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AN ANALYSIS OF CLEAN SURPLUS VALUATION MODEL IN NIGERIAN LISTED STOCKS

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ABSTRACT

The study empirically investigates the validity of the clean surplus valuation model in twenty nine selected Nigerian listed stocks. Using a panel co-integration approach, secondary data are collected from the annual reports of selected non-financial firms for the period 2011 to 2017. Analyses include the use of descriptive statistics, panel regression, unit root test and the Hausman test using E-view 8.0 software. Result supports the applicability of the clean surplus model to selected listed Nigerian stock for the period covered. Our result also affirms the assertion that the model is effective for short horizons. We suggest that further researches should introduce other variables to the model to ameliorate the deficiency of having high predictive ability in the short run only. This could improve its ability to predict for longer horizons.

Keywords: Ohlson, Valuation, stock prices, clean surplus, abnormal earnings
(JEL Classification: G14; G32; G11)

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Introduction

The price of stocks is a major issue of concern for capital market participants all over the world. The quest for a reliable model explaining variations in stock prices has generated researches among academics and professionals over time. Of the several models available, the Ohlson clean surplus model has gained popularity in recent times as it provides a theoretical framework for equity valuation based on certain fundamental information from financial report. Proponents of the clean surplus valuation model assert that the book value of equity and the discounted future abnormal earnings provide explanation for the changes in security prices. The model shows that the intrinsic value of a firm's stock can be articulated in terms of the original book value of stock, plus the discounted present value of infinite abnormal earnings beyond that investment (Ohlson (1995); Feltham & Ohlson (1995)). The popularity of the model in capital market accounting research stems from the value relevance of the financial information captured by the model in the prediction of stock prices.

The predictive ability of the model have been severally applied to and tested in stock markets in developed economies (0'Hanlon (1996); Lee & Swaminathan (1998); Liu, 2000; Spilioti & Karathanassis (2002); Valdes & Vazquez (2010); Lee, Chen & Tsa (2014)). Paucity of researches testing its validity exists in developing countries especially in Sub-Sahara Africa, where capital markets are highly imperfect and securities prices erratic. The study therefore seeks to replicate such study using data from the Nigeria Stock Exchange.

Following the crash of most stock prices in the Nigerian stock market in 2008, a high level of uncertainty and controversy now exist on what really determines the market prices of stocks in Nigeria. Using data from three years after the stock market crash (2011-2017) in verifying the validity of a firm's book value and the present value of its future abnormal earnings as explanatory variables of future stock prices documented by the Ohlson model, the result of this study will provide insight on the probable significant cause of the bearish market trend in the Nigerian stock market in recent times, whether firm specifics (variables in the Ohlson's clean surplus valuation model) or by some external factors like regulation quality and macro-economic influences.

The objective of the study is to empirically investigate the valuation relevance of the Clean Surplus Valuation Model in predicting stock prices of quoted firms in the Nigerian Stock market; and verify the validity of the assertion that the explanatory power of clean surplus model is effective for limited horizons.

The study covers 29 non-financial Quoted firms in the Nigerian stock market for a period of seven years 2011-2017, following the crash of prices in the market.

Review of Empirical Literature

Previous empirical researches in the fields of accounting and finance, have repeatedly emphasize the significant roles, book value and discounted future abnormal earnings play in the determination of the price of equity. Shortly after the Ohlson model, Bernard (1995) applied regression analysis in measuring the explanatory powers of book value, abnormal earnings and forecasted dividends and forecasted abnormal earnings. Their findings indicates that 29% of equity returns is explained by dividend alone while a combination of abnormal earnings and book value explained 68% of stock price variation.

Penman and Sougiannis (1998) used US listed equities, to ascertain the validity of valuation methods based on dividend, cash flow, and abnormal earnings estimates. Their finding indicates a high degree of prediction accuracy for abnormal earnings estimates compared to other variables. Free cash flow variable were identified as having the least predictive accuracy on firm value. Similarly, Lee and Swaminathan (1998) looked at the possibility of using both traditional indices (based on dividends, book to market, earnings) and variables of the Ohlson's model in predicting stock returns for US firms. Their result revealed a low return predictability for the traditional indices and finds the predictive ability for variables of the Ohlson's model.

