Survey of the Residual Income, Discounted Cash Flow and Adjusted Earnings Methods for Achieving Fair Value of the Company in the Capital Market

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Abstract

This paper investigate the residual income, discounted cash flow and adjusted earning methods for achieving fair value of the company in the capital market and comparing the average value of companies in the initial publicoffering in the stock exchange. Research hypotheses have been tested by usingcomparison tests of student t-test, Wilcoxon signed rank and Pearson and Spearman correlation coefficient. The findings of this research indicate that there is no significant difference between average fair values of companies based on the residual income method and average value of companies in the initial stocks offerings, but there is a significant difference between average fair values of discounted cash flow and adjusted earnings methods compared to the average value of companies in the initial stocks offerings. Furthermore, there is no significant difference between average fair value of companies based on the residual income and discounted cash flow methods and average fair value of companies based on discounted cash flow and adjusted earnings methods. Unlike, there is a significant difference between average fair value of companies based on the residual income and adjusted earnings.

Key word: average value of companies, Residual income, discounted cash flow, adjusted earnings, fair value

Introduction and problem statement

Analysts and investors have mostly considered selection of the evaluation method which covers the characteristics of risk and expenditure in a finite time horizon to meet the needs of investors for achieving the price ofthe exchange in the last decade. Furthermore this evaluation which provides potential investor the fairest value for decision making is one of the discussed topics. Howeverthis is discussed that which evaluation method could meet investor's expectation? In evaluation there may be the value creation factors of company in terms of non-financial factor. Therefore, it is impossible to determine growth opportunities only by using the discounted cash flow or current value of cash flow, but it is required to consider other factors which have a role in the creation of the growth opportunitiesfor the company. Investors, creditors, personnel, clients and managers are beneficiary in business enterprise ability to create desirable cash flow. Valuation model based on the residual income introduced the value of company as a function of expected and current accounting figures. Ohlson(2001)[12], Penman a Sougiannis (2003)[11] believed that company value is influenced by three factors including the book value of company's ownership rights, residual income and others information to determine the fair value by determining the value close to intrinsic value in the capital market. Numbers of shares are daily bought and sold by participants in the capital market, but investors always ask themselves:

what is the actual stock cost? To answer this question, they look at stock exchange boards, may be they find the answer to their question. An important point to be noted is that investors are motivated to increase the accuracy in their beliefs by means of data collection.it will quickly become an investment opportunity ifthey recognize which interpretation is correct. It leads the value of share towards the effective value. Likely at least, some of this data can be obtained through the analysis of financial statements. When investors act as described above, they have the so-called rational expectations [12]. The residual income method (the net surplus) follows the net income dynamics.Researchers such as Feltham and Ohlson [5] and Myers [10] proved that it is possible to express the company's value based on the accounting variables. Aforementioned method caused investors increasingly focusing on the net profit anticipation potential. In recent years,standard-setters have focused on the output values in the reflection of the value of assets and liabilities in the balance sheet and by using it to introduce the fair value; they considered it as an important factor in measurement [14]. Therefore, this current research focuses on output values and tries to manifest participants'assumptions in the market for evaluating and achieving the fair value. One of the reasons is the Financial Accounting Standard Board's new statements based on measuring the fair value which should indicate participants' assumptions in the capital market[14].

