

A Comparison between Ohlson 95 Model and Discounted Cash Flow: Empirical Evidence from Iran

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Abstract: This study compares the discounted cash flow approach and ohlson 95 methods. In theory discounted cash flow and ohlson95 approaches are equal, hence this study detects whether it is possible to astute that one approach has a privilege to the other form. The two valuation models are analytically compared. This study presents that if users present uncomplicated hypotheses in their valuation, they present prejudices in their corporation value estimations. Finally, due to the fact that framework for predicting is usually on the basis of accrual accounting and also the budget control is most of the time on the basis of accounting numbers rather than cash flow numbers, it is probable that corporation value estimation on the basis of accrual accounting conceptions and financial statement analysis is more concisely than the later.

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Key words: Ohlson95, Discounted cash flows, Discount rate, Book value

1. INTRODUCTION

In the past decade, the ohlson95 method and the discounted cash flow method (DCF) have received highlighting attention. In spite of the theoretical approach the ohlson95 method is presented in Edwards and Bell (1961) and Ohlson (1995). The DCF approach can be perceived in most finance texts. See, e.g. Copeland et al. (1990). Theoretical equivalence on the basis of strict hypotheses both the OL95 and DCF methods provide corresponding corporation value estimations in than the DCF method for corporation valuation while it is uninfluenced by accounting approaches (Copeland, Koller, & Murrin, 1990). However, Ohlson (1995) method is unrelated to various accounting approaches if it is utilized in the predicted financial statements. Recently, Penman and Sougiannis (1998) and Francis, Olsson, and Oswald (2000) researched empirically the validity of OL95 and DCF methods. Both surveys found that the OL95 provides more precise corporation value estimations than the DCF method. However, due to the fact that both valuation methods are on the basis of the similar theoretical framework, an appropriate conduction would refer that both methods provide alike corporation value estimations. This study presents that if users present uncomplicated hypotheses in their valuation, they present prejudices in their corporation value estimations. This question refers to two issues. First, Olsson (1998) states that shortening the hypotheses are usually presented when unlike valuation methods are used in practice. Due to the fact that shortening hypotheses present prejudice in the corporation value estimations, they are probable to influence

corporation value estimations on the basis of the OL95 and DCF approaches unlikely. Levin and Olsson (2000) present that if the constant condition is not achieved when the terminal value is calculated, the OL95 approach provides more accurate corporation value estimations than the DCF approach. This study examines if one of the valuation approaches has systematically privilege to the other when shortening hypotheses are presented. Second, an attractive valuation approach should be easy to utilize and it should help the user to conduct better corporation value estimations (Penman & Sougiannis, 1998). To instance valuation approaches which are on the basis of measures that exhibit the value production rather than the value distribution are easier to understand and interpretation and are therefore analytically attractive (Penman, 1992). Thus, this study evaluates whether the two valuation approaches are analytically attractive from a user aspect. This study presents that shortening hypotheses influence corporation value estimations unlikely. In some cases the OL95 approach provides more accurate corporation value estimations, while in others the DCF approach provides more accurate estimations. Finally, this survey states that due to the fact that the framework for predicting is on the basis of accrual accounting and due to the fact that budget control is usually on the basis of accounting numbers rather than cash flow measures, it can be logical to estimation corporation values on the basis on concepts and financial ratios acknowledged from accrual accounting and financial statement analysis, i.e. the OL95 approach. The research question addressed in this study has practical importance. If

shortening hypotheses are presented in corporation valuation, this study presents that it is important to know the influence on corporation value estimations. Depending on the type of hypothesis presented, the influence on corporation value estimations can be highlighting.

