

A REVIEW ON THE EFFICIENT MARKET HYPOTHESIS AND STOCK VALUATION MODELS

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ABSTRACT

Nowadays, one of the key approaches to reach a stable development in developing countries is privatization of the government-owned firms. This is mainly done by selling the firms' shares at the stock exchange markets. The stock pricing is central to the privatization process. Many models have been developed for stock price modeling which have had various feedback and functionalities within different economic, political and regional situations. Modern financial theory states that although, there are some exception in the mark, these exceptions are mainly due to inappropriate selection of data or incorrect definition of the systematic risk. In this paper we review the efficient market hypothesis and different models for stock pricing and valuation. This review shows that a fair judgment on market efficiency necessitates using proper standards and modeling and this, in turn, requires a close interaction between the financial market and academia.

Keywords: *Efficient Market Hypothesis, Stock Pricing, Stock Valuation Models*

Economic reform leading to privatization is one of the strategic approaches for the economic growth of the world's countries. This is of particular importance for the developing countries where the major economic developments are achieved through the change of government roles in leading the economics by privatizations. Privatization gives rise to reduce the direct impact of governments in the economics and increases its supervision role on the private sectors. The government can enact legislative changes to encourage the privatization benefits. This can create finer motivations for economic competitions, which reduces the fiscal burden and permits industries to raise funds from the capital market, facilitates the greater use of management and technological resources, and encourages broad-based share ownership in the society developments through stock markets. Selling the government-owned corporation and state-owned company shares in the stock exchange markets is the most favorable way for promoting the privatization. The stock valuation and pricing are central for achieving this goal. Selling the stock with high price could reduce the demand for buying the new shares which can ultimately fail the privatization process. On the other hand, a highly reduced price could create many doubts to sell the common property shares and creates a long-term failure of the process. Therefore, the stock valuation method stands out as the key in the privatization process.

One of the fundamental bases of the modern financial theory is the efficient market hypothesis. This hypothesis is largely founded on the information framework. As such, an efficient market is a market that its price of shares can readily reflect all available information in the market (Abdoh Tabrizi and Gonabadi, 1996). This is because there is a natural close relationship between the market efficiency and the speed through which the information is distributed in the stock market. Therefore, the price of the shares can be efficiently adjusted according to the new information fed into the market. In this paper, the main concepts of modern financial theory are discussed and the most important stock valuation methods are carefully reviewed.

CONCEPTUAL FOUNDATION

Efficient market

An efficient market is the one that is "informationally efficient and the information has a direct impact on the stock prices. This market assures that the investors have access to the same sorts of information,

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which are reflected in the market. The efficient market is based upon this premise that the investors' decisions for the sale and purchase of the shares are affected by the information they received. Hence, the stock price is a good indicator of the investment valuation.

Fama (1970) states that an efficient market is a market that can be rapidly adjusted by the new information. Although, the adjustability to the new information is an important factor for an efficient market, it is not the only factor. In an informationally efficient market, if all expectations and information of participants are properly reflected in the prices, the price changes will be unforeseeable.

Pricing

The price can be defined as a measure, value, amount or a scale. The price in the market is a value that is used to purchase a finite quantity or measure of a good or service exchange. Therefore, the pricing simply refers to put a value or price on a good or service. The pricing or valuation is a process that is constantly updated. This continuation is due to the environmental changes and the instability in the market, which necessitate the adjustment of prices.

LITERATURE REVIEW

The history of the stock valuation

The history of stock valuation according to Coleman (2006) dates back to the 15th century. In this classification, five evolutionary stages for the firm valuation are considered which will be discussed briefly in below:

- **Stage 1:** The firm valuation before the 15th century was based on the inventory valuation. After invention of the mutual accounting systems in 15th century, three measuring units were introduced, which included the valuation based on the enterprise profitability, net asset value and the liquidity flow.
- **Stage 2:** In this stage the valuation, based on the company's overall enterprise value, was replaced by the stock valuation of business entities. In this stage, the use of some valuation ratios, such as price per earnings per share (P/E), price to book value (P/B), and price per division per share (P/DPS), were becoming popular.
- **Stage 3:** In this stage, the shareholders' attention was mainly on the discounted cash flow (DCF) and time-adjust value (TAV). This resulted in creating of the dividend discount model (DDM). The discounted cash flow techniques have been long known as the theory of the investing value, which was introduced by Williams (1938).
- **Stage 4:** The financial researchers continued to find more applied approaches for the stock valuation. The outcomes were the modern portfolio theory by Markowitz (1952), capital asset pricing model by Sharpe (1964), the arbitrage pricing model by Ross (1973) and Fama and French's methodology (1992) for the stock pricing.
- **Stage 5:** After the portfolio modeling stage, some models, based on the stock yields, were created which were more focused on the stock yield rates and the present values of the future stock profits. In these methods, the present value of the future profits and stock prices were calculated to estimate the stock yield within a definite time period. This is then compared with the market yield and the return rate of the similar firms to provide an insight for a proper stock pricing and valuation.

A review on Iranian literature

Kalantari (1994) made a comprehensive study to find out the effect of using the data from other competitive firms on the accuracy of P/E estimation. Kalantari showed that in Iran for instance, P/E of the similar industrial firms could be used provides less prediction error for stock valuation of the subject firm. Mojtahedzadeh and Jahankhani (1995) analysed different methods for the firms' valuation. They used Miller and Modigliani and the related Value-Driver (VD) models, free cash flow, and the economic value added (EVA) methods. In particular, in VD method, there are six important factors, from which four are directly related to the firm's policy and management performance. This highlights the importance of the

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new policies and efficient management system. These factors include the net operational profit after tax deduction, tax savings, new investments and the expected return rate from new investments after tax deduction. Talebi (1995) proposed a new method for the stock valuation and pricing of the newly privatized firms. In Talebi's research, the initial prices of some privatized government-owned firms were studied and the present values of their future incomes were calculated for a period of three years. This research showed that although there was an evident relationship between the initial stock price and the later price changes, those changes did not have a sensible relationship with their expected return rate within the study period. Dastgir and Hosseini Afshari (2003) tried to evaluate the predictability of some theoretical models (e.g. Gordon's method, Walter method, and present value of the future cash flow) on the stock prices in Tehran Stock Exchange. They realized that those models failed to reasonably predict the stock market prices. Imani (2006) studied the impact of different factors (e.g. the fraction of shares for selling, the time of supply, industry type, P/E and the firm capital) on the stock pricing and valuation. The results of his research showed that the price of shares, when they are sold for the first time, is expressively different than the selling prices at the other times. It was concluded that this difference in prices is independent of the fraction of shares available for selling, whereas the rest of parameters showed considerable impacts on the price change.

A Review On Foreign Literature

LeClair (1990) applied the P/E model for a sample of 165 firms within the same industry. It was concluded that if the selected firms have close average profits on a two-year basis, the P/E model could reasonably predict the stock valuation. This was in agreement with the conclusion of Alford's study (1992). Alford (1992) investigated how a comparable firm should be selected for stock price prediction. He showed that the industry membership or a combination of return on equity and total asset is an effective criterion for selecting comparable firms. Perotti et al. (1999) stated that the privatization and lower political risk can lead to a quick increase in capital market growth and can ultimately result in the future development of the stock market. Ritter and Welch (2002) studied the US stock prices of a number of companies going public from 1980 to 2001. They found out at the end of the first day of trading, their shares traded on average at 18.8 percent above the price at which the company sold them.

EFFICIENT MARKET HYPOTHESIS

Analysis of the behavior of physical and capital asset prices has been long an interest for the investors and the researchers. In the early 20th century, many Stock Market Exchange experts tried to use the historical prices to predict the future market prices. Since 1930, many other researchers studied the randomness nature of the stock prices. The results of the latter created a strong theoretical basis for the economics and investments (Kalantari, 1994). The general idea was that we cannot predict the future behavior of the prices. They use the analogy of the price time series and the random numbers (Haugen, 1986). These studies resulted in the hypothesis of the random walk for the stock prices. This was the main theme of Ph.D. thesis of Fama (1970). He used the statistical correlation and dependence to study the logarithm of the changes happened in 30 shares in the stock market. He concluded that there is a very weak correlation between the successive price changes and could not find explanatory meaningful patterns. Therefore, the statistical analysis of the historical price could not come up with a proper prediction of the future prices. Fama's work was a shock to the US stock market and particularly for the investors, analysts and speculators as he concluded that the earned profit was mainly due to chance rather than a correct prediction. In such markets that Fama defines, the stock price is a reflection of the market information not a particular pattern (AbdohTabrizi and Gonabadi, 1996).

