IS ACCOUNTING ALCHEMY STILL THE RIGHT MEDICINE FOR FIRM'S EARNINGS AND BOOK VALUE? EVIDENCE FROM SUB-SAHARAN AFRICA

EDESIRI GODSDAY OKORO[1]
https://orcid.org/0000-0002-2762-0504

CHIZOBA M. EKWUEME[2]
https://orcid.org/0000-0002-0852-500X

[1] Delta State University, Abraka, Delta, Nigeria.
[2] Nnamdi Azikiwe University, Awka, Anambra, Nigeria.

ABSTRACT

Purpose: A major thread in accounting literature, which has remained a contentious issue, is how accounting alchemy can be modeled. The paper builds on existing accrual models in proposing an accounting alchemy model and tests if it is still the right medicine for earnings and book value of firms. The accounting alchemy model was based on mechanisms of earnings, book value, earnings before extraordinary items, net profit after tax, cash flow from operations, revenue, and total assets. We modified accrual models on the view that accrual models suggest that incomes/expenses are the most manipulated; contrarily, accounting alchemy proposes that assets are alchemized.

Originality/value: This paper proposes a new empirical model of accounting alchemy and practically assesses the validity of the model in Sub-Saharan Africa, where there are no studies. The proposed accounting alchemy model can be used in Asia, Europe, and other parts of the world to see if the study results can be replicated.

Design/methodology/approach: *Ex post facto* design was used, and secondary data were obtained for selected quoted firms in Sub-Saharan Africa comprising Nigeria, South Africa, and Kenya from 2012 to 2016. A sample of 64 firms was selected in the consumer and industrial goods subsector, and data were analyzed via descriptive (mean, standard deviation, correlation) and inferential (regression, fixed, and random effects) statistics.

Findings: Findings indicated that earnings and book value are significantly affected by accounting alchemy. This implies that accounting alchemy is not the right medicine for firm's earnings and book value. The result has practical application for researchers and the regulatory framework of accounting.

KEYWORDS

Accounting alchemy. Earnings per share. Book value per share. Accounting choices. Sub-Saharan Africa.

1. INTRODUCTION

The misuse of management discretion of accounting choices or alternatives has been an issue of concern not only to accounting and management researchers but to accounting practitioners and regulators. This concern stems from the fact that the globalized reporting framework of accounting (International Financial Reporting Standards – IFRS) permits management to employ dissimilar choices of accounting judgments in adjusting an entity's cash flows. Perhaps, the dissimilar accounting choices have propelled management or preparers of financial statements to employ a seemingly magical practice or process aimed at transforming accounting numbers. Transforming accounting numbers brings about heuristic behaviors that result in individuals relating accounting measures of performance (earnings) with real performance but without unraveling both. A pathway of unraveling accounting measures of performance (hypothetical) and real performance (actual), in fact, gave birth to the concept of accounting alchemy.

Accounting alchemy emerged in the accounting literature prior to the documentation by Verrachia (2009) in the 8th Annual Conference on Financial System and Macroeconomic Resilience by the Bank for International Settlements (BIS). Accompanying the documentation of Verrachia (2009) on accounting alchemy, other researchers, such as Barth (2010) and Cole (2017), contended that accounting measures should portray economic reality as opposed to accounting estimates. Broadly speaking, accounting alchemy is a novel concept that is gradually gaining a firm root as well as a topic for debate and analysis in the accounting literature; however, there is a dearth of empirical model(s) aimed at measuring or estimating accounting alchemy. Verracchia (2009) asserts that accounting alchemy is an enemy of greater transparency in financial reporting, given the fact that it can hinder the pathway towards obtaining transparent and reliable financial reports; however, that accounting alchemy exists, and it is believable and unsettling (Barth, 2010).

Verrecchia (2009), Dobre, Brad, and Ciobanu (2015), and Gnyana (2016) observed that, while opportunism is restricted both by the regulatory framework of accounting and independent auditors, there is much recent evidence in accounting literature suggesting that management of firms engage in accounting alchemy in order to accomplish personal or private gains. This view is further supported by positive accounting theorists like Hagerman and Zmijewski (1979) and Watts and Zimmerman (1986, 1990), advocating a number of reasons why the management of firms engage

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in accounting alchemy in the preparation and presentation of financial statements. Notable among these reasons are reporting higher management bonuses (Gaver, Gaver, & Austin, 1995), reducing the likelihood of bond-covenant breach (DeFond & Jiambalvo, 1994), and lowering regulation and political scrutiny of firms (Jones, 1991).