2. The theoretical equivalence of the OL95 and DCF approaches

This study is not accordant with up to date conservative accounting. Similar consequents are reported in previous US research and they are statistically highlighting. The sample used in this study is edged to huge corporations that have been in operation for a long time. Due to the fact that huge Japanese corporations tend to own land and securities that were acquired a long time ago, these assets are registered at historical costs and should diminish the book value of equity, which produces abnormal achievements. However, the consequent here does not give support to this theory. The basic model for corporation valuation is the dividend discount model (DDM) (Miller & Modigliani, 1961). When investors purchase stocks, they expect to gain two categories of cash flow dividend in the period during which the stock is owned, and the expected sales price at the end of the period. In the extreme illustration, the investor keeps the stock till the corporation is liquidated; in this condition, the liquidating dividend becomes the sales price. Under the hypothesis of an unlimited time scope, the DDM can be represented as:

$$P_0 = \sum_{t=1}^{\infty} \frac{\text{div}_t}{(1+k_e)^t} \quad (1)$$

Where P is the corporation value, div the dividends, and the cost of capital. The estimation of market value of a corporation's equity should not be influenced by the valuation approach used, so it is important to make sure that the valuation approaches are conceptually equal to each other. Due to the fact that the DDM is the theoretically correct model, it may be surprising to someone that a great deal of effort and resources are used to develop selective valuation approaches. One reason is that under the DDM, dividends are more treated as the distribution than the production of wealth. Penman (1992, p. 467) states it as the dividend puzzle price is on the basis of future dividends but perceived dividends do not tell us anything about price. Ideally, the valuation approach chosen incorporates those variables that exhibit the production of wealth rather than the distribution of wealth. Among other things, this will ease the interpretation of corporation value estimations for both financial analysts and investors. The OL95 approach was presented by Edwards and Bell (1961) and subsequently further developed by Peasnell (1982) and Ohlson (1995). It is extracted from the DDM. OL95 is a variation of the better-

acknowledged EVA approach (Stewart, 1991); it measures corporation value from an equity-holder's aspect rather than from a lender's and an equity-holder's aspect (EVA approach). The OL95 approach can be (T. Plenborg / Scand. J. Mgmt. 18 (2002) 303–318 305) represented as:

$$P_0 = BV_0 + \sum_{t=1}^{\infty} \frac{NI_t + k_e BV_{t-1}}{(1+k_e)^t} \quad (2-a)$$

The OL95 approach can also be represented in terms of financial ratios:

$$P_0 = BV_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - k_e) BV_{t-1}}{(1+k_e)^t} \quad (2-b)$$

where NI is the net income, BV the book value of equity, and ROE the return on equity.

To summarize, OL95 approach in (2a) and (2b) consists of two terms: book value of equity at the valuation date and the present value of future residual income. For this goal, residual income is showed as the difference between ROE and k_e multiplied by the book value of equity. As either the rate in book value or residual income intensifies, the difference between a corporation's estimation value and its book value intensifies. In other words, investors are only tending to pay a premium for the book value of equity if it is possible to achieve a rate of return on equity more than the equity cost of capital (i.e. the corporation produces positive residual income). The DCF approach can be found in most of the financial texts (Rappaport, 1986; Copeland et al., 1990). Penman (1997) presents that the DCF and the OL95 Approaches are theoretically equal. On the basis of DCF, it is possible to evaluate corporation value from an equity-holder's aspect (DCF):

$$P_0 = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+k_e)^t} \quad (3-a)$$

Where FCFE is the free cash flow of equity-holders. The DCF approach is stated in a form that reflects the value of the corporation, that include the interests of both debt and equity-holders (DCFF):

$$EV_0 = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1+WACC)^t} \quad (3-b)$$

Where EV is the corporation value (both interest bearing debt and equity), FCFE is free cash flow of the corporation and WACC is the weighted average cost of capital. (3a) and (3b) provide the similar equity value estimations if accordant hypotheses are made about growth in two cash flow approaches and if interest-bearing debt is precisely priced. Do the OL95 and DCF approaches provide the similar corporation value estimations in practice? Bernard (1995), using only the first 4 year of predict data, consequents that the OL95 approach covers 68 per cent of a corporation's stock price, while the DDM covers only 29 per cent. Using a little various approach, Plenborg (1999) consequents similar consequents when comparing the information content of achievements and cash flows. On the basis of

