Application of Price and Return Models on Value Relevance of Accounting Information: Evidence from Bangladesh

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Abstract: This paper examines the value relevance of accounting information related to price and return models for manufacturing firms in Bangladesh for the period 2002 to 2019. The results of the price model show that all the explanatory variables (EPS, BVPS and CFPS) have significant influence on the share price. Whereas the results of the return model show that, only EPS is significant at 1% level in explaining share return. Besides, independent variables considered in the case Return Model have been found to have accounted for about 3% variation in Market return; and independent variables considered in the Price Model have been found to have accounted for about 75% variation in Market Price of shares. This implies that the variance in stock price explained more by accounting variables (EPS, BVPS and CFPS) individually and in a combination than in stock return. Thus, the accounting information used in the price model proves to have an impact on the share price of manufacturing firms in Bangladesh.

Key words: Accounting Information; Price model; Return Model; Value Relevance and Bangladesh

Introduction

Value relevance, as the relationship between accounting information and market prices, is well-defined as the strength of certain accounting information to explain stock price variation, with greater value relevance indicating greater explanatory power (Ota, 2010; Al Arussi et al., 2009; Pushpa et al., 2012; Shamki and Rahman, 2012).

Many studies have explored the value relevance of accounting information by considering earning per share, book value per share and operating cash flows separately. Iftakhar, (2022); Khomidah, and Setiawan, (2022); Al Arussi, et al., (2009); Pushpa et al., (2012); and Anandarjan and Hasan, (2010) consider earnings as accounting information. Mohammadi (2012); Shamki and Rahman, (2012); and Suwardi, (2009) consider book value as accounting information. Whereas Khanagha et al., (2011); Thinggaard et al., (2008); Thi, et al., (2009); consider cash flow as accounting information.

Some studies combine two or more accounting variables such as earning per share, book value of equity (Khomidah, and Setiawan, 2022; Ayzer and Cema, 2013), earning per share, and operating cash flows (Dastgir, et al.,2008 ; Vishnani, and Shah, 2008); book value of equity and operating cash flows (Gee-Jung, 2009); and, earning per share, book value of equity and operating cash flows (Al Arussi, et al., 2009; Shamki and Alulis, 2016; Mohammadi, 2012; Shamki and Rahman, 2012; and Shamki, 2013)

The application of price and return models are very common in in value relevance studies. According to Ota, (2010) these models have the same academic basics but their outcomes are now and then uneven. Etim, et al., (2022) evaluated the connection between value relevance of accounting information (EPS, BVPS, and CFO) and stock prices of service companies in

Nigeria. The results showed that EPS was significant and positive in determining share price movements, while BVPS and CFO were positive but not statistically meaningful.

Puspa, et al., (2023) examined the value relevance of accounting information consisting of earnings information, book values, and operating cash flows in manufacturing companies in Indonesia after the full convergence of IFRS Financial Accounting Standards. The test results using the pricing model approach revealed that earnings and cash flow had value relevance, while book value had no value relevance. Similarly, Khomidah, and Setiawan, (2022). Investigates the value relevance of accounting information and stock prices in the banking sector of ASEAN countries, specifically Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Their findings reveal that both earnings and book value have a statistically positive impact on stock prices, indicating their value relevance.

Gee-Jung, (2009) and Suwardi, (2009) also noted that book value per share has increased its relevance in Korea and Indonesia. In another study, Bao (2004) found that both earnings per share and book value per share are value relevant in the Asian capital market. In Bangladesh, few studies (Uddin, 2020; and Suraiya and Jahur, 2016) have been conducted on the relevance of the accounting information. Their result showed the significant value relevance of accounting information for stock market investors.

Existing studies in this area of the accounting research in both developed and developing markets do vary from study to study with regard to the model used, variables considered, results found and inference drawn down. These differences could not constitute wisdom for the stock market. In view of these, the primary motivation behind this study is to bridge a gap in the current literature by investigating the utilization of Price and Return Models within the specific context of Bangladesh. Given the critical importance of understanding how accounting information is assessed in the market, this research strives to make significant contributions to academic knowledge. Moreover, it aims to provide practical insights that can benefit stakeholders in Bangladesh, including investors and managers, and potentially impact policy and decision-making processes pertaining to accounting practices within the country.

