The Relationship between Accounting Information and Share Price - Review Study

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Abstract

Determining equity's intrinsic value is still a controversial subject despite the numerous theoretical and empirical studies conducted in equity's valuation area. This study discusses the relationship between accounting information and share price through reviewing different equity valuation models. Besides, the study reviews the empirical studies conducted in emerging markets considering the models applied and the studies' results. The study showed that the empirical studies applied in emerging markets can be classified into three categories, studies that consider factors affecting the relationship between accounting information and share price, studies that consider the role of cash flows, and studies that applied an extended version of Ohlson model by including the financial ratios. Moreover, the study found that most empirical studies showed significant relationship between accounting information and share price. Nonetheless, those studies have some weaknesses such as limited justification of the changes in the value relevance of accounting information over time, over fitting problem caused by including relatively large number of variables in the models applied, and lack of theoretical justification of the selection of financial ratios. The study also found that Ohlson model which includes book value per share, earnings per share, and dividend per share is the most appropriate model from practical perspective.

Keywords: Equity value, dividend discount model, residual income model, Ohlson model, book value, earnings, financial ratios.

1. Introduction

Equity valuation isa controversial and essential subject that was studied numerously by scholars and financial analysts. While some equity valuation models consider risk and return concept in determining the equity value, other models consider accounting information as appropriate proxies of the firm's performance. Capital asset pricing model (CAPM), Fama and French three- factor model, and arbitrage pricing theory (APT)are the most popular equity valuation models that are classified under the first category. On the other hand, dividend discount model, residual income model, and Ohlson model are the most widespread models that are classified under the second one.

Sharp (1964) introduced capital asset pricing model which suggests that the required rate of return is equal to risk free rate plus the risk premium which is the difference between expected rate of return of market portfolio (appropriately diversified portfolio for which there is no unsystematic risk) and risk-free rate multiplied by beta (systematic risk indicator that measures the sensitivity of a particular stock return to the changes in the market portfolio's return). As for arbitrage pricing theory, Ross (1976) claims that the financial markets are not always efficient where the share prices are overpriced or underpriced in comparison to the intrinsic value. Under such conditions, the investors will seek to gain some profits from arbitrage operations. The model considers the macroeconomic factors as proxies of systematic risks that may influence the share or portfolio's required rate of return. Ross claimed that systematic risks are related to gross national product GNP, shifts of the yield curve, unpredicted fluctuations of the inflation rate, corporate bonds' spread, gross domestic product GDP, exchange rate, market indexes, and commodity prices. In the same vein, Fama and French (1993) studied the stock return considering systematic risk index (beta), company's size (market capitalization value), and stock's book value to market. They claimed that the shares of small capitalization firms tend to outperform those of large capitalization firms. Besides, they claimed that the value stocks (those whose book value is higher than market or intrinsic value) tend to outperform the growth stocks.

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As for the models where accounting information are adopted as the fundamental factors that determine the equity value, dividend discount model, which was suggested by Williams (1938) and later was developed by Gordon and Shapiro (1956),introduces that the equity value can be reached through discounting the expected future cash flows from this equity during the holding period at a reasonable discount rate, in other words the equity value is the present value of all expected cash flows represented by cash dividends associated with this equity. Indeed, dividend discount model is an implementation of the basic finance theory principles. Dividend discount model has two versions, fixed dividend growth rate and various dividend growth rates.On the other hand, residual income model, which was introduced by Edwards and Bill (1961) and developed by Peasnell (1982), claims that residual income equals to the net profit minus the charge for equity capital, which in turn equals to the cost of equity capital times book value of equity at the beginning of acquisition period. As for Ohlson model which was introduced by Ohlson (1995), equity value is determined by the equity's book value, earnings per share, and the firm related information that may cause abnormal earnings. Indeed, Ohlson model is considered as the most appropriate model from studying the equity value through the accounting information and from the practical feasibility perspectives. Ohlson model was applied numerously in the empirical studies in both developed and emerging markets, and it had the highest explanatory power in determining the equity value comparing to other models.

