty member to carry out such projects, and, fully sponsors them to cover the various costs of the project work (for data collection, travel, etc), thereby providing a unique opportunity to the two most important institutional stakeholders (faculty and students), to enrich their knowledge by extending their academic activities, outside the classroom learning situation, in the real world.

From the academic viewpoint, these projects provide a unique opportunity to the faculty and the engaging students to get a first-hand experience in knowing problems of targeted organizations or sectors on a face to face basis, thereby, helping in knowledge creation and its transfer, adding to the overall process of learning in a practical manner, with application of knowledge, as the focus of learning pedagogy, which is vital in management education.

Dr. Mousumi Sengupta

Chairperson, SDM RCMS

Acknowledgement

We take this opportunity towards expressing our sincere gratitude to the Director and Management of Shri Dharmasthala Manjunatheshwara Institute for Management Development (SDMIMD) Mysore for their unstinted encouragement and support towards completion of the applied research project. We have also greatly benefitted from the nuanced academic deliberations held as part of the JA Alpha International Conference Series over the last two years in general and particularly the Fourth Asia-Pacific Conference on Global Business, Economics, Finance and Social Sciences held at Kuala Lumpur, Malaysia in August 7-9, 2015. Lastly, we also extend our sincere appreciation towards the student fraternity at SDMIMD Mysore from whom we have derived enormous benefit by virtue of rich class-room interactions.

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Executive Summary

Corporate Valuation forms as one of the most significant pillars in the field of Finance. With refinements in academic theories surrounding asset-pricing models and advancements in computing technology, studies in this field have generated an enormous amount of interest among academics and practitioners alike. Whilst in the practitioner's world, corporate valuation is synonymous to a greater degree in relation to identification of robust investment opportunities, academic studies have sought to examine the plausible explanations for the observed divergence of enterprise values as represented by intrinsic and market-determined measures.

In this study, we seek to investigate the above research phenomenon by resorting to an empirical examination carried out on a sample comprising of the firms forming part of India's benchmark market index – SENSEX. As a prelude to the scientific procedure outlining the above, we discuss all the significant theoretical postulates surrounding the corporate valuation led by the Discounted Cash Flow (DCF) analysis and the Relatives Valuation framework. Our endeavour towards providing a succinct discussion on the popular postulates surrounding corporate valuation arises from the need to familiarize discerning readers with the right methodological treatment rendered in respect of the above. Given the almost multiplicity of approaches available within the realms of corporate valuation, it becomes almost bewildering for an astute financial reader to lend credence to any one acceptable model.

In this backdrop, in the current study, the emphasis laid upon the procedural treatment accorded to DCF and Relatives approaches assumes significance.

Upon the empirical investigation surrounding the corroboration of intrinsic measure of corporate values with the market-determined counterparts, we find statistically significant evidence refuting the null hypothesis underlying the indifference between intrinsically-determined enterprise values and market-determined enterprise values. Such an observation throws up interesting research possibilities. One, we might wish to decipher arguments against the phenomenon underlying 'market efficiency', as the same would obliterate any attempt made by a discerning investor to earn 'abnormal return' on her investment. Second, we might wish to substantiate the arguments forwarded by the iconic breed of investors subscribing to the 'value investing' philosophy by reasoning out the need to identify prospective investment opportunities available against a vast expanse of securities founded on a calibrated notion of 'fundamental approach towards investments'.

In conclusion, we believe that the existing work makes a novel attempt at reinforcing some of the most profound schools of thought underlying corporate valuation by presenting them in a systematic manner and detailing the procedural treatments, which have subsequently been subjected to a robust empirical analysis in order to derive meaningful inferences.

1. Discounted Cash Flow (DCF) I: Dividend Discount Model (DDM)

Need for Corporate Valuation : Portfolio managers constantly look for assets that make up as the right candidates in a portfolio. Institutional investor (domestic and foreign), private equity firms, and venture capitalists are some of the prominent entities that use valuation techniques in developing their portfolio.

In its simplest sense, valuation of an equity security leads to determination of intrinsic value, which is then compared with the prevailing market price to determine whether the investment is 'overvalued' or 'undervalued'. It may be represented as given below.

> Intrinsic value < Market value – 'Overvalued' – Sell signal
> Intrinsic value > Market value – 'Undervalued' – Buy signal

Valuation techniques therefore chiefly seek to determine the intrinsic value of security to identify its suitability as a candidate for a given portfolio.

Techniques of Valuation : There are plenty of that are available while engaging in valuation. However, it is important to note, while, valuation is an inexact science, usage of correct principles and application of right framework can lead the task of valuation rewarding. There are principally two popular approaches to valuation.

Fundamental approach : This approach uses the discounted cash flows (DCF) methodology to arrive at firm valuation. Dividend discount model (DDM), free cash flow to firm (FCFF), and Free cash flow to equity (FCFE) are the principal methods employed in this approach.

The fundamental approach to valuation seeks to capture the value of a firm by focusing on its key financial parameters. The core idea being that ultimately, valuation is a reflection of underlying financial performance of a firm, as projected over a forecasted period. This approach rejects the current valuation reflected by the markets, arguing that markets fail to capture the inherent business potential of a firm. This approach does not lend any consideration to valuation of similar businesses.

This approach is popularly employed in scenarios where companies go far an IPO (initial public offering), Mergers & Acquisitions, and valuation of privately held enterprises.

Relatives approach – Unlike the fundamentals approach, proponents of this approach, while accepting the fact that markets perform at a level less than the optimum point of efficiency, contend that ultimately markets do a fair job of valuing a security. Therefore, any starting point of valuation must begin the market price commanded by the security. Equity multiples like Price-to-earnings (P/E), Price-to-book value (P/BV), and Price-to-sales (P/Sales) are the important measures used under this approach. There are value multiples like EV/EBITDA and EV/Sales that are also popularly employed in relative valuation.

This approach is popularly employed in scenarios where publicly traded securities make a scramble to form part of an investor's portfolio. Also, the relatives or comparable companies approach is employed for valuing a privately held enterprise as the same can be compared with publicly traded business that reflect similar cash flows, risk profile, and growth rates.

In reality, portfolio managers and institutional investors use combination of the above approaches (fundamental and relative), where the two, while not competing, supplement the results.

The dividend discount model represents as the most simplest and convenient form of computing the intrinsic value of a security. Recollect that the value of a firm in a conventional manner may be represented as given in the equation depicted below.

$$\text{Total Assets} = \left[\frac{\text{EBIT}}{\text{ROA}}\right] \qquad \text{Eq. 1.1}$$

Here, EBIT is the operating income and ROA is the return on assets. Also, you may observe that the above equation is reflective of a cash flows occurring over perpetuity. The dividend model simply replaces operating income with dividends (as it is believed that cash flows are best described by the cash payments in the form of dividends that are paid to shareholders) and cost of equity (ke) replacing the ROA. However, as it is expected that the earnings-per-share will continue to grow at a constant rate, the stream of cash flows assume the form of growing perpetuity.

Constant model: Firms that bear the characteristics of excessively high pay-out ratios, have beta value converging closer to 1, and whose reinvestment opportunities have reduced drastically are deemed as candidates fit for stable model.

Constant model or Gordon's model is represented as shown below.

$$P_0 = \left(\frac{D_1}{k_e - g_n}\right) \qquad \text{Eq. 1.2}$$

where

P_0 = intrinsic value of a security

D_1 = dividend expected next year

ke = cost of equity (represented as CAPM)

g_n = constant growth rate

It is important to note that it is not the dividends that grow over a period, but rather the EPS that grows at a given rate of growth. Dividend is then simply represented as a pay-out percentage of EPS.