Francis, Ohlson, Oswald (2000) compare the reliability of value estimates from the dividend, earnings, and abnormal earnings models for the US equity market. Their findings reveal and uphold the accuracy of the abnormal earnings in explaining variations in stock prices over other variables in the model. Also, Spilioti and Karathanassis, (2002) result using evidence from the Athens stock market, indicates that the predictive ability of the Ohlson model is not

significantly different from the predictive ability of traditional valuation models for the sampled firms.

For Liu (2000), the Ohlson model was tested using Canadian data. Result shows that the model is a sound predictor of a firm's stock price and that it is best for a limited horizon. He advocated for the construction of portfolio for profitable trading strategies. The model was found to be both theoretically and empirically valid for Canadian stocks. Qi, Wu and Xiang (2000) examine the co-integration existing mong the key variables of the Ohlson model using the Engel and Granger approach. They used panel data from 99 US firms for the period 1958 to 1994. Their findings reveal that book value and residual income demonstrated non-co-integration with market value for about 80% of the sampled US firms.

Ota (2001) tests the validity of the clean suplus model for 674 Japanese firms for the period 1965-1998. Result reveals that the Ohlson model is valid for Japanese stocks in explaining contemporaneous stock prices and in predicting stock returns. Swartz (undated) looks at 129 listed firms in the Johannesburg Securities Exchange for the period 1992-2003, with a view to examining the soundness of Ohlson (1995) valuation model for firms quoted in the Johannesburg exchange. Using a panel data approach, he arrived at a positive and statistically significant effect for each explanatory variable (earnings, book value, and abnormal dividends) in the stock value determination of firms.

Segal and Callen (2005) x-rayed the validity of the ohlson (1995) model by interpreting the ambiguous ‘‘other information’’ variables as variables revealing expectation or speculation of investors. Panel data obtained from Compusta for 1990 to 2001 were collected and analysed using, non-parametric estimation, reverse regressions and portfolio regressions. Their empirical analysis suggests that any model that's fails in adequately accounting for these frictions will find it almost impossible in explaining stock prices.

Spilioti and Karathanassis (2005) empirically tested the clean suplus valuation model using data for firms quoted in the London stock exchange. Using a panel data analysis, data from the food and pharmaceutical sectors for the period 1996- 2000 were analysed. Result reveals that the model has high explanatory power in both sectors investigated.

Valdes and Vazquez (2010) used cointegration techniques in investigating the relationship existing among variables of the clean surplus model for Mexican firms. Using quarterly data for 1997 to 2008, the result shows that there exists an individual co-integration relationship among variables in the commercial and food/beverage sectors. Variables didn't cointegrate for firms in the construction sector.

Lee, Chen and Tsa (2014) adopt a panel co-integration approach in testing the validity of the Ohlson model, using listed firms in the United States for the period 1996 to 2004. Analyses reveal that the model can forecast future price movement more than other valuation model in any predicted horizon.

Design and Methodology

This study used an expost-facto research design; and, adopts a Panel co-integration Regression analysis, using data with both time series and cross sectional properties. Although the study population covers all firms Quoted in the Nigerian Stock Exchange, the study will focus on 29 non-financial quoted firms for the period 2011 – 2017. Secondary data are source from the annual financial statements of selected firms and the Nigerian stock exchange fact book. Our study follows the valuation perspective of the Ohlson model (which involves the use of book values and earnings as explanatory variables in predicting the prices of stocks).We seek to analyze the clean surplus valuation model using Nigerian listed stocks by ascertaining the co-integration effects among the various variables of the model.

Model Specification

In line with Ohlson (1995); Feltham and Ohlson (1995), the model of the study is given below as

$MPR = \alpha + \beta_1 BEt + \beta_2 Aet$ ……. (1)

The proposed long-run estimated model in this study is given below:

$MPR_t = \alpha_0 + \beta_1 BE_t + \beta_2 AE^{\alpha t} + \beta_3 AE^{\alpha t+1} + \beta_4 AE^{\alpha t+2} + \beta_5 AE^{\alpha t+3} + \beta_6 AE^{\alpha t+4} + \beta_7 AE^{\alpha t+5} + \varepsilon t$……. (2)

Where:

i. MPR is Market price per share
ii. BE is unit Book value of equity
iii. AE is Abnormal earnings
iv. α_0 = Constant (Intercept)
v. $\beta_1\ \beta_2\ \beta_3\ \beta_4\ \beta_5\ \beta_6\ \beta_7$ – Coefficients
vi. t = year under consideration