Investigating the association between accounting information and share price is substantial to help financial analysts recognize the accounting information that can represent firms' performance and value which in turn may help them predict the share value in the future and enhance the financial market efficiency through enhancing the value relevance of accounting information. Besides, studying the value relevance of accounting information helps the accounting standards-setters enhance the accuracy of the accounting information presented in the financial statements.

The other parts of this paper are organized as follows: In the next section, study motivation and objectives are discussed. After that, different equity valuation models that investigate the relationship between accounting information and share price are discussed theoretically. Then, empirical studies applied in emerging markets are discussed, categorized, and compared. Finally, findings and conclusion are presented.

2. Study Motivation and Objectives

Firms' performance represented by the accounting figures included in the financial statements affects firms'share prices. Investors concentrate on the percentage change in the firm's total assets, total liabilities, profits, and many other accounting figures when they make their investment decision in the stock exchanges(Wang, Fu, & Luo, 2013). Besides, investors investigate financial ratios, e.g. return on owners' equity, return on assets, return on sales, earnings per share, and book value per share while making the investment decisions(Mishkin & Eakins, 2009). Firms'shares prices are determined in the secondary market where buyers and sellers make their orders depending on their analysis of different firms' performance considering financial and non-financial information. Assuming that the firm's performance level is represented by the accounting information shown in the financial statements, financial analysts, through the financial statement analysis, provide investors with the necessary advice regarding their investment decisions.

Indeed, numerous empirical studies that investigated the relationship between accounting information and share price and applied residual income model, Olson model, or extended version of them were applied in emerging stock exchanges. Consequently, reviewing and discussing those models and studies can help in enhancing the models applied and the outcomes that might be reached in the future research. Additionally, studying the relationship between accounting information and share price may highlight the main weaknesses of the current accounting standards applied in different stock exchanges which in turn may enhance the value relevance of accounting information such that accounting information may be accurate proxies of the firms' performance.

This research studies different equity valuation models that investigates the relationship between accounting information and share price by reviewing the relevant literature. Dividend discount model, residual income model, and Ohlson model are reviewed and discussed thoroughly.

This research also reviews previous studies related to the relationship between accounting information and shareprice. Particularly empirical studies applied in stock exchanges in emerging economies are reviewed from the models applied, variables included, and results perspectives.

3. Equity's Valuation Models

3.1. Dividend Discount Model

Finance theory introduces that the equity value can be calculated by discounting the expected future cash flows from this equity during the holding period at a reasonable discount rate, in other words the equity value is the present value of all expected cash flows from this equity (Pirie & Smith, 2008). Dividend discount model, which was introduced by Williams (1938) and later was developed by Gordon and Shapiro (1956), adopted that concept and introduced the following formula to determine the common share intrinsic value:

$$V = \sum_{n=1}^{\infty} \frac{D_n}{(1+r)^n}$$

V: share's intrinsic value

D_n: cash payment of dividend at the end of period n

r: required rate of return or the capitalization rate

Assuming that the cash payments of dividends are still constant all the periods the previous formula can be simplified into:

$$V = \frac{D}{r}$$

If the efficiency exists in the stock exchange the intrinsic value should match the market value or the share price. The previous formula is valid since the equity holding period is infinite, but if the shareholder chooses to sell the share at the year m, the proper formula will be:

$$V = \sum_{n=1}^{m} \frac{D_n}{(1+r)^n} + \frac{P_m}{(1+r)^m}$$

m: selling date

P_m: share's market value at the date m

Researchers who contributed to dividend discount model considered two attributes of the share dividends and adjusted the main model in order to make it fit these two attributes as follows:

