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An Evaluation of Ohlson: Dividends and Economic Value-Added on Stocks Value Forecasts

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Abstract

The main objective of this study was to compare the valuation models, Ohlson, discounted dividends and EVA in the Tehran Stock Exchange. Considering the literature, five hypotheses were considered for the above investigation. The method applied in this research was descriptive and correlational. And multivariate regression was used to analyze the data. For data analysis, multivariate regression was used. And the data was collected from 120 companies during the six years and the data was compound. Finally, the results indicated that Ohlson model provided a much better efficiency than the other two. It also provided a better estimate of the stock market value. And also it can be concluded that EVA model was more efficient in Tehran Stock Exchange, compared to the dividend discount model.

Keywords: value stock, Ohlson, economic value, dividend.

1. Introduction

Identifying investment opportunities has always been a subject of interest for investors in securities, especially stock companies, apart from different analysis of the stock companies (like technical analysis or appropriate development opportunities, etc.), determining the actual value of companies has been one of the main concerns of market analysts, which means that providing a single and evolved model or solution that could calculate the intrinsic value of companies with minimum deviation has been one of the issues that has always been focus of attention of scientists (Bernards, 2007, p. 112).

On the other hand, there are other individuals and other organizations whose business is subject to value of companies, financing companies (for making arrangements for offer of shares of companies applying for accession to the stock market and those in need of financing), insurance companies (for providing insurance services related to value of companies and firms), commercial banks (for receiving reliable and valued security supported by provided facilities) and many other legal and natural persons whose business is dependent on such issues (Spilioti & Karathnassis, 2013, p 0.203).

Studies in Tehran Stock Exchange showed weak level of efficiency in the Tehran Stock Exchange, although not too distant researches have rejected low-level efficiency. And attempts for stock valuation are paramount in Tehran Stock Exchange. The main issue in the valuation is not the lack of adequate models for the valuation of an asset, but in fact there are many models to achieve this. And it must be said that to achieve a reasonable valuation, selection of the correct model for valuation is as important as understanding how to use that model (Damodaran, 2008, p. 239).

Given the above said, in this study, we sought to answer the question whether any of the models of Ohlson, economic value added and dividend provide a proper estimation of the value of the stock market in Tehran Stock Exchange.

2. The importance and necessity of research

In this study, it was attempted to provide selected models offered and to point out the strengths and weaknesses of each model and given the situation of the capital market of our country, we tried to provide a more appropriate model.

The necessity of this research is expressed in several ways:

1) The current mechanism of stock exchange causes the majority of companies that have qualified to enter the stock exchange to enter it, however, that requires the use of a system and valuation model perfectly suitable for the determining the fair value of these companies for the initial public offering.

2) The development of the OTC markets and third and fourth markets for major transactions and block ones and also to reduce transaction costs for all companies, including companies listed on the stock exchange requires the establishment of an appropriate mechanism for fair and acceptable valuation for both parties to transactions.

3) According to the Constitution, the government is obliged to transfer ownership of companies which are now owned by the state; the existence of appropriate models to estimate the real value of listed companies can help professionals and investor (the buyer) in making the wise choices.

4) Providing solutions (valuation models) to professional investors (investment companies and mutual funds) and even retail investors could lead to more logical transactions in the stock market, which would prevent abnormal events, such as the creation of bubbles or intense fluctuations, etc. due to behavioral factors (Asayesh & Ghalaeizadeh, 2014).

3- Hypothesis

The first hypothesis:
• Ohlson model has an impact on shareholder value.
The second hypothesis:
• EVA model has an impact on shareholder value.
The third hypothesis:
• Dividend discount model has an impact on shareholder value.
The fourth hypothesis:
• Ohlson model to estimate the value of the stock in anticipation of better economic value.
Fifth hypothesis:
• EVA model provides a better estimate in predicting the value of the stock than dividend discount model.

