
**PRICE LEVEL CHANGES AND FINANCIAL ACCOUNTING MEASUREMENT:
EMPIRICAL EVIDENCES FROM NIGERIA**

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ABSTRACT

This study discusses the impact of price level changes on financial accounting numbers. Previous studies on the subject have merely reproduced historical financial statements alongside 'inflation-adjusted' financial statements without any scientific methodology and empirical analyses to allow for reliable conclusions. It is this major gap that this study seeks to fill. A sample of ten firms was drawn for period between 2001-2010. The OLS regression estimated at nominal and adjusted levels in two separate models showed that both models have a high goodness of fit (R^2). However, the adjusted estimate exhibited a higher explanatory power and thus shows a better fit. This suggested that adjusted accounting estimates may after all be able to provide better and more realistic insight into a firm's state of affairs. The study recommends that historical financial accounting information should be presented side-by-side with their corresponding adjusted financial statement to disclose the effect of price level changes. Additionally, the Financial Reporting Council of Nigeria and other regulatory agencies should as a matter of necessity set up a system of accounting for price level changes to enhance the value relevance of accounting information.

Keywords: price level changes, value relevance, accounting information, inflation

INTRODUCTION

Accounting for price-level changes also referred to as inflation accounting is a financial reporting procedure which records the consequences of inflation on the financial statements that a company prepares and publishes at the end of the financial year, which is based on the assumption of a stable currency. The 1970s and 1980s were exciting period for accountants who welcomed change. The extremely high rates of inflation that were a feature of the period posed a considerable challenge to the traditional historically based financial accounting model. Within a period of less than twenty years, the professional accountancy bodies turned from conservative advocates of the historical cost *status quo* to radical reformers, urging the introduction of new systems and ideas. As the dragon of inflation was tamed, the urge for radical change dimmed, but reform did not come to an end. The challenge to the conventional wisdom that historical cost accounts were all one needed did not go away. The theoretical debate about the nature and purposes of financial accounting that accompanied attempts to take account of changing prices and the discussions about the merits of different models of measurement continued, to a large measure, in the area of standard setting. While the attempt to introduce a new orthodoxy based on the adoption of a system of financial accounting that comprehensively and systematically takes account of changing prices, general, specific or both, was halted via the withdrawal by the Financial

Accounting Standards Board (FASB) of its standard on Accounting For Price Level Changes. Financial accounting information in periods of rising prices has been criticized on the grounds that it reflects a number of dated monetary units while the value of the monetary unit is changing. According to Hughes, Liu, and Zhang (2004), inflation creates earnings illusion as an artifact of the mismatching of expenses based on allocations of historical costs with current revenues in determining earnings. This mismatching distorts mappings of aggregate earnings and book values into equity value such that value-relevant information is lost. This argument is replete with criticisms as Jofa (1982); Mosich and Larsen (1982); Chambers (1975a); Niehans (1978) offer support for such criticisms. While accounting for price level changes is not on the FASB's agenda, this area of research is much too vital to be ignored or abandoned. The recent issuance of International Accounting Standard (IAS 29) on Financial Reporting in Hyperinflationary Economics by the International Accounting Standards Board (IASB) has again brought to the fore the need for accountants to present financial statements to reflect the market realities rather than the historical values so as boost the value relevance of financial accounting information. In a period of general inflation, the relevance of historical costs is brought into question because they do not reflect consistently the current financial position or recent performance of the firm. In so far as historical costs are established at different dates, when the currency unit represented different real purchasing power, it can be argued that accounts drawn up on this basis create the fundamental measurement error of aggregating heterogeneous measurement units and thus, such financial statements are not value relevant in making informed decisions by various users of accounting information. Therefore, there is a need to restate the financial statements to capture the prevailing economic realities in the firms to disclose the current performances and positions of the firms in concomitant with the dynamics of the measuring unit. This forms the nexus between financial accounting measurement and price-level changes.

Suffice it to note that previous studies on values relevance of accounting information have focused on historical accounting data in estimating share price movement. To the best of our knowledge, no study has adjusted the historical data for price level changes to determine if a significant relationship exists between historical accounting estimates and inflation-adjusted accounting estimates in share price determination. It is against this backdrop that this study attempts to carry out a comparative analysis of the value relevance of accounting information to ascertain if the *a priori* expectation that inflation-adjusted financial statements approximate more accurately the market realities holds true.