In the view of other researchers, accounting alchemy may have possibly made firms alter financial statements (Larcker & Richardson, 2004; Jeanjean & Stolowy, 2008); influence contractual outcomes (Ball & Shivakumar, 2006; Barth, Landsman, & Lang, 2008); and mislead stakeholders about the underlying economic performance of an entity's financial position (Bartov, Gul, & Tsui, 2000; Kothari, Leone, & Wasley, 2005). Burgstahler and Dichev (1997), as well as Barth (2010), opined that firms using accounting alchemy as medicine for their earnings and book values do this in order to avoid "reporting red-ink". Verrecchia (2009) believes that failure to grapple with accounting alchemy may hinder the pathway to greater transparency in disclosing firm's earnings and book value. It is in light of the fact that whether accounting alchemy still remains the right medicine for firm's earnings and book values that this empirical study was triggered to resolve as well as verifying if accounting alchemy can be modeled.

2. THEORETICAL GROUNDS

The thread of accounting alchemy literature, in essence, can be linked to Healy's publication in 1985, intimately accompanied by DeAngelo's research in 1986 and recently on Verrecchia's publication in 2009. First, the term *alchemy* is derived from the Greek word, *Khemia*, which means to *transform*, *create* and *perfect* something; the goal of which is simply geared towards the hastened perfection of specific items. By and large, accounting is a scientific study in which records of expenditures and incomes of an entity, individual or government, are kept coupled with other useful information for planning, decision-making, and control. Fundamental among the delineations of accounting alchemy is that offered by one of the pioneers of accounting alchemy – Verrecchia (2009) in his paper titled "Accounting alchemy and financial system behaviour" in the Wharton School of the University of Pennsylvania.

Accounting alchemy, as Verrecchia (2009) puts it, means that individuals assume that accounting measures of performance accurately reflect real performance and do not assess the characteristics of accounting measures to determine whether that is, in fact, the case. Moreover, accounting alchemy

refers to a superficially magical process of transforming accounting numbers in financial statements in such a way that they would portray good fortunes for firms and hence reflect a hypothetical performance and not the real performance. The publication and research of Healy in 1985 and DeAngelo in 1986 respectively suggest that accounting alchemy can be perfected via the divide of accruals, while the publication of Verrecchia in 2009 indicates that accounting alchemy can be perfected via earnings transformation.

Accounting alchemy, as noted by Riedl and Suraj (2010) and Nejad, Zeynali, and Alavi (2013), is a means by which corporate entities report variability in income streams at the discretion of the company's directors. Also, Siti, Haron, and Henny (2013) assert that accounting alchemy assists corporate entities to moderate year-to-year deviation in income streams by shifting income from peak years to less successful years, making their income variation less unstable. Tokuga and Saki (2011) believe that accounting alchemy is a technique used by corporate entities management to trim down irregular vagaries in income by exploring the loopholes in accounting principles. To Healy and Wahlen (1999), accounting alchemy refers to employing accounting judgments in financial reporting and in adjusting transactions to alter financial reports aimed at misleading stakeholders about the underlying economic performance of corporate entities or to influence contractual results that depend on reported accounting numbers.

Worthy of note is the fact that some firms in Sub-Saharan Africa and further north still engage in accounting alchemy practice given the grey areas in the generally accepted accounting principles (Gaap). However, following the transition from national Gaap, firms all over the world were mandated to report their financial statements using global Gaap (IFRS) so as to moderate accounting alchemy acts by the management of firms. According to Dobre et al. (2015), the shift to IFRS is considered to bring significant improvements in accounting quality, judgments, and choices which are deemed to create more confidence for the users of financial statements. In the same vein, Barth et al. (2008) opined that the shift from national Gaap to global Gaap is deemed to reduce the likelihood that managements disclose information in order to obtain a private benefit or increase accounting alchemy, considering the flexibility given to preparers of financial statements.

In order to mislead stakeholders, management must have access to information that is not accessible to outside stakeholders so that accounting alchemy is unlikely to be translucent to outsiders. According to Chen, Tang, Jiang, and Lin (2010), the frequency of accounting alchemy is higher when corporate entities try to meet analyst's forecasts. However, prior studies

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(see Nejad et al., 2013; Siti et al., 2013) suggest that more firms engage in accounting alchemy in order to decrease their earnings rather than to avert negative earnings and book values.

