RELEVANCE OF EARNINGS AND BOOK VALUE: EVIDENCE FROM LISTED PHARMACEUTICAL COMPANIES

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Abstract

For accounting information to be useful for decision making it is essential that it is relevant for decision-making and should have a significant relation with stock prices or stock returns. Value relevance research aims to explain the impact of accounting information on stock prices or stock returns. This study examines the value relevance of earnings and book values on listed Indian pharmaceutical companies' stock prices by using the Ohlson price model. The study gathered a series of panel data from 2006 to 2015 from the Nifty Pharma index. Ordinary least square and panel regression estimation were done using EViews. The findings provide sufficient evidence of those earnings per share (EPS) and book value per share (BVPS) jointly and individually for the Nifty Pharma index sample played an essential role in influencing stock prices. However, there is an insignificant decline in the combined value relevance of EPS and BVPS. The findings reveal that the EPS and BVPS played an important role in influencing stock prices. However, explanatory powers of EPS and BVPS in all years are significantly lower than that of developed countries. Overall findings show mixed results on the considerable influence of firm size on the value relevance of accounting information. This study's findings have implications for analysts, investors, and other market participants; they should use EPS and BVPS in the equity valuation of pharmaceutical companies for better allocation of resources in capital markets.

Keywords: Stock Market, Ohlson Model, Nifty, Stock Prices, Firm Size, Accounting Information

Authors' individual contribution: Conceptualization – M.B.; Methodology – M.M. and M.B.; Formal Analysis – M.M.; Investigation – M.M.; Resources – M.M. and M.B.; Data Curation – M.M.; Writing – Original Draft – M.M.

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1. INTRODUCTION

Value relevance research is part of financial accounting research investigated under capital market-based accounting research (CMBAR), which aims to explain the impact of accounting information on stock prices or stock returns. Empirically, measured if there is a statistical association between accounting information and market measures such as stock prices or stock returns (Franscis & Schipper, 1999). From the investor's perspective, accounting information is deemed relevant if it is found to have a significant relation with stock prices or stock returns (Barth, Beaver, & Landsman, 2001). This line of CMBAR acquired much attention from many researchers, and the considerable attention resulted from the notion raised in the early 90s that accounting information became less relevant for investors (Azeem & Kouser, 2011).

Since Ball and Brown (1968), there is a large part of literature documented the association between accounting information and stock returns or stock prices or both, these literature includes (Lev & Zarowin, 1999; Mulenga & Bhatia, 2018; Shamki & Rahman, 2012; Bhatia & Mulenga, 2019b; Bhatia & Mulenga, 2019c). Such literature expanded to include both balance sheet measure (book value per share) and income statement measure (earnings per share) due to the Ohlson (1995) price model and reports that earnings per share (EPS) and book value per share (BVPS) are significant in explaining marker share prices. The Ohlson (1995) price model has been successfully tested in various studies within different contexts and applied in different stock markets with different attributes.

Prior literature has empirically examined the value relevance of accounting information in the Indian context (Bhatia & Mulenga, 2019; Sharma, Kumar, & Singh, 2012; Vishnani & Shah, 2008; Mulenga & Bhatia, 2020) but none of these studies exclusively examine the value relevance of accounting information and its impact on stock prices of Indian pharmaceutical companies, and we argue this as a shortcoming of the existing empirical literature. Some literature focused on measuring the value relevance of accounting information other than the pharmaceutical industry. Motivated by the lack of research in this area and the purpose of this study is to redress the literature gap and examine value relevance accounting information using the price model. It will enhance the understanding of accounting information's ability to explain the variations in stock prices of Indian pharmaceutical companies.

To measure the value relevance of EPS and BVPS pharmaceutical companies listed on National Stock Exchange of India (NSE) under the Nifty Pharma index from 2006 to 2015 are considered. The pharmaceutical sector contributes to the health care of the people and is also considered an essential sector in the Indian economy and has a significant contribution to the Indian stock market. The Indian pharmaceutical sector is expected to reach US$ 55 billion value by 2020. The pharmaceutical sector was valued at US$ 33 billion in 2017. The country's pharmaceutical industry is expected to expand at a CAGR of 22.4 percent over 2015-2020 to $ 55 billion. India's pharmaceutical exports stood at US$ 17.27 billion in FY18 and have reached US$ 19.14 billion in FY19.

The choice of the variables used in this study is guided by previous studies and the theoretical framework of the Ohlson price model (1995), which is based on the two bottom lines of accounting information that are EPS and BVPS. The Ohlson price model has been successfully tested in various studies within different contexts and applied in different stock markets with different attributes. According to the price model, market share prices are expressed as a linear function of its EPS and BVPS.

Our study is motivated by these gaps in value relevance studies based in India. As far as awareness is, this is the first study that addresses the above-mentioned gaps. The objectives of this study are:

1. To examine the ability of EPS and BVPS to significantly influence stock prices of Indian pharmaceutical companies by using price model.

