

Investigation and Comparison of Ohlson, Model, Economic Value Added Model and Dividend Discount Model in 50 Top Companies in Tehran Stock Exchange

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ABSTRACT

The first and most important factor for making investment decisions in Stock Exchange is price and therefore it is important to value and estimate real value of stock. Different models and methods have been proposed for determining real value of stock.

In the present research, Ohlson valuation model, economic added value model and dividend discount model were compared in top 50 companies in Tehran Stock Exchange during 2005-2012. Results of three valuation models were evaluated by means of correlation coefficient, determination coefficient, Friedman coefficient and other methods of analysis. Finally, economic added value model was selected as the most appropriate model. Ohlson model and dividend discount model were placed in the next ranks. Therefore, all three hypotheses of the research were supported.

KEYWORDS: valuation, dividend, Economic added value, Ohlson

INTRODUCTION

Some resources will be required for supplying investment. The best resource for providing investment is people savings. Stock market is a strong mechanism for directing this resource towards production sector. Economic changes such as acceleration of privatization process in Iran and necessity for allocating resources optimally to value-creating economic activities require changes and improvements in stock market. Optimal allocation of resources using scientific and effective use of national capitals is required for such a change which brings long-term economic growth and development. In Iran, financial institutes are not so developed and common and most investors and shareholders lack access to valid financial and economic analyses and it is difficult to interpret factors which affect their activities. Consequently, risk of investment in buying and selling shares is high.

Identification of appropriate investment opportunities is an attractive subject for investors who invest in Stock Exchange and especially in companies' shares. Besides different stock-related analyses (like technical analyses or appropriate development opportunities and ...), determination of real value of companies is one of the main concerns of market analysts. In other words, finding a unique and complete model or solution for determination of real value of companies with the least deviation and error is an important subject which has received a lot of attention by financial analysts.

Research importance

Studies reveal the weakness of efficiency in Tehran Stock Exchange. This is while some studies had rejected the weakness of Tehran Stock Market in the past few years. At present, valuation of shares is of top priority in Tehran Stock Exchange.

Absence of enough models for valuation of an asset is not the main subject in valuation because there are many models in this regard. Selection of a proper model for valuation is as important as understanding way of using that model in order to achieve a reasonable valuation (Damoudaran, 2008, p 31).

Research objectives

General objective: identification of a proper model out of select models based on the present conditions of Iranian financial market for insiders' use.

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Applied objectives:

1. Prediction of price variations for market analysts in order to identify investment opportunities. In other words, identification of stocks with overvalue and undervalue conditions for proper investment.
2. Provision of a proper model for determination of fair value for purchaser and seller in transactions with companies which have not been admitted to Tehran Stock Exchange
3. Provision of an appropriate mechanism for valuation of companies outside Stock Market for stakeholders like commercial banks (for determining lending amount), insurance companies (for providing insurance services and...).

Research questions

- Whether there is any significant difference between real prices estimated by the three models?
In case of existence of difference, which model has more efficiency considering the present conditions?

Research hypothesis

1. Economic value added model (EVA) provides a better estimation of market value in comparison with Ohlson model.
2. Economic value added model provides a better estimation of market value in comparison with dividend discount (DDM) model.
3. Ohlson model provides a better estimation of market value in comparison with dividend discount model.

RESEARCH LITERATURE

Value: value of an asset, whether it is real or financial, depends on the level it can satisfy needs and expectations of people. Value or favorability of assets of a company depends on the ability to create cash flows in a specific time period. Value is not a static concept and is not similar to other concepts.

Valuation:

From Stove's viewpoint (2006), valuation is the process of estimation of the value of assets based on variables which are thought to be related to future returns of investments or based on comparison with similar assets. Valuation is a process in which the current price of an asset is determined. Valuation is a completely economic concept and when an asset is to be valued, it is accompanied by legal concept of asset.

Price (market value)

Price is the real amount of money spent on buying a asset. In other words, price or market value is the selling price of an asset when transacted (P. Novu, 2005, p: 275-276).