- Fixed dividend growth rate which was introduced by Gordon and Shapiro (1956), and Gordon (1962): Although this case cannot generally happen in the real-life cases, it should be discussed from theoretical perspective. The formula of this case is:

$$V = \frac{D_0(1+g)}{(1+r)^1} + \frac{D_0(1+g)^2}{(1+r)^2} + \cdots + \frac{D_0(1+g)^{\infty}}{(1+r)^{\infty}}$$

D_0: the present dividend per share

g: the constant dividend growth rate

By doing some math's manipulation, which is explained in appendix 1, and providing that the required rate of return (r) is always larger than the constant dividend growth rate (g), the formula may be modified and becomes as follows:

$$V = \frac{D_0(1+g)}{r-g}$$

- Various dividend growth rates (growth phases) which was introduced by Malkiel (1963) and Molodovsky and his colleagues (1965): in this case the dividends growth rate takes different values. If the dividends growth rate takes the value of g_1 from the beginning of acquiring time until the end of period m, and then takes the value of g_2 perpetually, the formula becomes as follows:

$$V = \sum_{n=1}^{m} \frac{D_0(1+g_1)^n}{(1+r)^n} + \sum_{n=m+1}^{\infty} \frac{D_m(1+g_2)^{n-m}}{(1+r)^n}$$

g_1: the first dividend growth rate

g_2: the second dividend growth rate

m: the period in which the first dividend growth rate g_1 is applied

D_m: the dividend value at the end of period m

While dividend discount model has a solid rationality which is assessing the equity value by finding the present value of future expected dividends, it faces a huge challenge when evaluating the shares without stable dividends. It also does not consider the capital gains issue and only considers the share ability to generate earnings. Firms adopt different dividend payout policies and change the dividend payout ratio during different periods. Consequently, while the model seems to be a good evaluator for the dividends with stable growth rate, it does not help when evaluating the shares without stable and clear dividend payout and constant dividend growth ratio. Indeed, dividend discount model is also not applicable in the cases of shares buyback decisions that are made by different firms sometimes.

3.2. Residual Income Model

Edwards and Bill (1961), Peasnell (1981), and other authors tried to develop an equity valuation model that is more related to accounting information. They suggested the residual income concept as a tool to design such a model. According to their opinion, residual income equals to the net profit minus the charge for equity capital, which in turn equals to the cost of equity capital times book value of equity at the beginning of acquisition period (Hamadi & Hamadeh, 2012):

$$RI_t = NI_t - rBV_{t-1}$$

RI_t: the residual income at the end of the period

NI_t: the net income at the end of the period

r: the discount rate (cost of the capital)

BV_{t-1}: the book value of the equity at the beginning of the period

Indeed, the residual income model depends on the clean surplus relation which implies that the accounting earnings contain all changes in the book value of equity apart from dividends and any other transactions with the owners;

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

By replacing the NI_t with its value according to the residual income equation:

$$D_t = RI_t + rBV_{t-1} + BV_{t-1} - BV_t$$
$$D_t = RI_t + (1+r)BV_{t-1} - BV_t$$

By substituting this dividend value in the discount dividend model:

$$V_0 = \sum_{t=1}^{\infty} \frac{E_0[RI_t + (1+r)BV_{t-1} - BV_t]}{(1+r)^t}$$

Provided that $\frac{E_0[BV_t]}{(1+r)^t} \to 0$ as t $\to \infty$:

$$V_0 = BV_0 + \sum_{t=1}^{\infty} \frac{E_0[RI_t]}{(1+r)^t}$$

That last formula represents the residual income model, and it implies that the equity value can be reached by adding the current equity book value to the expected residual income payments discounted at a capital cost rate. Generally, the share price in the stock exchange should equal the equity value calculated by residual income model provided that the stock market is efficient.

Precisely, the residual income model is relatively more related to accounting information than the dividend discount model because it included the equity book value, and expected abnormal earnings which depend on the net income. Besides, residual income model considers the economic profitability instead of accounting profitability of the firms and can be applied for all firms regardless of the existence of cash dividends.