4- Model of research

The model of first hypothesis:

$$MV_{it} = \beta_0 + \beta_1 V_{Ohlsonit} + \varepsilon_{it}$$

MV_{it} = stock market value: mean stock price x in year t.
B_0 = constant
$\beta_{1Vohlsonit}$ = Ohlson beta value
ε_{it} = model error term

The model of second hypothesis:

$$MV_{it} = \beta_0 + \beta_1 V_{EVAit} + \varepsilon_{it}$$

MV_{it} = stock market value: mean stock price x in year t.
B_0 = constant
$\beta_{1Vohlsonit}$ = EVA model beta value
ε_{it} = model error term

β1VEVAit = amount of beta EVA model
ε_it = including model error

The model of first hypothesis:

$$MV_{it} = \beta_0 + \beta_1 V_{DDM} + \varepsilon_{it}$$

MV_{it} = stock market value: mean stock price x in year t.

B_0 = constant

β_1VDDM = dividend model beta value

ε_{it} = model error term

5- Theoretical framework

- ✓ EVA:

EVA is defined as net operating profit after tax (NOPAT) minus the corporate book value multiplied by the weighted average cost of capital (WACC). Sometimes, NOPAT is called Non-leverage corporate profits (debt excluded) and sometimes it is equal to earnings before interest and taxes EBIAT.

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

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

As seen, the EVA also combines accounting factors (income, equity and book value of debt) with market factors (WACC).

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

V: Stock prices through the EVA model

BV_0: book value of stocks: Equity on the balance sheet divided by the number of shares.

EVA: Economic value-added: how to calculate explained above.

K_t: The expected rate of return on common shareholders: To determine the expected return, the geometric mean of stock returns will be used during the period of investigation. (Xiaoqing et al., 2014).

- ✓ Ohlson model:

Feldam and Ohlson model (1995) uses profit and corporate book value as a basis for determining the market value. Based on Feldam and Ohlson model, corporate value is equal to the present value of the expected future dividends.

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

V_0: Stock value through Ohlson model

B_0: Book value of stock: Equity on the balance sheet divided by the number of shares.

ROE: Return on investment: net income divided by equity.

r: Expected Returns: To determine the expected return, the geometric mean OF stock returns will be used during the period of investigation. That is, using stock index returns between 2009 and 2014, this rate was obtained.

g: Dividend growth rate of the company: To determine the dividend growth rate, geometric mean during the period of the study will be used. That is, using the dividend growth rate over the period 2009 to 2014 the rate can be calculated.

Dividend discount model:

Gordon growth model was used in this study. Gordon growth model could be used to assess a stable situation with a constant growth rate. This model is a function of the value of dividends expected in future periods, the cost of equity and the expected growth in dividends.

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

V: shareholder value through dividend model

DPS_1: Expected dividend for next year (future period)

K_e: The expected rate of return on common shareholders: To determine the expected return, the geometric mean stock returns will be used during the period of investigation.

g: Dividend growth rate: To determine dividend growth rate, geometric mean during the period of the study will be used.

• To determine the expected return, the geometric mean stock returns will be used during the period of investigation.

• To determine the rate of dividend growth, the geometric mean will be used during the period of investigation.

- ✓ Market value:

To determine the market value per share, the average market price during the year is considered (Xiaoqing et al., 2014).

6. Type of research

This research was a descriptive one and in terms of method, it was an applied research. Library studies used to develop texts and literature, and experimental research design using retrospective approach (ex post) was used. Ex post approach focuses on the study by research after the even and data collection of a naturally available environment, or from events occured without the involvement of the researcher, so that there would no possibility of manipulation of independent variables. In this study, statistical population comprised all companies listed on the Tehran Stock Exchange from 2009 to 2014 that had the following characteristics:

1. They were a member of the Tehran Stock Exchange before 2009.
2. The Company's fiscal year ends as of March each year.
3. During the fiscal years 2008-2014, fiscal year or activity has not changed.
4. Data needed to calculate variables must be available.
5. Not among financial brokerage companies and banks.