Besides, evidences of fraudulent practices by companies such as Enron, WorldCom, Xerox, African Petroleum Development, Afribank Plc., Oceanic Bank International Plc., Mainstreet Bank Plc., and many others can be linked with accounting alchemy practices. There is no doubt that the demise of these firms has forced the regulatory framework of accounting, accounting practitioners, analysts, and scholars to focus on measures aimed at reducing accounting alchemy practices. Nevertheless, the practice of accounting alchemy by corporate entities takes several forms like changes in policy of expenditure capitalization, revenue recognition, depreciation method, among others.

Notwithstanding the perspectives of prior studies on accounting alchemy, such as the views of Verracchia (2009), Barth (2010), Cole (2017), and others, there is no conceivable model or measures aimed at estimating what accounting alchemy should be in accounting literature. The present study attempts to provide a model of accounting alchemy by building on the existing accrual models of Jones (1991) and Dechow, Sloan, and Sweeney (1995) (with a combination of relevant characteristics of prior accrual models) in order to advance a model of accounting alchemy; also, the study tests if the built accounting alchemy model still remains the right medicine for firm's earnings and book values.

A study by Dechow et al. (1995) finds evidence that accounting alchemy has the tendency to influence reported financial performance, like earnings per share (EPS). In addition, Dechow et al. (1995) report a wide annual variation in the number of firms that engage in accounting alchemy. To Dechow et al. (1995), when there is enough dispersion in investors' beliefs in relation to expected earnings, management employs accounting alchemy to beat expected earnings and report the earnings found in financial statements of corporate entities. The above researchers find a significant positive association between accounting alchemy and EPS. Thus larger EPS reported by corporate entities may connote larger accounting alchemy.

For instance, in the United States, Maker and Alam (2003) assessed the impact of managerial discretion on the information content of reported earnings during the period of 1973 to 1992 for 123 firms. The ordinary least square result indicated that firms' discretionary accruals are priced by the stock market and that earnings have incremental information content as regards future profitability.

Similarly, Lee, Li, and Yue (2005) studied the link between the amount of managed earnings and firms' earnings performance in the United States of America by means of the ordinary least square estimation technique. Results support the predictions that the amount of managed earnings and firm performance are correlated, except that the restatement sample test results are mixed.

A study by Kyungho and Schroeder (1990) presented evidence on whether analysts' earnings forecasts predict management's accruals choices and if analysts predict accruals. In their study, earnings forecast errors were composed of two parts, namely cash-flow and accruals forecast errors, and, by means of regression estimation technique, it was discovered that management bonus-maximizing incentives permit the recognition of situations in which accruals forecast errors are anticipated to offset cash-flow forecast errors and situations in which they are anticipated to aggravate cash-flow errors.

Correspondingly, Ayers, Jiang, and Yeung (2006) examined if there is a positive relationship between accrual proxies and earnings benchmarks of groups set aside at other points in the allocation of earnings, earnings changes, and analysts-based unpredicted earnings in the United States during 1994-2002. The regression estimation model showed similar results for the earnings change allocation. Contrarily, a positive link between accruals proxies and beating pseudo targets obtained from analysts-based unpredicted earnings was found to be more pronounced for the firms during the period investigated.

Uwuigbe (2011) investigated the impacts of firms' characteristics on earnings manipulation of publicly quoted companies in Nigeria by using a total of 20 publicly quoted firms on the floor of the Nigerian Stock Exchange (NSE). Corporate annual accounts for the period of 2006-2010 and use of both descriptive statistics and econometric analysis were utilized. The study revealed that, while firm size and firms' corporate strategy have a significant positive effect on earnings manipulation (which is proxied by accruals), the link between firms' financial leverage and accruals was not significant and positive for the sampled firms in Nigeria.

Equally, Barth (2010) assessed some vital perspectives on accounting alchemy by x-raying some measures via which accounting alchemy practices can be condensed in Switzerland. The qualitative research design was used, and findings indicated that there are substitute or complementary methodologies that can be used to condense or reduce accounting alchemy, which usually goes beyond the management of firms.