Although the model introduces a clear insight about computing the equity value by considering the cost of capital and economic profit instead of only considering the accounting profit, it has a disadvantage related to the required rate of return or the cost of capital which is subject to change due to so many reasons (Michael & Walker, 1998). However, considering the book value gives the model an advantage of using the accounting figures mentioned in the financial statements to estimate the equity value.

3.3. Ohlson Model

In order to develop the residual income model Ohlson (1995) depended on the following three assumptions (Ohlson, 1995):

- Risk neutrality existed so that the capital cost rate equals the risk- free rate.

- Accounting information and dividends satisfy the clean surplus relation, and dividends decrease the equity book value, but they do not affect the current earnings.

- The behavior of the residual earnings through the time- series is framed by a linear model.

Considering the first assumption the equity market price (or value) according to the dividend discount model takes the following formula:

$$P_t = \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t[D_{t+\tau}]$$

Where:

P_t: equity market price at date t

D_t: net dividends paid at date t

R_f: the risk- free discount rate plus one

$E_t[.]$: the expected value operator conditioned on the date t information.

According to Ohlson this model permits negative dividend, so that the dividends included in the model are dividends net of capital contribution. Ohlson translated the second assumption into two mathematical relations:

$BV_{t-1} = BV_t + D_t - NI_t$ and

$\partial BV_t/\partial D_t = -1$

$\partial NI_t/\partial D_t = 0$

According to these assumptions and provided that $\frac{E_t[BV_{t+\tau}]}{R_f^{\tau}} \to 0$ as $\tau \to \infty$, the equity price according to the residual income model will be:

$$P_t = BV_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t[RI_{t+\tau}]$$

To illustrate the third assumption Ohlson inserted another variable in addition to residual income (abnormal earnings) which is the information variable V_t and suggested the following equations:

$$RI_{\tau+1} = \omega RI_\tau + V_t + \varepsilon_{1t+1}$$

$$V_{t+1} = \gamma V_t + \varepsilon_{2t+1}$$

The error terms $\varepsilon_{1\tau}$, $\varepsilon_{1\tau}$, $\tau{\geq}1$ are not predictable, zero mean variables; $E_t[\varepsilon_{kt+\tau}] = 0$, k=1,2 and $\tau \geq 1$. The parameters ω and γ are fixed, known, and restricted to be non- negative and less than one.

Ohlson concluded that the expected earnings depend on three factors; capital cost rate, abnormal earnings, and information and he represented this fact as follows:

$$E_t[NI_{t+1}] = (R_f - 1)BV_t + \omega RI_t + V_t$$

Finally, Ohlson suggested the following formula for the equity market price (equity value):

$$P_t = BV_t + a_1 RI_t + a_2 V_t$$

Using his model's three assumptions and by doing some math's manipulation, which is shown in appendix 2, Ohlson concluded that the values of a_1 and a_2 can be determined by the following formulas:

$a_1 = \omega/(R_f - \omega) \geq 0$

$a_2 = R_f/(R_f - \omega)(R_f - \gamma) > 0$

As it is shown above, Ohlson model is based on the economic profitability, economic value added, and residual income concepts. Ohlson model seems to be the most appropriate model to study the relationship between share price and accounting information practically as it considers the book value, earnings, and the information as independent variables. It also adopts a multiple linear regression equation to investigate the relationship between accounting information and share price and it is applicable by using the accounting figures included in the financial statements regardless of the existence or nonexistence of cash dividends. Indeed, the significance of Ohlson model comes from its widespread application in most empirical studies in different stock exchanges (although in most studies the information variable is eliminated from the model). In the next section, a general review of the empirical studies applied in emerging stock exchanges is discussed.

