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Impact of Accounting Data on Stock Prices: The Case of Vietnam

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Abstract

This research is conducted for evaluating the impact of accounting numbers on stock prices of listed firms on Vietnam Stock Exchange. Data were collected from 416 listed firms for the period from 2012 to 2016. By using models of OLS, FEM, REM and GLS for evaluating the relationship between earnings per share (EPS), book value of stock (BV) and stock prices, the results show that EPS, BV have positive relationships with stock prices with the level of 48.13% basing on the model of Ohlson (1995) and on the model of Ohlson adjusted to Aboody et al. (2002). Based on the findings, some implications for investors and stakeholders have been given in the context of Vietnam.

Keywords: Accounting numbers, Book value, Earnings per share, Stock price

1. Introduction

The price of stock is affected by many factors, including accounting information in the financial statements. In the developed stock exchange, many studies investigated the relationship between accounting numbers and stock prices. Ball & Brow (1968) found that

profit in the financial statements had impact on the stock prices in the New York Stock Exchange. Basing on the model of Ohlson issued in 1995, many researches were conducted for finding the relationship between accounting data and the stock prices in different contexts. Collin et al. (1998) found that under the model of Ohlson, financial information explained 54% of variation of stock prices in The United State. King & Langli (1998) used regression model of profit and book value of stock prices and found that accounting numbers explain 70%, 60% and 40% of variation of stock prices in United Kingdom, Norwegian and Germany respectively.

In the context of Vietnam, a lot of studies looked into the relationship between accounting numbers and stock prices such as Nguyen (2009), Tran (2013), Truong & Nguyen (2016). Interestingly, results of these studies are different because of using independent variables in different models. These studies focused on two directions. The first is using the model of Ohlson designed in 1995 with the dependent variable of unadjusted stock price (Nguyen, 2011; Nguyen, 2016). The second is employing the model of Ohlson (1995) and adjustment to the model Aboody et al. in 2002 (Nguyen, 2009; Tran, 2013; Truong & Nguyen, 2016). The reason for using the second direction is that Vietnam Stock Exchange is underdeveloped so using the model of Ohlson issued in 1995 did not show the relationship between accounting numbers and stock prices because the market has not always reflected the true value of stocks. So the question is that using the model of Ohlson (1995) or adopting the model of Ohlson (1995) with adjustment to the model of Aboody et al. (2002) in the Vietnam Stock Exchange. How is the relationship between accounting numbers and stock prices?

So this paper is conducted for investigating the impact of accounting numbers on stock prices of Ohlson (1995) and Ohlson (1995) with adjustment to Aboody et al. (2002).

2. Literature Review

Many researchers have investigated the relationship between stocks and financial information including profit, earnings per share, book value of stock. Ball & Brown (1968) concluded that profit was one of the useful financial information for valuing stock. Therefore many empirical studies examined and measured the relationship between accounting numbers and stock prices such as researches conducted by Lev & Ohlson (1982), Walker (1997).

Basing on the model of Ohlson (1995), this relationship has been more looked into. Accounting information in this case includes items in the balance sheet through net asset and items on the income statement. The result of Ohlson (1995) concluded that accounting numbers has impact on prices of stocks.

Colins et al. (1997) looked into the changes of stock prices and profit, and profit value of owner's equity in the United State for 40 years. By using the model of net profit as a theoretical framework, researchers employed regression model between stock prices and book value of profit, and owner's equity and concluded that apart from profit, book value of equity has also positive impact on stock prices.

Sanject (2011) tested the relationship between stock prices and accounting data through book value of stock, earnings per share, profit, profit ratio, dividends for the period from 1993 to 2009. The result showed that earnings per share, book value of share has significant impacts on

market value of stocks. Osama et al. (2012) investigated all non financial listed firms on Kuwait Stock Exchange (KSE) in the period from 2003 to 2009. Other studies conducted by Stark & Thomas (1998), Hand & Landsman (2005), Lo & Lys (2000), Akbar & Stark (2003) found that stock prices were positively affected by book values of accounting numbers. The results are also agreement with those conducted by Green et al. (1996), Rees (1997), Collins et al. (1997), Stark & Thomas (1998), Chen & Su (2001), Elshamy (2005), Alfaraih & Alanezi (2011).