In the financial world, there are three types of efficiency in the capital market, which include informational, allocative and operational/functional efficiencies. These are described briefly as follows:

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Informational Efficiency

In an informationally efficient market there is a direct relationship between the available information in the market and the stock prices. In such markets, the stock prices are closer to the intrinsic values. An efficient market must be sensitive to the new information. Whenever, the new information is available, the prices are adapted. The informational efficiency is divided into a weak-form, a semi-strong-form and a strong-form efficiencies, each of which have different implications on how markets work. In the weak-form efficiency the market prices follow a random walk pattern and the historical data cannot provide the future trend of the prices. In semi-strong-form efficiency, it is implied that share prices can adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. Finally, in strong-form efficiency, share prices reflect all information, public and private, and no one can earn excess returns.

Allocative Efficiency

An immediate outcome of an efficient market is that the resources are used in an optimal way. One of the key duties of capital market is that it should be able to financially support the firms and organizations. A characteristic of an allocatively efficient financial market is that it provides funds from the ultimate lenders to the ultimate borrowers in a way that the funds are used in the most efficient manner. This happens when larger part of capital is allocated to the most productive activity. Therefore, the producers produce only those types of goods and services that are more desirable in the society and also in high demand.

Operational Efficiency

Operational efficiency refers to the easiness and the speed of trades in the market to deliver products or services to the customers in a most cost-effective and high quality manner. This efficiency leads to increase the asset liquidity.

CHARACTERISTICS OF AN EFFICIENT MARKET

In general, the characteristics of an efficient market are summarized as follows (Haugen, 2001)

- An efficient market should be competitive. The conditions for a competitive market include but not limited to abundant demand and supply, availability for public, and most importantly a high number of participants for trades. If a market has a limited number of trades and has limited participants it cannot be classified as an efficient market.
- The information should be available to all participants in a low cost and a high speed.
- The participants should be ensured that the prices that they are paying/receiving for the shares are close to the intrinsic values. In other words, the participants are ensured that they are trading on the fair prices, for the goods and services.
- The exchange costs should be low, and the participants should be able to borrow and lend with current interest rates in the market.
- In an efficient market, the stock traders do not have excessive power to over-control and/or rule the market prices

CRITIQUES ON THE EFFICIENT MARKET HYPOTHESIS

There are some critiques on the efficient market hypothesis. One of the most important one is the “January Effect”, which states that the first month of each year comes with more benefits for the investors. All the critiques generally highlight the existence of some patterns in the price changes and question the random theory of stock prices. Some of the financial experts believe that the stock prices are always affected by the profit-seeking behaviour of the investors and not to the information available in the market. In general, we cannot classify the markets into absolute efficient or inefficient. A middle-state with a combination of some external patterns and randomness can be used to ensure that the daily changes

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and incidents do not necessarily affect the prices immediately. Moreover, a combination of other political and sociological factors and different interpretation of information by investors can also have strong impact on the price changes (Sadeqi, 2007).

STOCK VALUATION MODELS

Traditional Models

In general, each share produces two types of cash flows; firstly the stock's profits that are paid in a regular (e.g. annual) manner, and secondly the value of stock at the selling date. When the stock is preserved for a long period of time, the present value of future price reduces according to a time horizon and can reach to zero for a period of 50 to 100 years (Pandey, 2009). Hence, the price of a share today is the present value of an infinite stream of dividends. The value of a share today is calculated as follows:

$$P_0 = \frac{Div_1}{(1+r)^1} + \frac{Div_2}{(1+r)^2} + \frac{Div_3}{(1+r)^3} + \sum_{t=4}^{\infty} \frac{Div_t}{(1+r)^t}$$

Where, P_0 is the present value of a share, Div_t is dividend at time t .