Supporting the view of Barth (2010), Cole (2017) investigated the connection between accounting alchemy and earnings volatility using content

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analysis. The study indicated that accounting alchemy is connected with earnings volatility. Moreover, it was found that there is significant variation between hypothetical measures of accounting performance and real performance among firms in the United States of America.

Besides, prior studies (see Dechow et al., 1995; Kasznik, 1999; Cairney & Murdoch, 1998) have all included EPS in estimating reported financial performance. Thus, this study included EPS as a reported financial performance measure in order to resolve the puzzle in the accounting literature. Hence, we hypothesized that accounting alchemy has no association with earnings of selected quoted firms in Sub-Saharan Africa. More importantly, studies have not established whether there is a relationship between accounting alchemy and book value per share (BVPS) of firms in Sub-Saharan Africa. The researchers believe that accounting alchemy may have a strong influence on the book value of firms since management may want to portray a strong or better book value of its shares to both existing and potential shareholders. Given the above position, we thus hypothesized that accounting alchemy has no association with the book value per share of selected quoted firms in Sub-Saharan Africa. Thus, this study attempts to fill the lacuna in the accounting literature on accounting alchemy and earnings per share and book value per share.

3. METHODS

This present study builds on the existing accrual models of Jones (1991) and Dechow, Sloan, and Sweeney (1995) in order to advance a model of accounting alchemy. Jones' model (1991) measured accruals as net income – cash flow from operations while Deschow et al. (1995) model measured accruals as current annual accruals: i.e., earnings before extraordinary items minus cash from operations). Given the above, it would be pertinent to first state both accrual models of Jones' (1991) and Dechow et al. (1995) and, afterward, to state the modeling of accounting alchemy.

- Jones' (1991) model:

$$VTA_i = NI_i - CFO_i \qquad \text{Equation (1)}$$

in which: VTA_i = value of total accruals for firm i; NI_i = value of net income for firm i; CFO_i = value of cash flow from operations for firm i.

- Deschow et al.'s (1995) model:

$$ACA_i = EBIT_i - CFO_i \qquad \text{Equation (2)}$$

in which: ACA_i = annual current accruals for firm i; $EBIT_i$ = earnings before extraordinary items for firm i; CFO_i = cash from operations for firm i.

The first model (Jones, 1991) is based on presenting the value of total accruals as the difference or variation between net income and cash flows from operating activities through the formulae used in Equation (1). Equation (1) is similar to the one used in prior studies done by Teoh, Welch, and Wong (1998), Xie (2001), Bartov et al. (2000), and Ayers et al. (2006). The second model (Deschow et al., 1995) is based on presenting current annual accruals as the difference or variation between earnings before interest and tax and cash from operating activities through the formulae used in Equation (2). Equation (2) is similar to the one used in prior studies conducted by Keung and Shih (2014), Zunera, Farah, and Muhammad (2015), Dobre et al. (2015), and Gnyana (2016).

- Modeling accounting alchemy

In this study, accounting alchemy was developed based on the existing accrual models of Jones (1991) and Dechow et al. (1995). Considering both models, the accounting alchemy model is thus given as:

$$AA = \frac{NI - CFO}{TA} + \frac{EBIT - CFO}{REV} \qquad \text{Equation (3)}$$

in which AA = accounting alchemy; REV = revenue; TA = total assets.

While earnings management literature suggests that incomes and expenses are the most manipulated, accounting alchemy proposes that besides incomes and expenses, assets of firms are alchemized. Thus, we build on existing accrual models by taking into cognizance relevant characteristics, such as revenue and asset components, that can easily be transformed by preparers of financial statements. For instance, Jones (1991) proposed that management of firms manipulate expenses or bad debts rather than revenue, while Deschow et al. (1995) proposed that firms manipulate revenue rather than expenses. On this note, the accounting alchemy model is estimated as:

$$AA = \frac{REV\left(NI - CFO\right) + TA\left(EBIT - CFO\right)}{TA\left(REV\right)} \qquad \text{Equation (4)}$$

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- Accounting alchemy and earnings

$$EPS = \left\{ \frac{fREV(NI - CFO) + TA(EBIT - CFO)}{TA(REV)} \right\} \qquad \text{Equation (5)}$$

- Accounting alchemy and book values

$$BVPS = \left\{ \frac{fREV(NI - CFO) + TA(EBIT - CFO)}{TA(REV)} \right\} \qquad \text{Equation (6)}$$