Danish data, Plenborg consequents that four years of cumulative achievements describes 22 percent of the stock price variation in the similar measurement period. In comparison, cumulative free cash flows describe less than 1 per cent of the stock price variation in the similar four-year period. The consequents of both Bernard and Plenborg show that the required predict period is shorter for the OL95 approach than for the DDM/DCF approach. Penman and Sougiannis (1998) and Francis et al. (2000) compare the reliability of corporation value estimations on the basis of the DDM, OL95 and DCF approaches, respectively. Albeit both studies use US data, a primary difference between them is that the predicted data are considered unlikely. Francis et al. use Value Line's predict data while Penman and Sougiannis use realized data as estimations of historical predicts.⁸ Despite the various sources of predict data, both studies exhibit that the OL95 approach provides less prejudiced corporation value estimations than the DDM and the DCF approaches. This consequent is not sensitive to various methods to calculate the terminal value. However, the OL95 approach did not conduct regularly well when terminal value calculations are important. This is the case when the book value of equity is a bad clue of corporation value. The Penman and Sougiannis (1998) and Francis et al. (2000) studies suggest that the OL95 approach provides more accurate corporation estimations than the DDM and the DCF approaches. However, their consequents conflict with the consequent in Section 2 that the OL95 and DCF approaches are both inherently on the basis of the DDM and thus, from a theoretical aspect, should provide the similar corporation value estimations. Plenborg (2000) also consequents that the three valuation approaches produce the similar point estimation of corporation value in practice, if the similar hypotheses are used. This shows that neither Penman and Sougiannis nor Francis et al. have taken into account that the similar hypotheses must be used. An examination of their test methods shows that this is the case too. For instance, the growth rates used to calculate the terminal value are set at 0 and 4 per cent in both surveys. Thus, the association between the predicted financial statements and the input in the various valuation approaches is most probable in accordant. Further, both studies omit the growth that usually influences the free cash flow negatively. They settle the growth rate without a corresponding settlement of the free cash flow. Finally, the DCF approach measures corporation value from a combination of equity-holder and lender aspect, while the OL95 approach measures corporation value from an equity-holder's aspect only. As exhibition by Damodaran (1994, p. 146), the growth rate does not

have to be the similar in the two valuation approaches due to effect of leverage. Penman and Sougiannis (1998, p. 354) debate the usefulness and uselessness of these two predicting methods. T. Plenborg / Scand. J. Mgmt. 18 (2002) 303–318 307

Albeit the tests conducted by Francis et al. and Penman and Sougiannis are no More gratifying than the hypotheses on their basis, the consequents do provide some useful perspectives into corporation valuation. If the valuation approaches are not properly used, the approaches provide various corporation value estimations. This is also stressed by Olsson (1998, p. XII): 'one typically makes various shortening hypotheses along the road when implementing the various models Fand various hypotheses may cause quite substantial variations in the consequence value estimations'. More than that, the studies of Penman and Sougiannis and Francis et al. show that if the internal corresponding between the three valuation approaches is violated, the OL95 approach should be preferred for corporation valuation at the expense of the DDM and DCF approaches. The question is, however, whether the consequents in both Penman and Sougiannis and Francis et al. are able be generalized to all types of shortening hypotheses, or whether the consequents are a consequent of the shortening hypotheses presented in the studies.