Materials and Methods

Population and Sample: This study was based only on secondary data which has covered manufacturing companies listed on DSE for 2002 to 2019. In order to increase the homogeneity and comparability of results banks and financial institutions were excluded from the sample. Accordingly, 10 manufacturing sectors were selected for the study population such as cement, ceramic, engineering, food and allied, jute, pharmaceuticals & chemicals, tannery industries service, textile, and miscellaneous. Using Yaro Yamani's technique, the derived sample size was ascertained through the employment of the aforementioned formula: $n = N / [1 + Ne^2]$,

Where: n = sample size, N = Listed Manufacturing in DSE; e = 0.05 (95% confidence level).
In line with this approach, the total sample comprises 71 publicly listed manufacturing companies on the Dhaka Stock Exchange (DSE), selected based on data availability.

Data Collection and Analysis: The researcher conducted an extensive review of both domestic and international literature related to the current study. This literature review

facilitated the identification of various variables associated with the value relevance of accounting information. In this study, EPS (earnings-per-share), CFPS (cash flow-per-share), and BVPS (book value per share) were considered as independent variables, while SIZE (Company's size) and LEVRG (Leverage) were considered as controlling variables. Consistent with prior research, including studies by Beisland, et al., (2010), and Uddin (2020), this paper adopted yearly observations. Following the literature's precedent, the study gathered necessary secondary data from multiple sources, including publications from the Dhaka Stock Exchange (DSE), annual reports of sampled companies, and the DSE database. For the analysis of collected data, this study utilized SPSS, Eviews 10.0, and Microsoft Excel Sheet. The chosen analytical tools were employed to derive meaningful insights from the acquired data, aligning with established methodologies in the field.

Econometrics Model: A limited number of studies have simultaneously investigated the value relevance of earnings, book value and cash flows (Khanagha, et al., 2011). Hence this study attempts to extend the literature, especially in Bangladesh. The study question is the choice between the application of price and return models on value relevance accounting information.

Table 1. List of Operational Variables

Variables	Definition
EPS	EPS refer to earnings per share of a company at end of the financial year. (Uddin, 2020; Khomidah, and Setiawan, 2022; Al Arussi, et al., 2009; Shamki and Alulis, 2016; Mohammadi, 2012; Pushpa et al., 2012; Shamki, and Rahman, 2012; and Shamki, 2013)
ΔEPS	ΔEPS refer to change in earnings per share (Shamki and Alulis, 2016; Shamki, and Rahman, 2012).
BVPS	BVPS refers to the book value of a company's equity per share at the end of the financial year (Khomidah, and Setiawan, 2022; Uddin, 2020; Shamki and Alulis, 2016; Shamki, and Rahman, 2012).
ΔBVPS	ΔBVPS refers to the change in book value of equity per share (Shamki and Alulis, 2016; Shamki, and Rahman, 2012).
CFPS	CFPS refers to a company's cash flow from operating activities per share at the end of the year (Uddin, 2020; Shamki, 2013 and Anandarajan and Hasan, 2010).
Company's size (SIZE)	Company size refers to the natural logarithm of a company's total assets at the end of the financial year (Uddin, 2020; Suraiya and Jahur, 2016).
Leverage (LEVRG)	Leverage refers to the ratio of debt to total assets of a company at year end (Uddin, 2020; Suraiya and Jahur, 2016).
P_{it}	P_{it} refers the average annual share price.
R_{it}	R_{it} refers share return.

Within the analysis, the functional relationship models were assessed using a multivariate regression technique, outlined as follows:

Price Model: $P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BVPS_{it} + \beta_3 CFPS_{it} + \beta_4 SIZE + \beta_5 LEVRG + e_{it}$

Return Model: $R_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 \Delta EPS_{it} + \beta_3 BVPS_{it} + \beta_4 \Delta BVPS_{it} + \beta_5 CFPS_{it} + \beta_6 \Delta CFPS_{it} + \beta_7 SIZE + \beta_8 LEVRG + e_{it}$

Table 1 presents a comprehensive summary of the operational variables utilized in all the estimated models of the study.

Accordingly, the study's hypotheses are:

$H_{01\text{-}a}$: The accounting information does not have a significant impact on the share price.