Research background

A lotof researches have been conducted about the evaluationof business enterprise in the initial offerings in the stock exchange. Weston and Copeland (1986) offered "discounted cash flow" method to determine the companies' stock price. They argued that in all companies, cash is an operational symbol. If the company's future cash is anticipated and discounted based on the risk level, the company's value can be estimated [15]. Penman and Sougiannis (2003) evaluated and observed the stock prices using the residual income in a prestigious portfolio. The difference between estimates of models of the companies' value determination is in the range of 70 to 170 percent of the actual value of the share. Francis et al (2000) used estimates of 5 year-value linewithin the given time (with final growth rate of 0 to 4 percent) and offered the possibility of the intrinsic value of the business enterprise by determining the valuation time (by simulating the investor's situation) and finally they found that estimates of the residual income prefer to estimates based on free cash flow or dividend. Lundholm et al(2001)compared the value estimates based on the discounted cash flow and the residual income models in New York stock exchange and argued that why participants and analysts offer different estimates of the net value by using of two abovementioned models, while both models follow certain assumptions. They found that there was difference between both models' estimates which is caused by using incompatible hypothesis in the data processing. They showed that in recent researches there have been made some mistake in their estimateswhich make difference between determinate values and therewith it leads to large differences in their evaluation [9].Spilioti and Karathanassis (2003) studied about empirical applicationof "clean surplus" evaluation model upon food and pharmaceutical industry. This study was conducted during 1996 to 2002 when specific financial crisis occurred in the UK stock exchange. They found that Ohlson's model has not had the appropriate performance in anticipating the stock price changes in both sectors as a representative of UK economy [13]. Curtis and Neil Fargher (2003), in an empirical study, studied about the ability of valuation model anticipation based on abnormal profits compared with the free cash flow to assess the value of initial public offerings price of the shares of American companies during 1985 to 2001.the result showed that models based on the abnormal profits evaluate the suggested price of initial offerings 20 percent more than transacted price. They argued that

methods based on profit are the most appropriate methods to evaluate the initial public offering of securities [3].Cupertino et al (2005) studied about the cash flow, the residual income and the discounted dividend methods for valuation of Brazilian companies during 1995 to 2004 and they found that the cash flow method has more accountability compared to these methods and it can also estimate the business enterprise value more appropriately. It is showed that the residual income method and the discounted dividend tend to be higher estimates compared to others valuation methods [4].Ahmad Pour et al(2005) studied about methods of assessing the share basic price of companies which subject to the privatization and concluded thatexcept method of company's net current assets value, specified values using adjusted earnings and net discounted cash flow methods make significant difference on companies' transfer price[1]. Mahmoud Abadi and Bayazidi (2008) made the comparison between the accountability of the residual income valuation models and the abnormal earnings growth for determining the value of companies and it has been found that there is not a significant difference between accountabilities of both models in the valuation of companies' value in different industries and in the general case and all most in all case, the residual income valuation model has relatively higher accountability powers in determining the companies' value [2].

Hess et al (2009)studied about the discounted cash flow and the residual income valuation methods accounting for deviationsfrom abovementioned methods of payable value. In this study, companies grouped into 20 portfolios including 69 companies of New York stock exchange, America stock exchange and National Association of Securities Dealer (NASD), then companies value was evaluated based upon above methods. Results of abovementioned research showed that the residual income method had lower inflation compared to other valuation methods in the majority of tested companies during 1988 to 1998 [8].

Research Hypothesis:

First hypothesis: there is a significant difference betweencompanies'average and fair value based on the residual income, the discounted cash flow and adjusted earnings methods and companies average value at initial public shares offerings.

Second hypothesis: there is a significant difference among the residual income, the discounted cash flow and the adjusted earnings methods in determining the companies' fair value.

Research Methodology

This current study is a kind of accounting provable researches which semi empirically studies whether accounting variables are relevant and useful or not. Obtained information and the nature of researchis quasi-empirical and ex-post facto, because tested variables occurred in the past when there is not the ability to control and manipulate for the researcher and also the goal of study about test correlation is to determine that there is a correlation or not and using this relations in anticipates. Research required information about financial statements and company's prospectuseshave been obtained from financial soft wares and data banks in the Tehran stock exchange website. For research hypothesis and theories, the comparative method is used. Comparison tests of student t-test and Wilcoxon signed rank are used for analyzing data and testing the research hypothesizes and parametric test (Pearson) and nonparametric test (Spearman) are used for relational checking of companies' value in the initial shares public offerings and value of the residual income, discounted cash flow and adjusted earnings methods. Statistical tests used in this research are as follows:

1. Paired Statistical comparison test (paired t-test) is used for comparing two averages. To use paired t-test, Following assumptions have been investigated. If thesepreconditions exist, this kind of test would be used. These preconditions include: 1) Measurement scale should be at least

interval; 2) Variable should be normally distributed; 3) these compared variables variances should not differ significantly; 4) samples should be selected among accidental population and should be discordant.