Also basing on the model of Ohlson (1995), empirical articles have been conducted in the context of developing countries such as research conducted by Naimah (2012) in Indonesia, Shamki (2012) in Jordan, Perera & Thrikawala (2010) in Sri Lanka, Khanagha (2011) in UAE, Omokhudu & Ibadin (2015) in Nigeria, Khanna (2014) in India. There was impact of accounting numbers on stock prices but in different levels in these studies.

In the context of Vietnam, Nguyen (2009) also employed Ohlson model for the data from 2003 to 2007 showing R2 of 40%. However, the data were collected in the newly Vietnam Stock Exchange and its incomplete legal framework. Nguyen (2011) also employed the model of Ohlson with the data of 430 listed firms in Hanoi Stock Exchange and Ho Chi Minh Stock Exchange in 2009 and R2 was 43%. Vo (2014) investigated factors influencing Vietnam's stock prices including US stock prices, foreign exchange rates, gold prices and crude oil prices and found that stock prices have been affected significantly by US stock prices, and foreign exchange rates over the period before the 2008 Global Financial Crisis.

3. Research Model

In the effective market, the price of stock is impossible to estimate so income from stock is random and usually in a normal distribution. The market is divided into three levels, i.e. weak form; semi-strong form; and a strong form. In the level of weak form market, the stock price reflects information in the past. In the semi-strong form market, current stock price reflects complete information disclosure and an entity information such as profits, dividends and management representations as well. In the strong form market, commercial rules cannot be conducted basing on the internal data because current prices has reflects that kind of information.

In the model of Ohlson (1995), the stock price was integrated from variables of book value of stock and of earnings per share. Dependent variable was stock price. Basing on the models of Ohlson (1995), Aboody et al. (2002), Collins et al. (1997), Dechow & Sloan (1999), Frankel & Lee (1998), Hand & Lansman (2005), King & Langli (1998), Koji (2001), we employ models as below:

$$PA_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BV_{it} + u_{it} \quad (1)$$

$$P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BV_{it} + u_{it} \quad (2)$$

In which:

P_{it}: stock price of firm i, year t

$PA_{it:}$ stock price of firm i, year t has been adjusted as

$$PA_{t/\tau} = \frac{P_{t+\tau}}{1 + R_M^{\tau}}$$

$P_{t/r}$: stock price at time t (year end) adjusted because of price mistake (due to inefficient market) τ months afterward

P_{t+r}: stock price at time t +τ
R_M^{τ}: market interest (calculated basing on VN-Index) from time t to t +τ

τ: period of time after 3, 6, 9, 12 months

EPS_{it}: earnings per share of firm i, year t

BV_{it}: book value of stock of firm i, year t

This research employs the quantitative method and test the impact of earnings per share (EPS), book value of stock on the stock prices (BV) basing on four models of Ordinary least squares (OLS), Fixed effects model (FEM), Random effects model (REM), and Generalized least squares (GLS).

4. Data and Methodology

4.1 Data Collection

Data were collected from audited financial statements of listed firms in the Vietnam Stock Exchange for the period from 2012 to 2016. In the total of 707 listed firms in the Ho Chi Minh Stock Exchange (HSX) and Hanoi Stock Exchange (HNX), 416 listed firms, accounting for 58.5%, is in the final sample because of having all data in five consecutive years. In which, 202 listed firms in HSX and 214 in HNX with the total observations of 2,080.

Basing on the final sample, we compare approaches of running OLS, FEM, REM for selecting the most suitable model for the population. Also basing on the audited financial statements, we use data of earnings per share (EPS), book value of stock (BV). Data of stock price (P) and VN-Index were collected from database of cophieu68 at given time at 0, 3, 6, 9 and 12 months after year end.

Table 1. Dependent and Independent Variables

Variable	Full name	Measurement	Sources
P_{it}	Stock price of firm i at day t	Closing price of HSX, HNX	Historical data at time t at www.cophieu68.com
PA_{it}	Stock price adjusted of firm i at day t	Closing price of HSX, HNX adjusted	Historical data at time t at www.cophieu68.com
EPS_{it}	Earnings per share	Earnings per share of firm i at day t	Income statement of listed firms
BV_{it}	Book value of stock	Book value of stock of firm i at time t	Balance sheet, Notes to the financial statements of listed firms

VN-Index was gathered for the period from 2nd January 2013 to 31st March 2017, value & trends are presented in Figure 1, below:

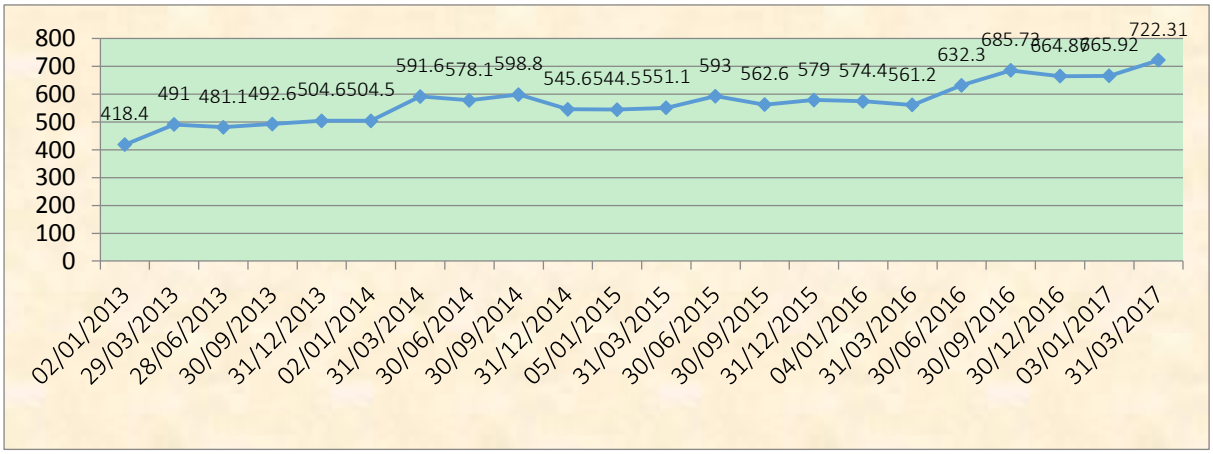

Figure 1. Date of VN-Index for the period from 2nd January 2013 to 31st March 2017

4.2 Data Processing

Panel data is used for the model of the relationship between accounting data and the stock prices of listed firms in Vietnam Stock Exchange. We run OLS, FEM and REM. After choosing the most suitable model for the population, we test the selected model and evaluate deficiencies of the model. If deficiencies exist in the model, we run GLS.

5. Results and Discussion

The data in the Table 2 show that:

Variable of stock price adjusted (PA): The price of stock after adjustment, at the time $t_{0,}$ after 3 months, 6 months and 12 months for the period from 2012 to 2016, fluctuated from 13.88 thousand Vietnamese dong to 15.32 thousand dong. The lowest price was at June (t_6) and highest price at beginning of the year t_0. At the time of t_0 & t_3 we have 2,080 observations and at the time of t_6 t_9 t_{12} we have 1,664 observations because we do not have data of stock prices at the end of June t_6, September t_9, and December t_{12} of 2017.

Variable of stock price (P): stock price, at the time $t_{0,}$ $t_{6,}$ $t_{9,}$ t_{12} for the period from 2012 to 2016, fluctuated from 15.32 thousand dong to 17.91 thousand dong, at the lowest level at t_0 and highest level at t_3. The lowest price of stock is 0.87 thousand dong and highest price is 250.62 thousand dong.

Variable of earnings per share (EPS): average earnings per share is 2,227.78 thousand dong, the highest point is 27,280.75 thousand dong and the lowest is -31,627 thousand dong.

Variable of book value of stock (BV): average book value of stock is 1.03 thousand dong, highest level is 81,000 dong and lowest level is 1,000 dong. Average book value of stock in the Table 2 is the highest than average stock price in the period from 2012 to 2016.

Table 2. Descriptive Analysis of Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
EPS	2,080	2,227.80	3,071.46	-31,627	27,280.75
BV	2,080	18.03	9.22	1	81
PAt_0	2,080	15.32	18.04	1.17	197.6
PAt_3	2,080	14.14	16.74	0.73	189.17
PAt_6	1,664	13.88	15.76	0.85	171.51
PAt_9	1,664	14.31	16.65	0.73	174.21
PAt_{12}	1,664	15.16	17.04	1	171.92
Pt_0	2,080	15.32	18.04	1.17	197.6
Pt_3	2,080	17.91	21.53	0.87	250.62
Pt_6	1,664	15.47	17.45	0	197.21
Pt_9	1,664	16.37	19.19	0	195
Pt_{12}	1,664	16.99	19.16	0	199

The correlation coefficient, r, is value between -1 and +1 calculated so as to represent the linear dependence of variables or sets of data. Basing on the value of r, we know the correlation of variables and if r>0.8 meaning that the issue of multicolinearity exists.