$H_{01\text{-}b}$: The accounting information does not have a significant impact on market return.

Results and Discussion

This section of the study is organized around four primary analyses: descriptive statistics, correlation analysis, and multivariate regression analysis. Table 2 presents the descriptive statistics for all variables considered in the analysis, including mean values and their standard deviation.

Table 2. Descriptive Measures

Panel A	**PRICE**	**EPS**	**BVPS**	**CFPS**	**SIZE**	**LEVRG**
$\bar{x}$	3.82	6.31	44.88	9.127	20.36	0.78
σ	1.40	14.25	60.46	27.41	1.52	2.27
Skewness	0.32	0.00	0.000	0.00	0.08	23.64
Kurtosis	-0.48	-0.08	-0.08	-0.08	0.43	611.86
Minimum	0.33	-38.96	-148.19	-77.78	14.77	0.00
Maximum	8.15	51.59	235.96	96.22	25.71	67.41
Panel B	**RETURN**	**ΔEPS**	**ΔBVPS**	**ΔCFPS**	**SIZE**	**LEVRG**
$\bar{x}$	0.43	0.37	2.14	0.69	20.45	0.78
σ	1.49	7.47	25.96	21.09	1.50	2.27
Skewness	0.00	-0.15	0.55	0.26	0.08	22.64
Kurtosis	-0.08	31.67	40.15	82.41	0.43	611.86
Minimum	-4.32	-77.78	-279.54	-295.2	14.77	0.00
Maximum	5.18	70.28	272.20	293.91	25.71	67.41

Source: Author's calculation

Upon reviewing Table 2, it is observed that share price and the market return have a mean of Tk. 3.83 and 0.4335 respectively. From Panel A, BVPS shows the highest standard deviation (60.465). It suggests that the Book Value Per Share values in Panel A exhibit significant variability or dispersion around their mean. This could be due to various factors such as fluctuations in asset values, changes in liabilities, or other financial adjustments that affect the book value. From Panel B, ΔBVPS shows the highest standard deviation while the lowest is shown by ΔEPS. It indicates that changes in Book Value Per Share (ΔBVPS) are more variable, while changes in Earnings Per Share (ΔEPS) are relatively less variable. Investors may consider these findings when evaluating the financial stability and predictability of the company's book value and earnings.

Prior to conducting the regression analysis, several assumptions were evaluated, including linearity, normality, homoscedasticity, and independence of errors. The results revealed no issues with linearity, normality, homoscedasticity, or independence of error terms. In other words, it was established that all the necessary statistical assumptions for multivariate

statistical techniques were met. The fulfillment of these assumptions ensures the validity and reliability of the obtained results. The significance levels are represented by the denotations of *, or ** at 1%, and 5%, respectively. Table 3 indicates the share price has highly moderate correlations with EPS, BVPS and slightly weak correlations with CFPS.

Table 3. Correlation Analysis between IVs and *DV* (Price Model)

IVs	DV	Correlation coefficient (R)
EPS	PRICE	0.671*
BVPS	PRICE	0.550*
CFPS	PRICE	0.489*

Source: Author's calculation

Table 4 shows the significant positive coefficients on these variables (β_1, β_2 and β_3) which endorsed value relevance of all variables individually. These findings underscore the importance of profitability (EPS), net asset value (BVPS), and cash generation (CFPS) as key factors influencing investors' perceptions of a company's value, as reflected in share prices. Investors and analysts often use these metrics to assess the financial performance and health of a company when making investment decisions. This result is consistent with the previous literature (Etim, et al., 2022; Iftakhar, 2022; Khomidah, and Setiawan, 2022; Uddin, 2020; Al Arussi, et al., 2009; Shamki and Alulis, 2016; Mohammadi, 2012; Pushpa et al., 2012; Shamki, and Rahman, 2012; and Shamki, 2013)

Table 4. Regression Result of Price Model

Price Model: $P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BVPS_{it} + \beta_3 CFPS_{it} + \beta_4 SIZE + \beta_5 LEVRG + e_{it}$