The growth rate in the case of dividend model is reflected as shown below.

$$g = ROE \times RR \qquad \text{Eq. 1.3}$$

where

g = growth rate of EPS

RR = retention ratio (1-payout ratio)

ROE = return on equity

Note that the following assumptions hold good in respect of the constant model.

g_n = risk-free rate (argument being growth cannot be more than the nominal growth rate of economy)

ROE = k_e (argument being at terminal stage firm cannot earn positive excess returns)

RR = $\left(\frac{g_n}{ROE}\right)$ (retention ratio is computed as the unknown from the given relationship)

Two-stage model : The above mode is relevant for a firm whose earnings (in this case EPS) are growing at a stable rate. However, if a firm's earnings are growing at a supernormal rate, then it is only feasible to employ a two-stage or a n-stage model. Bear in mind the one predominant distinction between a constant and a two-stage model. In a constant model, cost of equity (k_e) will always be greater than the growth rate. However, no such restriction is place in a two-stage model. Here, in the years when the firm's earnings are growing at a supernormal rate, it is to be expected that the growth rate will be greater than the expected return as measured by cost of equity.

In an equation form, it is represented as shown below.

$$P_0 = \sum_{i=1}^{n} \frac{D_n}{(1+k_e)^n} + \left(\frac{D_{n+1}}{k_e - g_n}\right) x \frac{1}{(1+k_e)^n} \qquad \text{Eq. 1.4}$$

In the above equation the first part relates to the **present value of dividend flows in supernormal stage** while the second part relates to **present value of the terminal value.**

Again, note that dividend is computed as pay-out percentage of EPS. This is because it is meaningless to allow the dividends to grow as they are merely a function of EPS.

Scenarios where an analyst might employ the dividend discount model:-

a) Firms having a consistent dividend pay-out policy, as dictated by the earnings characterizing a particular industry (for example, FMCG industries are traditionally expected to have more stable earnings);

b) Firms that are dictated by management's policy of rewarding the shareholders with regular streams of dividend income; and

c) Firms that have disposable cash left over after meeting all the reinvestment, interest, and taxation expenditures.

Notwithstanding the merits surrounding the dividend model in terms of the simplicity of computations and relatively few explicit assumptions, dividend model is restricted as this model works poorly in scenarios where either firms have highly erratic dividend payment history or traditionally believe in 'keeping' large amounts of cash, without putting them to use in rewarding the shareholders by virtue of remuneration in the form of dividends.

Nevertheless, dividend model should be used more cautiously by an analyst, if he has to defend his argument on the computation of intrinsic value in a decisive manner.

The H-model : In keeping with the inherent limitation associated with a two-stage dividend model where growth rate falls precipitously to the risk-free rate; this model seeks to overcome the same by allowing the convergence of supernormal growth with terminal growth rate in a gradual way.

It is assumed within this model that the firm will maintain a supernormal growth rate of g_s for exactly 2H years subsequent to which the firm's growth rate is expected to converge with terminal growth rate – g_n.

The model is expressed in the following equation

$$P_0 = \left[\frac{D_0(1+g_n)}{(k_e - g_n)}\right] + \left[\frac{D_0 \, x H x (g_s - g_n)}{(k_e - g_n)}\right] \qquad \text{Eq. 1.5}$$

While the model overcomes the rigid assumption surrounding a two-stage model, however the implied assumptions made by this model pose a serious limitation. These are as given below.

The assumption that the growth rate will fall linearly over 2H period is questionable, as in rela circumstances, this may not hold good.

The assumptions that pay-out ratio remains constant is also questionable as the firms are expected to increase their pay-out ratio as and when they reach terminal stage.

Again, assuming that a firm's supernormal growth rate will hold exactly for 2H years also remains highly questionable.

For the above listed limitations, while theoretically the H-model looks appealing, at the same time, the utility derived from practical stand-point is severely limited.

2. Discounted Cash Flow (DCF) II: Free Cash Flow to Firm (FCFF) Model

The Free Cash Flow to firm (FCFF) Model : An understanding of this method forms the backbone for any subsequent discussion and analysis involving valuation. It is useful to appreciate that even the relatives approach is ultimately derived out of a typical DCF framework. Thus a thorough understanding of the concepts underlying this technique becomes supremely essential.

An equity value is derived from the firm value, which is generally understood as the sum of operating and non-operating assets.

Firm value = Operating assets + Non-operating assets

To start analysing the specific parameters representing firm valuation, observe the following parameter, which is the basic foundation for the FCFF Model.

$$\text{Total Assets} = \frac{\text{EBIT (Operating Income)}}{\text{ROA}}$$

Here, the total assets represent the entire firm value. Also, observe that the above parameter is representative of a typical time value of money concept involving 'perpetuity'. Since, the above model suffers from the deficiency of being historical in nature; an FCFF model substitutes the above with parameters that are 'forward-looking'.

Representation of earnings – Operating income (EBIT) offers as a poor representation of earnings as it has the following limitations.

a) It is historical in natures as it is derived from financial statements that represent the past performance of a firm.

b) It offers as a very poor substitute for cash flows.

c) It is influenced by the peculiarities of accounting, where the financial statements are prepared using the accrual principles.

Free-cash flow to the firm (FCFF) represents as an excellent measure of earnings. It is understood as a financial cash flow that is available for distribution to all the stakeholders (equity and debt) after meeting the principal requirements of capital expenditure and working capital.

Unlike the operating income, this measure is forward looking, and does not suffer much from the peculiarities of accounting. FCFF is computed as shown below.

FCFF = NOPAT – Reinvestments Eq. 1.6

NOPAT – It is also called as earnings before interest and after taxes (EBIAT). It is computed as shown below.

NOPAT = EBIT x (1-t) Eq. 1.7

where

EBIT = Operating income

t = tax rate

NOPAT represents the earnings relevant for all the stakeholders (equity and debt included), but after meeting the tax expense requirements. It becomes a reliable measure of earnings as it eliminates the tax advantage arising out of interest expense.

Reinvestments – It is defined as the sum of Net capital expenditure (capex) and changes in non-cash working capital. It is computed as shown below.

Reinvestments = Net capex + changes in non-cash working capital Eq. 1.8

Net capex = Capex – Depreciation & amortization expense Eq. 1.9

Capex represent the net addition to operating fixed assets (assets employed for generating income) over a given year. This figure may be obtained from the 'schedule of fixed assets' mentioned in the annual report. Depreciation and amortizations figures are mentioned in the income statement.

Changes in non-cash working capital represent the investment required by the business to sustain operating activities on an on-going basis.

Change in non-cash working capital = Current year operating working capital – Previous year operating working capital Eq. 2.0

Operating working capital = Operating current assets (OCA) – Operating current liabilities (OCL) Eq. 2.1

Operating current assets generally include the inventory and trade receivables (debtors), while operating current liabilities include the trade payable (creditors).

Note that the following are excluded from the definition of working capital.

a) Cash, marketable securities, and short-term investments – These are capable of earnings returns by virtue of their investments in risk-less assets like government securities etc. This may lead to an upward or downward bias on enterprise value.

   Also, an increase in cash for a firm over a particular period will have the direct consequence of increasing the working capital requirement. This in turn will lead to higher reinvestments and consequently, lower FCFF. There may thus be a downward bias in respect of intrinsic value of the company.

b) Interest bearing current liabilities – These are inherently taken into consideration while arriving at the enterprise value with the help of cost of capital.

Valuation Model – The FCFF approach (two-stage model)

$$EV = \sum_{t=1}^{n} \frac{(FCFF_t)}{\left(1+WACC\right)^t} + \frac{FCFF_{(n+1)}}{(WACC_{st}-g_n)} \times \frac{1}{(1+WACC)^n}$$

Eq. 2.2

where

EV = Enterprise value

$FCFF_t$ = Free cash flow to firm in year t

WACC = Weighted average cost of capital

n = number of years of supernormal growth period

Here, the first term represents the **'supernormal'** growth stage while the second represents the **'terminal'** stage.

The concept behind the various inputs required for arriving at the enterprise value is discussed below.

Inputs for the supernormal stage : Growth rate – Growth rate for firms at the supernormal stage is best described by the product of ROC (return on capital) and RIR (reinvestment rate). It is represented as;

g_s = ROC x RIR Eq. 2.3

ROC is defined as the ratio earnings available for all stakeholders arising out of capital employed. It is computed as shown below.

$$ROC = \frac{NOPAT}{Capitalemployed}$$ Eq. 2.4

RIR is defined as the reinvestments justified out of NOPAT. It may be computed as shown below.

$$RIR = \frac{Reinvestments}{NOPAT}$$ Eq. 2.5

Note that for start-up and young firms, the reinvestments can well exceed the NOAPT, which has

the consequence of RIR being more that 100%. This will lead the FCFF to be negative, which is acceptable.