Data in the Table 3 and 4 show that independent variables have linear regression with dependent variables. EPS and BV have positive relationships with dependent variables of PA and P. Also in Tables 3 and 4.

Table 3. The Correlation Coefficients between Independence Variables and Dependent Variable of PA

Variable	EPS	BV	PAt_0	PAt_3	PAt_6	PAt_9	PAt_{12}
EPS	1						
BV	0.6288	1					
PAt_0	0.6233	0.5843	1				
PAt_3	0.6389	0.5885	0.9779	1			
PAt_6	0.6439	0.5733	0.9467	0.9623	1		
PAt_9	0.6399	0.5786	0.9216	0.942	0.9729	1	
PAt_{12}	0.6366	0.5811	0.8861	0.9066	0.9394	0.9723	1

Table 4. The Correlation Coefficients between Independence Variables and Dependent Variable of P

	EPS	BV	Pt_0	Pt_3	Pt_6	Pt_9	Pt_{12}
EPS	1						
BV	0.6288	1					
Pt_0	0.6233	0.5842	1				
Pt_3	0.6332	0.5819	0.9766	1			
Pt_6	0.6465	0.5749	0.9465	0.9618	1		
Pt_9	0.6379	0.5762	0.9162	0.9366	0.973	1	
Pt_{12}	0.6388	0.5817	0.8852	0.9045	0.9424	0.9725	1

In this paper, dependent variable of stock has been adjusted (PA, at the $t_0, t_3, t_6, t_9, t_{12}$) and stock price (P, at the $t_0, t_3, t_6, t_9, t_{12}$). We have 10 regression models and compare which the most suitable model of OLS, FEM or REM using the test of F and Hausman.

By F testing, we see that Prob>F=0.0000<α=5% with significant level of 5%. So we conclude that FEM is suitable and OLS is unsuitable because of existing fixed affect of each firm through time. The next step is to run FEM and REM and test Hausman for selecting which one is better.

Hausman testing is presented in Table 5, 6, 7 and 8. Clearly, P value = 0.000 <α=5% so we conclude that FEM is more suitable than REM and FEM is the best model for dataset.

Data in Tables of 5, 6, 7 and 8 show that there is a positive relationship between stock prices and EPS and BV and all ratios have significant levels of 1%. Independent variables explain at the highest level of 48.13% and 47.53% in the FEM. The results show that 3 months after year end and Pt_3 and PAt_3 explain the relationship with the highest level and slightly reduce in 6, 9, 12 months after year end.

Table 5. Results with Dependent Variable of PA at at t_0, t_3, t_6

	Dependent Variable of PAt_0			Dependent Variable of PAt_3			Dependent Variable of PAt_6		
	OLS	**FEM**	**REM**	**OLS**	**FEM**	**REM**	**OLS**	**FEM**	**REM**
EPS	0.00263***	0.00132***	0.00195***	0.00258***	0.00143***	0.00194***	0.00242***	0.00115***	0.00175***
BV	0.615***	0.822***	0.747***	0.544***	0.673***	0.654***	0.503***	0.553***	0.602***
_cons	-1.635**	-2.461*	-2.496***	-1.420**	-1.18	-1.961**	-0.487	1.423	-0.789
N	2080	2080	2080	2080	2080	2080	1664	1664	1664
R-sq	0.482	0.4586	0.4754	0.498	0.4813	0.4920	0.462	0.4440	0.4552
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman testing (p-value)		0.0000			0.0000			0.0000	

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

Table 6. Results with Dependent Variable of PA at $t_{9,}$ t_{12}

	Dependent Variable of PAt_9			Dependent Variable of PAt_{12}		
	OLS	**FEM**	**REM**	**OLS**	**FEM**	**REM**
EPS	0.00249***	0.000980***	0.00170***	0.00250***	0.000806***	0.00161***
BV	0.556***	0.580***	0.666***	0.584***	0.634***	0.712***
_cons	-1.166	1.747	-1.39	-0.85	2.012	-1.187
N	1664	1664	1664	1664	1664	1664
R-sq	0.461	0.4375	0.4528	0.459	0.4251	0.4490
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman testing (p-value)		0.0000			0.0000	

