

Critical Analysis of Discounted Cash Flow Approach to Share Valuation and Capital Asset Pricing Model and the relevance of Behavioural Economics in Security Analysis



Discounted Cash Flow Approach (DCF) method of share valuation and Capital Asset Pricing Model (CAPM) for estimating the expected rate of return on a share, are popular methods used in Security Analysis and Share valuation. However, they may not have practical relevance in the real world as the price of share is affected by a number of complex socio-economic aspects that these methods do not provide for. Methods used in Share Valuation like the DCF and CAPM serve the purpose of conceptual understanding of the behaviour of a share price in capital markets and applying them in the real world could be risky. Moreover, the assumptions used in these methods have been considered impractical. Share Valuation methods are far less exact than the laws of physics and an analysis of Capital Markets therefore become a part of Behavioural Economics. Deducing Market Values of shares by way of mere formulae is simplistic. This article critically analyses the DCF and CAPM and explains why behavioural economics is relevant in security analysis.



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The Investor or a potential investor being an “Economic Man”, always wishes to maximise his wealth. He therefore always wants to get “more value for money” than he spends or hopes to get “more value for the money over a period of time” when he invests. Hence, it is important for him to initially know the value of the security that he is investing into and the traded price of the security to find out if the security is “overvalued” or “undervalued”. If he believes that the security is undervalued, he would wish to buy it and

hope that it would give him “better value for money over a period of time of investing” when the market price gets corrected.

Let us have a brief overview on the popular method of valuation that has been suggested in academics - Discounted Cash Flow Approach (DCF) to share valuation:

Discounted Cash Flow (DCF) Approach to share valuation

This method is based on the precept that an investor prefers present consumption to future as the value of money declines over a period of time.

Dividend Discount Model:

$$P_0 = [D_1 / (1 + r)] + [P_1 / (1 + r)]$$

P_0 = current price of equity share

D_1 = Dividend expected after one year

P_1 = Price of the share expected a year ahead

r = rate of return required on the equity share

This method simply states that current price is the sum of present value of dividend receivable in the next year and present value of the expected market price after a year.

Illustration:

Let us say $P_1 = 120$, $D_1 = 5$ and $r = 0.10$

$$P_0 = [5 / (1 + 0.10)] + [120 / (1 + 0.10)]$$

$$P_0 = [5 / (1.10)] + [120 / (1.10)]$$

$$P_0 = 125 / 1.10$$

$$\text{Or } P_0 = 113.63$$

P_0 is the theoretical value of the share.

Hence if the Market price is below 113.63, the investor buys it and if it is over 113.63 he sells it.

If the growth rate of the share is constant, let us say ‘g’, the expected Market price of the share after 1 year i.e. P_1 will be $P_0 (1+g)$.

According to the Dividend Discount Model,

$$P_0 = [D_1 / (1 + r)] \text{ (Present value of dividend)} + P_0 [(1+g) / (1+r)] \text{ (Present value of Market price of share assuming a constant growth rate, g),}$$

both discounted at the rate of return expected of the share.

$$\text{Present value of dividend} = [D_1 / (1 + r)]$$

$$\text{Present value of Market price of share assuming a constant growth rate, } g = P_0 [(1+g) / (1+r)],$$

where, r is the rate of return required on the equity share.

Hence, the Dividend Discount Model formula will be:

$$P_0 = [D_1 / (1 + r)] + [P_0 (1+g) / (1+r)]$$

or

$$P_0 = [D_1 + P_0 / (1 + r)]$$

$$P_0 = [D_1 / (r-g)]$$

Illustration:

Let us say $D_1 = 5$, $r = 0.15$ and $g = 0.10$

$$P_0 = 5 / (0.15 - 0.10)$$

$$= 5 / (0.05)$$

$$= 100$$

Hence in this case, if the Market price is over 100, the share is considered to be overvalued and if it is less than 100, it is considered to be undervalued.

CAPM: Relationship between risk and return

Investor always has the option of investing his money in instruments that provide risk-free returns. Investing in financial markets obviously cannot be without risks. Before investing in a share, every investor would know that there are certain intrinsic risks that the share carries and also market risk that affect all shares. Hence, he would like to be compensated for these risks by way of additional return over and above the possible risk-free return that he can enjoy. This additional return is called the risk premium.