4. Literature Review

In this part of the study, previous empirical studies applied in different emerging economies stock exchanges are discussed where this discussion covers those studies' models, variables, and results. Indeed, most previous studies adopted residual income model and Ohlson model to assess the relationship between accounting information and stock price. These studies can be classified into three categories:

1- Studies that assessed the changes in the value relevance of accounting information considering some factors that may affect the relationship between accounting information and share price. Below are some examples of those studies:

Some authors studied the factors the affect the value relevance of accounting information such as corporation size, earnings persistence, and share's liquidity. In their study, Chen, Chen, and Su (2001) investigated the impact of accounting information on stock price in Shanghai and Shenzhen stock exchange in China (Chen, Chen, & Su, 2001). The results showed that accounting information have statistically significant impact on the share price. For both Ohlson and return models applied, earnings have lower impact when the company reports negative earnings. Furthermore, earning information in earning model have more impact in smaller companies. As for Ohlson model, net profit has bigger effect on share price in larger firms, while book value seems to have a bigger impact in the smaller companies. Earning persistence has no significant impact on the relevance of earnings. As for liquidity of share, in earning and Ohlson model, its impact was bigger for companies with higher liquidity share.

Elshandidy (2014) studied the value relevance of accounting information in three stock exchange markets in China considering different accounting standards implemented using Ohlson model and considering book value per share and earnings per share as independent variables for 1999-2012 period. He applied Ohlson model to investigate the value relevance of accounting information in A-share market which follows Chinese Accounting Standards, B-share market which implements International Financial Reporting Standards or International Accounting Standards, and H-share market where Hong Kong GAAP or International Accounting Standards. The study's results indicated a sufficient value relevance of accounting information in all markets apart from H-share market where the accounting information value relevance was partial. Likewise, the results showed that the value relevance of accounting

information under International Financial Reporting Standards and Chinese Accounting Standards was higher for A-share and B-share market comparing to H-share market (Elshandidy, 2014).

In the same vein, Rimmel and Baboukardos (2016) studied the value relevance of accounting information in Johannesburg Stock Exchange for 2008-2013 period applying extended Ohlson model which includes earnings per share and book value per share in addition to other accounting information like return on equity in the lights of integrated reporting rule. The study's outcomes showed significant enhancement of the value relevance of earnings per share after implementing integrated reporting rule comparing to the previous periods when that rule was not implemented. Besides, the study showed essential decrease in the value relevance of book value per share after implementing the mentioned rule in the stock exchange (Rimmel & Baboukardos, 2016).

Wang and Chang (2008) examined the impact of accounting disclosure level on the relationship between accounting information and stock price. They applied their study on both of Taiwan Security Exchange (TSE) and Taiwan Over The Counter market (OTC). The researchers chose a sample of 662 companies and classified them into two groups, the first one is high closure companies with one third of the total sample and the second group is low disclosure companies with two third of the total sample. The research was based on Ohlson's 1995 model.The researchers used one- year cross sectional differences in disclosure levels. The results showed that the companies that have a high level of accounting information disclosure have a higher association between accounting earnings (EPS) and stock price than the companies that have a low level of accounting information disclosure. The researchers concluded that the company which increases accounting information disclosure transparency can increase accounting earning, thereby increasing stock price. The result also showed that disclosure level interaction with book value is negatively and insignificantly associated with stock price. On the other hand, the results suggested that there is a positive and statistically significant relationship between book value and stock price, and there is a positive and statistically significant relationship between earning per share and stock price.

Other authors like Gleakos, Mylonakis, and Kafouros (2012) studied the relationship between accounting information and share price considering the change in the accounting information value relevance over time. They implemented Ohlson model on the stock exchange of Athens. They selected 38 corporations listed in Athens financial market between 1996- 2008 (Glezakos, Mylonakis, & Kafouros, 2012). They concluded that explanatory power of earnings per share increased over time. They also concluded that explanatory power of earnings per share was bigger when the stock exchange was at its high levels, while the opposite was true for the explanatory power of book value. According to the researcher, the reason is that investors focus much more on the fundamental data (book value) when the stock exchange is not doing well, but they do not do that when the stock exchange is doing well.