3. The influence of shortening hypotheses (misspecification) on corporation value estimations

This section explores the consequences of shortening hypotheses on corporation value Estimations on the basis of OL95 and DCF, respectively. While a range of shortening hypotheses could be considered, this study is inspired by Penman and Sougiannis and Francis et al. As showed above, Penman and Sougiannis and Francis et al. make a number of shortening hypotheses where the internal corresponding between the predicted financial statements and the valuation approaches is violated. This leads to prejudiced corporation value estimations. Few of the hypotheses are as follows: 1. Arbitrary growth hypotheses for terminal value calculations. 2. The use of long-term (target) capital structure in the WACC calculation (rather than the use of weights used by the predicted balance sheet) and constant costs of debt and equity. Due to the fact that theory suggests that cost of equity is a positive function of financial leverage, a third type of shortening hypothesis is examined too. 3. The use of long-term (target) capital structure in the WACC calculation (rather than the use of weights used by the predicted balance sheet) and settled cost of equity (considering the risk of the corporation changes as the market debt to equity ratio changes). In order to

examine the effect of the three types of shortening hypotheses on corporation value estimations, an instance is constructed where predicted financial statements that include the cost of capital are prepared.

4. Arbitrary growth hypotheses for terminal value calculations

In the first instance the growth rate from the predicted financial statements deviates from the growth rate which is used in the terminal term of the OL95 and DCF approaches. As pointed out above, this violates the internal corresponding between the predicted financial statements and the OL95 and DCF approaches. In a associated study, Levin and Olsson (2000) presents that if the parameters (value drivers) are not constant in the terminal period, the growth rate in the predicted financial statements will not also be constant and so violates the hypothesis of a constant growth rate in the terminal term. They exhibit that it leads to prejudiced corporation value estimations. Further, the OL95 approach can provide less prejudiced corporation value estimations than the DCF approach. In order to examine the influence of the shortening growth hypothesis, the growth rate used in the OL95 and DCF approaches is various from the 0 per cent growth rate assumed in the predicted financial statements. Specifically, the growth rate deviates three percentage points from the growth rate assumed in the predicted financial statements. Due to the fact that unprejudiced accounting is assumed in the instance and the internal rate of return equals the cost of capital, consequently residual income is equal to zero. In the second instance, the weights in the WACC formula are various from the used weights in the predicted balance sheet (debt and equity) and the costs of debt and equity are assumed to be constant across various capital structures. Both Penman and Sougiannis and Francis et al. use a target capital structure and constant costs of debt and equity. However, in order to make sure theoretical equivalence between the OL95 and DCF approaches, Levin and Olsson (1995) exhibit that the weights used by the predicted debt and equity should be used. Ideally, the cost of equity (and debt) should also be settled according to the capital structure in order to reflect the striking financial risk (Gregory, 1992)

5. The prediction as well as budget control of accounting numbers and free cash flows

An important sight of corporation valuation is the quality of the predictions. The variables that need to be predicted in the OL95 and DCF approaches, which used that financial analysis, are various may concentrate on various issues when carrying out their corporation valuations according to one or the other approach. The ROE (accounting

numbers) is in focus in the OL95 approach, while free cash flows are in concentration in the DCF approach. Several recent studies have examined the prediction of achievements and cash flows. Plenborg (1996) consequents that the time series patterns of achievements are more stable relative to various cash flow measures including free cash flows. Shroff (1998) consequents that achievements have lower variance, higher correlation with returns and higher prediction ability for returns than cash flows. Finally, Dechow, Kothari, and Watts (1998) consequent that up to date achievements by themselves are a more gratifying predict of future cash flows than the up to date cash flow. These consequents may also describe why the value driver concept, which is on the basis of accounting numbers and financial ratios, is suggested for the predicting of both accounting numbers and free cash flows (Copeland et al., 1990; Stickney & Brown, 1999). As mentioned above, ROE is the primary value driver in the OL95 approach and it is well designed that the ROE is able to be decomposed into a number of 'sub-value drivers' like profit margin, asset turnover, interest provide and financial leverage. Nissim and Penman (1999) illustrate a framework for decomposing the ROE. Interestingly, financial analysts already focus on ROE. The OL95 approach, therefore, meshes nicely with most of the financial statement analysis concepts used in practice. The DCF approach focuses on the estimation of cash flows and therefore, focuses on the value drivers that influence cash flows. There is often a connection between value drivers that influence cash flows and the ratios used in the financial statement.