In the end, 120 companies were analyzed.

7. Methods and tools for data collection

Using library studies, literature was obtained from Persian and Latin books and professional journals and Web sites available (such as www.codal.ir, www.seo.ir, www.tse.ir, etc.) as well as by visiting the Tehran stock exchange and the data was collected from the financial statements and the notes, the weekly reports, monthly of stock exchange and also Rahavaran Novin software. To collect the data needed to calculate variables, data bases "Rahavard Novin" and "Tadbir Pardaz". In cases where the data in the database was incomplete, hand-in library archives in Stock Exchange and Website of Management research, development and Islamic studies, Securities and Exchange Organization (www.rdis.ir) was used. It should be noted, to calculate the variables of the study and analysis of raw data, Excel software was used and to perform above said tests, EViews software was used.

8 – Results

8-1- Descriptive statistics

Descriptive statistics of the variables are provided in figure (1). The results presented in Figure (4-1) provide an overview of the state of research data.

Figure 1 - Descriptive statistics of the research

Variables	**Mean**	**Median**	**Max**	**Min**	**SD**	**Skewness**	**Kurtosis**
stocks value	6451	6034	113553	342	1033	0/178	2/78
Ohlson	7012	6984	106477	455	1265	1/92	4/9
Economic Value Added	7412	7001	110230	460	1380	0/261	1/79
Dividend	7660	7330	128945	210	2038	1/51	4/17

discount							

In total according to the values of the table above that shows the information of the descriptive statistics of research variables, it can be concluded that for all variables, there was average dispersion, which can be inferred from the value of the standard deviation; also, from the distance between mean and median, it can be concluded whether the variable is symmetric; here, all variables have a relative symmetry.

8-2- Test of the reliability of the variables

Figure (2): Dickey-Fuller unit root test results generalized for all variables

Variable	Test's statistic value	Error level	Reliability level
Stock value	**1061/04**	**0/000**	**I(0)**
Ohlson	**1290/61**	**0/014**	**I(0)**
EVA	**1082/47**	**0/000**	**I(0)**
Dividend discount	**1254/86**	**0/000**	**I(0)**

As can be seen in the figure above, generalized Dickey-Fuller unit root test results show that all the variables are valid.

8-3- Correlation coefficient test

To detect the presence and direction of a linear relationship between independent variables, Pearson correlation coefficient test was performed and results are provided in figure (3).

Figure (3): Pearson correlation coefficients

Variables	**Ohlson**	**EVA**	Dividend discount
Ohlson	**1**		
EVA	**0/577**	**1**	
Dividend discount	**0/268**	**0/367**	**1**

As seen in figure (3), the correlation coefficient between independent variables in the models indicates their high interdependency.

8-4- Test of research hypotheses

Hypothesis one

The first hypothesis of the study was to investigate the effect of Ohlson on stock value. To test this hypothesis, simple regression and the following model were used.

According to the result of the Hausman test and reject the hypothesis H0, the results for the model with fixed effects panel data methods are used. Following the results of the model estimation using panel data with fixed effects in PD (4) is provided. According to the result of the Hausman test and the fact that the hypothesis H0 was rejected, to estimate the model, panel data methods were used. Followings are the results of the model estimation that was done using panel data with fixed effects as shown in figure (4).

Figure (4) – Model estimation results

Variable	Coefficient	Student's t test	Significance
Intercept	0/673	25/15	0/000
Ohlson	0/069	3/13	0/002
F Fisher statistic (significance)	855/06 (0/000)		
The coefficient of determination	0/506		
Durbin-Watson statistic	2/08		

The coefficient of determination

The coefficient of determination represents the percentage of dependent variable variation that is accounted for by the independent variables. In this model, the coefficient of determination is equal to 0.506. This means that the independent variables explain 50 percent of dependent variable.