2. To study the correlation of EPS and BVPS with stock prices of Indian pharmaceutical companies.

3. To explore the combined and incremental value relevance of EPS and BVPS over time.

Understanding the value relevance of accounting information in this sector will be relevant to investors, mutual funds, and analysts for investment purposes and regulator/s of the stock market. The structure of this paper is organized as follows: Section 2 covered the review of previous related literature on the value relevance of accounting information, followed by the methodology in Section 3. Section 4 focused on the presentation of empirical results and analysis, followed by discussions in Section 5. Section 6 gives the conclusion, followed by limitations of the study, and future scope of research.

2. LITERATURE REVIEW

The literature on value relevance research is enormous, and its historical development and comparison among various countries have increased over a period of time (Mulenga & Bhatia, 2020). There are two commonly used approaches in value relevance and that information approach and measurement approach (Collins, Maydew, & Weiss, 1997). As per the information approach, accounting information is relevant if the stock prices retort to the publication of accounting information; and as per the measurement approach, the market value of the firm is expressed as a linear function of earnings, book value, and other relevant accounting information (Ohlson, 1995). The approach measures the explicit relation between market indicators of the company's value and accounting information by using the explanatory power of regression analysis (Collin et al., 1997). The demand for capital market research comes from four sources (Kothari, 2001), and that are tests of capital market efficiency, positive accounting theory, disclosure regulation, and fundamental analysis and valuation.

Value relevance studies investigate the usefulness of various accounting information in influencing market share prices or stock returns or both (Francis & Schipper, 1999; Lev & Zarowin, 1999; Shamki & Rahman, 2012; Bhatia & Mulenga, 2019; Alfaraih & Alanezi, 2011). Such studies have their roots in the valuation models that link accounting numbers and market values or stock returns (Barth, Beaver, & Landsman, 2000). The purpose of valuation models aimed to assess the relevance of accounting information for various users of financial statements, particularly investors (Ragab & Omran, 2006). In 1995, Ohlson introduced the price model and depicted in his work that the market value of equity is expressed as a linear function of EPS, book value, and other value-relevant information (Vishnani & Shah, 2008). The model is considered as among the most crucial valuation models in value relevance research, which explains stock prices better than other valuation models (Ohlson, 1995).

Since Ball and Brown (1968) and Beaver (1968), many researchers have highlighted the value relevance of EPS and BVPS on market measures such as stock price and stock returns. For example, Alfaraih and Alanezi (2011) examine the value relevance of earnings and book value on stock prices and stock returns of listed companies in the Kuwait

Stock Exchange. Their study results reveal that EPS and BVPS jointly and individually are significant and depict a positive relationship with the share price and stock returns. Contrary to Shamki and Rahman (2012), the value relevance of EPS and BVPS individually increased by using price models only. Based on returns model findings, the study reports increased on the value relevance of earnings and declined on the value relevance of BVPS. Overall empirical findings report that EPS is more relevant in influencing share prices and stock returns of Jordanian industrial companies than BVPS.

Similarly, Francis and Schipper (1999) examined the value relevance of EPS and BVPS on stock prices and stock returns of US firms and concluded that the value relevance of earnings and change in earnings declined and no evidence was found on the decline of BVPS. The results of Francis and Schipper (1999) are inconsistent with Brimble and Hodgson (2007), Collins et al. (1997), Bao and Chow (1999), which suggest that the value relevance of EPS did not decline.

Olugbenga and Oyerinde (2014) examined the value relevance of accounting information on the share price of non-financial firms listed in the Nigerian Stock Exchange. Using EPS, BVPS, dividend per share and cash flow per share, and market stock prices (dependent variable), they concluded that accounting information used in the study is relevant for equity valuation. Contrary to Lev and Zarowin (1999) value relevance of EPS, BVPS, and cash flows per share was noted to decline due to change in business.

Different researchers from the emerging financial market also examined the value relevance of EPS and BVPS using the price model (Oshodin & Mgbame, 2014; Thompson & Adah, 2012; Azeem & Kouser, 2011), but the results are inconsistent among themselves. Among these studies, few reported that earnings and book value are relevant in influencing market share price (Tharmila & Nimalathasan, 2013; Thompson & Adah, 2012; Azeem & Kouser, 2011), while other studies (Oshodin & Mgbame, 2014) reported that EPS is more relevant than BVPS.

For the purpose of analysing the relationship between accounting information and market share prices, the study used the price model and Modigliani and Miller's theorem (1958). The results reveal that EPS and BVPS have the same explanatory power as BVPS and dividend per share in explaining market share prices. The results further reveal that dividend per share has greater explanatory power than EPS for firms with transitory earnings and book value. A study based in Korea by Kwon (2018) established that the value relevance of book value, accounting earnings, operating income, cash flows, and operating cash flows significantly changed before and after K-IFRS adoption.