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

Table 7. Results with Dependent Variable of P at $t_{0,}$ $t_{3,}$ t_6

	Dependent Variable of Pt_0			Dependent Variable of Pt_3			Dependent Variable of Pt_6		
	OLS	**FEM**	**REM**	**OLS**	**FEM**	**REM**	**OLS**	**FEM**	**REM**
EPS	0.00263***	0.00132***	0.00195***	0.00331***	0.00182***	0.00244***	0.00269***	0.00128***	0.00191***
BV	0.615***	0.822***	0.747***	0.692***	0.858***	0.837***	0.557***	0.574***	0.661***
_cons	-1.635**	-2.461*	-2.496***	-1.947**	-1.621	-2.647**	-0.472	2.333	-0.622
N	2080	2080	2080	2080	2080	2080	1664	1664	1664
R-sq	0.482	0.4586	0.4754	0.492	0.4753	0.4857	0.465	0.4499	0.4583
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman testing (p-value)		0.0000			0.0000			0.0000	

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

Table 8. Results with Dependent Variable of P at $t_{9,}$ t_{12}

	Dependent Variable of Pt_9			Dependent Variable of Pt_{12}		
	OLS	**FEM**	**REM**	**OLS**	**FEM**	**REM**
EPS	0.00286***	0.00115***	0.00200***	0.00283***	0.000965***	0.00185***
BV	0.637***	0.675***	0.761***	0.654***	0.726***	0.799***
_cons	-1.380*	1.71	-1.684	-0.995	1.834	-1.426
N	1664	1664	1664	1664	1664	1664
R-sq	0.458	0.4348	0.4503	0.462	0.4288	0.4518
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman testing (p-value)		0.0000			0.0000	

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

However, before analysing factors affecting stock prices, we test heteroscedasticity, multicolinearity, autocorrelation.

+ Heteroscedasticity testing: we use Modified Wald Test for knowing whether or not exist of heteroscedasticity.

Ho: no heteroscedasticity; H1: heteroscedasticity existence

If P value <0.05 meaning that we reject Ho and accept H1. Basing on the Table 9, P value < α=0.05. So we reject Ho. After testing 10 models with P value = 0.000 < α=0.05. It means that there is non existence of heteroscedasticity. So we run GLS.

Table 9. Testing Variance Existence (FEM)

Model No.	Dependent Variables	Independent Variables	P_value	Conclusion
1	**PAt_0**	EPS, BV	0.0000	Variance change
2	**PAt_3**		0.0000	Variance change
3	**PAt_6**		0.0000	Variance change
4	**PAt_9**		0.0000	Variance change
5	**PAt_{12}**		0.0000	Variance change
6	**Pt_0**	EPS, BV	0.0000	Variance change
7	**Pt_3**		0.0000	Variance change
8	**Pt_6**		0.0000	Variance change
9	**Pt_9**		0.0000	Variance change
10	**Pt_{12}**		0.0000	Variance change

+ Multicolinearity testing: for detecting whether or not existing multicolinearity, we use Varian Inflation Factor (VIF). If VIF>10, multicolinearity may exist (Hair *et al*, 1995).

Table 10. Regression Result of VIF with Dependent Variable of PA

	PAt_0	**PAt_3**	**PAt_6**	**PAt_9**	**PAt_{12}**
PA	1.93	1.99	1.86	1.85	1.85
EPS	2.11	2.17	2.06	2.04	2.03
BV	1.91	1.9	1.8	1.81	1.82
Mean VIF	1.98	2.02	1.91	1.9	1.9

Table 11. Regression Result of VIF with Dependent Variable of P

	Pt_0	**Pt_3**	**Pt_6**	**Pt_9**	**Pt_{12}**
P	1.93	1.97	1.87	1.84	1.86
EPS	2.11	2.16	2.07	2.04	2.03
BV	1.91	1.89	1.8	1.81	1.82
Mean VIF	1.98	2.01	1.91	1.9	1.9

+ Autocorrelation testing: we use Wooldridge test for knowing whether or not autocorrelation existence.

Ho: no autocorrelation

H1: autocorrelation existence

If P value <α = 0.05, we reject Ho and accept H1, meaning that autocorrelation exists. The results of testing 10 models show that P value < α = 0.05, Ho is rejected, meaning that variables in models are autocorrelated.

