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THE APPLICATION OF FELTHAM AND OHLSON (1995) MODEL FOR IRANIAN COMPANIES LISTED IN TEHRAN STOCK EXCHANGE

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ABSTRACT

One of the valuating firm's market values is Feltham and Ohlson (1995) model. On this model, firm's market value is related to historical accounting data. Historical accounting data in this model are book value, net financial assets and abnormal operating earnings. We use this model and examine effectiveness of this for companies listed on Tehran Stock Exchange (TSE). For this, we use the companies listed on TSE between 2003 through 2012 and test the model. The number of research's sample is 80 for 10 years. The results show that there is a meaningful relationship between firm value and book value, abnormal operating earnings and net operating asset and so, this model is a suitable one for companies listed on TSE. Also, the results show that 64.9 percent of firm value is explained by these variables and, the relationship between net operating assets and firm value is stranger than other variables.

Keywords: *Feltham and Ohlson (1995) Model, Firm Market Value, Stock Price*

INTRODUCTION

Stock market is a fine and suitable place for both investors and public companies, because they can both exchange their funds with securities and vice versa. Therefore, study and research about this market is very significant (Hejazi *et al.*, 2011). For making good economic decisions, investors need different information. Of the most needed information is stock price and firm value. In efficient market, stock prices fully reflect all available information in the market; so stock price is equal to actual value. But, previous studies (i.e. Ghalibaf and Nateghi, 2006) show that TSE is not efficient. Therefore, investors in TSE need a model that forecast the stock interest for choosing a suitable portfolio. Because of these reasons, in this research we investigate the effectiveness of Feltham and Ohlson (FO) (1995) model in companies listed on TSE.

FO (1995) model provides a theoretical framework to relate accounting variables with the market price of stocks. Various empirical researchers have tested this model and support for this has not been consistent. Some studies confirm this model, but some reject. In this section, we review several studies.

Khodadadi and Emami (2010) studied efficiency of the four adjusted versions of Feltham-Ohlson (1995) models. The first and third versions (traditional models) are similar to Ohlson (1995) and Feltham-Ohlson (1995) models, respectively and the difference is that the other information variable has been ignored without access to analysts' forecast. The second and fourth versions (sign-oriented models) attempt to improve traditional models by segregation of the abnormal earnings in terms of their sign. The research results show that sign-oriented models have better performance in prediction of the abnormal earnings compared to traditional model. Using forecasted abnormal earnings in all of the valuation functions indicate that none of the studied models can appropriately forecast firm's value. Also, the results suggest the advantage of Feltham and Ohlson based to the Ohlson based models both in respect of abnormal earnings forecast and regarding studied firms' valuation.

Pilly (2004), evaluated the FO (1995) model assuming market inefficiency in the Canadian companies. He excluded financial firms. For every year from 1989 to 1998, four portfolios are formed based on the V/P ratio where V is the predicted value of the firm based on the FO (1995) model and P is the market value at the fiscal year end. There is a statistically significant difference in one year returns on low (V/P)

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portfolios and high (V/P) portfolios. Noise traders acting on pseudo signals continue to invest in overvalued stocks. Professional arbitrageurs are unable to restore equilibrium because of their limited wealth and time horizons.

As shown above, some researches support FO (95) model, but some reject. So we investigate the effectiveness of this model for companies listed on TSE.

As will be illustrated later, on FO (1995) model, firm value is related to book value, abnormal operating earnings and net operating asset. A question is that what percentage of firm value is explained by these accounting data for Iranian companies. So, three hypotheses are developed for answering this question to investigate first, the relationship between firm value with these variables and then scale of these effects. The hypotheses are:

H₁: there is a meaningful relationship between book value of stock and firm value.

H₂: there is a meaningful relationship between abnormal operating earnings and firm value.

H₃: there is a meaningful relationship between net operating asset and firm value.

MATERIALS AND METHODS

Methods and Variables Definition

There are several models for valuating stock price. According to Anand and Faseruk (2008), these models are classified in 3 major groups: Finance-based valuation models, valuation models based on historical accounting data and valuation models based on forecasted accounting data.

One of the valuation models based on historical accounting data is Feltham and Ohlson (1995) Model. In this model, accounting assets is divided into financial and operating assets. The properties of financial and operating assets are different, so this model distinguishes between them.

Financial assets and liabilities on the balance sheet have relatively perfect markets and as such, one can make an assumption that the book value and market value of financial assets are equal. In contrast, the operating assets have an imperfect market and as such, there is a difference between the book value and market value of operating assets. The existence of this “discrepancy (the difference between the market and book value), referred to as (unrecorded) goodwill, institutes the problem of how to determine the factors and information that bears on its sign and magnitude” (Feltham and Ohlson, 1995).

This model is based on a clean surplus relationship and perfect accounting for financial assets. Furthermore, the interest rate is assumed to be the same for a financial asset and a financial liability. In addition, the model makes the distinction between conservative and unbiased accounting. In unbiased accounting, the expected value of (unrecorded) goodwill unbiased as defined by equation (1) becomes zero in the long run. With conservative accounting, the expected value of (unrecorded) goodwill is greater than zero (Feltham and Ohlson, 1995).

$$g_t = p_t - bv_t \tag{1}$$

Where g_t (unrecorded) goodwill; p_t market value of firm’s equity at date t; and bv_t book value of firm’s equity at date t.