A study by Varun (2012) found that dividends per share and investment expenditure significantly influence the share price of the FMCG sector. Varun (2014) concluded that abnormal earnings and book value has a significant effect on the share price. Few India-based studies, Sharma et al. (2012), and Vishnani and Shah (2008) studied the impact of cash flow statements on the share price; they found an insignificant relationship between them. A recent study based on the Indian banking sector by Bhatia and Mulenga (2019) reported that EPS and BVPS jointly and individually relate with the market share price of both public sector banks and private sector banks.

Overall findings suggested that EPS and BVPS are more relevant, though in some studies value relevance of EPS and BVPS declined over time (Lev & Zarowin, 1999) while others reported only declined on the value relevance of earnings and change in earnings (Francis & Schipper, 1999).

2.1. Firm size and the value relevance of earnings and book values

Firm size is a factor that influences the value relevance of earnings and book values; this is evidenced by Collins et al. (1997), Bae and Jeong (2007), Brimble and Hodgson (2007), Alfaraih and Alanezi (2011). The study of Brimble and Hodgson (2007) used a sample of Australian firms and investigated the value relevance of EPS and BVPS. Based on their findings, the value relevance of earnings and book value individually and jointly are low. The study also reveals that the influence of firm size on the value relevance of accounting information is greater for small firms than in a large firm. Similarly, Hodgson and Clarke (2000) used a sample of Australian firms listed in the Australian Stock Exchange to examine the value relevance of EPS and BVPS. The results of their findings reveal that EPS are more relevant for large firms than small firms; these results are inconsistent with Collins et al. (1997), which show that BVPS is more relevant than EPS in valuing small firms and not large firms.

Another study by Bae and Jeong (2007) finds that the value relevance of accounting information on stock price is significantly lower for the group of small firms because they have reported *adj.* R^2 of 2.9% and 25.6% for the Chaebol and non-Chaebol firms respectively compared to a group of larger firms. For a larger firm, the Chaebol and non-Chaebol firms reported *adj.* R^2 of 27.3% and 44.5%, respectively. Overall, firm size is a crucial factor influencing the value relevance of accounting information (Collins et al., 1997; Bae & Jeong, 2007; Brimble & Hodgson, 2007; Alfaraih & Alanezi, 2011). Based on the previous research discussed above, it is reasonable to expect that the theoretical framework of Ohlson's (1995) price valuation model will also be successful within the Indian context over the period covered by this study.

2.2. Hypotheses development

To test the value relevance of EPS and BVPS on stock prices of listed Indian pharmaceutical companies, the following hypotheses are developed:

H1: EPS and BVPS significantly influence stock prices of Indian pharmaceutical companies.

H2: EPS and BVPS significantly correlated with stock prices of Indian pharmaceutical companies.

H3: Combined and incremental value relevance of EPS and BVPS have increased over time.

3. RESEARCH METHODOLOGY

3.1. Sample and data

The data required for the study is sourced from the annual financial reports of listed pharmaceutical

companies, prowess database maintained by the Centre for Monitoring Indian Economy (CMIE). The study focuses exclusively on pharmaceutical companies listed on NSE under the Nifty Pharma index. The index consists of ten companies that holding the majority of share in the market and captures the performance of the pharmaceutical sector. Nearly 79.9% of the free-float market capitalization of equity forms part of the pharmaceutical sector as of March 31, 2016. The period considered for the study is from 2006 to 2015, 10 years. In India converged accounting standards are implemented from 2015 to mitigate the effect of these changes data post-2015 is not considered.

The study uses a per-share value of stock prices, earnings, book value and converted all variables into their natural logarithmic to avoid the problem of scaling effects, heteroscedasticity and attain more accurate results by reaching the normality of data for each variable and ensuring the normality of residuals following Glezakos, Mylonakis, and Kafouros (2012) and Kimouche and Rouabhi (2016). The constituents of the study are given in Table 1.

Table 1. Constituents of the study

S/No.	*Company name*	*Symbol*	*Data period*	*Observations*
1	Aurobindo Pharma	Auropharma	2006-2015	10
2	Cadila Healthcare	Cadilahc	2006-2015	10
3	Cipla	Cipla	2006-2015	10
4	Divi's Laboratories	Divislab	2006-2015	10
5	Dr.Reddy's Laboratories	DrReddy	2006-2015	10
6	GlaxoSmithKline Pharmaceuticals	Glaxo	2006-2015	10
7	Glenmark Pharmaceuticals	Glenmark	2006-2015	10
8	Lupin Ltd	Lupin	2006-2015	10
9	Piramal Enterprises	Pel	2006-2015	10
10	Sun Pharmaceuticals	Sunpharma	2006-2015	10
Total observations				*100*

Source: Generated by the authors from the official website of the National Stock Exchange (www.nseindia.com).

3.2. Model specification

To test the significant ability of EPS and BVPS in explaining market stock price, we based on Ohlson's (1995) price model, which expressed stock prices as a linear function of its EPS and BVPS following other researchers (Alfaraih & Alanezi, 2011). The descriptions of the variables are given in Table 2.