Empirical review of our variables gives the *Apriori* expectations as:

$\alpha_0 > 0$; $\beta 1, \beta 2, \beta 3, \beta 4, \beta 5, \beta 6, \beta 7$

Table 1: Description of Variables

Variables	Nature	Notation	Measurement	Source/ Justification
Market Price	Dependent	MPR	Market price per share calculated as the arithmetic average of monthly average closing prices	Spilioti and Karathanassis (2005)
Book Value	Independent	BE	is the owners' equity divided by the number of stocks in circulation,	Spilioti and Karathanassis (2005)
Abnormal earnings	Independent	AE	the difference between current earnings and the opportunity cost of capital. Where the opportunity cost is the previous period's BV times the cost of capital (that is, the risk-free rate). The cost of capital (risk free Treasury bill rate), Annualized T-bill rates are used as discount rates to calculate the present values of future abnormal earnings.	Spilioti and Karathanassis (2005)

Methods of Data Analyses

On the condition that the data set is stationary and integrated of the same order, the Engle-Granger two stage co-integration technique is used in determining the presence of a long-run relationship between the explained variable and each of the various independent variables. The study involves analyses like descriptive statistics, panel unit root test, Breusch–Godfrey serial correlation test as well as the Hausman test for fixed and random effect.

Results and Discussion

Table 2: Descriptive Statistic

	MPR	BE	AE
Mean	56.51124	10.55398	-66.54771
Median	12.08000	4.850000	-17.61000
Maximum	1200.000	51.22000	45.21000
Minimum	0.500000	-0.040000	-1280.920
Std. Dev.	152.7191	11.75890	155.7123
Skewness	5.191646	1.518164	-4.516087
Kurtosis	32.26055	4.373435	28.55219
Jarque-Bera	8073.436	93.00947	6151.393
Probability	0.000000	0.000000	0.000000

Source: Authors computation using E-views (2018)

The variables have little disparity from their corresponding mean since the ratio of mean to median is approximately one. There is a significant variation between maximum and minimum values. All variables skewed to the right (except for AE) from their corresponding mean. All variables possess a peaked distribution properties as indicated by the corresponding Kurtosis value that is greater than three (3). The Jarque-Berra statistic indicates that all the variables captured in this study are not normally distributed with their significant probability value at 5% level of significance. This called for the variables to be subjected to unit root test before further analyses.

Table 3: Stationarity Test

	Augmented Dickey Fuller (ADF)			**Philip-Peron (P-P) Unit Root**		
Variables	ADF Stat	Order	Remark	P-P Stat	Order	Remark
MPR	81.5333*	1(0)	S	66.2223*	1(0)	S
BE	65.7691*	1(0)	S	63.2872**	1(0)	S
AE	67.1298*	1(0)	S	63.7095	1(0)	S
S = Stationary						
*, ** indicates stationary at 1% and 5% respectively						

Source: Authors computation using E-views (2018)

Both the ADF and P-P unit root test clearly reveals that all the variables considered in the model attained stationarity at levels 1(0). Thus, the variables are fit to and can be used for the panel regression analysis.

Co-integration Test

The Pedroni test that is Engle and Granger based co-integration test was used to ascertain the existence of a long run relationship between the variables under consideration; the result is presented in table 4.3.

Table 4: Panel Co-integration Tests

Pedroni Residual Cointegration Test				
Estimation	Statistic	Prob	Weighted Stat	Prob
Panel v-Statistic	-2.709550	0.9966	-5.488692	1.0000
Panel rho-Statistic	2.521200	0.9942	6.932855	1.0000
Panel PP-Statistic	-5.664153*	0.0000	13.11554	1.0000
Panel ADF-Statistic	-5.723244*	0.0000	-2.751407	0.0030
**stationary at 1% level of significance*				

Source: Authors computation using E-views (2018)

From the Pedroni Residual test only the panel ADF and PP-stat rejects the null hypothesis that no co-integration exist in the relationship between variables. This means the variables converge in the long run, that is any variable that deviate after short run shock with adjust back to equilibrium in the long run.