2. One of the nonparametric tests is Wilcoxon test (signed-rank test) is proponed by Frank Wilcoxon for non-independent variablesfor the first time in 1945. In this test, more weights are given to signs which are far from zero and paired paradoxes are arranged based on absolute values of these quantities ($|Z1|…..|ZN|$) and to form an statistical test , ranks belongs to positiveviews sum up and ultimately test statistic is formed.

3. The Correlation Coefficient analysis is an index which describes the direction and quantity of relationship between two variables and is used to evaluatevariouscorrelation coefficients. The most important coefficients of correlation are Pearson and spearman coefficients. If both variables are eternal, the Pearson correlation coefficient is used and if they are interval, Spearman correlation coefficient is used.

How to calculate the value of a company according to discussed valuation methods:

A) Estimate of company's value by using residual earning method:

$$V_t = BV_t + \sum_{i=1}^{t} \left[\frac{RE_t}{(1+r)_I} \right]$$

V_t: Value of company at time of "t"

RE: Residual earning at time t is calculated as follows:

$(RE_t = CI_t(BV_{t-1} \times R)$

Cl_t: net interest of company before tax is calculated from following equation:

$CL_t = OI_t - NFE_t - T_t$

OI_t: operating interest

NFE_t: net financial and non-operating earnings are calculated from following equation:

$$NFE_t = EC_t - FE_t$$

EC_t: profits received from investments(such as a bonds, investment deposit with bank) and other revenues.

FE_t: financial expenses and other non-operating expenses

T_t: company performance taxes

R: The interest ratepayableon accountof long-term investment + 0.05(according toparagraph "F" of the article 14 of the Law of the Third Economic, Social and Cultural Development Plan of the Islamic Republic of Iran, Ratified in 1999).

BV_t: book value of shareholders' rights at time t equals:

$$BV_t = BV_{t-1} + E_t - D_t$$

(According to All-Inclusive concept revenge's and accounting clear surplus)

BV_{t-1}: book value of shareholders' rights at time t

E_t: company interest at time t based on accounting clear surplus.

D_t: Dividend at time t

B. valuation of company's value using discounted cash flow method

$V_t = \sum_{i=1}^{T} \frac{FCF_t}{(1Ir)_i}$

FCF_t: free cash flow at time tis calculated as follows:

$FCF_t = Co_t - CI_t$

CO_t: cash flow from operating activities during time t.

CI_t: cash flow from investment activities during time t.

C) Adjustedearnings method: according to the paragraph "F" of the article 14 of the Law of the Third Economic, Social and Cultural Development Plan of theIslamic Republic of Iran, Ratified in 1999, to exercise methods of share pricing, discounts and to determine models of payments by the buyers, net income ratio before taxes for three years before resignation to rate Of return on investment considering the effect of subsidiary factors in the escalator of shares base price (subject of Article 4, paragraph A of above bylaw)

$$V_t = \frac{(AEt_{-3} + AEt_2 + AEt_1)/3}{R}$$

V_t: the value of company at time t

AF_{l-1}, $AF_{L-2}$and AF_{L-3}: net income before adjusted tax according to the specified cases in escalator three years before resignation.

It should be noted that the presented rate of return on investment of the above escalator is used by above three methods.

Research statistical population

Statistical populations of this research are "accepted companies in the Tehran stock exchange".

In the current research for selecting sample, first companies not meeting following conditions are eliminated among companies are entering the stock exchange offering and accepted there (according to years being inserted in Tehran stock exchange website):

1. There should exist the financial information of 3 facial period before entering to the stock exchange.

2. The results of operations of tested business enterprises should lead to net income before tax during years before public offerings (at least three consecutive years).

3. They should not be classified as bank, insurance and investment companies.

4. Companies should be accepted in the stock exchange by the end of 2007, as well as the company name should not be omitted from the list of accepted companies in the stock exchange during survey.