The study expressed equations 5-6 in explicit form and represented them in equations 7 and 8:

$$EPS_{it} = \alpha_0 + \beta_1 AA_{it} + \epsilon_{it} \qquad \text{Equation (7)}$$

$$BVPS_{it} = \alpha_0 + \beta_1 AA_{it} + \epsilon_{it} \qquad \text{Equation (8)}$$

In order to control the relationship between the dependent variables (EPS and BVPS) and the independent variable (accounting alchemy) in equations 7 and 8, we introduced control variables (percent change in earnings before interest and tax – $\triangle$EBIT; and percent change in net profit after tax – $\triangle$NPAT). The use of percent changes in NPAT and EBIT as control variables is based on the suggestions of Riley (2007), Gong, Li, and Xie (2008), and Gramlich and Sorensen (2010) that they can be used to correct management error forecasts connected with accounting numbers.

Accounting alchemy goes on to provide corrective measures, like employing changes in earnings before interest and extraordinary items and profit after tax, in order to account for the hypothetical forecast error associated with accounting numbers. Thus, the composite model of the study is presented in models 9 and 10:

$$EPS_{it} = \alpha_0 + \beta_1 AA_{it} + \beta_2 \triangle EBIT_{it} + \beta_3 \triangle NPAT_{it} + \epsilon_{it} \qquad \text{Equation (9)}$$

$$BVPS_{it} = \alpha_0 + \beta_1 AA_{it} + \beta_2 \triangle EBIT_{it} + \beta_3 \triangle NPAT_{it} + \epsilon_{it} \qquad \text{Equation (10)}$$

in which: $\triangle EBIT_t$ = change in earnings before interest and tax in current period; $\triangle EBIT_{t-1}$ = change in earnings before interest and tax in prior period; $\triangle NPAT_t$ = change in net profit after tax in current period; $NPAT_{t-1}$ = net profit after tax in prior period; EPS_{it} = earnings per share of firm i in year t; $BVPS_{it}$ = book value per share of firm i in year t; AA_{it} = accounting alchemy of firm i in year t; ϵ_{it} = error term (non-discretionary accruals); and α & β = regression coefficients of the variables.

The study used panel data, comprised of earnings per share, book value per share, accounting alchemy components comprising net income, cash flows from operations, earnings before extraordinary items, total asset, and revenue, change in earnings before interest and tax ($\triangle EBIT$), and change in net profit after tax ($\triangle NPAT$). The parameters of the model were estimated via data related to the period from 2012 to 2016 for the selected quoted firms in Sub-Saharan Africa (West Africa: Nigeria; Southern Africa: South Africa; and East Africa: Kenya).

Moreover, given the currency difference of the diverse countries investigated (e.g., Nigeria: naira; South Africa: rand; and Kenya: shillings), all the study variables were transformed using the united states dollar (USD) in order to avoid scaling problem and to beat currency bias. Multiple regression estimation techniques were employed in gauging the association between accounting alchemy, earnings per share, and book value per share of the quoted firms in Sub-Saharan Africa under investigation. Analyses of the study entailed descriptive statistics (mean, standard deviation, minimum and maximum values, correlation, variance inflator factor, and normality plots) and inferential statistics (fixed and random effects and Hausman specification test).

4. RESULTS AND DISCUSSIONS

The results of the study were presented in order of precedence: analysis of mean, standard deviation minimum and maximum values, normality test (Jarque-Bera), correlation matrix, variance inflator factor, as well as fixed and random effects tests.

(Figure 4.1)

DESCRIPTIVE STATISTICS OF ANALYZED VARIABLES

Variável	Obs.	Mean	Std. dev.	Min.	Max.	JB prob.
BVPS	317	21.9743	31.0229	-5.1200	226.0300	0.6934
EPS	319	3.6447	7.1232	-12.600	49.7600	0.6436
AA	318	7.0009	22.1158	-114.0300	162.7200	0.5622
△EBIT	243	0.2934	1.7094	-16.7928	15.4860	0.3126
△NPAT	255	-3.6640	53.2526	-847.5000	43.6451	0.6913

Source: Elaborated by the authors.