Weighted average cost of capital (WACC) – It is the weighted sum of costs of equity and debt where the weights represent the capital structure. It is computed as show below.

$$WACC = (W_e \times K_e) + [W_d \times K_d(1-t)] \quad \text{Eq. 2.6}$$

Weight of equity (W_e)[1] is represented as proportion of equity in respect of total capital.

$$W_e = \frac{E}{(E+D)} \quad \text{Eq. 2.7}$$

Cost of equity is computed using the CAPM model, which is expressed in the following way.

$$K_e = R_f + (R_m - R_f) \times \beta \quad \text{Eq. 2.8}$$

Here, the risk-free rate is generally represented by the coupon rate prevailing in respect of long-term government bond. Market returns represent the historical average (geometric mean) of market returns (sensex in India) right from the inception[2]. Beta represents the sensitivity of the stock returns in relation with the market returns.

Cost of debt is computed in keeping the tax benefit as interest cost is treated as a tax deductible expense. This is represented as the sum of risk-free rate and the prevailing default spread in respect of long-term bond. This is expressed as given below.

$$K_d = (R_f + \text{default spread}[3]) \times (1-t) \quad \text{Eq. 2.9}$$

Effective tax rate – It is defined as the ratio of tax expenses over profit before taxes (PBT). It may be represented as shown below.

$$\text{Effective tax rate (ETR)} = \frac{\text{Tax expense}}{\text{PBT (Profit before taxes)}} \quad \text{Eq. 3.0}$$

Firms that are in the supernormal stage generally witness lower ETR. This is observed due to the benefits arising out of liberal taxation policies reflected by concessional tax rates or tax holidays for a defined period of years. It also arises out of the benefits arising out of deferred tax assets (scenario where the tax expense as per income statement is less than the tax payable as per the income tax rules). However, with the advancement of the firm, it is reasonable to expect the ETR to increase gradually.

How to determine whether a firm fits a constant or multi-stage growth model? : While the exact answer this will also be influenced by equity researcher's subjective assessment, the following two parameters do a fair job providing guidance on the above.

Tenure of the business – If the firm has already completed substantial years in service in relation with its industry, it is perhaps, a good candidate for constant model.

Dividend pay-out pattern – Mature firms (constant model) will have lesser opportunity to seek greater reinvestment opportunities; they may thus seek to send positive signal about its financial well-being by making higher dividend payments. A young firm (multi-stage model) on the contrary seeks to explore greater opportunities for reinvestments and thus make withhold dividend payments or keep it to very minimum, at best.

Inputs for terminal stage : Growth rate – It is not to be expected for firms reaching the maturity stage to be able to grow at a rate faster that the economic growth rate of its country. Thus, risk-free rate makes for a fair representation on terminal growth rate

$$g_n = R_f \quad \text{Eq. 3.1}$$

WACC – Mature firms are expected to have capital structure where the proportion of debt is expected to be more in comparison with its structure during supernormal growth years that is characterized by lesser proportion of debt in relation to total capital. The adverse implications of lowered earnings and greater competition make it difficult for a matured firm to bank entirely upon equity as a source of capital.

As a consequence, the weights of equity and debt will have to reflect the capital structure as relevant for a mature firm.

Costs of debt and equity – In the terminal stage also, the CAPM does a fair job capturing the required return

[1] W_d is simply computed as $(1-W_e)$

[2] A very long horizon of market returns gives the benefit of the returns following a 'normal distribution', thereby assigning credence to the figure so arrived.

[3] Default spreads are made available in credit rating websites like crisil.com, which contain credit default studies.

for equity holders, however, the beta would have to undergo change to reflect the new capital structure. For this, an unlevered beta (using supernormal capital structure and effective tax rate) is computed subsequent to which the same is re-levered (using mature capital structure and marginal tax rate). The same are computed as shown below.

$$\text{Unlevered Beta } (\beta_u) = \frac{\beta_l}{\left[1+(1-t)x\frac{D}{E}\right]} \quad \text{Eq. 3.2}$$

$$\text{Re-levered beta } (\beta_l) = \beta_u x\left[1+(1-t)x\frac{D}{E}\right] \quad \text{Eq. 3.3}$$

It is normally observed that the levered beta increases as the leverage position of the firm increases. This is because, with the additional exposure to debt, the riskiness of equity shareholders increases, which is then reflected by the beta value.

ROC_{st} – For mature firms, it is to be expected that their ability to earn excess returns will diminish substantially. Excess returns, also popularly called as Economic Value Added (EVA) is reflected as given below.

$$\text{Excess returns (EVA)} = \text{ROC} - \text{WACC} \quad \text{Eq. 3.4}$$

It is reasonable to expect mature firms to have an excess returns equivalent to '0', implying that at maturity stage, the firm's ROC will be equivalent to WACC. However, for firms that continue to exhibit considerable market leadership even after entering the maturity stage, it is reasonable to expect that the firm's ROC will converge with the industry average.

RIR_{st} – The reinvestment rate at maturity stage will be influenced by the terminal growth rate and terminal ROC. The same is reflected as shown below.

$$RIR_{st} = \frac{g_n}{ROC_{st}} \quad \text{Eq. 3.5}$$

Equity value : The sum of present value of free cash flows to firm (FCFF) and the present value of terminal value yields the enterprise value (EV). To this, the non-operating assets comprising cash and investments are added to arrive at the firm value (FV). Deducting the debt and minority interests yields equity value. The above may be represented as shown below.

$$\text{EV} = \text{PV of FCFF} + \text{PV of TV} \quad \text{Eq. 3.6}$$

$$\text{FV} = \text{EV} + \text{Non-operating assets} \quad \text{Eq. 3.7}$$

$$\text{Equity value} = \text{FV} - (\text{Minority interest} + \text{Debt}) \quad \text{Eq. 3.8}$$

Marginal tax rate – It is to be expected for the firms entering the maturity stage that the tax liability will increase with the gradual withdrawal of concessionary tax rates and tax holidays leading to the firm's ETR converging with the marginal tax rate at the time of maturity. Also, such firms are also expected to remain insulated from the benefits arising out of differential tax treatment leading to deferred taxes. Marginal tax rates are the corporate taxation rates that are in force from time to time.

3. Discounted Cash Flow (DCF) III: Free Cash Flow to Equity (FCFE) Model

Introduction : The FCFE approach seeks to determine the intrinsic value of a firm by discounting the cash flows that are available for distribution to the equity shareholders with a suitable discounting rate, which in this case is the cost of equity.

It may simply be understood as a variant of the typical FCFF (free cash flow to firm) where the cash flows are available for distribution to all the stakeholders (both debt and equity), which is discounted by the WACC (weighted average cost of capital).

FCFE Constant model : In its simplest sense, this may be expressed as given below.

$$P_0 = \left[\frac{FCFE_1}{(k_e - g_n)}\right] \quad \text{Eq. 3.9}$$

where

FCFE = Net income – Equity reinvestments

Equity reinvestments = Reinvestments – change in debt

Change in debt = All interest bearing debt (short & long) for current year

– All interest bearing debt (short & long) for previous year

Net income is the amount that is available after meeting all the expenses, including operating, financing, and taxes. In order to avoid an underlying bias, it is always useful to ignore the non-operating income (usually expressed as other income), while working with a net income figure. As a non-operating income is unsustainable in the long-run, it is prudent to remove this figure.

If the change in debt is positive, it implies that firm has added more debt during the year, which logically

enhances the cash flow[4]. Conversely, if the change in debt is negative, it means that the firm has repaid part of the debt, implying that there is a cash outflow (payment of debt).