There are many models for stock valuation according to the dividend calculations and not all of them might be favourable. For instance, this policy that a firm allocates all of its earned profits to the shareholders is not favourable policy. Always, there are many investment opportunities where a good manager should take advantage of them to increase the firm value. Whenever, a firm doesn't follow such investment policies, net present value of each share at time zero, is equal to the net present value of the growth opportunities. Hence, the price of each share, P , after investment is calculated as follows:

$$P = \frac{EPS}{r} + NPVGO$$

In which, EPS is earnings per share, NPVGO is the Net Present Value of Growth Opportunities, and r is the discount rate. In order to increase the value of a share, the net present value should be positive and the profits should be aggregated for the future investments. A calculation of the net present value of all future cash flows involved with an additional acquisition, or potential acquisition. The net present value of growth opportunities is used to determine the intrinsic value of a new project or acquisition at a given point in time, based on projected amounts. NPVGO is calculated by taking the net cash inflow, discounted at the firm's cost of capital, less the purchase price of the additional asset.

Market Value Added (MVA) Modelling

In this model the firm value is calculated as follows

$$\text{Firm Value} = \text{Invested Capital} + \frac{EVA}{k_w}$$

Where, k_w is the weighted average cost of capital and EVA is the economic value added.

Gordon's Model

Gordon (1962) proposed a model for stock valuation using the dividend capitalization approach. The model has some assumptions such as 1) the retained earnings are the only financial sources of the firm, 2) the return rate of the firm's investment is invariant, 3) the growth rate of the firm is a function of its retention ratio and the return rate 4) the capital cost for the firm remains constant but is greater than the growth rate 5) the firm has an unlimited life and 6) there is no taxation on the earnings.

Gordon has proposed the following model

$$P_0 = \frac{E_1(1-b)}{k-br}$$

In which, P_0 is the price per share at year zero, E_1 is the earning per share at year 1, k is the expected rate of return by the shareholders, r is the rate of return earned on investments and b is the fraction of earnings the firm retains.

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A closer look at the Gordon's model reveals that (Chandra, 2008)

- When the rate of return is greater than the discount rate ($r > k$), the price per share increases as the dividend pay-out ratio (D/E) decreases. This suggests that the optimal pay-out ratio for a growth firm is zero.
- When $r = k$, the dividend pay-out ratio variation will not affect the price per share. The pay-out ratio will not impact the share price of a normal firm.
- When $r < k$, the price per share increases as the dividend pay-out ratio increases. The pay-out ratio for a declining firm is 100%.

Miller And Modigliani Model

Miller and Modigliani (1961) presented two important theories for the stock valuation. The first theory states that a firm cannot change the total value of its shares with changing its capital structure. According to the second theory, there is a linear relationship between the firm's cost of equity and its depth-to-equity ratio. For proving their theories, they have used a simple model as follows

$$P_0 = \frac{D_1 + P_1}{1 + r}$$

In which, P_0 is the price per share at the end of time zero, P_1 is the price per share at the end of time 1, D_1 is the dividend after time 1, and r is the discount rate which is assumed to be constant. This equation can also be expressed as follows

$$nP_0 = \frac{1}{1 + r} (nD_1 + (n + m)P_1 - mP_1)$$

Where, n is the total stock price at time zero, nP_0 is the total value of enterprise at time zero, nD_1 is the total dividends paid to the shareholders at time 1, m is the number of new shares sold at time 1 at the ex-dividend price, $(n+m)P_1$ is the value of new shares sold to outsiders during time 1 and r is the discount rate. mP_1 in this formula is equal to total increase in net physical asset at time 1 after reduction of retained earnings at the same year. This can also be written as

$$mP_1 = I(X - nD_1)$$

In which, I is the total firm's investment level, and X is firms, total net profit. If mP_1 is replaced in nP_0 equation, a new equation can be found as follows

$$nP_0 = \frac{1}{1 + r} ((n + m)P_1 - I + X)$$

Since, D_1 doesn't appear in this new equation, and also $(n+m)P_1$, I and X are independent of D_1 , they have concluded that the current value of the firm doesn't depend on current dividend decisions.