Figure 4.1 shows the mean (average) for each of the variables and their respective standard deviation (degree of dispersion). The results shed light on the nature of the selected companies across countries in Sub-Saharan Africa (Nigeria, South Africa, and Kenya). First, BVPS shows the highest average, with a value of 21.97. This was followed by accounting alchemy (AA). △NPAT shows the highest dispersion with a standard deviation value of 53.25, while △EBIT shows the least dispersion with a standard deviation of 1.71. The dispersion of △EBIT shows that the sampled companies in Sub-Saharan Africa are not too dispersed from each other, an indication of relative change in △EBIT across the sampled firms. Also, AA, △EBIT and △NPAT recorded an average of 7.00, 0.03 and -3.66, respectively.

Moreover, variation of the study variables during the period under review was captured by the maximum and minimum values. The results of the maximum and minimum values for BVPS, EPS, AA, △EBIT, and △NPAT are clear indications that, most likely, the study variables were not constant over time. In addition, the Jarque-Bera (JB) probability values indicate that all the variables are normally distributed; hence, the data satisfy the normality condition. Given that all the variables are not constant over time and satisfy the normality conditions, whether accounting alchemy is still the right medicine for earnings and book values in Sub-Saharan Africa is feasible to be empirically examined, this was done using the correlation matrix, and the results are presented in Figure 4.2.

Figure 4.2

CORRELATION MATRIX OF VARIABLES

Variável	EPS	BVPS	AA	△EBIT	△NPAT
EPS	1.0000				
BVPS	0.0181*	1.0000			
AA	0.1848	0.1152	1.0000		
△EBIT	0.0470*	0.0138	0.0552	1.0000	
△NPAT	0.0132*	-0.2394	-0.0015	-0.0274	1.0000

Source: Elaborated by the authors.

In Figure 4.2, the result shows that accounting alchemy (AA) is positively associated with book value per share and earnings per share. As a matter of fact, accounting alchemy (AA) is negatively related to △NPAT and △EBIT. Moreover, the correlation matrix also revealed that no two explanatory variables of the study were perfectly correlated since none of the correlation coefficients exceeded 0.8, as suggested by Gujarati (2003). The above position is further confirmed from the result of the variance inflator factor (VIF):

Figure 4.3

VARIANCE INFLATOR FACTOR OF VARIABLES

Variable	VIF	1/VIF
△EBIT	1.00	0.9962
△NPAT	1.00	0.9970
AA	1.00	0.9925

Source: Elaborated by the authors.

The result of VIF = 1.00 is less than the accepted VIF value of 10.0, suggesting that there is the absence of multi-collinearity problem in the model.

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(Figure 4.4a)

KENYA ANALYSIS OF DEPENDENT, INDEPENDENT AND CONTROL VARIABLES

Dependent variable: earnings per share (EPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	7.0560	1.8880	3.74	0.001
AA	0.2390	0.0610	3.91	0.000
△EBIT	0.7730	1.4760	0.52	0.604
△NPAT	0.9480	0.6840	1.39	0.174
Mean = 6.007	Std. dev. = 12.671	R^2 = 0.3108	R^2 Adj. = 0.2534	Obs. = 40
Dependent variable: book value per share (BVPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	31.9810	4.4460	7.19	0.000
AA	0.3990	0.1440	2.77	0.009
△EBIT	-0.1980	3.4750	-0.06	0.955
△NPAT	2.0640	1.6100	1.28	0.208
Mean = 29.762	Std. dev. = 23.38	R^2 = 0.1986	R^2 Adj. = 0.1318	Obs. = 40

AA = accounting alchemy; △EBIT = change in earnings before interest and tax; △NPAT = change in net profit after tax.

Source: Elaborated by the authors.

Figure 4.4a presents the country-by-country results for Kenya (East Africa) as regards the dependent, independent, and control variables of the study. It is clear from the figure that the coefficients of all the sampled variables, except △EBIT (-0.198; -0.287), are carrying negative signs for BVPS. The negative sign attached to the coefficients of △EBIT in Kenya is an indication that accounting alchemy negatively influences earnings before interest and tax for the period under investigation. Also, it was found that accounting alchemy, earnings per share, and book value per share were statistically significant for Kenya.