In keeping with the similar approaches followed in DDM and FCFF, the inputs for the FCFE model are derived as shown below

g_n = nominal growth rate of economy (risk-free rate)

Further growth rate in the case of FCFE is expressed as follows

$$g = ROE \times Eq.\ RIR \qquad \text{Eq. 4.0}$$

where,

$$RIR = \left[\frac{g_n}{ROE}\right] \qquad \text{Eq. 4.1}$$

In keeping with the characteristic of a terminal firm, if we project that the firm's excess returns will cease to exist at the time of maturity, then the firm's ROE will be equal to its cost of equity k_e. In reality, however, we observe that allowing firm's ROE to converge with cost of equity -k_e (or for that matter ROC = WACC) leads to excessively high equity reinvestment rate (or high reinvestment rate), leading to substantially low FCFE (or FCFF), which in turn tends to push the intrinsic value (or enterprise value) downwards[5].

It is for this reason that as a matter of prudence, an analyst is well disposed in allowing the ROE (or ROC) to converge with its industry ROE (or ROC). In scenarios where the firm itself is dictating terms to the industry, it is reasonable to allow ROE (or ROC) to converge with its own historical ROE (or ROC) at the time of maturity[6].

Two-stage model : Similar to the DDM and FCFF approaches, the two-stage FCFE model is expresses as shown below.

$$P_0 = \left[\frac{FCFE_n}{(1+k_e)^n}\right] + \left[\frac{FCFE_{(n+1)}}{(k_e - g_n)}\right] \times \frac{1}{(1+k_e)^n} \qquad \text{Eq. 4.2}$$

Here again, the first term represent the present value of cash flows at supernormal stage, and the second term represents the present value of terminal value.

Also, note that just as we have seen in case of DDM and FCFF approaches, it is erroneous to allow the FCFE (or DDM and FCFF) to grow at a particular rate. Rather, FCFE (or DDM and FCFF) must be derived from Net income (or EPS and EBIT), which are expected to grow.

Growth in a two-stage mode is computed using the following equation.

$$g_s = ROE \times Eq.\ RIR \qquad \text{Eq. 4.3}$$

where

$$RIR = \frac{Equity\ reinvestments\ (Eq.RIR)}{Net\ income} \qquad \text{Eq. 4.4}$$

Equality of intrinsic value under FCFF and FCFE approaches : This has been seen as an interesting exercise, where an analyst seeks to reconcile the intrinsic values arrived under both FCFF and FCFE approaches. Here, it is useful to note that convergence of intrinsic values between the two is **possible only at the theoretical level.** Theoretically, if the following **implicit assumptions** are made, then equality of intrinsic value under both approaches will be the same.

Implicit assumptions that must be made:-

a) There is no growth rate

b) The weights of equity and debt are derived from the value of equity and debt, which in turn are arrived through the process of discounting in the first place (creating a circularity issue in a spreadsheet)

c) There is no extraordinary income (as these are added subsequent to the Net income)

As it has already been observed elsewhere (refer to the illustrative example discussed), in reality these assumptions just do not hold good, and consequently we observe a divergence of value in the intrinsic value computed under FCFF and FCFE approaches.

[4] When a firm is taking more debt, it may either use it for reinvestment purpose, which in any way will impact the FCFE computation. Alternatively, in an extreme case, the firm may borrow through short-term debt in order to reward the shareholders by virtue of a buy-back. In any case keeping with a typical cash flow statement, increase in debt leads to an increase in cash flow.

[5] The rationale also being that it is far difficult for a firm at the stage of maturity to sustain high reinvestment opportunities, which are expected to cease in the first place.

[6] Recall that we allowed Suzlon, and Tata Steel ROC at the time of maturity to converge with industry ROC and allowed Infosys ROC to converge with its own historical ROC. In case of Infosys FCFE, we allowed ROE to converge with its own historical ROE.

Given that FCFE requires explicit consideration of debt, this can become very taxing for an analyst working with companies whose capital structures change very frequently. As FCFF does not require explicit consideration of debt, computationally it becomes much easier to handle, which is a big saving. It is for this reason that FCFF has attained greater popularity in comparison with FCFE.

4. Relatives Valuation Model

Introduction : A relatives approach to valuation seeks to determine the value of a security by looking at the prices of all 'similar' securities. That is, the analyst is interested to understand as to how the price of security holds in relation to prices observed for all the similar securities. Anecdotally, it means if you are interested in purchasing a car, you may want to pay for the car by looking at the price you may have to pay for all those cars that are similar (say competitors) to the car in question.

While a traditional definition of similar securities is construed as firms offering products and services that are vastly similar (say belonging to the same industry); this narrow definition holds considerable challenge in respect of valuation. This is because while two firms may still operate in a similar industry, the sheer size, the underlying cash flows, and risk might be vastly difference making such comparisons highly meaningless. It is for this reason that in respect of relatives approach to valuation, an industry is defined that bears similarity on the following characteristics.

a) Growth rate

b) Cash flows

c) Risk

Here, pay-out ratio, market capitalization, and beta values of securities may be considered as decent approximations for growth, cash flows, and risk respectively.

How relatives approach is different from DCF approach

Parameter	DCF approach	Relative approach
Market efficiency	Even on average markets make mistakes in pricing a security	While markets may mistake in pricing securities individually, on an average basis, they are 'correct'
Value	Intrinsic value based on company's fundamental financial performance including the economy and industry factors	Relative value purely based on the pricing of a security in comparison to pricing of all the similar securities
Assumptions	Explicit assumptions required, which are far too many in number	Restricted number of assumptions, which are way less
Defence	Difficult in the face of challenging the valuation of 'market'	Less difficult as the value is at least indirectly derived from the valuation accorded by the 'market'

Relative valuation as disguised form of DCF valuation: While there is an underlying fundamental difference between the DCF and Relatives approach, the factors impacting the relative measures are ultimately 'fundamental' in nature.

To appreciate the above point, consider the intrinsic value derived under the typical DDM. It is expressed as follows.

$$P_0 = \left[\frac{D_1}{(k_e - g_n)}\right]$$

Dividing the above equation by EPS_0 on both sides of the equations translates as;

$$\frac{P}{EPS_0} = \left[\frac{Payout\ x(1+g_n)}{(k_e - g_n)}\right] \quad \text{Eq. 4.5}$$

Dividing the above equation by BV_0 on both sides of the equations translates as;

$$\frac{P}{BV_0} = \left[\frac{Payout\ x\ ROE\ x\ (1+g_n)}{(k_e - g_n)}\right] \quad \text{Eq. 4.6}$$

Dividing the above equation by $Sales_0$ on both sides of the equations translates as;

$$\frac{P}{Sales_0} = \left[\frac{Payout\ x\ Profit\ margin\ x\ (1+g_n)}{(k_e - g_n)} \right] \qquad \text{Eq. 4.7}$$

The above relatives and their respective factors may be summarized as shown below.

Multiples	Key companion variable	Inference
P/E	Pay-out, growth rate	Comparison with median P/E, which is higher, will convey that the security is undervalued; this may not be true as the firm may be commanding lower P/E as it may have lower **growth rate** in the first place.
P/BV	ROE	Comparison with median P/BV, which is higher, will convey that the security is undervalued; this may not be true as the firm may be commanding lower P/BV as it may have lower **ROE** in the first place.
P/Sales	Profit-margin	Comparison with median P/Sales, which is higher, will convey that the security is undervalued; this may not be true as the firm may be commanding lower P/Sales as it may have lower **profit-margin** in the first place.

In the light of the above observations, it is necessary to control for at least the **key companion variable.** This can be achieved by running a simple regression analysis where the dependent variable is represented by the multiple (P/E, PBV, and P/Sales), and the independent variable being represented by the key companion variable (Pay-out or growth, ROE, and Profit-margin)

PEG – Price earnings growth : Another commonly relative measure is known as PEG, which is computed as $\left(\frac{P/E}{\text{growth rate}} \right)$. This measure is useful as it seeks to standardize the P/E multiples that differ vastly across firms. As seen above, P/E is fundamentally impacted by growth rate. Subsequent to standardization, an overvalued firm may turn as undervalued and vice-versa. Here, a firm previously having high P/E might look overvalued, but when standardized with growth rate, in comparison to similar firms, it may have lower PEG as against the median PEG, implying that the security present a good 'buy' opportunity. This is because as the growth rate becomes larger, PEG becomes smaller and there may be an opportunity for the firm's P/E to converge with the overall median P/E. The reverse is true if the security looks undervalued without standardization[7].