Dividend discount model (DDM)

Gordon Growth Model can be used for evaluation of companies which have stable conditions with a fixed growth rate. This model considers the value of a share as a function of expected dividends in future periods, cost of equity and expected growth in dividends.

$$V = \frac{DPS_1}{K_e - g}$$

DPS_1 : expected dividend in coming year (coming period)

K_e : ordinary shareholders' expected return rate

g : constant growth rate of dividends

Economic value added:

EVA is equal to net operational profit after tax (NOPAT) minus book value of the company, multiplied by weighted average of capital cost. NOPAT is sometimes called non-leveraged earnings (without liabilities) and sometimes it is considered as earnings before interest and after tax (EBIAT):

$$EVA_t = NOPAT_t - (D_{t-1} + Ebv_{t-1})WACC$$

As it can be seen, EVA also combines accounting factors (earning, equity, and book value of debt) with market factors (WACC).

$$V = BV_0 + \sum_{t=1}^N \frac{EVA_t}{(1 + K_e)^t}$$

In EVA method, it is assume that the quality of cash flows is of great importance and is embedded in the mentioned formula. Supporters of this method believe that this method of calculating a company's value can link future capital budget to strategic decisions and therefore real performance of the operation is evaluated (Eslami, 2008, p 204).

Residual income model (Ohlson and Feldam)

Feldam and Ohlson model (1995) makes use of book value and earnings of a company as a base for determining market value of the company. According to this model, company's value is equal to current value of future expected dividends.

$$V_0 = B_0 + \frac{B_0(ROE - r)}{r - g}$$

As it can be seen in the above formula, value of each share is equal to the sum of book value of each share and discounted residual incomes. If ROE is equal to expected return rate, value of each share will be equal to book value. In ideal state, book value is equal to subtraction of current value of assets and value of company's liabilities. The second part of the above formula is concerned with the ability of the company to produce ROE higher than expected return rate (r). If possible, it is better to use subtraction of current value of assets and liabilities as B_0 in ROE. ROE is assumed constant in the above formula. Practically, the company is not always able to keep an ROE above expected return rate and ROE will be equal to expected return rate after a while (Raei&Bakhshiyani, 2008, p. 244).

RESEARCH METHODOLOGY

The present research is a descriptive and applied research. Library study was used for collecting information on literature. Research design is semi-empirical and has a retrospective approach. This approach refers to conduction of a study after events take place and collection of data in a natural context or in an event which is not controlled by the researcher. In this approach, manipulation of independent variables is impossible.

For each year in the investigated time period, we calculated dividends flow for DDM, EVA for EVA model and abnormal profits (residual) for Ohlson's model.

Now we should discount this information in order to be able to calculate annual value. Therefore, we must determine shareholders' expected return in a way which matches past and future conditions of the company.

Geometric average of Stock Market was used for determining expected return. Moreover, geometric average over the time period was used for determining dividend growth rate.

We calculated the value of sample companies using the selected valuation models for each year during 2006-2012 and using information over 2005-2012. It must be mentioned that MS Excel software was used for calculation of research variables and analysis of raw data and SPSS19 was used for doing the above tests.

Statistical population

50 top companies in Tehran Stock Exchange were selected as statistical population. It must be mentioned that use of the term "statistical population" is because top 50 stock market companies are considered as population and we do not influence selection of these companies. The investigated time period was 2004-2012 and information of the time period (2005-2012) was used in this regard.

Data collection method

Theoretical fundamentals of the research were gathered by means of Persian and English books and journals and internet websites (like www.codal.ir, www.seo.ir, www.tse.ir and...). Furthermore, financial statements and notes, weekly reports and monthly of Tehran Stock Exchange were also used for data acquisition.

Models analysis

		Stock value	Dividend discount	Ohlson	EVA
Stock value	Pearson Correlation	1	.573	.604	.611
	Sig. (2-tailed)		.000	.000	.000
	N	247	247	247	247
Dividend discount	Pearson Correlation	.573	1	.933	.951
	Sig. (2-tailed)	.000		.000	.000
	N	247	247	247	247
Ohlson	Pearson Correlation	.604	.933	1	.947
	Sig. (2-tailed)	.000	.000		.000
	N	247	247	247	247
EVA	Pearson Correlation	.611	.951	.947	1
	Sig. (2-tailed)	.000	.000	.000	
	N	247	247	247	247

Correlation coefficient between stock value in stock market and DDM is equal to 0.573, correlation coefficient between stock value in stock market and Ohlson model is equal to 0.604 and correlation coefficient between stock value in stock market and EVA is equal to 0.611.