Table 2. Description of dependent and independent variables

Name	*Nature*	*Formula*	*Description*
P_{it}	Dependent variable	Closing market share prices of firm *i* during the financial year *t*.	
α	Independent variable	Captures the influence of other variables that have been excluded from the model but exercise some influence on the market stock prices.	
EPS_{it}	Independent variable	Earnings are attributable to ordinary shareholders. Total amount of outstanding ordinary shares.	Earnings per share of firm *i* at time *t*.
$BVPS_{it}$	Independent variable	Equity share capital + shareholders reserves. Total numbers of outstanding ordinary shares.	Book value per share of firm *i* during the financial year *t*.
$FSIZE_{it}$	Control variable	Natural logarithm of total assets of firm *i* at time *t*.	Firm size of firm *i* at time *t*.
ε_{it}	Error term	Indicates the explanatory power of other value relevant information.	
t	Time	Represents the number of years covered for this study.	2006…2015 corresponding to the years 2006-2015.

Initially, we focused on the Model 1 to measure the joint ability of EPS and book value in explaining market share prices.

Secondly, we use a similar methodology employed by Alfaraih and Alanezi (2011) and Keener (2003) to compare the explanatory power of EPS and BVPS on stock price per share. Further, we decomposed the total explanatory power into tree components:

1. The incremental explanatory power of EPS.
2. The incremental explanatory power of BVPS.
3. The incremental power common to both EPS and BVPS.

In order to calculate the mentioned three components, the *adj.* R^2 for the following equations are estimated.

Model 1

$$P_{it} = \alpha_0 + \beta_1 \ EPS + \beta_2 BVPS + \varepsilon_{it} \quad (1)$$

Model 2

$$P_{it} = \gamma_0 + \gamma_1 EPS + \varepsilon_{it} \quad (2)$$

Model 3

$$P_{it} = \delta_0 + \delta_1 BVPS + \varepsilon_{it} \quad (3)$$

The *adj.* R^2 from Models 1-3 is used as the primary metric to measure value relevance and denoted as *adj.* $R^2_{(EPS \text{ and } BVPS)}$, *adj.* R^2_{EPS} and *adj.* R^2_{BVPS} for Models 1, 2, and 3 respectively. The incremental explanatory power of *EPS* (*incr. EPS*) is calculated by taking the explanatory power (*adj.* $R^2_{(EPS \text{ and } BVPS)}$), from Model 1 less the explanatory power (*adj.* R^2_{BVPS}) from Model 3; the incremental explanation power of *BVPS* (*incr. BVPS*) calculated by taking the explanatory power (*adj.* $R^2_{(EPS \text{ and } BVPS)}$) from Model 1 less the explanatory power (*adj.* R^2_{EPS}) from Model 2. The remaining *adj.* $R^2_{(EPS \text{ and } BVPS)}$ – *incr. EPS* – *incr. BVPS* represents the explanatory power common to both *EPS* and *BVPS* (*incr. Comm*).

In testing the third hypothesis of this study, we use R^2 decomposition to test whether the value relevance of accounting information has changed over time. Our test regress *adj.* R^2 *(Total), adj.* R^2_{EPS} *(incr. EPS),* and *adj.* R^2_{BVPS} *(incr. BVPS)* on a *TIME* trend variable as follow.

Model 4

$$Adj.R^2{}_T = a_0 + a_1 TIME + \varepsilon_{it} \quad (4)$$

Model 5

$$Adj.R^2{}_{EPS\ (incr.EPS)} = b_0 + b_1 TIME + \varepsilon_{it} \quad (5)$$

Model 6

$$Adj.R^2{}_{BVPS\ (incr.BVPS)} = c_0 + c_1 TIME + \varepsilon_{it} \quad (6)$$

Finally, we extended price model by incorporating firm size as control variable to capture its significance influence on value relevance of accounting information as presented in Model 7, consistent with prior researchers (Collins et al., 1997; Alfaraih & Alanezi, 2011).

Model 7

$$P_{it} = \alpha_0 + \beta_1\ EPS + \beta_2 BVPS + \beta_3 FSIZE + \varepsilon_{it} \quad (7)$$

4. RESULTS

4.1. Descriptive statistics

Table 3 presents descriptive statistics of pharmaceutical companies' accounting information, which comprises mean, median, standard deviation, minimum, and maximum. From the results, the highest value of standard deviation is in *EPS*, followed by *BVPS*. The standard deviation values after natural log transformation are well below 3, which suggests the absence of the outliers (Pallant, 2007). Further, *EPS* indicates the negative minimum value of -3.997 while the highest maximum value is in *FSIZE*. All variables used have a mean value higher than the median indicated that the distribution was positively skewed. Also, the Jarque-Bera statistics suggest that the data is not significantly different from normality except for *EPS*.