Campbell-Shiller Model

A valuation method advanced by John Y. Campbell of Harvard University and Robert J. Shiller, of Yale University. They use market history in a long period to come up with an average P/E ratio for stocks and argue that, when P/E's are higher than this average, the stock prices are higher than their real values. The problem with this approach is that it neglects changes in the economy (Weber and Laderman, 1999).

Cornell Model

Charles M. Lee of Cornell University closely examines the 30 stocks in the Dow Jones industrial average. He estimates a risk premium for each stock by measuring the price volatility of that stock's industry group. For instance, Lee states that the risk premium for General Motors Corp. is 9.48%, while for General Electric Co. it's just 4.48%. He believes that Auto stocks have a higher risk premium because their earnings and stock prices swing more dramatically than a diversified company such as GE. Lee then

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estimates future cash flows for each Dow stock and uses a combination of the risk premium and risk-free interest rate to discount that cash to a present-day "intrinsic value"(Weber and Laderman, 1999).

Hassett And Glassman Model

Hassett and Glassman believe that because the people's interaction with risk is changing with time, the traditional models cannot adequately predict the future prices as they don't include such important risk factor. They developed a model that finds the market to be sharply undervalued. They argue that investors don't see the stock market as the dangerous place they once did and thus will bid up stocks to far higher prices. Moreover, they believe that the risk premium is shrinking and is heading toward zero and the stocks have become a lot less risky than bonds. If their idea is right, this change overturns the statistical relationships that have held true for decades. It would throw a doubt especially on the long-held view that stocks are riskier than bonds(Weber and Laderman, 1999).

Walter Model

Walter (1956) has proposed a model of share valuation which supports the view that the dividend policy of the firm has a remarkable effect on share valuation. The Walter model has some key assumptions such as 1) the retained earnings are the only sources of finance for the firm, 2) the firm rate of return remains invariant, 3) the firm has a perpetual life. Walter model is as follows:

$$P = \frac{D + (E - D)r/k}{k}$$

In which, P is the price per share, D is dividend per share, E is the earnings per share, (E-D) is the retained earnings per share, r is rate of return of the investment and k is cost of capital. A further simplification of the above equation results in a simpler equation which has two terms

$$\frac{D}{k} + \frac{(E-D)r/k}{k}$$

The first term is the present value of an infinite stream of dividends and the second term is the present value of an infinite stream of returns from retained earnings. In Walter model, some points can be recognized:

When $r > k$, the price per share increases as the dividends pay-out ratio increases. In this case the optimal pay-out ratio for a growth firm is zero.

When $r = k$, the changes in dividends doesn't impact the price per share. In this case the optimal pay-out ratio for a normal firm is irrelevant.

When $r < k$ the price per share increases as the dividend pay-out ratio increases. The optimal pay-out ratio for a declining firm is 100%.

Stock Valuation Model Using Price Per Earnings (P/E) Of Similar Firms

One of the most important tools for evaluation of stock is to use the price per earnings ratio from the similar firms. In this method, the price per share of the firm is estimated using the current earnings of the firm, and the average price per earnings ratio of the similar firms. In other words, using this average price per earnings ratio, the earnings of a firm can be used to estimate the capital or the value. This can be expressed as the following equation:

$$P = E \times \frac{P}{E}$$

CONCLUSIONS

This paper was a review on the efficient market hypothesis and an elaboration of some important models for the stock pricing. The empirical research on stock market during the last three decades has created an ensemble of observations and systematic patterns in the prices, which cannot be easily analysed by current available models. However, the cooperation of the financial market with scientific associations

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can pave the way for gaining a profound knowledge of financial markets. Nevertheless, to have a fair judgement on financial behaviour reflected in the historical data, we need to properly use the available standards. However, it is important to note that, the market efficiency may not completely reflect the real market behaviour. For instance, a careless use of efficient market hypothesis can result in incorrect interpretations as it happens in the stock market financial bubble incidents.

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