2- Studies that assessed the relationship between accounting information and stock price considering the role of cash flows. Below are some examples of those studies:

Considering the value relevance of cash flows was the main interest of authors like Menike and Prabath (2014) where they studied the relationship between accounting information and share price in Colombo Stock Exchange in Seri Lanka. They selected 100 corporations listed in the stock exchange. Time scope of study was between 2008- 2012 (Menike & Prabath, 2014). They included three accounting factors: earnings per share, dividends per share, and book value per share in a multiple regression analysis model. Menike and Prabath concluded that the relationship between the three accounting variables (earnings per share, book value, and dividends) and share price was statistically significant for the divided per share Ohlson extended model they applied in their study.

Likewise, Omokhudu and Ibadin (2015) cosidered the role of cash flows in determining the share price. They applied two extended versions of Ohlson model by including cash flow from operations and dividend per share (Omokhudu & Ibadin, 2015). They applied their study on Nigeria stock exchange during 1994- 2013 period on a random sample of 47 companies operating in all industries except financial and banking sectors through fiexed-effect and random-effect models. Despite some mixed results, the results generally showed statistically significant relationships of earnings per share, dividends, and cash flows with the share prices under fixed-effect and random-effect models. On the contrary, the results did not show a statistically significant relationship between book value per share and share price under fixed-effect and random-effect model.

3- Studies that applied extended Ohlson model through some selected financial ratios. Some of those researchers' studies are reviewed below:

Wang, Fu, and Luo (2013) studied the relationship between accounting information and share prices in Shanghai stock exchange. The researchers randomly selected 60 listed companies all of them reported profits in their financial reports. They chose their annual financial reports of 2010. They adopted Ohlson's model that suggest a

linear relationship between accounting information and share price. To represent accounting information in their study, they used the flowing accounting indexes: earning per share, accounts receivable turnover ratio, rate of return on common shareholders' equities, income from main operation ratio, liquidity ratio, quick ratio, inventory turnover ratio, and price earnings ratio. They applied correlation analysis of accounting information indexes and share price. The results showed that earning per share and rate of return on common shareholders' equity are more correlated to share price. The results showed also that the relationship between share price and each of these two indexes is statistically significant.

Shamki (2014) included the financial ratios in his research where he studied the value relevance of accounting information in determining the share price in Aman stock exchange considering the effect of equity ratio on that relevance. He applied his research on the sample included 18 industrial firms between 1992-2002 (Shamki, 2014). He tested few models that included earnings per share and book value per share as independent variables and equity ratio as a dummy variable. The study results showed a significant influence of equity ratio on the aggregate value relevance of earnings per share and book value per share (negatively for earnings per share and positively for book value per share). The results implied more effect of equity ratio on book value per share than earnings per share. However, the study outputs indicated significant impact of equity ratio on the individual value relevance of book value per share but no significant impact of equity ratio on the individual value relevance of earnings per share was found.

Extending Ohlson model by including specific financial ratios was also the focus of Purswani and P S (2017) who investigated the value relevance of accounting information on construction companies listed in Bombay Stock Exchange by considering earnings per share, book value per share, dividend per share, price to book value per share, cash flow from operations, net worth, and assets turnover ratio as independent variables and share price as dependent variable (Purswani & P S, 2017). They applied their study on the panel data of the top 20 construction firms (form market capitalization perspective) for the period of five years 2011-2012 to 2015-2016 by applying correlations analysis, Fixed-effect model and Random-effect model techniques. The results showed a positive and significant relationship between book value per share and earnings per share and the firm market share, but the results also showed a negative significant effect of dividend per share and asset turnover ratio on the firm market share in the Fixed-effect model. As for Random-effect model, the outcomes implied a positive significant effect on earnings per share and price to book value per share on the firm market share and showed a negative significant effect of dividend per share and asset turnover ratio on the firm market share as in the Fixed-effect model. The explanatory power of Fixed-effect model was much higher than the explanatory power of Random-effect model.

