Abstract

The purpose of this paper is an attempt to reach a better stock valuation model of the Fundamental Analysis Approach, by reviewing the theoretical foundations and literature reviews.

By reviewing the theoretical foundations for each model of the fundamental analysis models, and sequentially beginning of the Discounted Dividend Model (DDM), through a Multiplier Models, and finally the Discounted Cash Flow Model (DCF), we find that all these models have strengths, despite the lack of accuracy, because it is required financial efficiency market. Recently Ohlson (1995) stated the simulated benefit in the formulation of the Residual Income Model (RIM). The Ohlson Model identifies the relationship between stock values and accounting variables.

By reviewing the literature reviews, in financial markets, we conclude that the best model that can be relied upon to predict stock value, that proved credibility in both emerging and developed markets, is Residual Income Model (RIM), which doesn't require financial efficiency for its application.

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1. Introduction

Based on a review of several Fundamental Analysis's literature (e.g., Fontanilla & Gentile, 2001; Thomsett, 2006; Faerber, 2008), we came to a comprehensive concept for Fundamental Analysis, it is "Knowledge of the rules and fixed steps access to its objectives of determining the intrinsic value of shares in stock markets, through a general framework to study the expected economic forecasts, leading to sectors which generate an increase in sales and profits, therefore measure strength financial companies, efficiency of management and business opportunities based on

∗Corresponding author. Tel.: +2010 945 47 444.
E-mail address: as.wafi@foc.cu.edu.eg.
historical financial statements and current conditions. Thus determine the stock fair value, and then compare them to market values resulting from interactions of supply and demand, to identify investment opportunities (profit or loss).

In next sections, we will illustrate the theoretical foundations for fundamental analysis models in terms of the composition of each model and its assumptions, evidence and to what extent is the accuracy and credibility of each model from empirical studies in both emerging and developed markets, after that what is the conclusion which we will reach, finally the contribution of this paper.

2. Theoretical Foundation

In order to estimate the fair (intrinsic) value of shares, they used valuation models by Fundamental Analysts in stock markets, these analysts use information of current and future earnings of the company to evaluate the fair value (Bernard, 1994; Fischer and Jordan, 1995; Penman, 1991; Bauman, 1996; Rielly and Brown, 2002; Jones, 2007 and Bodie, et al, 2009), and then compared with the market value to determine whether it was possible to invest in or to be excluded.

Because the value of the company is based on its ability to achieve cash flows and the uncertainty of those cash flows, and the most important principles of modern finance is that "any asset value equal to the present value of all expected future cash flows discounted at the required return." Given the complexity and importance of common stock valuation, so there are many techniques (Reilly and Brown, 2002 and Bodie, et al, 2009), the Fig. 1 shows various stock models valuation.

![Stock valuation models](image)

Fig. 1. Stock Valuation Models

We will show a summary of each of these models as follow:

2.1. Dividend Discount Models (DDM):

The dividend model depends on a basic assumption which is: the stock value is determined by discounting the expected dividends future cash (Subramanyam and Venkatachalam, 2007). Thus, the real value of the shares is determined by the present value of the cash dividend, which is expected to be generated as a result of the ownership of the stock (Bodie, et al., 2009). Therefore, we will explain common models and their assumptions as follows:
General Model for the DDM:

\[ V_0 = \sum_{t=1}^{\infty} \frac{D}{(1 + k)^t} \]  

(1)

Where; \( V_0 \): Value per share of stock, \( D \): Expected dividend per share, \( K \): required return rate on the stock or discount rate.

Model assumptions:
- The company continues to infinity.
- Continuation of dividends at a fixed rate means that the distribution policy is fixed for the company at a certain amount so that it can be correctly predict.
- The required return rate on the stock or discount rate "K" in the model remains constant because the discount rate depends on the market for the implementation of the investment, and is likely to change dramatically over time.
- This model requires the availability of financial market efficiency.

2.2. Models that depend on Multiples:

The multiples that determine equity value are more widely used, right down to the market value per share, which is based on the analysis of market data, and we will illustrate the most common ratio in this category is:

Earning Multiplier Model (P/E Ratio):

Referred to Multiplier model or what is called price to earnings ratio, as it is known practical or pragmatic model, upon which fundamental analysts, and its models more commonly used by securities analysts, compared to dividends model (Reilly and Brown, 2002; Faerber, 2008).