Table 12. Wooldrige Testing for Autocorrelation

Model No.	Dependent Variables	Independent Variables	P_value	Conclusions
1	**PAt_0**	EPS, BV	0.0000	Autocorrelation existence
2	**PAt_3**		0.0000	Autocorrelation existence
3	**PAt_6**		0.0000	Autocorrelation existence
4	**PAt_9**		0.0000	Autocorrelation existence
5	**PAt_{12}**		0.0000	Autocorrelation existence
6	**Pt_0**	EPS, BV	0.0000	Autocorrelation existence
7	**Pt_3**		0.0000	Autocorrelation existence
8	**Pt_6**		0.0000	Autocorrelation existence
9	**Pt_9**		0.0000	Autocorrelation existence
10	**Pt_{12}**		0.0000	Autocorrelation existence

+ GLS regression: after conducting regression and testing models, FEM is chosen as a suitable model. Then we run GLS for repairing deficiencies in the model.

Table 13. GLS Regression with Dependent Variable of PA

	PAt_0	**PAt_3**	**PAt_6**	**PAt_9**	**PAt_{12}**
EPS	0.00105***	0.00127***	0.00129***	0.00122***	0.00114***
BV	0.604***	0.549***	0.495***	0.551***	0.603***
_cons	-0.984**	-1.010**	-0.278	-0.926**	-0.767*
N	2080	2080	1664	1664	1664
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

Table 14. GLS Regression with Dependent Variable of P

	Pt_0	Pt_3	Pt_6	Pt_9	Pt_{12}
EPS	0.00105***	0.00165***	0.00146***	0.00142***	0.00119***
BV	0.604***	0.691***	0.556***	0.641***	0.737***
_cons	-0.984**	-1.298***	-0.303	-1.175**	-1.334***
N	2080	2080	1664	1664	1664
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000

t statistics in brackets * p<0.1, ** p<0.05, *** p<0.01

The data in Table 13 and 14 show that in the period from 2012 to 2016, EPS has an active impact on the stock price in different times with significant level of 1%. EPS coefficient is from 0.00105 to 0.00129 in Table 13, meaning that, is other factors unchanged, EPS increases (or decreases) 1 Vietnamese dong, it makes PA increase (or decrease) from 0.00105 to 0.00129 dong. EPS coefficient is from 0.00105 to 0.00165 in Table 14, meaning that EPS increases (decreases), if other determinants unchanged, it makes P increase (decrease) from 0.00105 to 0.00165 dong. So EPS has a slight impact on stock prices. This finding is also in agreements with that of Naimah (2012), Shamki (2012), Nguyen (2009), Tran (2013).

It can be seen from Table 13 & 14 that BV has a positive impact on PA, P with significant level of 1%. Specifically, BV coefficient is from 0.495 to 0.604 in Table 13, meaning that if other factors unchanged, BS increases (decreases) 1 Vietnamese dong, PV increases (decreases) from 0.495 to 0.604 dong. In the Table 14, BV coefficient is from 0.556 to 0.737, meaning that other determinants unchanged, BV increases (or decreases) 1 dong, P increases (or decreases) from 0.556 to 0.737 dong. This finding agrees with other findings conducted by Perera & Thrikawala (2010), Khanagha (2011), Omokhudu & Ibadin (2015), Osundina *et al* (2016), Khana (2014), Nguyen (2016).

Using the model of Ohlson (1995) or Ohlson model adjusted to Aboody *et al* (2002), the results are homogeneous in the context of Vietnam for the period from 2012 to 2016.

6. Conclusion

In this empirical study, panel data has been used with 2,080 observations in 416 listed forms in Vietnam Stock Exchange for the period from 2012 to 2016. OLS, FEM, REM were run with independent variables of EPS and BV. FEM is assessed as the most suitable model, basing on the testings of F and Hausman, and employed for evaluating the impacts of independent variables on stock prices. However, FEM has some deficiencies such as variance change & autocorrelation. So GLS was used for reducing deficiencies of the model. Basing on GLS testing, EPS and BV have positive relationship with the stock prices. Based on this finding, some implications are given as:

The first, to investors: before making economic decisions, investors need to care accounting data because, to some extent, they affect the stock prices such as item of EPS. However,

investors should find information of stock book value in different sources other than only in the financial statements.

The second, the relationship between accounting numbers and stock prices are well explained in the end of three months after year end. At the end of March is also the deadline that annual financial statements are submitted.

The third, financial data should be presented in the financial statements in complete and timing manners. Complete and timing disclosures of financial data in financial statements, auditors' reports, management representations will make beliefs from stakeholders including investors.

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