F Fisher statistics

To accept the significance assumption for the whole model or in other words a significant linear relationship between independent and dependent variables, F Fisher test was used. This test's null hypothesis was that there is no linear relationship between independent and dependent variables. Results in the table with a significance level of zero (under 5%) rejected the null hypothesis with confidence level 95 percent. In other words, there was a linear relationship between independent and dependent variables, and the model was valid to analyze the results.

Autocorrelation

To investigate this hypothesis, the Durbin-Watson statistic is used; if this statistic is between 1.5 and 2.5, assumption of the correlation between the residue terms will be rejected. Given

the result of this test, value of this statistic was 2.08, so there was no correlation in residue terms of this regression model.

Analysis of results

The aim of hypothesis was to study the issue whether the Ohlson model had an effect on the value of shares in companies listed on the Tehran Stock Exchange. Model showed that the error factor and level of dividend discount factor were (0.069) and (0.002), which indicates these variables significantly affected the value of the stock. Therefore, there was no evidence to refute this hypothesis and the hypothesis is confirmed.

Normality test

Figure (5): Testing the normality of the dependent variable using JB statistic

Variable	JB statistic	Prob.
Stock value	0.230075	0.870322

Given that JB = 0.23 is small and not in the critical area and also because the probability value is more than 0.05, so the assumption of normality is not rejected.

Hypothesis two

The second hypothesis was about the effect of the EVA on value of the stocks. To test this hypothesis, simple regression and the following model ERE USED. According to the result of the Hausman test and the fact that the hypothesis H0 was rejected, to estimate the model, panel data methods were used. Followings are the results of the model estimation that was done using panel data with fixed effects as shown in figure (6).

Figure (6) – Model estimation results

Variable	Coefficient	Student's t test	Significance
Intercept	0/756	23/01	0/000
EVA	0/036	2/89	0/004
F Fisher statistic (significance)	531/22 (0/000)		
The coefficient of determination	0/455		
Durbin-Watson statistic	1/98		

The coefficient of determination

The coefficient of determination represents the percentage of dependent variable variation that is accounted for by the independent variables. In this model, the coefficient of determination

is equal to 0.455. This means that the independent variables explain 45 percent of dependent variable.

F Fisher statistics

To accept the significance assumption for the whole model or in other words a significant linear relationship between independent and dependent variables, F Fisher test was used. This test's null hypothesis was that there is no linear relationship between independent and dependent variables. Results in the table with a significance level of zero (under 5%) rejected the null hypothesis with confidence level 95 percent. In other words, there was a linear relationship between independent and dependent variables, and the model was valid to analyze the results.

Autocorrelation

To investigate this hypothesis, the Durbin-Watson statistic is used; if this statistic is between 1.5 and 2.5, assumption of the correlation between the residue terms will be rejected. Given the result of this test, value of this statistic was 1.98, so there was no correlation in residue terms of this regression model.

Analysis of results

The aim of hypothesis was to study the issue whether the EVA model had an effect on the value of shares in companies listed on the Tehran Stock Exchange. Model showed that the error factor and level of dividend discount factor were (0.036) and (0.004), which indicates these variables significantly affected the value of the stock. Therefore, there was no evidence to refute this hypothesis and the hypothesis is confirmed.

Normality test

Figure (7): Testing the normality of the dependent variable using JB statistic

Variable	JB statistic	Prob.
Stock value	0.763011	0.126033

Given that JB = 0.76 is small and not in the critical area and also because the probability value is more than 0.05, so the assumption of normality is not rejected.

Hypothesis three

The third hypothesis was about effect on stock value of the dividend discount model. To test this hypothesis, simple regression and the following were used.

According to the result of the Hausman test and rejection of the hypothesis H0, to estimate the model, panel data methods were used. Followings are the results of the model estimation that was done using panel data with fixed effects as shown in figure (8).