This ratio is the simplest form of the multiplier model, the most common and widely used among securities analysts, and Faerber (2008) believes that it may be considered through this model to the stock value as equivalent to several times the earnings. This means that stock price is just a multiple of earnings per share, and can be expressed as follows:

\[ V_0 = EPS_1 \times \frac{P}{E} \text{ ratio} \]  

(2)

Where; \( P/E \text{ ratio} = \text{Market price of the stock} / \text{Earnings per share}, EPS_1: \text{Expected earnings per share for the next period.} \)

Model assumptions:
- Continuity of the firm in make profits, and in the case of the opposite (to achieve loss) cannot be applied to the model.
- The availability of developed financial market (where at least a weak form of efficiency) for the predictability of future value of earning per share.

Notwithstanding the foregoing, however, Bodie, et al. (2009) believe that there are shortcomings in the analysis of models that depend on Multiples, and it has been a trade-off between Dividends Models and Models that depend on Multipliers, as follows:

- Dividends Model characterized by logic, because it is the best estimate of the current value for a firm, it may be expected as the present value of the dividends paid by the enterprise to shareholders, while some of analysts and investors believe that this model is not realistic, as it is difficult to accurately predict future dividends. It assumes implicitly predict dividends from now to infinity, and it is impossible to achieve. On the other hand, other investors may want to focus on capital gains, rather than focusing on the dividends.
- On the other side, the multiplier model (P/E ratio) is characterized as less accurate and less objective, yet it is easy to apply, and the common approach in the valuation, but the term the price/earnings ratio became a part of the framework of contemporary investment language.
Finally, it is clear that the models relying on dividends become worthless, if a company chooses - at least temporarily - to reduce or stop dividends (Bodie, et al, 2009), so an alternative model was developed: a Free Cash Flow Model. It is the form below.

2.3. Discounted Cash Flow (DCF) Models:

Using Free Cash Flow Firm Statement (FCFF), which is calculated as follows (Bodie, et al., 2009):

\[ FCFF = EBIT \times (1 - \text{Tax Rate (Tc)}) + \text{Depreciation and Amortization} - \text{Change in Working Capital} - \text{Capital Expenditure} \]  

(3)

To get Firm Value, the net present value of free cash flow firm is calculated using an appropriate discount rate (Weighted Average Cost of Capital WACC), and Present Value of Terminal Value\(^1\) using the same discount rate (WACC), to become the Firm Value as shown:

\[ \text{Firm Value} = \sum_{t=1}^{T} \left( \frac{FCFF_t}{(1-WACC)^t} \right) + \frac{V_T}{(1-WACC)^T} \]  

(4)

Where; \( V_T = \frac{FCFF_t + 1}{WACC - g} \)

To reach the Value of Equity, we follow this equation;

\[ \text{Value of Equity} = \text{Firm Value} + \text{Excess Cash} - \text{Outstanding debt} + \text{Value Investment} \]  

(5)

Hence, the Equity Value will be divided by the number of shares, to reach Fair Value per Share, as in equation no. 6, the following;

\[ \text{Fair Value per Share} = \frac{\text{Equity Value}}{\text{Number of Shares}} \]  

(6)

Model assumptions:

- The required rate of return on the stock or the discount rate in the model remains constant; because the discount rate depends on the market for the implementation of the investment, and likely is changing dramatically over time.
- Requires the availability of financial market efficiency for application of the model to calculate the present value of Terminal Value (\(V_T\)).

Penman (1992) refers to that the DCF Model, despite the lack in its use by many researchers and practitioners, it is one of the most important valuation models, and this is what was agreed upon Copeland, et al. (1990), they have pointed out that discounted cash flow approach DCF captures all the elements that affect the value of the company in a comprehensive and frank until the last moment. Nevertheless the study of Penman (1992) has shown that its application in practice is not clear at all.

2.4. Residual Income "Earnings" Valuation Model (RI Model):

Recently, Ohlson (1995) simulated the formulation of the Residual Income Model for valuation from the DDM, Where the Ohlson model defines the relationship between the stocks values and accounting variables, such as earnings and book value. The steps towards the methodological development of the relationship between accounting data and non-accounting data, and the value of equity firm has in a series of researches by Ohlson (1990 and 1995) and Feltham

\(^1\) As in the case in the DDM and DCFM, the terminal value used to avoid adding the current value of the sum of the infinite cash flows, the terminal value may simply be the present value of the fixed rate of growth infinite, and as a general rule, the Intrinsic Value estimates depend critically on the value of fixed terminal value. (Bodie, et al., 2009).
and Ohlson (1995), been based on the work of many of the studies (e.g.; Edwards and Bell, 1961; Peasnell, 1982 and
Brief and Lawson, 1992); Feltham and Ohlson (1995) developed a model directly observes the relationship between
the information variables and stocks.