Table 3. Descriptive statistics of the dependent and independent variables

Variables	*Mean*	*Median*	*Std. Dev.*	*Min*	*Max*	*Jarque-Bera*	*Prob.*
P_{jt}	6.533	6.523	0.767	4.779	8.157	1.432	0.488
EPS_{jt}	3.205	3.387	1.270	-3.997	4.969	996.42	0.000
$BVPS_{jt}$	4.988	4.969	0.680	3.447	6.546	1.009	0.603
$LSIZE_{jt}$	10.892	10.848	0.794	8.780	12.873	0.137	0.934
Observations	*100*						

4.2. Correlation matrix

Table 4 shows the association between variables, which are measured by the Pearson correlation coefficient. The highest correlation coefficient is 65.4% (between *BVPS* and *SP*), followed by 56.2% (between *EPS* and *SP*), which is a strong positive correlation. However, there is a weak positive correlation coefficient between *FSIZE* and P_{jt}. There is a strong positive correlation between independent variables (*EPS*, *BVPS*) and the dependent variable (*P*) at a level of 1%, consistent with Khanna (2014). Further, the correlation coefficient and variance inflation factor (*VIF*) is well within acceptable limits and indicate the absence of multicollinearity.

Table 4. Correlation among dependent and independent variables

	P	*EPS*	*BVPS*	*FSIZE*
P_{it}	1.00			
EPS_{it}	0.562***	1.00		
$BVPS_{it}$	0.654***	0.227**	1.00	
$FSIZE_{it}$	0.078	-0.131	0.367**	1.00
VIF		1.12	1.27	1.22

*Note: ***, **, and * significant at a level of 1%, 5%, and 10% respectively.*

4.3. Regression results

4.3.1. Regression results under ordinary least square

The following tables present the summary of regression results for Models 1, 2, and 3 for each year from 2006-2015 and the decomposition of the coefficient of variation for Indian pharmaceutical companies. Table 5 reveals the result of the pooled data for Model 1 indicates that *EPS* and *BVPS* jointly are significant at a level of 1% and positively related to stock prices.

Table 5. Pooled and yearly cross-sectional regression results of market stock prices on EPS and BVPS

Models 1-3

$$P_{it} = \alpha_0 + \beta_1\ EPS + \beta_2 BVPS + \varepsilon_{it} \quad (1)$$

$$P_{it} = \gamma_0 + \gamma_1 EPS + \varepsilon_{it} \quad (2)$$

$$P_{it} = \delta_0 + \delta_1 BVPS + \varepsilon_{it} \quad (3)$$

Dependent variables: market share prices

Year	*N*	β_1	β_2	*Adj.* $R^2_{(EPS\ and\ BVPS)}$	γ_1	*Adj.* R^2_{EPS}	δ_1	*Adj.* R^2_{BVPS}
2006	10	0.397 (2.65)**	0.534 (3.80)**	0.884	0.79 (4.58)***	0.689	0.796 (6.01)***	0.796
2007	10	0.989 (3.04)**	-0.156 (-0.41)	0.887	0.861 (8.97)***	0.898	0.931 (5.58)***	0.770
2008	10	0.829 (2.17)*	-0.072 (-0.19)	0.499	0.772 (3.53)**	0.560	0.589 (2.07)**	0.269
2009	10	0.068 (0.88)	0.869 (3.00)**	0.480	0.087 (0.80)	-0.041	0.890 (3.13)**	0.495
2010	10	0.146 (0.51)	0.820 (2.42)**	0.753	0.738 (3.83)**	0.603	0.966 (5.68)**	0.776
2011	10	0.870 (6.10)***	0.525 (3.92)**	0.840	0.829 (3.48)**	0.553	0.465 (1.48)	0.117
2012	10	0.391 (4.81)**	0.384 (2.07)*	0.788	0.436 (4.70)**	0.701	0.626 (1.80)*	0.201
2013	10	0.308 (4.68)**	1.192 (5.56)**	0.792	0.135 (1.07)	0.016	0.716 (1.99)*	0.248
2014	10	2.905 (2.36)**	0.926 (3.55)**	0.661	0.981 (4.65)**	0.696	0.606 (1.67)	0.168
2015	10	0.725 (3.00)**	0.066 (0.26)	0.501	0.747 (3.53)**	0.560	0.344 (1.00)	0.001
All years	100	0.264 (6.69)***	0.626 (8.51)***	0.600	0.340 (6.73)***	0.309	0.738 (8.56)***	0.422

Table 6. The decomposition of adj. R^2

$$Incr.EPS = adj.R^2_{(EPS\ and\ BVPS)} - adj.R^2_{BVPS} \quad (8)$$

$$Incr.BVPS = adj.R^2_{(EPS\ and\ BVPS)} - adj.R^2_{EPS} \quad (9)$$

$$Incr.Comm = adj.R^2_{(EPS\ and\ BVPS)} - adj.R^2_{EPS} - adj.R^2_{BVPS} \quad (10)$$