5. Empirical Research on SENSEX Firm in India

Rationale for the Study : A significant postulate surrounding the financial literature pertains to the potential investment opportunities arising from the divergence of a security's intrinsic value from its purported market value. An observation of the above phenomenon would propel a fundamental analyst to seize the opportunity by devising a suitable investment opportunity. In this study, we seek to examine the above postulate by observing the degree of divergence of a firm's intrinsically determined enterprise value (EV)[8] from the one determined by the market. Such an exercise merits a careful consideration as the derived inferences might offer an evidence towards either acceptance or rejection of the popularly held notion surrounding the ability of successful portfolio managers to consistently beat the market (measured by the ability to generate excess returns over the market) by resorting to fundamental analysis.

A fundamental analyst would recommend a suitable investment strategy so long there is an observed divergence of a security's intrinsic value from its market value. In such a scenario, two possible outcomes emerge, which is represented below.

[7] Here, the firm with lower P/E may be commanding very low growth rate in comparison with similar firms yielding high PEG. If the median PEG is less, it is to be expected that the firm's P/E will converge with the lower median P/E thereby presenting a 'sell' opportunity.

[8] Here, we seek to capture a firm's enterprise value, which is considered as a broader representation of a firms' aggregate performance as against equity value, which is limited in its appeal by restricting to earnings that are primarily relevant for shareholders alone.

Intrinsic value < Market value – 'Overvalued' – Sell signal

Intrinsic value > Market value – 'Undervalued' – Buy signal

Even while, there might exist an opportunity for an investor to devise a congruent investment strategy in the wake of a difference existing between a security's intrinsic value from its market value, it becomes interesting to observe if such a phenomenon would also exist at the 'portfolio level'. This argument assumes significance as diversified fund houses like those represented by mutual funds constantly engage in fundamental analysis to develop a portfolio capable of generating returns that is consistent with the risk embellished in a portfolio's investment policy. If indeed the enshrined objective of the investment policy of a diversified fund house is to generate returns comparable with the market, the desire to engage in an expensive fundamental analysis might be obviated. This may be further corroborated by the fact that empirical research on performance of mutual funds has shown that mutual funds do not seem to be able to earn greater net returns (after sales expenses) than those that can be earned by investing in a market portfolio (Fischer & Jordan, 1995). This might, perhaps, explain the wide proliferation and popularity of Index funds among the investing community. An Index fund without engaging in an elaborate 'securities' analysis', merely, seeks to mimic the returns generated by the market by maintaining a market-representative portfolio.

An interesting research question that arises from the above discussion is: whether the intrinsically determined mean EV (of all the firms forming part of a market index) is significantly different from the mean EV determined by the market? An attempt towards resolution of the above research question would help in expanding the existing body of literature surrounding corporate valuation framework applied at the portfolio level.

Review of Significant literature : There have been several academic studies that have sought to examine the efficacy of different valuation models as applied to firms with an objective to determine firms' intrinsic values. In this study, whilst we seek to study the firms' EVs as depicted by intrinsic and market measures, the main thrust of the study rests towards deciphering the role of valuation in the context of a portfolio by critically examining the utility derived by resorting to an exhaustive fundamental analysis in respect of all the securities forming part of a market-representative portfolio. Given that there is a discernible dearth of studies pertaining to examination of the above posited research question, the study seeks to offer a plausible resolution, thereby closing a significant research gap. In the ensuing section, we discuss the alternative methodologies that are widely discussed with the corporate valuation framework.

Discounted Cash Flow (DCF) approach to valuation

Amongst all the available tools in respect of valuation, DCF delivers the best results provided the inputs used in respect of carrying out the analysis are used correctly (Goedhart, Koller, & Wessels, 2005). Theoretical contributions surrounding the DCF models posit that firms' intrinsic value could at best be captured by discounting the projected earnings using a suitable discount rate. The literature surrounding the DCF valuation offers several alternatives in respect of defining the inputs comprising of earnings and discount rate.

These may broadly be classified into the following

a) Equity related measures

b) Enterprise related measures

In respect of equity related measures, one of the most commonly employed models pertains to the dividend discount model (DDM), which in its simplest form, establishes the intrinsic value of an equity as the present value of earnings available to equity shareholders discounted by a discount rate, that is, more conveniently captured by an equity's required return (say, cost of equity - k_e) as arrived under the capital asset pricing model CAPM[9] (Gordon, 1962).

While there have been several improvisations to the classical DDM approach to equity valuation acclaimed for its simplistic approach; there are several limitations associated with valuation when restricted purely as an

[9] Even though several alternative asset-pricing models have suggested in the financial literature, which prominent among them include the arbitrage pricing model (APT) and the multi-factor model; empirical research has not been successful towards firmly establishing the supremacy of alternative asset-pricing models over the simple and time-tested CAPM. The popularity of CAPM also stems from the fact that the risk is captured by a single factor (Reilly & Brown, 2006).

equity measure. The fact that the figure of equity earnings is arrived only after deducting depreciation, interest expenses, and taxes; comparison of equity values among comparable ends up as an exercise at best in futility owing to serious differences arising out of investment policies, capital structure, and the applicable taxation statues. Unless the earnings variable is controlled for the above, any interpretation attributing to the earnings performance will be subjected to a serious error. This is particularly true, when the investors are particularly interested in evaluating a firm's core operating performance. In light of this argument, it becomes essential to capture a firm's operating performance by looking at an enterprise-wide earnings measure and subsequently relate it to its enterprise value (EV). Such a variable, perhaps, is best captured by EBITDA.

Acknowledging the utility of EBITDA in valuation, Fernandez (2001) conducted a study with the objective of identifying the reasoning employed by analysts when making their recommendations. The study found the price-earnings-ratio (PER) to be highly volatile. Notwithstanding the above limitation concerning PER, the study found that the value multiple – EV/EBITDA was the second most popularly employed multiple (after PER) while undertaking the valuation of firms. The study consisted of a sample of 175 multiples chosen across 1,200 companies representing different geographies.

Similarly, Lie & Lie (2002) carried out a study with the objective of determining the role of multiples in determining corporate value. The authors inferred that asset multiples tended to be more precise and less biased as compared to the sales and earnings multiples. It was also observed that forecasted earnings played a much better role in estimating company value as compared to historical earnings. Further, EBITDA as an earnings measure served as a better alternative in comparison with EBIT and EBT as substitutes of earnings measure. The sample for the study consisted of all the firms forming part of the *Compustat* database with the financial data pertaining to fiscal year-end of 1998.

In the following section, we discuss some of the most prominent empirical studies that have sought to examine the impact of different multiples in capturing the firm value. Multiples, also popularly referred to as relative measures, are expressed as a ratio of firm value (numerator) and a representative earnings measure (denominator)[10]. Using a simple mathematical demonstration, it may be proved that relatives are ultimately derived from their fundamental valuation expression (see Appendix I). In the process of examining the key finding of the studies discussed below, our endeavour remains to point out the potential deficiencies arising out of relatives being expressed as equity multiples.

In an influential study, Alford (1992) employs price-earnings multiple to empirically examine the accuracy of the P/E valuation method when comparable firms are selected on the basis of industry, risk, and earnings growth. The study points out that accuracy occurs when the portfolio is constrcuted using earnings growth and risk parameters of comparable firms. Moreover, the study does not find any evidence of improvement in portfolio coontruction when P/E multiples are adjusted for varying degree of leverage. The study also makes the assertion that the efficacy of selecting comparable firms increases with the increasing size of the firm. The study, while making a significant contribution to the expanse of valuation literature fails to capture the entire value of the firm as represented by an enterprise value. This becomes an important limitation particularly when comparable firms might vary significantly in respect of captial structure represented by varying degrees of leverage.

In a study pertaining to valuation of IPOs comprising of a sample of 190 firms from 1992 to 1993, it was found that the multiples comprising of price-earnings (P/E), market-to-book (M/BV), and price-to-sales (P/Sales) of comparable firms were observed as having only modest predictive ability. The variations were found to be praticularly large for young firms forming part of the industry. While the study rued that valuations became more accurate when trailing earnings were substituted with predictive earnings, the absence of consideration a more firm wide representative multiple renders the study somewhat ineffective (Kim & Ritter, 1999).