Diversifiable risk and non diversifiable risk

Risks are classified into two types, viz., Diversifiable risk (company specific risk) and non diversifiable risk (systematic risk or market risk). Company specific risk can be mitigated by having a well diversified portfolio of investments. However, Market risks are the ones that cannot be wiped away as they affect all the shares that get traded in the stock market.

CAPM is a model used to find the theoretically appropriate required rate of return for an asset assuming that all the diversifiable risk has been eliminated.

Market risk is nothing but the extent to which the share is sensitive towards market movements explained by β (Beta)

Beta is the regression coefficient or in other words, it is the ratio of Co-variance of the return of the security with market returns to Variance of the return on market portfolio or square of standard deviation of the return on market portfolio.

$E(R)$ = (Expected rate of return from a share) is calculated using a popular method called Capital Asset Pricing Model.

CAPM explains the relationship between return and risk in the form of a linear equation

$$\text{i.e., } E(R) = R(F) + \beta(E(RM) - R(F))$$

Where

$E(R)$ = Expected return on security

$R(F)$ = risk free return

β = Beta of security

$E(RM)$ = expected return on market portfolio.

Thus, if the “Expected rate of return on the share” is higher than the “required rate of return on the share” the share is considered to be undervalued.

Let us say $R(F) = 0.10$

Beta, β is 1.20

$E(RM) = 0.15$

$E(R) = 0.10 + 1.2 (0.15 - 0.10)$

$= 0.10 + 1.2 (0.05)$

$= 0.10 + 0.06$

Here 0.06 is considered the risk premium.

$= 0.16$ or 16%

If the required return is 20%, the investor would not invest in this share as expected return from the share is below the required return on the share.

CAPM is a modern theory in Finance that explains that valuation of a security is a function of expected return from the security and expected return is based on the extent of risk / volatility of the security in the market.

As per CAPM if r is significantly higher than $R(F)$ (risk free return), it means that the risk component in the security is very high.

Critique

As per DCF method, g (expected growth rate) and D_1 (expected dividend) are the ones that need to be forecast.

D_1 is subject to company policy towards dividend at the end of the year and g is the growth rate of business. G is assumed to be constant but is not likely to be constant in reality. Estimation of g can be done by an understanding of the fundamentals of the business. The required return on a share is also subjective.

Let us try and understand why?

In security analysis and investment strategies, a lot of emphasis is laid on Fundamental Analysis, both in theory and practice. Fundamental Analysis, in simple terms, suggests that the value of a security depends upon all aspects that affect the business of that security i.e. feasibility of the line of business, management, changes in competition and technology, overall

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economic factors, etc.

The very objective of the exercise of Fundamental Analysis is to be able to measure the value of the security, compare it with the going market price and make a judgement as to whether it is overvalued or undervalued. And then of course, as the popular adage in capital markets goes, “Sell the overvalued and buy the undervalued”.

Efficient Market Hypothesis claims that financial markets are capable of

- acquiring relevant business information,
- understanding the information,
- accurately quantifying/translating the value of the information in monetary terms and
- incorporating this effect of the information on to the traded price of the security

In other words, if markets are considered to be efficient, one cannot earn returns in excess of the average market returns given the information available in the market.

The essence of efficient market hypothesis is that if an investor needs to make profit on over/under valuation, he needs to arrive at the so called “fair value of the share” before the market understands it.

This brings us to the very basic question - How can an investor or a potential investor who belongs to a dynamic business environment, be able to do the SWOT (Strengths, Weaknesses, Opportunities and Threats) and PESTEL (Political, Economical, Technological and Legal) analyses and also be able to translate these complex factors in monetary terms to arrive at the “fair value of the share”?

Even if he was able to do this complicated exercise, going by the efficient market hypothesis, the market also would be simultaneously working on re-calculating the share price. So, if the estimated fair share price calculated by the analyst is indeed different from that determined by the market, which of the two amounts should be taken as the acceptable one?

How can one expect any efficient market or wise investor to be able to exactly predict future events like changes in technology, changes in political scenarios, regulatory environments etc?

The fact is that many of the retail investors have the money but not the time, aptitude, skill or inclination to understand security analysis. The Nobel Laureate from Carnegie Mellon University, Herbert Simon in his “Theory of bounded rationality” states that people are not always able to obtain all information. He says, “Since we have only so much brainpower and only so

much time, we cannot be expected to solve difficult problems optimally.”