FO (1995) model shows that market value of a firm can be simplified as:

$$p_t = bv_t + \alpha_1 ox_t^a + \alpha_2 oa_t + \beta_1 v_t \tag{2}$$

This model assumes that:

$$Ox_{t+1}^a = w_{11} ox_t^a + w_{12} oa_t + v_{1t} + \tilde{\epsilon}_{1t+1}$$

$$Oa_{t+1}^a = w_{22} oa_t + v_{2t} + \tilde{\epsilon}_{4t+1}$$

$$\tilde{v}_{1t+1} = y_1 v_{1t} + \tilde{\epsilon}_{3t+1}$$

$$\tilde{v}_{2t+1} = y_2 v_{2t} + \tilde{\epsilon}_{4t+1}$$

Where:

oa_t = operating asset at time t,

ox_t = operating earnings at time t, and

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$$OX_t^a = OX_t - (R_f - 1) * oa_{t-1}$$

OX_t^a = abnormal operating earnings and is related to operating earnings by the relationship.

V_{1t} and V_{2t} are the other pieces of information that affect the abnormal operating earnings assets; ϵ_{1t} , ϵ_{2t} , ϵ_{3t} and ϵ_{4t} represent the white noise or random disturbance and have zero means. In addition, the following restrictions are imposed on the persistence parameters: the absolute value of γ_1 and γ_2 is less than one, $0 \leq w_{11} < 1, 0 \leq w_{22} < R_f, w_{12} \geq 0$. The parameter w_{12} represents dichotomous conditions. It is less than one for unbiased accounting and greater than one, but less than R_f for conservative accounting.

Equation (2) shows that the market value depends on book value and net operating assets, adjusted for abnormal operating earnings and other information that modify the prediction of future profitability.

We classify research's variables into 2 groups: Independent variables, dependent variable. Firm value is the dependent variable and book value, net operating assets and abnormal operating earnings are independent variables. Firm market value is equal to closing stock price at the end of fiscal period. Book value is the amount of shareholders' equity divided by number of stocks at the end fiscal year. Net operating assets are defined as the book value of shareholders' equity, minus net financial assets, plus net deferred tax liabilities. Net financial assets are calculated as cash, plus short-term investment, minus long-term debt, the current portion of long-term debt. Abnormal operating earnings are equal to operating earnings in year t, minus expected normal earnings. Expected normal earnings are equal to cost of capital for each firm, multiplied by the previous period's net operating assets. The cost of capital is the cost of a company's funds (both debt and equity), or, from an investor's point of view "the shareholder's required return on a portfolio company's existing securities. The rate you would use to discount cash flows if using the "cash flow to the firm" method is actually a company's weighted average cost of capital, or WACC. A company's WACC accounts for both the firm's cost of equity and its cost of debt, weighted according to the proportions of equity and debt in the company's capital structure. Here's the basic formula for WACC:

$$WACC = WdKd(1 - t) + WeKe$$

Where:

Wd: Weight of Debt

Kd: Cost of Debt

We: Weight of Equity

Ke: Cost of Equity

t: tax rate

The cost of debt is relatively straightforward: It is the interest rate a company must pay to borrow money, based on the current yield on any of the bonds the company has issued. In this research, we use the lowest rate of bonds in Iran that is 15.5 percent. Tax rate for the Iranian companies is 25 percent. Tax exemption for the companies listed on TSE is 10 percent; so, we consider quantity of t as 22.5 percent.

There are several models for calculating **Ke**. Average Realized Returns Model, Adjusted Average Realized Returns Model, Capital Assets Pricing Model (CAPM), Dividend growth model and Accounting Based Assessment Model are the famous models for it.

Osmani (2003) investigates the effectiveness of these models for Iranian companies listed on TSE. The results show that Accounting Based Assessment Model is more efficient. For this, we use the model in this research for calculating **Ke**. This model presented by Edward, Bell, Ohlson is as follows:

$$p_t = b_t + \sum_{i=1}^T (1 + r)^{-i} E_t (x_{t+i} - rb_{t+i-1}) + (1 + r)^{-T} E_t (p_T - b_T)$$

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Where:

- P_t : Current stock price
- b_t : Current book value per share
- b_{t+i} : Book value per share in future
- x_{t+i} : Earning per share in future
- r: Cost of Equity

RESULTS AND DISCUSSION

In this research, we first test the meaningfulness of FO (95) model. For this we use bellow formula:

$$F = \frac{SS_r / k - 1}{SS_e / n - k}$$

The results are summarized in table 1:

Table 1: Meaningfulness Test Results of FO Model

R²	Adjusted-R2	F	P-Value	D-W
0.649	0.647	489.854	0.000	1.918

As shown in table 1, the model is suitable for Iranian companies.

After confirming the model, we determine the relationship between independent variables and firm value. The results of H₁ to H₃ test is summarized in table 2:

Table 2: Hypotheses Test Results

Variable	The correlation coefficient	Significant level	Number of sample
Book value	0.114	0.001	800
Abnormal operating earnings	0.515	0.000	800
net operating asset	0.728	0.000	800

Using SPSS software, we find that all hypotheses are confirmed. In the other words, the relationship between all independent variables and firm value is positive and meaningful.

After determining the relationship between independent variables and the dependent variable, we determine the amount each variable’s effect of on the firm value. The results show that net operating asset has the most impact on firm value. The results of this test are summarized below:

Variable	Amount of impact
bv_t	0.049
ox_t^a	0.346
oa_t	0.627

Also, the results show that about 64.9 percent of the firm value is explained by independent variables of the models:

The results of FO (95) model examination	
Coefficient of determination(R²)	Adjusted-R²
0.649	0.647

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Conclusion

The results show that, 64.9 percent of firm value is explained by model's variables. This means that Iranian investors focus on historical accounting data for decision making. Also, the relationship between net operating assets and firm value is stranger than other variables. On FO (95) model a portion of firm value is related to other information; this is 35.1 percent for Iranian companies. We suggest to add other variables to this model as other information and to expand the model in TSE.

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