[10] Broadly speaking, there are two popular variants of multiples – equity and enterprise. In the former, a value in is predominantly expressed as a firm's equity value, while in the latter; it is expressed in the form of a firm's enterprise value.

In an intersting study carried out to examine the role of accounting multiples in determining their valuation accuracy in european equity markets, three important inferences are made: 1) Equity-value multiples outperform entity value multiples, 2) Knowledge-releated multiples are more accurate than traditional multiples, and 3) Forward-looking multiples outperform trailing multiples. The sample consisted of the firms forming part of the S&P 500 and STOXX 600 indices (Schreiner & Spremann, 2007). Ignoring the last two, the first requires a careful scrutiny of the multiples employed by the authors. Surprisingly, the authors use multiples like P/EBITDA, P/EBIT, and P/EBT to lay their assertions. Inference made on the strength of such multiples is inconsistent and outrightly erroneous. In order to lend meaningful credence to the multiples, an important safeguard that must be taken is to ensure that the earnings measure (numerator) is an appropriate function of the defined valuation measure (denominator). For instance, market price of a share must necessarily be compared with earnings avaialble to shareholders. If the denominator is EBITDA, then the numerator must be a firm-wide value (Damodaran, Damodaran on Valuation, 2006).

Having discussed the limitations associate with equity-valuation measures, we now present a discussion involving the existence alternative methodologies to capture enterprise value.

Enterprise Value (EV): A discussion on alternative approaches : In the foregone discussion, we have presented arguments supporting the utility of enterprise value as a more appropriate measure towards capturing a firm's performance. Earlier, it was also pointed out that in order to lend meaningful comparison among firms of different sizes; it becomes necessary to normalize EV by using a representative earnings measure, which is best captured by EBITDA. The ratio of EV and EBITDA gives rise to the value multiple – EV/EBITDA. While EBITDA[11] representing a firm's operating earnings is more readily traceable from an Income statement, EV is subjected to estimation towards which the following two approaches are available.

EV: Market based approach : In the first method, EV is most commonly computed in the following manner.

EV = MV of equity + Total debt – Cash & bank balance

Eq. 4.8

Here, market value of equity is reckoned as the market capitalization computed as the product of market price per share and the total number of shares outstanding. Total debt comprises of interest bearing short-term and long-term debt. It must be noted that the above computation is applied for all non-financial firms. In case of financial firms comprising of banks and financial institutions, EV is modified, which is expressed to include the total deposits.

EV = MV of equity + Total debt + Total deposits – Cash & balances with RBI Eq. 4.9

Given that deposits represents as a major form of capital, it looks reasonable to include them as part of the enterprise value. The deposit comprises all the three significant components representing the demand, savings, and time.

Notwithstanding the merit underlying the computational procedure above, the above approach suffers from several limitations that are delineated below.

a) Consideration of market capitalization for capturing the equity value may be inappropriate. Given the vagaries of markets, the assigned market price may not be reflective of the futuristic business potential. An uncontested assignment of market value merely indicates a passive acceptance of inherent biases underlying the reflected equity value. Moreover, the possibility of the systematic factors weighing heavily in determining market prices (oblivious to the firm's fundamental business considerations) might result in a market value that is far removed from reality.

b) An EV determined by the market fails to reflect an appropriate discount rate, which is, best described, as measure of the security's risk. It is the WACC (weighted average cost of capital) that captures a security's inherent risk. While it might be possible to estimate the implied discounted

[11] EBITDA is most often not directly published in the Income statement. However, with the given information on Earnings before taxes (EBT), interest expense, and depreciation, it becomes possible to compute the EBITDA figure fairly simply by adding back interest expense and depreciation.

rate from security's market prices; such a discount rate may not be able to capture fully the security's business and financial risk.

c) Another major limitation surrounding the computation of estimated enterprise value using market measures is that the total debt value (computed as the sum of interest bearing short-term and long-term debt) is directly retrieved from the balance sheet. As the balance sheet values are historical in nature the derived debt value is rendered ineffective. A computed EV with 'market' value of equity and 'book value' of debt may be is at best incongruous.

In fact, it is highly surprising to find some of the reputed equity research agencies employing the above questionable methodology towards determining the EV. Here, present an illustration of the computed EV/EBITDA and EV/Sales multiples employed in the equity report pertaining to Shoppers Stop (symbol: SHOSTO). The report is compiled by ICICI direct, which is an acclaimed equity research house.

Financial information pertaining to Shoppers Stop (all amount in INR crore except multiples)

Market capitalization = 3,106

Debt (March – 13) = 471

Cash (March – 13) = 27

EV = 3,550 (computed using Eq. 1 depicted above)

EBITDA (March – 13) = 96

Sales (March – 13) = 3,177

EV/EBITDA = 36.98

EV/Sales = 1.11

A preliminary glance into the equity report confirms the above computations as reflected by the reported numbers (ICICI Direct, 2013).

EV: DCF approach : In the alternative module considered to be more plausible and consistent, EV is represented as the present value of the projected Free-cash-flow-to-firm (FCFF) discounted using a discount rate, which is most predominantly represented by a firm's weighted average cost of capital (WACC).

In its simplest form, EV for a stable firm expressed as a growing perpetuity model is computed as shown below.

$$EV = \left(\frac{FCFF_1}{WACC_{st} - g_n} \right)$$

where

$FCFF_1$ = Free-cash-flow-to-the-firm at the end of year 1.

$WACC_{st}$ = stable weighted average cost of capital

g_n = growth at the maturity stage (usually equated to risk-free rate R_f)

The above model could be expanded to represent the two-phase model, which is represented below.

$$EV = \left[\sum_{t=1}^{n} \frac{(FCFF_t)}{\left(1+WACC\right)^t} \right] + \left[\frac{FCFF_{(n+1)}}{(WACC_{st} - g_n)} \times \frac{1}{(1+WACC)^n} \right]$$

Here, the first-term pertains to the present value of FCFF during the 'supernormal stage', while the second-term represents the present value of the 'terminal stage'. The considerations involving selection among 'stable' and 'supernormal' models are discussed in Appendix II.

(Damodaran, Damodaran on Valuation, 2006), has provided an exhaustive framework towards estimating the above inputs concerning the computation of a firm's EV. The adopted approach towards estimation of these inputs finds support in the valuation framework suggested by McKinsey & Company[12] (Koller, Goedhart, & Wessels, 2010).

A brief discussion surrounding the procedures involved towards estimation of the inputs surrounding the computation of EV is presented below.

Free-cash-flow-to-the-firm (FCFF) – It is represents as an unbiased earnings measure free from the deficiencies surrounding the accountant's measure of earnings. It is commonly represented as a financial cash flow available for distribution to all the stakeholders (equity and debt) subsequent to meeting capital expenditure and working capital. It is computed as;

FCFF = NOPAT – Reinvestments

[12] The approach towards computation of EV is almost similar except for few differences in terminologies. For instance, the popular earnings measure known as NOPAT (Net operating profit after taxes) is christened as NOPLAT (Net operating profits less adjusted taxes) in the McKinsey framework.

It may be observed that though the above depicted procedure towards computation of FCFF is more plausible and acceptable; an accountant's model on valuation, popularly, depicts FCFF as show below.

FCFF = O – I (Penman, 2009) Eq. 5.0

Where,

O = Cash flow from operating activities (CFO)

I = Cash flow from investment activities (CFI)

The limitations arising from the above depicted form of FCFF are:

Firstly, unless the CFO is appropriately adjusted for extraordinary items (which form part of operating activities as default classification) and taxes, an outright retrieval of CFO from financial statements will render the computations erroneous. The 'taxes paid' figure used to arrive at CFO is significantly different from 'tax expenses', which is a more realistic measure to capture the impact of taxation on earnings of the firm[13].

Secondly, even when using the cash from investment activities, utmost care must be taken to ensure that the investments resulting out of non-operating activities do not creep into the computed figure of FCFF as any inclusion of the same would seriously 'corrupt' FCFF and render it inaccurate.