Experimental existing research generally has provided support to this model, it is now proposed to the model as an
alternative to the DCF Model for the stock valuation. Current experimental Research has shown that the model has
new horizons from two angles; first, the model illustrates the stock prices better than existing models on the basis of
the discount on a short term of dividends and cash flows (Bernard, 1994 and Penman and Sougiannis, 1998). Second,
the model provides a valuation approach that is more complete than previous valuation alternatives commonly used
(Frankel and Lee, 1998), and as a result of the above Dechow, et al. (1999) believes that this model gives better
efficiency results in the short term than DDM and DCFM. Ohlson (1995) illustrates that the Residual Income Model
(RIM) as follows in this equation;

\[
P_t = b v_t + \sum_{t=1}^{\infty} (1 + r)^{-T} E \left[ X_t\right] \\
\]

Where; \( X_t\) = \( r b v_{t-1} \) (8)

Where; \( p_t\): Stock prices in the period \( t\), \( b v_t\): Stock book Values in period \( t\) and \( t-1\), \( E_t\): Expected value from
operations conditional information at period \( t\), \( X_t\): Firm earnings at period \( t\), \( r\): Discount rate.

**Model assumptions:**

- The book value represents the company's resources, which can be allocated to earnings arising in the
  future, as well as representing the liquidation value of the company assets or adapting to them (Burgstahler
  and Dichev, 1997).
- The current earnings per share or know what a variable flow, measure the accumulations in the book
  value, so it serves as a proxy for the current value of the company or its value in use (Barth, et al., 1996).
- The expected earnings per share represent a proxy for the variable that contains the relevant value in
  addition to the above information (Dechow, et al., 1999).
- Finally, this model does not require application in efficient financial markets, helping to ease its
  application in the emerging markets (Ragab and Omran, 2006; Bettman, et al., 2009; Fung, et al., 2010
  and Wafi, et al., 2015).

It must be emphasized that the model does not provide a complete framework for basic analysis, and it is noted
that Ohlson (1990 and 1995) and Feltham and Ohlson (1995) researches don’t identify specific variables financial
statement (more than book value and Earnings) or useful non-financial information when evaluating the firm value,
however, this should not be considered as a weakness in the model. By appealing to economic intuition and
institutional knowledge, researchers in accounting began to identify those variables, therefore, the action taken in the
research submitted by Bauman (1992) shows that Ohlson (1990 and 1995), and Ohlson and Feltham (1995) provide
original arguments in support of fundamental analysis. As pointed out by Penman (1992) the importance of research
done by Bauman (1996) is to discover what they offer of information from future earnings from the viewpoint of
financial statement analysis.

3. Literature Review

Bauman (1996) believes that the real start of the research studies in the stock valuation using the fundamental
analysis return for three main articles: The first study by Lev and Ohlson (1982) who identified the need to "create a
stock valuation models to complement and expand the traditional correlation studies for accounting research based
on the market". The second article was a stated study by Lev (1989) that our understanding of the process of financial
statement analysis "not exceeding much from the list of financial ratios, which is supposed to be used by investors",
and discussed the need to change capital market research to measure and evaluate issues. Finally, the third article by
Bernard (1994) criticized the empirical research regarding the role of accounting data in valuation stock, among his
suggestions for future research calling for more of the methodology modeling and the studies that use samples of firms
within particular industry or economic sector, thus allows researchers to exploit their knowledge of the detailed
disclosures and institutions. After these three leading researches, a number of researchers began to test the analytical and experimental relation for the accounting data and non-accounting data related to the valuation equity firm.

We will clarify many of the empirical studies, which focused on studying the relationship between the various fundamental analysis models, and show how its predictive ability of future stock value in different financial markets; developed and emerging as follows.