Therefore among 102 companies entering the stock exchange during 2003 to 2007, given the above condition, just 60 companies have been investigated.

Findings

As seen in table (1), in the case of paired variables,average value of companies in the initial public offerings using the residual income methods and according to the calculated statistical absolute value t and z about first hypothesis, one con accepted that there is not a significant difference between the average of fair value of companies base on the residual income method and average of company value in the initial public offerings of the stock exchange, but there is a significant difference among average fair values of companies in the initial public offerings. In the case of second hypothesis, one can concluded that there is not a significant difference amongaverage fair values of companies based on the residual income, the discounted cash flow and the adjusted cash flow methods, but there is a significant difference among average fair value of companies based on the residual income and the adjusted earning methods.

Table1.summary of statistical results of the research hypothesis review

Hypothesizes	Difference between Estimatedvalue and the averagevalues of the initial offerings	Statistic of Comparison test of averages		Statistic of the signed rank test		Hypothesizes results
		t-student	The test error	Z	The test error	
First hypothesis The residual income method	-2073.89	-1/640	.108	-1.344	179	Non accepted
Discounted cash flow method	1852.70	2/782	0.007	-2/488	0.013	accepted
Adjusted earning method	1851.36	2/864	0.006	-3/043	0.002	accepted
Second hypothesis Residual income and discounted cash flow methods	1956.91	1/808	0.077	-1/415	0.157	Non accepted
Residual income and adjusted earning methods	3812.14	2.467	0.017	-2.750	0.006	accepted
Discounted cash flow and adjusted earning methods	599.59	0.722	0.473	-0.571	0.568	Non accepted

Pearson and Spearman correlation coefficient tests are used to study about the relationship between values of companies in initial public offerings and estimated fair value of the residual income, discounted cash flow and adjusted earning methods.

Name of variables and statistical indexes		Residual income	Discounted cash flow	Adjusted earnings
Companies values in initial public offering	Pearson coefficient correlation	0.605	0.471	0.539
	Spearman coefficient correlation	0.796	0.366	0.583

According to table (2),the results show that there is a significant and positive relationship between average value of companies in the initial public offerings and the estimated fair value of the residual income, the discounted cash flow and the adjusted earnings methods. Among tested methods, the strongest relationship between companies' values in the initial public offerings is allocated to the residual income method. As well as the results relatedto considered tests including pairwise comparison of tested methods are shown in table (3);

Table 3. Distributions related to the residual income, discounted cash flow and adjusted earnings methods and average value of initial public offering
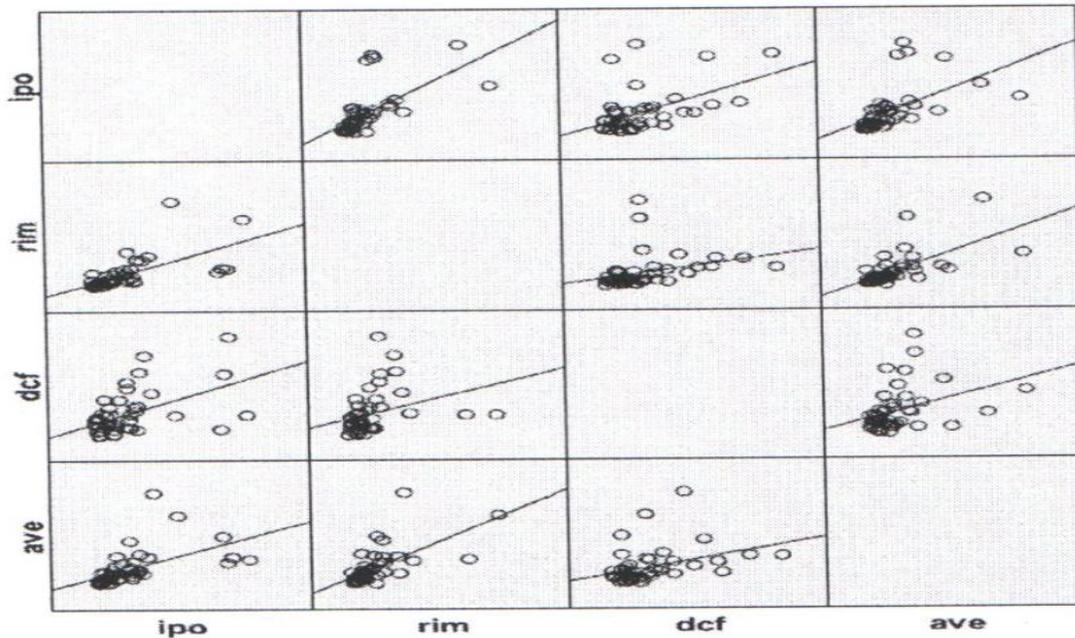
AVE: Adjusted Earnings
RIM: Residual Income Method
DCF: Discounted Cash Flow
IPO: Average Value of Initial Public Offerings