Sample for the Study : In order to examine the validity represented by the computed mean values of EV/EBITDA surrounding the DCF and Market-determined approaches, we select all the firms surrounding the BSE SENSEX as on March 31st, 2014. The firms constituting the SENSEX were retrieved from the Capitaline database (Capitaline, 2015). SENSEX being the most widely tracked market index in respect of the performance of Indian capital markets represents as an ideal sample for carrying out the analysis. Moreover, being representative of the widest range of industries operating within the Indian economy; the inherent bias arising out of selection of only few representative industries gets completely eliminated.

Significantly, it must be noted that the SENSEX, which is a constituent of 30 firms reflects the market sentiment on a real-time basis as an aggregator of more than 3,000 firms that are listed and traded on the BSE. Ultimately, as the *central limit theorem* states that the sampling distribution of the mean of any random sample of observation will tend towards the normal distribution with mean equal to population mean, μ, as the sample size tends to infinity. The normality assumption stands implicitly embedded while carrying out the hypothesis testing.

While the valuation models have conventionally been applied on an ex-ante date, the validity of a robust valuation model should be evidenced equally when applied on an ex-post data. This is also consistent with academic studies (reflected earlier in the study) that have sought to empirically examine the validity of valuation models by relating it to historical data.

Research Findings : Our objective in this study has been to compute the EV for all the firms forming part of India's benchmark index – SENSEX using the two popularly employed methods comprising of DCF and Market-determined approaches. Having delineated the postulate surrounding the above approaches in detail, we now proceed towards reflecting the computed data by subjecting it to a rigorous analysis backed by sound theoretical judgements.

As highlighted earlier in the study, it would be interesting to observe if there exists any significant difference between the reported mean values of EV as computed under DCF and Market-determined approaches. In order to normalize EV (given the differential asset size of firms); we use the multiple – EV/EBITDA and depict the values for all the firms under the two approaches. The computed values are presented in Appendix III[14].

It is also interesting to note that almost all the equity research reports and financial databases consistently report valuation ratios of companies listed on stock exchanges. These valuation ratios represent both equity and value multiples. P/E (price-to-earnings), P/BV (price-to-book value), and P/Sales (price-to-sales) are some of the most commonly depicted equity multiples.

With all the above multiples addressing valuation from an equity shareholders' perspective coupled with the

[13] Votaries of accounting approach to valuation will argue that the earnings figure as represented in financial statements will undergo several adjustments before making it worthy of inclusion in the model. However, the enormous number of adjustments must be justified by the resulting accuracy of the computed figure.

As Damodaran argues: "Accountants should do accounting and leave valuation to those who are better equipped (psychologically and tool-wise) to do valuation"

[14] The conceptual procedure underlying computation of EV for Banks and Financial Institutions is presented in Appendix IV.

fact that varying degrees of investment, capital structure, and taxation produce highly volatile earnings numbers; financial investors seek to capture the value of the entire firm as represented by enterprise valuation ratios comprising of EV/EBITDA and EV/Sales.

The valuation ratios are reported using both the recent financial statements in the form of TTM (trailing twelve months) as well as using the last fiscal year financial statements. In keeping with the objective of the study, we use the fiscal year-end financial statements to compute the intrinsic enterprise values and compare it against the valuation ratios reported by the financial database, which is reckoned as the Market-determined valuation ratio.

In keeping with the law of parsimony, we construct the null hypothesizing that there is no significant difference between the computed mean values of EV/EBITDA arrived under the two approaches (DCF and Market-determined). The null and alternate hypotheses are represented below.

$$H_0: \overline{\left(\frac{EV}{EBTDA}\right)_{DCF}} = \overline{\left(\frac{EV}{EBITDA}\right)_{Market}}$$

$$H_a: \overline{\left(\frac{EV}{EBTDA}\right)_{DCF}} \neq \overline{\left(\frac{EV}{EBITDA}\right)_{Market}}$$

The above formulated hypothesis is examined by employing t-test: paired two sample for means tested at 5% level of significance. The result of the analysis is shown in Table I below.

Table 1

T-test: Paired Two Sample for Means for EV/EBITDA

	DCF	**Market-determined**
Mean	13.87433333	12.132
Variance	85.62359092	50.51936828
Observations	30	30
Pearson Correlation	0.264184727	
Hypothesized Mean Difference	0	
df	29	
t Stat	0.947740504	
P(T<=t) one-tail	0.175546371	
t Critical one-tail	1.699127027	
P(T<=t) two-tail	0.351092742	
t Critical two-tail	2.045229642	

(Source: Excel analysis)

It may be observed from the above table at p-value ≥ 0.35; we fail to reject the null underlying no significant difference between the mean values of EV/EBITDA obtained from the two approaches. What reasoning might be offered to explain the above phenomenon?

Without casting aspersions in respect of the utility of 'fundamental analysis', the results from the above seek to reinforce the theoretical postulate surrounding the benefits arising out of holding a well-diversified portfolio accruing to a marginal investor. It may also be argued that as ultimately investment in a well-diversified portfolio (SENSEX in this case) seeks to generate the most optimum risk-return combination for an investor, the enormous outlay of resources towards undertaking an elaborate fundamental analysis, perhaps, looks unwarranted. The surge in the popularity of Index funds and consequent clamour by investors towards investing in these assets surely seeks to reaffirm the above delineated postulate.

It must be emphasized here that the above observed revelations do not seek to make any judgement in respect of the investment policy adopted by numerous fund-houses that constantly endeavour to generate 'excess returns[15]' in keeping with the risk-propensity of the investors. As dictated by the theory underlying Capital Market Line (CML), the tendency of to earn higher returns must be matched-up with an ability to assume commensurate risk leading to an upward movement along the CML (Sharpe, 1970).

Ultimately, a fund manager who chooses to hold fewer securities (say, a dedicated sector-representative fund) would be aspiring to generate superior returns on the portfolio, which, to a large extent, would be dependent upon the 'quality' of securities constituting the portfolio. The constituting securities in turn may be chosen in accordance with the valuation philosophy professed fervently by fundamental analysts as represented by the DCF model.

Scope for further research : In this study, we have sought to examine a fundamental tenet relating to valuation models surrounding the determination of EV of firms in respect of the two widely followed approaches: namely, DCF and Market-determined. In the course of examination of this tenet, we have

[15] Here, an 'excess return' is defined as a scenario where a fund is able to generate returns, that is marginally higher than the one that would be generated by a benchmark market-index.

broadly discussed the underlying methodologies as applied under the two approaches and critically reasoned the relative merits and demerits of each of the valuation models.

Our observation that there is no significant difference observed values of mean EV computed using two alternative approaches of valuation poses interesting questions in respect of the utility of the valuation exercise in respect of securities constituting a market-wide portfolio usually represented by a benchmark market index. There is perhaps a greater scope for researchers to carry out a more detailed investigation in respect of the above posited research finding.

The above finding might also perhaps lead academic investigators to empirically examine the theoretical postulate surrounding 'market efficiency'. While several advanced and well-nuanced methodologies have already been employed to examine the validity of market efficiency with varied results; there could certainly be a greater scope for researchers to employ valuation ratios as a basis to carry out an empirical examination of market efficiency.

6. Summary & Conclusions

The study, while making a significant seminal contribution within the realms of valuation, endeavoured to merit a careful re-examination of the theoretical postulate surrounding the determination of EV derived under the two popular approaches viz., DCF and Market-determined. A central research question addressed in the study involves identification of plausible reasons leading to either convergence or divergence between the observed values of mean EV obtained from the two approaches. We find no evidence of divergence, which in many ways, serves towards reinforcement of the investment postulate presented by the portfolio theorists who recommend investors to hold a diversified portfolio in order to attain an optimum risk-return combination.

A primary argument offered in support of the above observation relates to the redundancy of engaging in an active stock selection exercise by resorting to a detailed fundamental analysis. As long as a portfolio manager is dealing with a well-diversified portfolio (typically represented by an Index fund); the portfolio manager should be successful in achieving comparable returns in keeping with the risk-continuum of investors. That is to say, portfolio managers while dealing with index representative portfolios will be well served in steering their efforts towards tracking the market on a sustained basis and ensuring that the constituent portfolio closely matches the market portfolio.