Year	*Adj.* $R^2_{(EPS\ and\ BVPS)}$	*Adj.* R^2_{EPS}	*Adj.* R^2_{BVPS}	*Incr. EPS*	*Incr. BVPS*	*Incr. Comm*
2006	0.884	0.689	0.796	0.088	0.195	0.601
2007	0.887	0.898	0.770	0.117	-0.011	0.781
2008	0.499	0.560	0.269	0.23	-0.061	0.33
2009	0.480	-0.041	0.495	-0.015	0.521	-0.026
2010	0.753	0.603	0.776	-0.023	0.15	0.626
2011	0.840	0.553	0.117	0.723	0.287	-0.17
2012	0.788	0.701	0.201	0.587	0.087	0.114
2013	0.792	0.016	0.248	0.544	0.776	-0.528
2014	0.661	0.696	0.168	0.493	-0.035	0.203
2015	0.501	0.560	0.001	0.5	-0.059	0.06
All years	0.600	0.309	0.422	0.178	0.291	0.131

4.3.2. Extended price model

The extended price model results reveal that the estimated beta coefficient of *EPS* and *BVPS* is also significant at $p < 0.01$ and have a positive coefficient, consistent with Alfaraih and Alanezi (2011). The beta coefficient, *EPS,* and *BVPS* are 0.252, and 0.666 are positive.

Table 7. Extended price model

Model 7

$$P_{it} = \alpha_0 + \beta_1 EPS + \beta_2 BVPS + \beta_3 FSIZE + \varepsilon_{it} \quad (7)$$

Dependent variable: market share prices

Variable	*Coefficient*	*t-statistic*	*Prob.*
EPS_{it}	0.252	6.23	0.000***
$BVPS_{it}$	0.666	8.26	0.000***
FSIZE	-0.081	-1.19	0.237
Constant	3.282	4.65	0.000***
R^2	0.614		
Adj. R^2	0.602		
F-statistic	50.95		
Prob. (F-statistic)	0.000		

*Note:*** Statistically significant at a level of 1%.*

4.3.3. Analysis of changes in the value relevance of EPS and BVPS over time

The result from regressing the *adj.* R^2 on-time trend variable (Table 8) reveals that these changes are insignificant.

Figure 1 shows the trend in total and incremental explanatory power of *EPS* and *BVPS* over time. From the inspection of Figure 1, it is noticeable that the combined explanatory power of *EPS* and *BVPS* shows a slightly decreasing tendency over time.

Table 8. Regression analysis results of adj. R^2 value of combined and incremental EPS and BVPS on TIME trend variable

Models 4-6

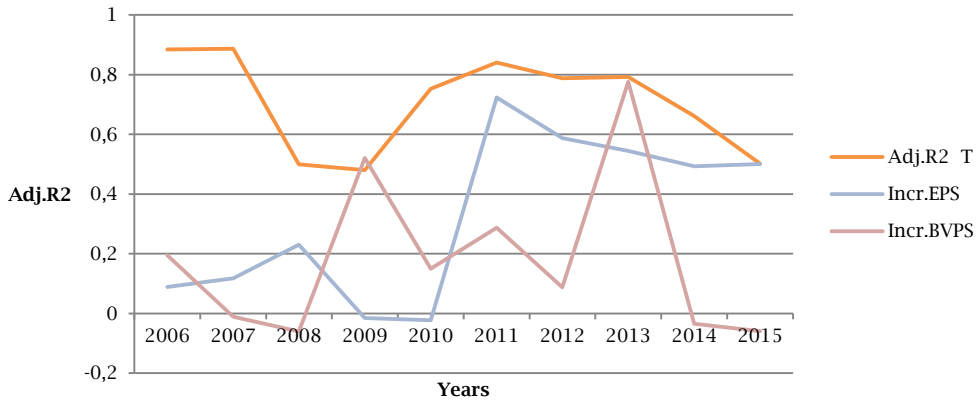
$$Adj.R^2{}_T = a_0 + a_1 TIME + \varepsilon_{it} \quad (4)$$

$$Adj.R^2{}_{EPS\,(incr.EPS)} = b_0 + b_1 TIME + \varepsilon_{it} \quad (5)$$

$$Adj.R^2{}_{BVPS\,(incr.BVPS)} = c_0 + c_1 TIME + \varepsilon_{it} \quad (6)$$

a_0	a_1	Adj. R^2	b_0	b_1	Adj. R^2	c_0	c_1	Adj. R^2
0.794 (7.05)	-0.015 (-0.85)	-0.031	-0.024 (-0.17)	0.063 (2.76)	0.424	0.166 (0.83)	0.003 (0.11)	-0.123

Figure 1. Trends in total and incremental explanatory power of EPS and BVPS over time 2006-2015



4.3.4. Further results

As shown in Model 1, *EPS* and *BVPS* have a positive and significant influence on stock prices at a 1% level. It signifies that there is a direct relationship between variables. The result of *adj.* R^2 for the model is 0.749, and *F-value* is 27.92.