Figure (8) – Model estimation results

Variable	Coefficient	Student's t test	Significance
Intercept	0/566	19/4	0/000
Dividend discount	0/013	2/17	0/03
F Fisher statistic (significance)	714/12 (0/000)		
The coefficient of determination	0/356		
Durbin-Watson statistic	2/44		

The coefficient of determination

The coefficient of determination represents the percentage of dependent variable variation that is accounted for by the independent variables. In this model, the coefficient of determination is equal to 0.356. This means that the independent variables explain 35 percent of dependent variable.

F Fisher statistics

To accept the significance assumption for the whole model or in other words a significant linear relationship between independent and dependent variables, F Fisher test was used. This test's null hypothesis was that there is no linear relationship between independent and dependent variables. Results in the table with a significance level of zero (under 5%) rejected the null hypothesis with confidence level 95 percent. In other words, there was a linear relationship between independent and dependent variables, and the model was valid to analyze the results.

Autocorrelation

To investigate this hypothesis, the Durbin-Watson statistic is used; if this statistic is between 1.5 and 2.5, assumption of the correlation between the residue terms will be rejected. Given the result of this test, value of this statistic was 2.44, so there was no correlation in residue terms of this regression model.

Analysis of results

The aim of hypothesis was to study the issue whether the dividend discount model had an effect on the value of shares in companies listed on the Tehran Stock Exchange. Model showed that the error factor and level of dividend discount factor was (0.013) and (0.03), which indicates these variables significantly affected the value of the stock. Therefore, there was no evidence to refute this hypothesis and the hypothesis is confirmed.

Normality test

Figure (9): testing the normality of the dependent variable using JB statistic

Variable	JB statistic	Prob.
stocks value	1.245670	0.735001

Given that JB = 1.24 is small and not in the critical area and also because the probability value is more than 0.05, so the assumption of normality is not rejected.

Hypothesis four

The aim of this thesis was to study the issue whether Ohlson model provides a better estimate than the EVA model in terms of predicting the value of the shares. According to t coefficients and statistic, Ohlson coefficients of determination will be equal to (0. 069) and (3.13) and (0.506), which are higher compared to the t coefficient and statistic and Ohlson coefficient of determination of economic value, which are (0.036) and (0.89) and (0.455), indicating that Ohlson model provides a better estimate than the EVA model in predicting stock prices, so no evidence to refute this hypothesis was found and this hypothesis was confirmed.

Hypothesis five

The aim of hypothesis was to study the issue whether the economic value added model was a better model than dividend discount model in prediction of stock value or. According to t coefficients and statistic, Ohlson coefficients of determination will be equal to (0.036) and (2.89) and (0.455), which were higher compared to the dividend discount model for which t coefficients and statistic, Ohlson coefficients of determination that were equal to (0.013) and (2/17) and (0.356), indicating that the economic value added model provided a better estimate than the dividend discount model in predicting stock prices; so no evidence to refute this hypothesis was found and this hypothesis was confirmed.

9. The overall conclusion of research

The main objective of this study was to compare the Ohlson, discounted dividends and EVA valuation models in the Tehran Stock Exchange. Considering the results from review of literature, five hypotheses for the above investigation were considered and these were tested. Finally, the results indicated that the Olson model looks much better than the other two. Besides, it provides a better estimate of the market value of shares. And also it can be concluded that EVA model is more efficient in Tehran Stock Exchange, compared to the dividend discount model.

10. Suggestions

Given that Ohlson model is effective on stock market value, it is recommended that investor price stock using this model in investment decisions and stock analysts use this model as well.

Due to the influence of the dividend discount model, it can be proposed that companies consider their dividends as a factor affecting pricing.

Given Ohlson's superiority over the EVA model, it can be suggested that investors and analysts use more new models such as Ohlson in the assessment and valuation. Also at a more macro level, for initial offer operation, financing companies (for making arrangements for offer of shares of companies applying for accession to the stock market and those in need of financing), insurance companies (for providing insurance services related to value of companies and firms), commercial banks (for receiving reliable and valued security supported by provided facilities) and governments (for enforcement of general policies of article 44 of Constitution) can use this model for further optimization of their businesses and services.

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