Given the foregoing, the study seeks to answer the following questions:

- Does the difference between dividend per share adjusted for price level changes and historical dividend per share alter significantly the value relevance of accounting estimate?
- Does the difference between earnings per share adjusted for price level changes and historical earnings alter significantly, the value relevance of accounting estimate?

The objective of this study is to establish if the differences in inflated-adjusted and historical dividends per share and earnings per share will significantly alter the value relevance of these accounting numbers. The paper is partitioned into five sections. Besides the foregoing introduction, section two discusses the materials and method. Section three focuses on empirical result. Section four harps on the discussion of the results and hypotheses testing. This is followed by section five, the concluding part of the study.

MATERIALS AND METHOD

Literature Review and Hypotheses Development

Currently, there is a clear dissatisfaction with the traditional accounting model which is based on historical costs. This dissatisfaction stems from inflation, a phenomenon that is increasingly significant in the modern business environment. The effects of inflation on the traditional accounting model and the financial statements which are produced by this model are particularly problematic, with various users of financial statements finding some inadequacy peculiar to their own needs. Managers are unhappy with the traditional model in an inflationary economy because it does not distinguish between real performance measurement and changes in the value of measuring unit. Investors are dissatisfied because the model fails to distinguish between two identical firms (in terms of listed naira value of assets) whose assets were purchased at different time (with different currency values). Similarly, academicians are bothered by the lack of accurate reporting of income as a result of the conundrum of price level changes. The accusations of inadequacy are perhaps one strong factor in recent criticism of the accounting profession. Some critics argue that inflation accounting is a form of unwarranted 'creative accounting'. What is however clear from these criticisms is what the stakeholders feel about the quality and accuracy of organizations as presented by directors, nay accountants. It is against the foregoing background that this section is devoted to x-raying the relevant literature and conceptual framework which are germane to the *locus classicus* of price level changes and financial accounting measurement.

Share Market Price

The market price of the share is mainly determined by the forces of demand and supply of a particular security in the market (Malhtra, 1987, Piotrosbi D Joseph. Et al. 2004; Zakir and Khanna,1982). According to Sharma(2011), the market price reflects the collective wisdom and knowledge of the market. The price of a share at a particular moment represents the balance struck between the buyers and sellers. Daily price fluctuations arise because of changes in the buying and selling pressure. Due to these fluctuations it becomes difficult to decide as to which market price should be regressed as a measure of dependent variable. In the present study, arithmetic means of high and low market price of share during the financial year of the firm has been taken. Mathematically it is calculated as: $P = \frac{PH + PL}{2}$ Where PH is the greatest market price, PL is the lowest market price during the year which relates to the 't' period.

Share Price and Earning Per Share

The equity shareholders are the sole claimant to the net earnings of the corporation after making payment of dividend to the preference share-holders. The earnings per share is one of the best measures of profitability. It also helps in projecting the value of security, which depends upon the expected future benefit and risk associated with it. Higher the magnitude of expected future benefits, higher will be value of a security and vice versa.

The increasing earnings per share generally indicates the growth of a company and resulting in high market price.

The earnings per share is arrived at as follow:-
$$\text{EPS} = \frac{\text{Net Profits after Tax} - \text{Preference Dividend}}{\text{Number of Equity Shares Outstanding}}$$

The earnings per share has a positive relationship with market price, i.e., higher the earning per share, higher will the market price. (Ball and Brown 1968; Baskin 1989).

Kam (1990) claims that the income statement is the most important financial report since it reveals results of the operations in a firm. Ball and Brown (1968) stated early the great importance of income statements. Their empirical findings indicate that fifty percent of all available information about a firm is captured in the income statement. Several researchers throughout time have made supportive conclusions about the information content in earnings reports (e.g., Beaver, 1968; Collins, et.al, 1997; Lev & Zarowin, 1999). Lev and Zarowin (1999) introduce two ways in measuring value relevance of accounting information, the measure of explanatory power R² and the combined ERC (earnings response coefficient). R² is a measure generated from the regression analysis and enables to interpret the degree of the association between stock returns and earnings. Combined ERC is defined as the sum of the slope coefficients of the level and change of earnings measuring the sensitivity of the stock price to earnings. This measure reflects the average change in the stock price associated with a dollar change in earnings. A low slope coefficient suggests that reported earnings are not particularly informative to investors. In contrast, a high slope coefficient indicates that a large stock price change is associated with reported earnings reflecting investor's belief that earnings are long run earnings power of the firm (Lev & Zarowin, 1999). There are two empirical regression models that are widely used among researchers; price regression and return regression (e.g., Francis & Schipper, 1999; Collins et al., 1999; Lev & Zarowin, 1999; Gjerde et al., 2005). Price regression represents the stock price as the dependent variable where earnings (often quoted in earnings per share (EPS)) are the independent variable.