T. Plenborg / Scand. J. Mgmt. 18 (2002) 303–318 315 analysis, as is also illustrated by Nissim and Penman (1999). However, when a predict on the basis of value drivers is transformed from accounting numbers into free cash flows, some obvious links between the financial statement analysis and the DCF approach are lost. For instance, financial analysts rarely use budget control of free cash flows. On the other hand, it can be more intuitive (and more probable) that budget control is on the basis of accounting numbers and is summarized in financial ratios that are on the basis of accounting data. Due to the fact that the framework for predicting is on the basis of accrual accounting and due to the fact that budget control is usually on the basis of accounting numbers rather than cash flow measures, it can be logical to estimate corporation values on the basis of concepts and financial ratios acknowledged from accrual accounting and financial statement analysis, i.e. the OL95 approach.

6. Research variables

Table 1: The variables of the research

corporation value at the end of year t	$BV_t + \sum_{t=1}^T \frac{NI_t - (E(r_i) \times BV_{t-1})}{(1+r)^t}$	V_t
book value of equity at the end of year t		BV_t
Net profit at the end of year t		NI_t
book value of equity in the beginning of year t		BV_{t-1}
capital expense of normal stock		$E(r_i)$
	$E(r_f) + \beta_i^*(r_m - r_f)$	$E(r_f)$
profit of corporation portfolio		r_m
profit risk free		r_f
expected profit of corporation		r_i
Systematic risk		β_i
Fair value	$\sum_{t=1}^T \frac{FCF}{(1+r)^t}$	V_t
free cash flow	$OCF_t - ICF_t$	FCF_t
operating cash flows in the period of		Co_t
Investment cash flows in the period of		Ci_t
discount rate		R

%21

7. Research method

7.1. Sample selection

The sample data were obtained using the TSE database of Tehran stock market and data provided by Tehran securities exchange Association. The data for companies are collected from 2007 and 2011 on the following conditions:

- (i) the corporations are listed on the Tehran Stock Exchange (TSE),
- (ii) the accounting period ends in Esfand,
- (iii) banks, securities corporations, and insurance corporations are excluded,
- (iv) A minimum of 5 consecutive years of accounting data is available for each corporation included in the sample

7.2. Sample data

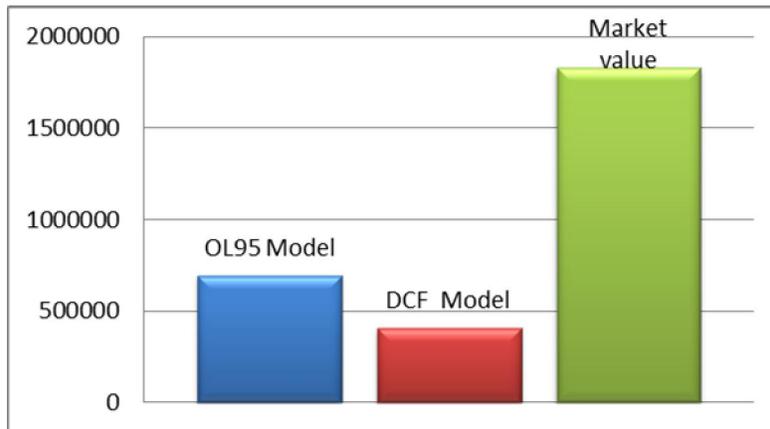
Table 2: Frequency of distribution of corporations of instances due to industry

Number of sampels	Industry	culumn
1	Other mines extraction	1
2	Metal extraction	2
1	Publishing, printing & multiplication	3
17	Automobile & manufacturing spare parts	4
3	Manufacturing metal products	5
6	Other non metal mineral products	6
1	Investments	7
9	Cement, lime & gatch	8
2	Oil, Coke & nuclear fuel product	9
6	Main metals	10
1	Hard sugar & sugar	11
6	Tile & seramic	12