3.1. In the developed markets:

In a study by Penman and Sougiannis (1998) aimed at comparing the accounting valuation models under many conditions, including the accounting standards on an accrual basis, and also trying to resolve the problems resulting when calculating "Terminal Value" in the DDM and DCFM, because the accrual basis produces accounting errors at calculating that value, as reflected in the end, on the errors in the prediction or the intrinsic value of shares and compared to stock market value. Being applied on US market indicators "NASDAQ, AMEX, NYSE", during the period from 1973 to 1992 and using regression models using analyses conditional and unconditional, concluded that the results of the earnings and book value models have practical advantages over than analyses by DDM and DCFM.

Being applied on US market indicators also - NYSE, AMEX - during the period from 1983 – 1990, the study by Abarbanell and Bushee (1997) aimed at examining the basic relations between the accounting basic signals between stock prices, using the earnings, stock prices, monthly returns, and some of the financial data that reflected on fundamental analysis, based on the view via Penman (1992) and Lev and Thiagarahan (1993).

The results of the study concluded to analysts' forecasts do not use the full information, because investors forecast revisions are strongly linked to many of these signals, and raises this study about the failure response analysts' reaction to the financial data likelihood that investors may be unqualified in the basic analyses, showing that the macroeconomic variables, such as; inflation and the total gross national product, and also the determinants project variables, such as; previous earnings news, and expected earnings growth, which identifies some of the relationships between basic signals, future earnings, and prediction errors.

In a study by Nissim and Penman (1999) attempt at studying the impact of the relationship between financial ratios analysis on equity valuations, and in this study indicated that for the analysis of the financial position of its uses in the equity valuation, in this context is integrating the analysis of earnings and expansion, the application on the US market indices in the period between 1963 - 1996, and using the Pooled Cross Sectional and Time Series Analysis.

The study concluded that the analysis includes an analysis of earnings and an analysis of the growth. The earnings analysis includes traditional analysis, and analysis of growth works to be completed both of earnings and growth. The financial ratios appropriate for forecasting models compared to DDM and DCFM.

In a study of Subramanyam and Venkatachalam (2007) whose main goal is to test the relative ability of earnings and cash flow relative to interpret the future intrinsic equity value. By performing statistical analysis using the data available after 1987 through the Compustat database during the study period from 1988 to 2000, in which it can determine the future intrinsic value, and using the earnings models "DDM" as an independent variable, to determine the intrinsic value as the dependent variable. By using the $R^2$ coefficient to determine the strength of the relationship between variables, and using the same coefficient ($R^2$) in the DCF Model as an independent variable, and the intrinsic value as the dependent variable. The study concluded that the coefficient of determination ($R^2$) output of Earnings Models (DDM) more significant than the ($R^2$) output of DCF Model, and to determine the intrinsic value equation the fundamental analysis was applied "DDM", which was reached or proposed essentially by Ohlson (1989).

By re-application on the same sample during the same period by using the model with the highest coefficient determine $R^2$, the period was divided into two periods: the first is to be used in the estimation model to predict, and the second is to make the forecasting process, and the study concluded that the intrinsic value approach is a more direct test to confirm the accumulated earnings (represented in DDM) and is better than forecasting by cash flow (represented by DCFM).

In a study by Fung, et al. (2010), who aimed at employing two alternative measures of Fundamental Value: first; the intrinsic value (IV) using the DDM which was developed by Subramanyam and Venkatachalam (2007). Second; adjusted stock value in the inefficient market, which provided by Aboody, et al. (2002) who assumed that the
inefficient market decision should be reflected in future changes for prices, depending on this assumption they measured fundamental changes for certain companies using adjusted stock price for price changes in the future.

By testing the available data in all companies in research centre, which is inside the Industrial Annual Compustat file for the period 1984 – 2003, they re-examined the relation between the value and accounting data (via Residual Income RI Model), the results concluded that the focus on efficiency or inefficiency market must be taken into consideration, while searching in the relation between the value and accounting data.

3.2. In the emerging markets:

In the Asian Capital Markets, Using samples of the Hong Kong Stock Exchange for the trading of securities, the study (Cheung, et al, 1997), which created the two strategies: the first; the earnings to price ratio (P/E ratio), the second; book value to price ratio (BV/P ratio), and the results indicated that the two strategies have achieved extraordinary returns.

And (Chung, et al, 1999) study, which also found positive for the strategies applied in the Korean financial market, which was based on the foundations of previous studies (e.g. Ou and Penman, 1989; Holthausen and Larcker, 1992) Concluded results of the study to the inefficiency of the Korean financial market, as well as the success of used strategies in prediction.