Viet Ha, Hung, and Xuan (2022) studied the relationship between share price and accounting information in Vietnamese stock exchange using Least Absolute Shrinkage and Selection Operator (LASSO) method between 2008-2019 using the figures of 52 accounting indicators and the stock prices. Their research results showed that book value per share had the strongest positive impact on the share price, and that size of the company (total revenues) had the second strongest positive effect on the share price, and third came the profitability (return on assets, earnings per share, gross profit margin) which had the lowest positive effect on the share price (Viet Ha, Hung, & Xuan, 2022).

Subing, Kusuma, and Gusni (2017) studied the impact of internal and external factors on the share price in Indonesia Stock Exchange. They included return on assets, price earnings ratio as independent internal variables and oil prices, interest rate, inflation rate and systematic risk as independent external variables. Their study's sample consisted of panel data of 18 companies listed in Indonesia stock exchange and operating in consumer goods industry for the period 2008-2015 (Subing, Kusumah, & Gusni, 2017). The study's outputs showed positive and significant relationships between each of price earnings, return on assets, and oil price and the share price. On the contrary, the outcomes showed negative and significant relationship between inflation rate and stock price. However, the results did not show a significant relationship between systematic risk and interest rate and the stock price.

5. Findings And Conclusion

In principle, equity valuation models can be classified into two categories. The first one includes models that study the equity value through risk and return concept, e.g. capital asset pricing model, arbitrage pricing theory, and Fama-French three factors model. The second category includes models that study the equity value considering the accounting information, e.g. dividend discount model, residual income model, and Ohlson model.

Dividend discount model determines the equity value by finding the present value of its future expected dividends, but it cannot be applied when determining the shares without stable and clear dividend payout and constant dividend growth ratio. Moreover, it does not consider the capital gains and only considers the share ability to generate earnings. As for residual income model, it suggests that the equity value can be determined by adding the

current equity book value to the expected residual income payments discounted at a capital cost rate. Obviously, the residual income model highly considers the accounting information when determining the equity value. Further, residual income model considers the economic profitability instead of accounting profitability of the firms and can be applied for all firms regardless of the existence of cash dividends. Nonetheless, it has a main weakness related to the required rate of return or the cost of capital which is subject to change due to so many reasons. On the other side, Ohlson model is based on the economic profitability, economic value added, and residual income concepts. Ohlson model seems to be the most appropriate model to study the relationship between share price and accounting information practically where it considers book value, earnings, and information as the main variables through which share price can be determined. It also adopts a multiple linear regression equation to investigate the relationship between accounting information and share price and it is applicable by using the accounting figures included in the financial statements.

In general, most researchers conducted Ohlson model in studying the relationship between accounting information and share price in emerging markets. Besides, most of these studies showed a significant relationship between accounting information and share price. Some researchers investigated the relationship between accounting information and share price in the lights of the factors that may affect this relationship (Rimmel & Baboukardos, 2016; Elshandidy, 2014; Chen, Chen, & Su, 2001). Accounting standards, disclosure level, and firm size are some of those factors. The main weakness of those studies was that the value relevance of accounting information was studied over time or in different stock exchanges where different accounting standards are applied. Consequently, even though these studies' results showed significant difference in the relationship between the accounting information and share price before and after applying specific accounting standards or between different stock exchanges in the same country where different accounting standards are implemented, those results are still questionable as this difference could be caused by other factors (that may have changed over time or that are related to different stock exchanges features). Besides, those studies did not provide valid justifications of the change in accounting information value relevance when the value relevance of earnings per share or book value per share increases or decreases due to the implementation of different accounting standards and rules.