Table 5: Panel Regression Result

	Fixed Effect Method (FEM)			**Random Effect Method (REM)**		
Variable	**Coefficient**	**t-Statistic**	**Prob.**	**Coefficient**	**t-Statistic**	**Prob.**
C	35.53322	2.680500	0.0140	3.080277	0.656853	0.5143
BE	1.084493	1.004639	0.3265	-0.021928	-0.040041	0.9682
AE	0.000910	0.023605	0.9814	-0.123105*	-4.533565	0.0000
AE(1)	0.123022*	2.222932	0.0373	-0.008698	-0.181204	0.8570
AE(2)	-0.014276	-0.224806	0.8243	-0.188285*	-5.659961	0.0000
AE(3)	-0.080562	-1.462077	0.1585	-0.091419*	-2.869839	0.0060
AE(4)	0.072219	0.884001	0.3867	-0.115350*	-8.904663	0.0000
AE(5)	-0.003322	-0.145167	0.8860	-0.038589*	-2.228075	0.0305
R-squared	0.849971			0.878426		
Adjusted R-squared	0.825923			0.861059		
F-statistic	391.8370			50.57826		
Prob(F-statistic)	0.000000			0.000000		
D.W Stat	2.391034			1.555848		

HAUSMAN TEST			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	54.695893	7	0.0000

**stationary at 1% level of significance*

Source: Authors' computation using E-views (2018)

While we carried out fixed and random effect regression estimation, the Hausman test was carried out on the random effect estimate to choose between the fixed and random effect. The outcome of the test shows that the Chi-square statistic of 54.70 approximately is significant at 1% level to undermine the efficient and predictive power of random effect coefficient estimate. Thus, the fixed effect estimation is preferred. Our results also indicate the existence of some individual co-integration relationship among variables.

With an R-Square of 0.849971, After adjusted for degree of freedom, the model still account for about 83 % of total systematic changes in market prices of stocks by all the explanatory variables taken together as indicated by the Adjusted R2 value of approximately 83%. As only about 17% of these systematic changes in stock market prices was not accounted for by the model, thereby resorting to the stochastic error term to provide explanation for such changes. The implication of this is that the model has a good fit of the regression line and an adjusted R-Square of 0.825923 shows the dependent variable (market price) is well accounted for by the explanatory variables. Hence, upholds the validity of the clean surplus valuation model in the sampled Nigerian firms.

Discussion of Findings

1. The result of the study validates a high predictive ability of the clean surplus valuation model in the determination of stock prices among quoted firms in the Nigerian Stock market. The study is in tandem with the results of Ota (2001), Liu (2001).
2. From the fixed effect result, AE (1) was seen to have a positive and substantial influence on the present market price of stock. The assertion of the short horizon predictive ability of abnormal earnings hold true for sampled firms.
3. Abnormal earnings after one year AE (1) were not significant determinants of stock market price.
4. The relationship between the market price of shares and abnormal earnings for year t+2, t+3, t+5 were negative. This negates the apriori of the ohlson model which states a positive nexus between all explanatory variables and the explained variable in the model. This abnormality could provide explanation for the bearish and unstable nature of Nigerian stocks since the stock market crash of 2008.

Conclusion and Recommendations

The study is focused on testing the ability of variables in the Ohlson clean surplus valuation model to determine share prices in Nigeria for the period 2011-2017. Using co-integration technique, the fixed effect panel regression result revealed a positive nexus between market price and book value, Abnormal earnings of year t, t+1, t+4. The relationship that exist between market price of shares and abnormal earnings for year t+2, t+3, t+5 were negative. Abnormal earning for year t+1 had significant effect on the market prices of samples stocks.

Our study must be viewed with caution as the study covers only stocks of non-financial quoted firms in Nigeria.

Based on this finding, we hereby recommend that:

i. Portfolio managers and Investment analysts could use the clean surplus model in advising clients and selecting the composition of portfolios.
ii. This Ohlson model should be used for decision making by investors because it is viable for short horizons, using the model would limit forecast errors associated with models used for long horizons.

Further studies may therefore examine the applicability of the Ohlson model in Nigerian quoted financial firms. Studies could also introduce other variables to the model to ameliorate the deficiency of having high predictive ability in the short run only. This could improve its ability to predict for longer horizons. The perception of investment analysts and speculators could also be sampled on the extent to which book value and abnormal earnings determine share price.

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