Conclusions andrecommendations

Among the accounting studies, valuation methods of business enterprise based on using the financial statement items is one of the important topics of the financial and accounting studies. Therewiththe concept of the fair value valuation hierarchyof statement No.157 of financial accounting standards, on financial instruments of recognition and measurement of fair value stated that: "market price for assets and liabilities is better than the fair value". So market price introduces the fair value. In other words, market value is the cost achieving in an actual transaction between tended buyers and sellers. Valuation methods such as the residual income and discounted cash flow methods can help investors to specify the logic of paid price and the fair value which is the fairest value.

In this section of paper, research findings with findings of other researches are analyzed nationally and internationally for comparison;

According to first hypothesis, the relationship between book value variables, accounting income and market value, shareholders rights and its changes in the stock exchange is similar to results of most researches related to clean surplus in national and international levels. Such researches include studies were conducted by Spilioti and Karathanassis (2003)[13], Mahmud Abadi and Bayazidi(2008)[2] and Hess et al(2009)[8].it should be noted that indicated studies were conducted in different time periods and the suggested output is different from which has been used in this study. Therefore according to this current research and most of above researches, one can find out that further focus on fundamental concepts of valuation and tend to relationship between the residual income and output raises the attitude towards models directly evaluating the

company. It should be noted that when this method is used in a given (limited) time,it can increase the accountability of performance related to the book value and reported earnings. Results obtained from this research about comparison of the discounted cash flow method and the average value of companies of initial public offerings is not similar to findings of research conducted by Cupertino et al (2005)[4], however this research findings are similar to that of Ahmad Pour et al research(1384)[1].

The findings of the research hypothesizes related to the residual income and the discounted cash flow methods in the valuation of fair value of companies conform to findings of Lundholm (2001)[9],Cupertino et al (2005)[4] and Hess et al (2009) [8] studies. According to results of Hess et al studies [8], one can conclude that the residual income method compared to the discounted cash flow showed about 14 percent value being close to theaverage of value of initial public offerings.

Thus if the future trend of profitability of company is more than the suggested trend of output of the institution, it can ensure the operating cash flow entering into business enterprise. In the case of other valuation methods, obtained value based on the discounted cash flow method conforms to the obtained value based on the adjusted earnings method. However estimated valuations about the residual income and adjusted earnings methods show different results.

According to the findings of this current study, one can find that the residual income method impressively helps investors and analysts in the valuation of fair value of business enterprise. It should be noted that by virtue of new bylaw on pricing of business enterprises which subject to privatization, approved by cabinet in 2007, referring generally to the three profitability method, market approach and net current value of companies assets, the residual income method has not been considered. Thus it is not recommended to use the residual income method in valuation and base price appraisal for business enterprise when entering into the stock exchange. As follows, some cases will be mentioned which will be beneficial in future researches;

Conducting this research on OTC companies and business enterprise constitution and surveying the residual income before and after constitution

Also it is recommended that financial analysts consider the restrictions of dirty surplus accounting which cause deviances in fair estimates of assets and liabilities valuation and minimize their effects.

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