Correlation coefficient between DDM stock value and Ohlson model is equal to 0.933 and correlation coefficient between DDM and EVA is equal to 0.951 and correlation coefficient between EVA and Ohlson model is equal to 0.947.

DDM

						ANOVA ^b
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.912E9	1	1.912E9	119.960	.000 ^a
	Residual	3.904E9	245	15936392.107		
	Total	5.816E9	246			
a. Predictors: (Constant), dividend discount						
b. Dependent variable, stock value						

Significance level of F is equal to 0.000. This is smaller than 0.05. Therefore, H₀ is rejected in 95% certainty level and this means there is a significant model in 95% certainty level.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.573 ^a	.329	.326	3992.04110
a. Predictors: (Constant), dividend discount				

Determination coefficient is equal to 0.329. this shows about 33% of variations in the dependent variable can be determined (predicted) by means of independent variable (DDM).

EVA model

						ANOVA ^b
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.174E9	1	2.174E9	146.208	.000 ^a
	Residual	3.642E9	245	14867172.784		
	Total	5.816E9	246			
a. Predictors: (Constant), EVA						
b. Dependent Variable: stock value						

Significance level of F is equal to 0.000. This value is smaller than 0.05. Therefore, H₀ is rejected in 95% certainty level. In other words, there is a significant model in certainty level.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.611 ^a	.374	.371	3855.79730
a. Predictors: (Constant), EVA				

Determination coefficient is equal to 0.374. this means 37% of variations in dependent variable is determined by independent variable (EVA).

Ohlson model

						ANOVA ^b
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.124E9	1	2.124E9	140.924	.000 ^a
	Residual	3.692E9	245	15070721.317		
	Total	5.816E9	246			
a. Predictors: (Constant), Ohlson						
b. Dependent Variable: Stock value						

Significance level of F is equal to 0.000 which is smaller than 0.05. therefore, H₀ is rejected in 95% certainty level. In other words, there is a significance model in 95% certainty level.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.604 ^a	.365	.363	3882.10269
a. Predictors: (Constant), Ohlson				

Determination coefficient is equal to 0.365. This means about 37% of variations in dependent variable is determined by independent variable (Ohlson model).

Comparison of models

Determination coefficient is the most important index in investigation and comparison of estimation models. In the following table, standard deviation has been presented in addition to determination coefficient. A small value of standard deviation is indicative of fitness of the model. In contrast, a high value of determination coefficient is indicative of fitness of the model.

Adjusted determination coefficient	Determination coefficient	correlation	models
0.33	0.33	0.57	Dividend discount
0.37	0.37	0.61	EVA
0.36	0.36	0.60	Ohlson

Friedman test

Friedman test was used for ranking of the three models and in order to specify whether differences between EVA, DDM and Ohlson model are significant or not.

Mean Rank	model	rank
2.01	EVA	1
2.00	Ohlson	2
1.98	DDM	3

CONCLUSION

Correlation test (Pearson correlation coefficient) was used for verification of linearity of relationships because this test measures linear correlation between two variables.

Results of each of the models are as follows (for short):

DDM:

Determination coefficient is equal to 0.329. Therefore, about 33% of variations in the dependent variable is determined by independent variable (dividend discount).

EVA model:

Determination coefficient is equal to 0.374. This means about 37% of variations in the dependent variable is determined by independent variable (EVA).

Ohlson model:

Determination coefficient is equal to 0.365. This means about 37% of variations in the dependent variable is determined by independent variable (Ohlson model).

Considering the questions and hypotheses of the research and the above tables, it can be concluded that EVA model is the most appropriate model for the present financial and economic conditions of Iran and Ohlson model is also more suitable than DDM.

Recommendations based on hypotheses

Considering the relative advantage of EVA model, shareholders are advised to use this model for identification of value of companies in order to establish corporate sovereignty mechanisms. Analysts, brokers and investment companies are also advised to use this model due to the nature of their activities and market leaders are advised to use the model due to their needs for identification of real value of companies. Ohlson model can also be used more than DDM model due to relative superiority of Ohlson model over DDM and also high correlation between Ohlson model and EVA model.

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