3	Rubber & plastic	13
2	Electric tools machinery	14
6	Machinery & equipments	15
1	Wooden products	16
11	Chemical products	17
8	Nutritious & drinking products except hard sugar and sugar	18
3	Textile	19
16	Medical products and materials	20
105	Total	

7.3. Analysis consequents

Figure 1: Average of corporation value of corporations on the basis of Ohlson(1995), DCF and fair value



Consequents of correlation analysis for second hypothesis:

Table 3: Consequents of Wilcoxon signed ranks test

Test	Correlation coefficient	t-statistics	S-statistics	P-Value	Meaningful level	Consequent
Spearman correlation coefficient	0.765	17.071	-	0/000	%95	H_0 Refused
Kendal correlated coefficient	0.641	-	3500	0/000	%95	H_0 Refused

Table 4: Consequents of correlation coefficient

Test	Correlation coefficient	t-Statistics	S-statistics	P-Value	Meaningful level	Consequent
Spearman correlated coefficient	0.572	7.092	-	0/000	%95	H_0 Refused
Kendal correlated coefficient	0.429	-	2346	0/000	%95	H_0 Refused

Table 5: Consequents of Wilcoxon signed ranks test

Levels	Numbers	Average of levels	Statistics-z	Asymp. Sig	Consequent
Negative levels	5	42.60	-8.214	0/000	Confirmed
Positive levels	100	53.52			

Table 6: Consequents of correlation coefficient

Test	Ohlson's model with fair value	DCF model with fair value
Spearman correlated coefficient	0.745	0.577
Kendal correlated coefficient	0.641	0.429

Panel A of Figure 1 presents the consequents of the Consequents of correlation analysis between Ohlson (1995) and fair value of the corporations. The spearman correlation coefficient between two model equals to 0.765 and P-value is under 0.05. This shows that Ohlson's model and fair value of corporations are positively correlated. This is confirmed by statistics of Kendal Correlation coefficient so that Kendal correlation coefficient between two models is 0.641 and the P-value is under 0.05. Panel A of Table 3 presents the consequents of the Consequents of correlation analysis between discounted cash flows and fair value of the corporations. The spearman correlation coefficient between two model equals to 0.572 and P-value is under 0.05. This shows that discounted cash flows and fair value of corporations are positively correlated. This is confirmed by statistics of Kendal Correlation coefficient so that Kendal correlation coefficient between two models is 0.429 and the P-value is under 0.05. As Table 4 presents, the correlation between Ohlson(1995) and fair value is higher than the correlation between discounted cash flows and fair value so the difference between Ohlson(1995) and fair value is less than the difference between discounted cash flows and fair value.

8. Conclusions

Due to the fact that the OL95 and DCF approaches are theoretically equal, they both provide the similar corporation value estimations if used properly and accordantly. If the valuation approaches are not properly used, they can easily provide prejudiced corporation value estimations in practice. This study presents that shortening hypotheses influence corporation value estimations unlikely. Given the uncertainty surrounding corporation valuation in practice, the use of shortening hypotheses may seem acceptable. Levin and Olsson (1998, p. 287) state that 'one sometimes hears comments to the effect that it is not worth the extra effort to use correct and precise calculation methods when valuing corporations, due to the fact that there is so much doubt in the data that must exceedingly be fed into the model'. However, as exemplified in up to date research, the influence of shortening hypotheses on corporation value estimations may be highlighting. Accordingly, it is important that practitioners present shortening hypotheses in their corporation valuation are aware of the influence of these on corporation value estimations. In a related comment, Levin and Olsson (1998, p. 287) point out that 'uncertainty is additive. The fact that there is a lot of doubt in the data should really spur the analyst even more to what he or she can do to reduce the

over-all uncertainty'. Future researchers within this area may want to examine how practitioners use various valuation approaches. Due to the fact that the influence of shortening hypotheses on corporation value estimations may be highlighting, and due to the fact that the introduction of shortening hypotheses influences corporation value estimations in a predictable way, an understanding of the extent and types of shortening hypotheses presented by practitioners is valuable.

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