The alternative return regression is often applied in addition to price regression where abnormal stock return is denoted as the dependent variable, and the variability in the regression model is explained by the independent variable of unexpected earnings. In addition, some researchers estimate return regression where return received act as the dependent variable and earnings and change in earnings act as independent variables. This

paper considers only price regressions. Easton and Harris (1991) suggest that earnings are an explanatory variable for returns. To confirm the level of earnings and the variability in earnings explaining stock returns, they performed a multiple cross sectional regression of annual returns. Their findings show a significant coefficient on earnings in all 19 years, while the coefficient on the variability in earnings is significant in less than half the years. Studies investigating the relationship between abnormal returns and unexpected earnings might mitigate the effect of measurement errors by including both earnings level and earnings change variables as measures of unexpected earnings (Easton & Harris, 1991). They assumed in this setting that both earnings variables measure unexpected earnings with errors.

Change in the value relevance of earnings has been investigated in several studies. Collins, Maydew and Weiss (1997) performed an annually cross sectional regression over a 40 year period and concluded that the incremental value relevance of earnings declined over the time period 1953-93. Collins et al. explained the decline in earnings by a shift in value relevance from earnings to book value driven by increasing frequency of onetime items, increasing frequency of negative earnings, intangible development and increasing average firm size. Lev and Zarowin (1999) show supportive evidence of a declining association between reported earnings and stock return. Lev and Zarowin performed a cross sectional regression to measure the association between change in earnings and stock return over a 20 years's time period in the U.S. Their findings show decrease in the relationship between stock returns and earnings measured by R² in the 1977-96 period from 6-12% in the ten first years to 4-8% in the last ten years. They reported that earnings account for only 5% to 10% of the variation in stock returns in year by year intervals.

Kormendi and Lipe (1987) conclude earlier that poor return earnings association was due to a lack of earnings persistence. Their results suggest that stock returns are not excessively sensitive to earnings innovations. Easton and Harris (1991) claimed that prior research studies had a lack of a long term perspective. They empirically indicated that the issue of poor return earnings association might be an explanation of applying only short-run data. Empirical testing confirmed their hypothesis that the correlation between returns and earnings will increase using long term accounting data information. Their findings show a dramatically improvement in the return earnings association using long term intervals. An alternative explanation of the poor return earnings association is a matter of model specification, investigated by Beaver, McAnnally and Stinson (1997). They characterize the price earnings relation as a system of a simultaneous equation. In a price regression, the independent variable (earnings) and the dependent variable (price) can act as if they are both endogenously determined because they are affected by information which are explicitly difficult to specify. Beaver, McAnnally and Stinson provide evidence that changes in both the variables, price and earnings, are endogenous implying that a portion of the single equation bias can be mitigated via joint estimation.

Share Price and Dividend per Share

Dividend represents the portion of the profit after tax which is distributed to the shareholders for their investment and risk bearing in a company. The amount of dividend paid to the shareholders depends on the dividend policy option of a company. The stable dividend policy helps in resolving uncertainty from the minds of the investors and also plays an important role in creating a healthy investment climate (Sharma, 2011). The dividend rate of a company has a significant influence on the market price of a share. The dividends generally influence the share price in a positive direction as depicted in earlier empirical works (Gordon 1959, Desai 1965, Irfan and Nishat 2000, Gitmon and Lowrence 2004).

The dividend per share is arrived as follows:

$$\text{DPS} = \frac{\text{Total amount of dividend paid to equity shareholders}}{\text{Number of equity shares outstanding}}$$

Against the background of the reviewed literature, the study raises the following testable propositions which are stated in the null;

- H₁**.The difference between dividend per share adjusted for price level changes and historical dividend per share does not alter significantly the value relevance of accounting estimate.
- H₂**.The difference between earning per share adjusted for price level changes and historical earnings per share does not alter significantly the value relevance of accounting estimate.