Hence, Efficient Market Hypothesis seems simplistic and anomalous.

The popular Random walk theory clearly states that the price of a security moves randomly without a pattern and cannot be predicted. This is true, given that share prices move as the new information keeps coming and the market understands it. However, fundamental analysis is done only on the basis of information available *at that point of time* and the analysis becomes obsolete once there is some new and significant information that is available subsequently.

Theories on valuations like Walter’s Model on dividend policy relevance and Gordon’s dividend discount model, do not provide for behaviour aspects.

Even the well known CAPM is based on unrealistic assumptions like

- a. No taxes and transaction costs
- b. Investors are rational (which is not always true!)
- c. All information is easily available
- d. No arbitrage opportunities in market etc.

In CAPM, the Beta, as discussed, is the ratio of Co-variance of the return of the security with market returns to Variance of the return on market portfolio. Here, the Co-variance can be calculated only out of a sample of historic data. CAPM suffers from the criticism that any statistical tool suffers i.e. “How can one predict the future based on past data and events considering that markets are dynamic and there need not be any relation between the past and the future?” Going by Random Walk theory, CAPM also becomes unreliable.

With all due respect, theories on valuation are academic and serve the purpose of gaining an understanding of capital markets. These are not as robust as some of the laws of physics. Hence, practically applying them could be risky.

Security Analysis as part of Behavioural Economics

Study of Share Valuation and analysis of Capital Markets is a part of Behavioural Economics and these are far less exact than the laws of physics. Hence, deducing them by way of mere formulae is too simplistic.

The investor or potential investor in capital markets is after all the “Economic Man” as described in Neo-Classical Economic theories. He is a bundle of desires and always looks to maximise satisfaction by either getting more value in use or exchange (say,

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goods against money) in the present or postponing his enjoyment to a future date by way of making an investment, thereby expecting higher returns from them as compensation for sacrificing present consumption. This value of sacrifice of satisfaction out of present consumption varies from person to person. Hence, the expected return from an investment would also correspondingly vary from investor to investor. This makes the concept of “Value” relative to the individual, a mere point of view.

Market price is purely a reflection of the psychology of the investors/traders who estimate by themselves. **Market Value of a security is always a value perceived by the market. Spread or Notional margin on a security is purely the difference between two perceptions, i.e. perception of value of the analyst and perception of value of the market. This is applicable at any point of time.**

Adam Smith in his popular book, “An enquiry into the nature and causes of the wealth of nations”, states that value could have two meanings -

1. Value in use
2. Value in exchange

Both values estimated by the same individual for the same good at the same time may still be contradictory. He refers to the paradox of value (Diamond-Water Paradox) where water is underpriced though it has high value in use and diamond is highly priced even though it has no value in use. Goods may be exchanged or utilised based on what gives them higher value. Therefore, an investor will decide to buy or sell judging on the basis of what gives him maximum utility. This value is very relative and varies from individual to individual and cannot be explained by methods/formulas on share valuation.

Analysts would agree that success in market requires not just the ability to accurately collect facts and make forecasts in monetary terms, but also the ability to predict *market behaviour* over a period of time so as to outsmart the market. This exercise is almost impossible as one needs luck.

Fundamental Analysis assumes that an investor always buys the undervalued and sells the overvalued which need not be the case always. This need not be true. Even a rational investor may defy Fundamental Analysis while trading.

Investor Confidence

For example, there could be an instance where an investor might be forced to sell his investment in distress even though he might know that it is undervalued. Similarly, an investor may arrive at the theoretically fair value of a share and see the market surge well above it. He is confident enough to ride on a 'bubble' and buy the security though he is well aware that it is overvalued and sell it just before the bubble bursts, provided that he is confident of predicting when exactly the bubble would burst.

Winner's Curse

Let us take a typical example of an auction. Every bidder bids for the item that goes under the hammer and keeps bidding till the point where he believes the going bid price has exceeded the perceived value of the item. This, of course, is a point of view which may again vary from bidder to bidder. There might be even instances where bidders bid more out of passion and/or pride to acquire the item, despite the fact that they might end up overpaying deliberately. This phenomenon is popularly called the "winner's curse" in behavioural economics which says, winners of a competitive bid invariably end up overpaying. This is quite often the case in capital markets and even in Mergers and Acquisition that fail. This phenomenon in the real world is a blatant contradiction to what fundamental analysis expects a logical and rational investor to do.