Variable	Coeff.	Std. Error	t	Sig.	Tolerance	VIF
C	1.369737	0.422	3.240	0.001		
EPS	0.044	0.002	18.413	0.000	0.634	1.576
BVPS	0.003	0.006	6.076	0.000	0.657	1.522
CFPS	0.011	0.001	10.191	0.000	0.802	1.247
SIZE	0.0943	0.024	4.365	0.001		
LEVRG	0.018	0.013	1.326	0.002		
R^2			0.536			
Adj. R^2			0.534			
F			293.519			
P (F-statistic)			0.000			
Durbin-Watson stat			1.75			

Source: Author's calculation

Table 4 also demonstrates the absence of multicollinearity, as indicated by tolerance values below 1 and variance inflation factor (VIF) values below 10. The Durbin-Watson test for the price model yields a value close to 2, suggesting no autocorrelation. With an overall R-square of 0.536, it implies that 54% of the variation in the dependent variable (price) can be explained by the independent variables in the model. The Price model is deemed well-fitted, supported by the significant F-statistics at the 1% level. In conclusion, it can be inferred that EPS, BVPS, and CFPS exert a significant and profound influence on share prices.

Table 6. Correlation Analysis between IVs and *DV* (Return Model)

IVs	DV	Correlation coefficient (R)
EPS	RETURN	0.109*
ΔEPS	RETURN	0.067**
BVPS	RETURN	0.001
ΔBVPS	RETURN	0.052
CFPS	RETURN	0.071**
ΔCFPS	RETURN	0.038

Source: Author's calculation

Table 6 illustrates the pairwise correlations among all variables utilized in return model. The correlations were assessed at a significance level of 5%. The findings in Table 3 suggest that there are statistically significant positive relationships between share return and the financial metrics EPS, ΔEPS, and CFPS. Investors may use these correlations to inform their assessments of a company's financial strength and make investment decisions based on these indicators.

In the return model, only Earnings per Share (EPS) emerges as statistically significant at a 1% level in explaining share return. This aligns with the findings of prior research, including studies such as Puspa, et al., (2023) and Anandarajan and Hasan (2010). The lack of significance for Book Value per Share (BVPS) could be indicative of a supporting stance for the argument that earnings carry more information content than book value. This observation is consistent with the results reported in earlier studies, including those by Puspa, et al., (2023); Ananda Rajan and Hasan (2010), Al Arussi, et al., (2009), Shamki and Alulis (2016), and Shamki and Rahman (2012).

Table 7. Regression Result of Return Model

Return Model: $R_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 \Delta EPS_{it} + \beta_3 BVPS_{it} + \beta_4 \Delta BVPS_{it} + \beta_5 CFPS_{it} + \beta_6 \Delta CFPS_{it} + \beta_7 SIZE + \beta_8 LEVRG + e_{it}$

Variable	Coeff.	Std. Error	t	Sig.	Tolerance	VIF
C	1.632	0.657	2.482	0.013		
EPS	0.015	0.003	4.102	0.000	0.578	1.731
Δ EPS	0.003	0.005	0.607	0.543	0.876	1.142
BVPS	-0.014	0.002	-1.35	0.177	0.593	1.686
Δ BVPS	0.002	0.001	1.618	0.105	0.867	1.153
CFPS	0.010	0.001	0.598	0.549	0.760	1.315
Δ CFPS	0.002	0.002	1.251	0.211	0.946	1.057
SIZE	-0.063	0.033	-1.91	0.055		
LEVRG	0.049	0.019	2.494	0.012		
R^2			0.032			
Adj. R^2			0.026			
F			5.275			
P (F-statistic)			0.000			
Durbin-Watson stat			1.76			

Source: Author's calculation

Furthermore, the result underscores that Cash Flow Per Share (CFPS) does not exhibit value relevance for firms in the DSE (Dhaka Stock Exchange), which is consistent with previus literature such as Puspa, et al., (2023). This finding suggests that, in the context of the DSE, cash flow per share may not be a significant factor influencing share return, as indicated by the lack of statistical significance.

Table 7 reveals an R-squared (R^2) value of 0.032, indicating a low explanatory power. This suggests that only 3.23% of the variation in market return can be explained by the independent variables considered in the model. The significant F-statistics indicate that both the price and return models are well-fitted to the data. Comparing Tables 4 and 7, it is evident that the R^2 value for the price model is higher than that for the return model. This implies that the explanatory power of accounting variables (EPS, BVPS, and CFPS) individually is more pronounced in the price model compared to the return model. This finding aligns with prior research, including studies by Gee-Jung (2009), Shamki and Rahman (2012), and others.