We also contend that the above revelation does not seek to repudiate the efforts engaged by equity researchers who justify their position by engaging in a highly nuanced fundamental analysis in order to superior returns over and above the market over a prolonged investment horizon. The classical capital market theory certainly offers an opportunity to every savvy investor to earn higher rates of return so long as there is an ability to assume higher risk.

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Appendix I

Mathematical proof surrounding derivation of a Relative Valuation[16] measure from a Valuation measure

The most basic expression surrounding computation of Intrinsic Valuation of a security is depicted using the Gordon Model, where,

$$P_0 = \frac{D_1}{(K_e - g_n)}$$

Dividing the above equation on both sides by earnings (E_0), the above equation transforms as;

$$\left(\frac{P}{E}\right)_0 = \left[\frac{\left(\frac{D}{E}\right)_0 (1+g_n)}{(K_e - g_n)}\right]$$

where

$\left(\frac{P}{E}\right)_0$ = price-to-earnings multiple

$\left(\frac{D}{E}\right)_0$ = pay-out ratio

g_n = stable growth rate

Similar to P/E, the two other popular multiples comprising of price-to-book (P/BV) value and price-to-sales (P/Sales) could be expressed as depicted below.

$$\left(\frac{P}{BV}\right)_0 = \left[\frac{\left(\frac{D}{E}\right)_0 \left(\frac{E}{BV}\right)_0 (1+g_n)}{(K_e - g_n)}\right]$$

$$\left(\frac{P}{Sales}\right)_0 = \left[\frac{\left(\frac{D}{E}\right)_0 \left(\frac{E}{Sales}\right)_0 (1+g_n)}{(K_e - g_n)}\right]$$

Multiples	P/E	P/BV	P/Sales
Key Companion Variables	Pay-out ratio	Pay-out ratio ROE (return on equity)	Pay-out ratio Profit-margin ratio

[16] The entire principles surrounding Relatives Valuation rests upon deciphering the impact of key companion variable(s) on their respective multiple(s).

Appendix II

How to determine whether a firm fits a Constant a Multi-stage growth model?

The most important factors considered by valuation experts while deciding between the alternative growth models – stable and multi-stage; the following three parameters assume highest significance.

1) Dividend pay-out pattern – Mature firms (constant model) will have lesser opportunity to seek greater reinvestment opportunities; they may thus seek to send positive signal about its financial well-being by making higher dividend payments. A young firm (multi-stage model) on the contrary seeks to explore greater opportunities for reinvestments and thus make withhold dividend payments or keep it to very minimum, at best.

2) Leverage – Firms at the maturity stage will be expected to rely on debt capital to a greater extent in comparison to equity. This is because, as the firm matures, equity investors will be demanding a higher required rate of return for committing capital. At maturity, with ROC typically settling down at a lower level or converging with WACC; achieving a higher rate of return becomes a difficult proposition. Consequently, for matured firms, we would witness a higher leverage ratio. In contrast, a young firm typically has a greater component of equity as equity investors are willing to invest in anticipation of the future growth potential existing in the business.

3) Growth – The growth rates for a mature firm typically seek to converge with the growth rate of the economy, usually represented by risk-free rate achievable from investment in a government security (G-Sec). A younger firm, on the contrary, will be characterized by higher growth rates at least in the initial years of business.

Appendix III

List of 30 firms constituting part of BSE SENSEX as on March 31st 2014

	Company	EV/EBITDA	Computed EV/EBITDA
1	Axis Bank	11.15	12.29
2	B H E L	6.37	4.92
3	Bajaj Auto	12.41	11.18
4	Bharti Airtel	8.11	4.78
5	Cipla	13.94	33.96
6	Coal India	10.97	8.37
7	Dr Reddy's Labs	15.64	17.78
8	GAIL (India)	6.96	7.99
9	H D F C	13.38	10.61
10	HDFC Bank	15.15	5.78
11	Hero Motocorp	11.43	8.34
12	Hind. Unilever	24.1	29.74
13	Hindalco Inds.	17.11	16.44
14	ICICI Bank	13.94	12.77
15	Infosys	10.87	21.49
16	ITC	20.43	16.74
17	Larsen & Toubro	13.77	6.85
18	M & M	11.2	11.34
19	Maruti Suzuki	10.26	6.95
20	NTPC	7.35	7.55
21	O N G C	6.04	6.05
22	Reliance Inds.	8.89	7.5
23	Sesa Sterlite	23.15	8.79
24	St Bk of India	15.19	21.14
25	Sun Pharma.Inds.	8.58	7.18
26	Tata Motors	56.09	11.17
27	Tata Power Co.	10.57	8.14
28	Tata Steel	4.84	7.28
29	TCS	16.41	17.64
30	Wipro	11.93	13.2

Appendix IV

Concept note on Valuation of Banking & firms forming part of the SENSEX

While using the Free Cash flow to firm model (FCFF) in respect of determination of intrinsic value of firms, the inputs surrounding the banking firms need some modification. In the section below, we explain the modified version of the FCFF model surrounding the stable model. A stable model surrounding the valuation ratio of EV/EBITDA could be expressed in the flowing manner.

$$\left[\frac{EV}{EBITDA}\right]=\left[\frac{(1+g_n)\left[(1-t)-\left(\frac{Reinvestments}{EBITDA}\right)-\left(\frac{Depn(1-t)}{EBITDA}\right)\right]}{(WACC-g_n)}\right]$$

Eq. 2

The notations used in the above equation are explained below.

EV = Enterprise value

EBITDA = Total income – (Operating expenses – Depreciation) – Provisions & Contingencies

g_n = maturity growth rate (equal to federal T – Bond rate)

t = marginal tax rate (equal to corporate tax rate)

Depreciation in the context of a banking entity relates to bank's fixed property represented by property and furniture & fixture. There are two important terms that deserve detailed explanation.

Reinvestments – This is arrived as the product of Net Operating Profits after taxes (NOPAT) and Reinvestment rate (RIR %). While applying the mature model, the following expressions hold good.

$$\text{Reinvestments} = \text{RIR x NOPAT}$$
$$g_n = (\text{ROC x RIR})$$

(Koller, Goedhart, & Wessels, 2010) Eq. 2.1

where

ROC = WACC (as excess returns are equal to zero for a matured firm)

$$\text{RIR} = \left[\frac{g_n}{\text{WACC}}\right]$$ (derived from the above expression)

Note that NOPAT may be derived from EBITDA as

$$\text{NOPAT} = [\text{EBITDA}(1-t) - \text{Depreciation}(1-t)]$$

Eq. 2.1.1

Another computational input that needs an elaborate mention is the weighted average cost of capital (WACC). Note that it assumes a much simpler form in the context of a non-banking entity. However, a typical definition of WACC as the sum of weighted costs of equity and debt is simply rendered meaningless in the context of a bank. This is because, for a bank the primary sources of capital are three - Equity, Deposits, and Borrowings. Deposits could be further classified into three - Demand, Savings, and Term. With each category of deposit coming at a specific cost, WACC merits redefinition, which may be expressed as shown below.

$$\text{WACC} = (W_E \text{ x } K_E) + (W_{DD} \text{ x } K_{DD}) + (W_{SD} \text{ x } K_{SD}) + (W_{TD} \text{ x } K_{TD}) + [W_D \text{ x } K_D(1-t)]$$

Eq. 2.2

where

W_E = Weight of equity

K_E = Cost of equity (using CAPM approach)

W_{DD} = Weight of demand deposits

K_{DD} = Cost of demand deposits (reckoned at 0%)

W_{SD} = Weight of savings deposits

K_{SD} = Cost of savings deposits (reckoned at 4%)

W_{TD} = Weight of time deposits

K_{TD} = Cost of time deposits (reckoned at 9%)

W_D = Weight of debt (borrowings)

$K_D(1-t)$ = After-tax cost of debt (cost of debt is computed as the sum of risk-free and default spread)