Winner's Curse phenomenon was analysed by Werner De Bondt and Richard Thaler in their study using data for stocks traded on the New York Stock Exchange, which suggests that as and when new information comes in to the market, investors tend to overreact to the information and give less weightage to prior information. If this conclusion is true, then securities that do well over a period of time would

invariably be overvalued as the market might over react to good news. In the same way, the market might over react to bad news thereby getting the securities underpriced.

Wait/Buy/Hold/Sell

Neo classical economists like Alfred Marshall explain that in a competitive market, the price of a good varies until it settles at a point where the quantity demanded by consumer is same as the quantity supplied by the seller, thus resulting in economic equilibrium.

In capital markets, investors/potential investors fall in one of the four categories -

- a. Wait
- b. Buy
- c. Hold
- d. Sell

A potential buyer may wish to wait for the prices to go down. At the same time, another investor may plunge into the market and willingly buy at the traded price. Similarly, some sellers would sell at the traded price, while others might want to wait for the price to go up to a point where they believe that the price is fair to sell at.

What the experts said:

For the "Economic man", utility of any good varies from time to time. David Laibson, Behavioural Economist from Harvard says "There's a fundamental tension, in humans and other animals, between seizing available rewards in the present, and being patient for rewards in the future,"

Max Bazerman, the Nobel Prize winner from Harvard Business School, states that "People act irrationally in that they overly discount the future". He also states that people end up spending on things that they cannot afford for example, with their credit cards, hence end up buying less over their lives.

The Sub Prime Crisis, a classic example, has a lot to do with people trying to live beyond their means in the hope that they would be able to pay out their debts as their future financial abilities improve. That is when people started facing defaults and foreclosure. Even the financial regulators of the US might have to take responsibility as they made decisions based on some unrealistic assumptions. The Sub Prime Crisis that affected the World economy can be explained to a great extent by Behavioural Economics and not necessarily by Fundamentals.

As we discussed above, CAPM assumes that

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investors are always rational. Richard Thaler from the University of Chicago Booth School of Business, considered being the father of Behaviour Economics says, "Conventional economics assumes that people are highly-rational - super-rational - and unemotional. They can calculate like a computer and have no self-control problems", thereby criticising market based approaches to economics.

Further, the plans of the "Economic man" to invest in capital markets are subject to his propensity to save and that again is subjective. Humans who are interested in making investments tend to save more during the earning life to ensure financial stability in the retired life. But here again the extent of saving has a lot to do with the 'will power to save' and the extent of 'self control to forego current spending' exercised by the potential investor. Moreover, regulators often influence these tendencies by making saving more attractive by proving tax sops from time to time.

Drawbacks of Behavioural Economics

The major counter argument against Behavioural Economics is that it is more "descriptive" than "prescriptive". Complex behaviour tendencies that attempt to explain stock market anomalies like January effect, weekend effect, winners curse etc. are purely verbose and do not attempt to mathematically establish the relationship between variables by way of a robust formula. But still, it does not take away the fact that Behavioural Economics is relevant from Security Analysis point of view. Behavioural Economics in academia is still at a very early stage of inception and is expected to gain importance with further empirical studies and research over a period of time.

Conclusion

Valuation methods using statistical tools and mathematical equations do not take into consideration the crucial aspects of sporadic behaviour of the average investor which probably explains the anomalies of the market.

Statistical tools need not always be able to predict future market trends given the Random Walk Theory.

Markets never move in any pattern. Hence, historic data can be irrelevant in security analysis. Also, share values need not necessarily mean the sum of present value of future cash flows. Share value, in simple micro economic terms, the amount at which the seller is willing to sell and the buyer is willing to buy and that too at one point of time. The conclusion one can draw from the above is that, the findings of Alfred Marshall and Adam Smith still remain more applicable in valuation of shares than modern theories.

In today's world, Investor sentiments also get emphasis in media and it is not just all about business fundamentals. Behavioural Economics is indeed gaining importance in academia and practice.

Why Behavioural Economics is relevant in today's world? - It is relevant because, as Adam Smith said "psychology is a part of decision making in economics" and therefore, Value is simply 'one's perception at one point of time'! ■

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