Table 8. Results of Fixed Effect Model (FE) and Random Effect (RE) of Price Model

Price Model : $P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BVPS_{it} + \beta_3 CFPS_{it} + \beta_4 SIZE + \beta_5 LEVRG + e_{it}$

	FEM				REM			
Variables	**Coef.**	**Std. Error**	**t-Statistic**	**Prob.**	**Coef.**	**Std. Error**	**t-Statistic**	**Prob.**
Constant	-8.02	0.606	-12.039	0.00	-4.41	0.55	-8.03	0.00
EPS	0.020	0.002	8.021	0.00	0.02	0.002	10.77	0.00
BVPS	0.001	0.006	1.813	0.07	0.02	0.006	3.55	0.00
CFPS	0.006	0.001	5.032	0.00	0.08	0.001	7.66	0.00
SIZE	0.566	0.033	17.151	0.00	0.38	0.027	14.14	0.00
LEVRG	0.036	0.016	2.304	0.02	0.02	0.014	1.84	0.05
R^2	0.749				0.349			
Adjusted R^2	0.733				0.346			
F	47.77				136.09			
Prob. of F	0.000				0.0000			
Wald Ch^2	6042.88				5431.47			
Prob. Ch^2	0.00				0.00			
Hausman Test	161.088							
Prob.	0.000							

Source: Author's calculation

In essence, the result suggests that the accounting variables have a more substantial impact on explaining variations in share prices (price model) compared to market returns (return model), as evidenced by the higher R^2 value in the former. This is in line with findings from previous literature, reinforcing the notion that accounting variables play a more influential role in understanding share prices.

To test the resilience of the price model, this study employed both Fixed Effect and Random Effect methodologies. Table 8 displays the R-squared outcomes for Fixed Effect Model (FEM) and Random Effect Model (REM) in comparison to the Price Model. The results indicate that the explanatory variables, namely EPS, BVPS, and CFPS, are statistically significant in both FEM and REM. Moreover, the Wald test for both FEM and REM is significant at the 1% level, suggesting that these models possess a 99% ability to explain the dependent variable. The Hausman test results further reveal that the Fixed Effect Model (FEM) is the optimal choice for the price model, given the probability value of 0.000. This signifies a high level of confidence in the superiority of the Fixed Effect Model in explaining the variation in the dependent variable. In essence, these findings affirm the robustness of the Price Model, supported by the significance of the explanatory variables in both Fixed and Random Effect Models, as well as the favorable results from the Wald and Hausman tests.

Conclusion

This study has investigated the value relevance of accounting information through the application of market-based models, specifically the Price and Return Models. The findings from the Price Model indicate that all accounting variables are significant in explaining the share price of the sampled firms. Conversely, the Return Model reveals that only EPS holds significance. Consequently, it is concluded that the Price Model significantly contributes to the understanding of value relevance in manufacturing firms in Bangladesh. Based on the study's outcomes, it is recommended that investors take into consideration key accounting information, such as EPS, BVPS, and CFPS, when making investment decisions. This approach may serve as a hedge against equity and price risks. Additionally, it is suggested that listed corporate firms in Bangladesh should align their disclosure practices with investors' demands by providing relevant accounting information. The study identifies EPS, BVPS, and CFPS as crucial accounting information for stock market investors. As a result, the management of listed manufacturing firms in Bangladesh should prioritize these variables in their financial reporting to meet the informational needs of stakeholders. It is advisable for manufacturing firms to focus on enhancing earnings through innovation and strategic investments, as well as finding cost-effective measures. Moreover, public offerings of ordinary shares and potential bonus offerings are recommended to bolster shareholders' funds, providing firms with more opportunities for investment diversification and an increase in net book value.

Acknowledging the constraints of this study, the identification of potential future research areas is proposed as follows: (i) a comparable investigation could be undertaken within the financial sector to extend the understanding of the value relevance of accounting information; (ii) an independent study could be conducted to assess the influence of institutional factors such as rumors, insider trading, corporate governance, and company characteristics on the value relevance of accounting information. This would provide valuable insights into the broader contextual factors affecting the relationship between accounting information and market dynamics.

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