Research Design and Data Analysis Method

Conventional value relevance studies have focused on the ability of financial statement to capture and summarize information that affects firm value. However, the research design which is cross-sectional attempts to provide a methodological framework to x-tray the theoretical arguments that resulting from the variance between the economic concept of price indexation and the accounting concept of historical cost, a quantitative heterogeneity could exist and thus has implications on extant studies on informativeness of accounting numbers. Following a vast tradition in accounting research, we extend value relevance studies by juxtaposing inflation adjusted accounting values with their historical cost estimates.

With regards to the methodological design of the study, the study builds on and extends the Ohlson's (1995) model. Ohlson (1995) developed a model to examine the informativeness of book value of shareholders' equity and its current level of earnings. However, such considerations as the inflation effects on such values were not examined. Consequently, the research design will extend the Ohlson (1995) model while computing the inflation adjusted estimates. Thereafter a comparative model analysis between the extended model estimated at the conventional historical cost and the inflation adjusted estimates will be done. The population for this study comprises all companies quoted of the floor of the Nigerian Stock

Exchange for the period ended 31st December, 2009. However in view of the seeming impractical involvement of all the quoted firms, a sample of ten(10) companies shall be selected on a sectorial basis for a period of ten(10) years (2000-2009) to allow for a detail time series and cross-sectional examination of the effect of price level changes on the corporate financials. Random sampling technique will be used for the selection of the proposed sample companies. The reason adduced for this is to allow every quoted company the chance of being selected. Furtherance to this method, a table of random numbers will be used in probabilistically determining the sample companies. This attempt is to eschew any form of subjectivism associated with non-probability sampling technique. Multiple regression analysis will be utilized by the researcher in providing evidence for the theoretical arguments that the price level index as an economic measure of relative and periodic price changes for economically relevant conditions could threaten the informativeness of financial accounting estimates computed on the basis of conventional historical cost principle. The regression analysis will be carried out using the ordinary least squares (OLS) estimation technique. The choice of this technique is predicated on the fact that the sample estimates obtained using the technique represents the Best (minimum variance), Linear, Unbiased Estimate of the population parameters. This is often referred to as the BLUE properties. The justification for the use of this technique is based on the conclusions of Gujarati (2006) that the technique yields the best linear unbiased estimates (BLUE) of the population parameters.

Model Specification

The Ohlson (1995) model will be specified to capture accounting estimates. As stated earlier, the rationale is to examine the theoretical basis that resulting from the difference between the economic concept of price indexation and the accounting concept of historical cost, a quantitative heterogeneity could exist which has implications on the informativeness of the estimates. However, the issue is examining the materiality or otherwise of this heterogeneity. In order to achieve this, a comparative model analysis between the model estimated at the conventional historical cost and the inflation adjusted estimates will be done. Statistical tests derivable from the regression results such as the t-values, the f-test and the goodness of fit test will be employed in examining and reporting the statistical significance of the observed results.

The models are specified thus;

$$P = \beta_0 + \beta_1 \text{ DPS} + \beta_2 \text{ EPS} + U. \text{ ----- (1)}$$

Where p= share price
 DPS=Dividend per share
 EPS=Earnings per share
 U= Error term.

RESULTS

In order to examine if there is a significant bias in the value relevance of accounting numbers computed on historical and inflation adjusted values, the widely used Ohlson (2005) model is adopted.

Dependent variable= share price

Table 1

	Expected Sign	Model 1 (historical values)	Model 2 (Adjusted values)
C		-0.302 (1.82) [-0.17]	-5.04 (13.76) [-0.36]
DPS	+	0.24 (0.06) [3.88]	0.27 (0.05) [5.18]
EPS	+	-0.03 (0.02) [-1.61]	-0.03 (0.01) [-2.20]
R-Squared		0.76	0.85
Adjusted R square		0.57	0.74
f-stat		3.95	7.30
Prob(f)		0.08	0.03
Durbin Watson stat		1.82	2.05
Mean of d.var		4.14	4.14
Standard error of regression		3.13	0.74

Note: () –standard errors [] - t-values
Source: *Researcher’s computation* (2011)