In the Hong Kong Stock Exchange, also we find the study of Chung and Kim (2001), where they aimed at achieving two main objectives: The first is the development of a new approach in order to predict the intrinsic value of equity by using financial data which is in the published financial statements. The second objective is to predict the stock intrinsic value practically using the proposed model (which is achieved by objective one). Using a large sample of Korean companies, with the exclusion of companies that provide financial services to the difference of its financial structure for other companies, where the sample period is nine years from 1983 to 1991 and was divided into two periods: The period of development and evaluation of the model (1983 to 1985), and the period prediction model (1986 to 1988 and 1989 to 1991), then valuate the degree of mispricing, where Chung and Kim (2001) developed and calculated Price deviation metric (which is named measure of D-value). To achieve this, the study based on Pooled Cross Sectional and Time Series Analysis, the results concluded that the Korean market is an inefficient market, for the sample of Korean companies; the observed values from the market differ from the corresponding intrinsic values by approximately ± 20%.

And complementary of the studies that have been done on the emerging markets, specifically on the Egyptian stock market, Ragab and Omran (2006) who aimed at examining the relationship between the stock price and the book value per share, as well as earnings per share, is described in the Residual Income Model, as shown:

\[ MV_{it} = \alpha + \beta_1EPS_{it} + \beta_2BV_{it} + \epsilon \]  

By using the data listed in the Egyptian market during the period from 1998 to 2002, and using the Pooled Cross Sectional and Time Series Analysis. The results showed that there is a strong significant correlation when the degreeof

2Which is the scale that directly measures to what extent the deviate the predicted intrinsic values from the observed market values.

3Note the exclusion the Earnings per Share Variable "FEPSt" from this model which developed by Ohlson (1995), Ragab and Omran (2006) indicated the Egyptian Stock Market is need of supplementary information sources from the accounting reports published, to become more efficient.
significant 1% of all companies during the time period, which confirms the ability to use that model to predict future stock prices.

4. Findings and Conclusion

We conclude from the foregoing that the various valuation models for predicting stock prices using the fundamental analysis approach, differed in its accuracy and credibility, from a financial market to another, we find that the Distributions Discounted Models (DDM) proved more useful than the Discounted Cash Flow Models (DCFM) in developed financial markets, this is the finding of the study by Penman and Sougiannis (1998) and Subramanyam and Venkatachalam (2007), also Copeland, et al. (1990) confirmed that the DCFM is not characterized by high credibility when predicting the future stock value, and when comparing between DDM and RIM, studies it has been shown the most credible model is that model which is based on accounting data (Residual Income "RI" Model) and this was confirmed by Fung, et al. (2010).

On the other hand, in the emerging financial markets, we find that it is difficult to use both DDM, and DCFM, because of the difficulty in calculating the Terminal Value (V_T) for future periods extending to the next three years (Subramanyam and Venkatachalam, 2007), so the best models to predict stock prices in those markets, are the models that rely on financial ratios (e.g., Cheang, et al., 1997; Chung, et al., 1999 and Chung and Kim, 2001), but these models presuppose that the existence of financial efficiency is at least a weak efficiency form, so several studies found that the RIM, which rely on the historical accounting data: the book value and earnings per share, have proved their usefulness in emerging markets, specifically in the Egyptian financial market (Ragab and Omran, 2006 and Wafi, et al., 2015).

From the above, we reach the result that the best model that can be relied upon to predict stock prices, is that which proved useful in both the emerging and developed financial markets, because of its high credibility in both of them, and does not require efficient market to implement it, this model is Residual Income "RI" Model.

5. Contribution of Paper

After reviewing the theoretical foundations and the evolution of the Fundamental analysis valuation models, and presenting the assumptions, the advantages and disadvantages of each model separately, then ensuring the credibility of these assumptions and the validity of each model in empirical studies, We find that it was adding a new reference combining the theoretical foundation and implementation practical for Fundamental Analysis Models in the financial markets, beginning with DDM and until the RIM which treated many of the shortcomings or weaknesses of the other models, as well as the possibility of implementation in all financial markets (emerging and developed). In addition to providing further effort and suffering for searching for any of fundamental analysis models that can be more credible than others in predicting the stock value in financial markets. Finally, this paper collected all fundamental analysis models which forecasted for stock value, so we recommend further research in what is the latest, which begins with the end of this paper.

References


Faerber, E., 2008. All about stocks. 3rd Ed. Mc Grow Hill.