Other researchers studied the relationship between accounting information and share price by extending Ohlson model with dividend per share and cash flows from operations (Omokhudu & Ibadin, 2015; Menike & Prabath, 2014).Including dividend per share in the model could be justified, after checking the multicollinearity issue, but including dividend per share and cash flow from operations in the same multiple regression analysis model may not be justified as the probability of multicollinearity between these two variables seems to be high.On the other hand, including dividend per share is justified as adopting dividend per share with book value per share and earnings per share helps in covering wealth value, profitability, and expected cash flows from the firm's share. Further, including only three factors in the multiple regression model may help in eliminating the overfitting issue.

Some of the researchers adopted an extended version of Ohlson model by adding, in addition to the earnings per share and book value per share, some financial ratiolike profitability ratios, liquidity ratios, turnover ratios, debt ratios, and market price ratios (Viet Ha, Hung, & Xuan, 2022; Purswani & P S, 2017; Subing, Kusumah, & Gusni, 2017; Shamki, 2014; Wang, Fu, & Luo, 2013). The main weakness of this category of studies is that the selection of the financial ratios was not justified through specific criteria. Neither the selection of the financial ratios' category (e.g. profitability, liquidity, ...etc.) nor the selection of the ratio itself (return on equity, return on sales, ...etc.) was justified through clear criteria. Besides, the selected financial ratios are clearly correlated to the main components of Ohlson model, book value and earnings. For instance, in some of those studies return on equity was included in the model with earnings per share where the multicollinearity issue most probably exists. Further, some multiple regression models adopted in those studies contained large number of independent variables which may generate an overfitting problem.

In summary, it can be said that Ohlson model which includes book value per share, earnings per share, and dividend per share seems to be the most appropriate model form theoretical and empirical perspectives. Adopting dividend per share with book value per share and earnings per share as independent variables in a multiple linear regression model helps in covering wealth value, profitability, and expected cash flows form the firm's share. Also, adopting such a model where only three variables are included may eliminate the overfitting issue faced by other models. Besides, this model is appropriate from the practical perspective as it is applicable by considering only the accounting information shown in the firms' financial statement.

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Appendix-A

By multiplying both sides of the main equation be (1+r) / (1+g) and subtracting the main equation from the product we will get:

$$\frac{V(1+r)}{(1+g)} - V = D_0 - \frac{D_0(1+g)^\infty}{(1+r)^\infty}$$

Since r is greater than g, the second term of the right- hand side will approach zero:

$$V\left[\frac{(1+r)}{(1+g)} - 1\right] = D_0$$

$$V\left[\frac{(1+r) - (1+g)}{(1+g)}\right] = D_0$$

$$V(r-g) = D_0(1+g)$$

$$V = \frac{D_0(1+g)}{r-g}$$

Appendix-B

Define the 2 × 2 matrix

$$P \equiv R_f^{-1}\begin{bmatrix} \omega & 1 \\ 0 & \gamma \end{bmatrix}$$

Ohlson model's third assumption can be expresses as follows:

$$(RI_{t+1}, V_{t+1}) = R_f P(RI_t, V_t) + (\varepsilon_{1t+1} + \varepsilon_{2t+1}),$$

and

$$R_f^{-\tau} E_t[RI_{t+\tau}] = (1,0)P^\tau(RI_t, V_t)$$

By combining $P_t = BV_t + \sum_{\tau=1}^\infty R_f^{-\tau} E_t[RI_{t+\tau}]$ with the last expression:

$$P_t - BV_t = \sum_{\tau=1}^\infty R_f^{-\tau} E_t[RI_{t+\tau}] = (1,0)[P + P^2 + \cdots](RI_t, V_t)$$

$$\equiv (a_1, a_2)(RI_t, V_t)$$

The sum of the matrix series $P + P^2 + \cdots$ converages because the maximum characteristic root of P is less than one. By using algebra it can be showed that the sum of the series equals $P[I - P]^{-1}$ and

$(a_1, a_2) = (1,0) P[I - P]^{-1}$ and by explicit calculation

$a_1 = \omega/(R_f - \omega)$

$a_2 = R_f/(R_f - \omega)(R_f - \gamma)$