Table 9. Regression results of the stock price on EPS and BVPS estimated under the panel data approach

Models 1-3

$$P_{it} = \alpha_0 + \beta_1 \ EPS + \beta_2 BVPS + \varepsilon_{it} \quad (1)$$

$$P_{it} = \gamma_0 + \gamma_1 EPS + \varepsilon_{it} \quad (2)$$

$$P_{it} = \delta_0 + \delta_1 BVPS + \varepsilon_{it} \quad (3)$$

Dependent variable: stock price

	Fixed effect model						Random effect model		
	1			2			3		
Variable	**Coef.**	**t-stat.**	**Prob.**	**Coef.**	**t-stat.**	**Prob.**	**Coef.**	**t-stat.**	**Prob.**
Constant	3.352	9.24***	0.000	5.828	39.66***	0.000	3.445	11.71***	0.000
EPS	0.169	4.81***	0.000	0.220	5.08***	0.000	-	-	-
BVPS	0.529	7.22***	0.000	-	-	-	0.619	7.93***	0.000
R^2	0.777			0.645			0.390		
Adj. R^2	0.749			0.605			0.384		
F-statistic	27.92			16.20			62.81		
Prob.	0.000			0.000			0.000		
Total observ.	100			100			100		

*Note: *** Statistically significant at a level of 1%.*

4.3.5. Extended price model

The result of *adj.* R^2 for the model is 0.746, and *F-value* is 25.33, these values are significant for $p < 0.000$; the extended price model explains 74.6% variations in the market share prices of Indian pharmaceutical companies.

Table 10. Regression result of market stock prices on *EPS*, *BVPS*, and *FSIZE*

Model 7 $P_{it} = \alpha_0 + \beta_1 EPS + \beta_2 BVPS + \beta_3 FSIZE + \varepsilon_{it}$ (7)			
Dependent variable: stock price			
Variable	***Coefficient***	***t-statistic***	***Probabilities***
EPS_{it}	0.168	4.68	0.000***
$BVPS_{it}$	0.542	6.17	0.000***
FSIZE	-0.021	-0.28	0.779
Constant	3.522	4.97	0.000***
R^2	0.777		
Adj. R^2	0.746		
F-statistic	25.33		
Prob. (F-statistic)	0.000		

*Note: *** Statistically significant at a level of 1%.*

5. DISCUSSION

The positive value of the coefficient reported in Table 5 signifies there is a direct relationship between variables, the values signify that a unit increase in *EPS* (*BVPS*) will lead to a 26.4% (62.6%) increase in market stock prices (*P*). This is in line with the previous study conducted in Kuwait (El Shamy & Kayed, 2005) where both *EPS* and *BVPS* influenced the market share price of listed companies; however, the incremental explanatory power of *EPS* was greater than that of *BVPS*.

Further, estimated regression results show that Model 1 is statistically significant and explained about 60% (*adj.* $R^2 = 0.600$) of the variations in stock prices of Indian pharmaceutical companies. Year by year, price regression results do not support pooled data results, and the *adj.* R^2 value of yearly analysis ranges from 88.4% in 2006 to 50.1% in 2015. The coefficient estimate for *BVPS* was positive and significant in all years, except in 2007, 2008, and 2015, where it is insignificant. The coefficient estimate for *EPS* was positive and significant in all years, except in the years 2009 and 2010, where it is insignificant.

Table 6 provides the results of the decomposition of *adj.* R^2 for private sector banks. The result from the table reveals that *EPS* adds more to the overall explanatory of the model than *BVPS*. The *incr. BVPS* is relatively high at 29.1%, while the *incr. EPS* is 17.8%. The common explanatory power of *EPS* and *BVPS* is 13.1%. In the study conducted on the US-listed companies (Collins et al., 1997) it was found that 54% of the variation in stock prices was explained jointly by *EPS* and *BVPS*. The study also showed a significant decline in the explanatory power of earnings per share and an increase in the explanatory power of book value per share.

The positive value of the coefficient as reported in the extended price model (Table 7) signifies the direct relationship between variables. Also, values signify that a unit increase in *EPS* (*BVPS*) will lead to a 25.2% (66.6%) increase in market stock prices (*P*). On the other hand, the beta coefficient of firm size (*FSIZE*) is insignificant and depicts a negative relationship with market share prices. It signifies that firm size insignificantly influences the market stock prices of Indian pharmaceutical companies.

Contrary to claims made in literature, the coefficients on the *TIME* variable for incremental *EPS* and incremental *BVPS* (Table 8) suggest that there is a significant increase in the incremental value relevance of *EPS* ($b_1 = 0.063$, $p < 0.05$) and an insignificant increase in the incremental value relevance of *BVPS* ($c_1 = 0.003$, $p > 0.10$) over the period. These findings are inconsistent with Collins et al. (1997), Lev and Zarowin (1999), Jang, Jung, and Lee (2002), which show a significant declined in the incremental explanatory power of earnings and an increased in the explanatory power of *BVPS*.

The regression results of the stock price on *EPS* and *BVPS* estimated under the panel data approach (Table 9) indicate that *EPS* and *BVPS* are jointly explaining a 74.9% variation in Indian pharmaceutical firm's stock prices. Highly significant F-statistics values express that all the explanatory variables (*EPS* and *BVPS*) have a strong ability to explain variation in the dependent variable (stock prices). *EPS* and *BVPS* have a beta coefficient of 0.169 and 0.529, which shows that its effect is 16.9% and 52.9% on stock prices of pharmaceutical-listed firms. The study conducted in the Chinese stock market (Chen, Chen, & Su, 2001) also concluded that the relationship between accounting information represented by *EPS* and *BVPS* was value-relevant according to both pooled cross-section and time-series regression.