Below is a re-specification of the regression equations with their estimated coefficients and t-values for historical values(equation 1) and adjusted values(equation 2) respectively. The t-values are presented in parenthesis below each parameter estimate.

$$SP = -0.302 + 0.24DPS - 0.03EPS \text{ -----(1)}$$

(1.82) (0.06) (0.02)

$$SP = -5.04 + 0.27DPS - 0.03EPS \text{ -----(2)}$$

(13.76) (0.05) (0.01)

DISCUSSIONS

The finding indicates that the goodness fit (R^2) for both model 1 and model 2 is 0.759 and 0.853 respectively. This is high and thus suggests that both historical and inflation adjusted estimates still explain about 75.9% and 85% of the systematic variations of the dependent variable about its mean. However, the adjusted estimate (model 2) exhibits a higher explanatory power and thus shows a better fit. Consequently, it is likely that adjusted accounting estimates may after all be able to provide better and more realistic insight into a firms "state of affairs". However, a caveat to the statistical inference of the R^2 is that the volatile nature of inflationary pressure especially from developing systems may undermine the stability required for financial projections and planning though the effects is dual depending on the direction of such inflationary pressures. This suggests that the historical values may provide a safe haven for the purpose of analysis and forecasting. The f-statistic which is an indicator of the models predictive capacity and also a statistical test criterion for the goodness of fit shows a value of 3.948 and 7.304 and a Prob (F-statistic) value of 0.082 and 0.0255 for model 1 and model 2 respectively. The Prob (F-statistic) value passed the test of significance at 5% significance level and thus the models are statistically significant. This indicates that despite the computation of estimates at different levels i.e. historical and adjusted values, both models exhibit similar predictive properties and the adjustment factor did not result in any bias at least with reference to the extended (2005) model adopted in the study. There could thus be a need to examine the issues across other models. The slope coefficient of the variables reveals that for dividend per share (DPS) a positive relationship is observed at both measurement levels i.e. model 1 and model 2 and the relationship is also statistically significant at 5% significance level. The finding is consistent with our a priori expectation and implies that DPS is stable irrespective of the computational levels i.e. historical and inflation adjusted. For earnings per share (EPS) a negative slope coefficient is observed for both models and thus the relationship with share price is negative but the result is however statistically insignificant at 5% levels. Though, the relationship could be termed stable irrespective of inflation adjusted effects, the findings contradicts the a priori expectation. The Durbin Watson statistics specifies a value of 1.82 and 2.05 for model 1 and 2 respectively and this does not provide convincing evidence of the existence of considerable stochastic dependence between successive units of the error terms.

H₁. *The difference between dividend per share adjusted for price level changes and historical dividend per share does not alter significantly the value relevance of accounting estimate.*

The result indicates a t-value of 0.6 for DPS at historical level and 0.5 at adjusted level, suggesting a statistical difference between the historical and adjusted accounting estimates. We therefore accept the alternative hypothesis that the difference between dividend per share adjusted for price level changes and historical dividend per share alters significantly the value relevance of accounting estimate.

H₂. *The difference between earning per share adjusted for price level changes and historical earnings per share does not alter significantly the value relevance of accounting estimate.*

Similarly, the result indicates a t-value of 0.2 for EPS at historical level and 0.1 at adjusted level, suggesting a statistical difference between the historical and adjusted accounting estimates. We therefore accept the alternative hypothesis that the difference between Earnings per share adjusted for price level changes and historical dividend per share alters significantly the value relevance of accounting estimate.

CONCLUSION

In general, the results show that historical-cost data overstate the relative financial strengths of firms. The historical cost-based financial estimates for dividend per share and earnings per share are higher than those of inflation-adjusted. The differences are statistically significant. However, the findings suggest that both historical-cost and inflation-adjusted data of earnings per share and dividend per share are value relevant. The explanatory power of market value of equity regression results reveal the fact that inflation-adjusted information is more value relevant than historical cost information. When we measured the information content of inflation-adjusted data against those of historical-cost data, the result showed that inflation-adjusted earnings per share had significant incremental explanatory power over and above the historical-cost earnings per share and dividend per share. Overall, the results show that the two sets of data are not substitutes but, rather, they are complementary. Because of these complementarities, policy makers should require inflation-adjusted data as supplementary data to historical-cost information rather than in place of historical-cost data.

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