The results of the extended price model that incorporate firm size reveal that the estimated beta coefficient of *EPS* and *BVPS* jointly are also significant at $p < 0.01$ and have a positive coefficient, consistent with Alfaraih and Alanezi (2011). The beta coefficient of *FSIZE* exhibits an insignificant influence on stock prices. The Chi-square and p-value of the Hausman test are 13.20 and 0.004, respectively, which indicates that the fixed effect approach is appropriate for the model

6. CONCLUSION

This study examines the value relevance of EPS and BVPS on stock prices of Indian pharmaceutical companies listed at NSE under the Nifty Pharma index. The study uses Ohlson's (1995) price model, which expresses market share prices as a linear function of both *EPS* and *BVPS*. We also extended the Ohlson price model by incorporating firm size as a control variable to capture its significant influence on accounting information's value relevance. The study used a similar methodology employed by Collins et al. (1997) and El Shammy and Kayed (2005) to compare the explanatory power of EPS and BVPS on stock prices. We decomposed total explanatory power into three components:

1. The incremental explanatory power of EPS.
2. The incremental explanatory power of BVPS.
3. The explanatory power common to both EPS and BVPS.

To estimate the regression models' use, we employed ordinary least squares (OLS) and panel data regression approaches as the method of analysis, where *adj.* R^2 is used as a primary metric and variable coefficients for measuring value relevance of earnings and book values.

The findings of our study indicate that:

1. *EPS* and *BVPS* jointly and individually are significant and positively related to market share prices of Indian pharmaceutical companies. However, analysis of year by year has shown that the value relevance of *BVPS* is higher than *EPS*.

2. Also, the value relevance of earnings per share and book value per share jointly are higher, as reported in the first model. These findings imply that investors under pharmaceutical firms perceived earnings per share and book value per share to be relevant. These results are consistent with Ragab and Omran (2006), Bae and Jeong (2007), Tharmila and Nimalathasan (2013), Khanna (2014), Alfaraih and Alanezi (2011).

3. Further, there is an insignificant decline in the combined value relevance of earnings and book value per share. However, the coefficients on the *TIME* variable for incremental *EPS* and incremental *BVPS* suggest a significant increase in the incremental value relevance of *EPS* ($b_1 = 0.063$, $p < 0.05$) and an insignificant increase in the incremental value relevance of *BVPS* ($c_1 = 0.003$, $p > 0.10$) over the period. On the contrary, our results failed to match with the findings Brimble and Hodgson (2007), Collins et al. (1997), Bao and Chow (1999).

4. Overall empirical findings show mixed results on the significant influence of firm size on the value relevance of accounting information. The firm size was reported as an insignificant variable and depicted a negative relationship with market share prices under both OLS and the panel regression approach. These findings are different from the findings of studies (Alfaraih & Alanezi, 2011; Brimble & Hodgson, 2007; Bae & Jeong, 2007).

The findings reveal that the *EPS* and *BVPS* played an important role in influencing stock prices. However, explanatory powers of *EPS* and *BVPS* in all years are significantly lower than that of developed countries. For example, in the US, Collins et al. (1997) report that earnings and book values per share jointly explain about 75 percent of US firms' stock prices.

Further, the analysis of regression and determination coefficients has shown that earnings per share and book value per share individually are significant and have a positive influence on stock prices. However, *adj.* R^2 for *BVPS* is higher than that of *EPS*, meaning that *BVPS* has great information content (comparable to *EPS*). These results are consistent with Bae and Jeong (2007) and are inconsistent with Alfaraih and Alanezi (2011), who found opposite patterns of explanatory powers.

Analysis of changes in the value relevance in the period 2006-2015 indicated an insignificant declined in the combined value relevance of earnings and book value per share over time. Incremental earnings per share suggest a significant increase and book value per share suggest an insignificant increase over time. The findings of this study have implications to analysts, investors, and other market participants that they should use earnings per share and book value per share in the equity valuation of pharmaceutical companies for better allocation of resources in capital markets.

The findings of this study have significant implications for investors, creditors, and analysts under pharmaceutical companies and have few limitations. First, the study examines the value relevance of selected accounting information from the statement of financial position and income statement; future study may add more variables.

Second, the conclusion is based on the analysis of 10 pharmaceutical companies listed under the Nifty Pharma index for a period of 10 years from 2006 to 2015, and results can be generalized to pharmaceutical companies similar to those used in this study. Future studies may extend the research period and may include other sectors like the oil and gas sector, services sector, and energy.

Third, the converged international financial reporting standards have been implemented in India, a study comparing value relevance of pre- and post-converged accounting standards can also be carried out for various sectors.

Lastly, it will be significant and interesting to see comparative analysis on value relevance between various sectors and between countries.

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