(**Figure 4.4b**)

NIGERIA ANALYSIS OF DEPENDENT, INDEPENDENT AND CONTROL VARIABLES

Dependent variable: earnings per share (EPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	1.6750	0.4830	3.47	0.001
AA	0.9260	0.2770	3.34	0.001
△EBIT	0.0380	0.1990	0.19	0.850
△NPAT	0.0060	0.0970	0.06	0.955
Mean = 2.134	Std. dev. = 5.026	R^2 = 0.0944	R^2 Adj. = 0.0695	Obs. = 113
Dependent variable: book value per share (BVPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	9.3160	1.2500	7.44	0.000
AA	0.1950	0.7110	2.71	0.008
△EBIT	0.1110	0.5170	0.21	0.831
△NPAT	0.0780	0.2510	0.31	0.757
Mean = 9.794	Std. dev. = 12.443	R^2 = 0.0667	R^2 Adj. = 0.0410	Obs. = 113

AA = accounting alchemy; △EBIT = change in earnings before interest and tax; △NPAT = change in net profit after tax.

Source: Elaborated by the authors.

Figure 4.4b captures the country-by-country results for Nigeria (West Africa). From the figure, it is obvious that the coefficients of all the sampled variables are carrying positive signs. The positive signs attached to the coefficients of all the variables are clear indications that accounting alchemy has a significant influence on earnings per share and BVPS in Nigeria.

(Figure 4.4c)

SOUTH AFRICA ANALYSIS OF DEPENDENT, INDEPENDENT AND CONTROL VARIABLES

Dependent variable: earnings per share (EPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	4.0460	0.7220	5.60	0.000
AA	0.0630	0.0650	0.97	0.334
△EBIT	0.6060	1.1870	0.51	0.611
△NPAT	-0.0140	0.0060	-2.18	0.032
Mean = 4.441	Std. dev. = 5.658	R^2 = 0.0843	R^2 Adj. = 0.0523	Obs. = 90
Dependent variable: book value per share (BVPS): 2012-2016				
	Coefficients	Std. errors	t-values	Prob.
Constant	34.2970	6.1790	5.55	0.000
AA	0.2170	0.5540	0.39	0.697
△EBIT	0.6410	10.1070	0.06	0.950
△NPAT	-0.1300	0.0530	-2.46	0.016
Mean = 2.919	Std. dev. = 3.964	R^2 = 0.0724	R^2 Adj. = 0.0392	Obs. = 90

AA = accounting alchemy; △EBIT = change in earnings before interest and tax; △NPAT = change in net profit after tax.

Source: Elaborated by the authors.

Figure 4.4c shows the country-by-country results for South Africa (Southern Africa), and from the figure, it is clear that the coefficients of all the sampled variables, except △NPAT (-0.014 and -0.130), are carrying negative signs for EPS and BVPS. The negative signs attached to the coefficients of △EBIT and △NPAT are clear indications that accounting alchemy negatively influences earnings before interest and tax and net profit after tax for the period under investigation. Besides, it was found that EPS and BVPS are significantly affected by accounting alchemy, indicating that accounting alchemy has a significant influence on earnings per share and book value per share in South Africa.

- Model 1: $EPS_{it} = \alpha_0 + \beta_1 AA_{it} + \beta_2 \triangle EBIT_{it} + \beta_3 \triangle NPAT_{it} + \epsilon_{it}$

Figure 4.5a

FIXED AND RANDOM EFFECTS OF ANALYZED VARIABLES: EPS AND AA

Estimator	OLS (Obs. = 243)		FE (Obs. = 243)		RE (Obs. = 243)	
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
AA	0.1435** (5.95)	0.000	0.1434** (5.88)	0.000	0.35** (5.95)	0.000
△EBIT	0.0461 (0.18)	0.857	0.0521 (0.20)	0.841	0.0461 (0.18)	0.857
△NPAT	-0.0146 (-1.82)	0.069	-0.0149 (-1.84)	0.0.067	-0.0146 (-1.82)	0.068
R-Sq.	0.1402					
R-Sq. Adj.	0.1294					
Prob. F.	0.0000					
R-Sq. (within)			0.1399		0.1399	
R-Sq. (between)			0.4951		0.5089	
R-Sq. (overall)			0.1402		0.1402	
Wald Ch2					38.97	
Prob. Ch2					0.000**	
Hausman test			Chi2(2) = 0.08		Prob > Chi2 = 0.9940	

** Significant at 0.05% level; items in parentheses are t-ratios; Z-test in parentheses, boldfaced; AA = accounting alchemy; △NPAT = % change in net profit after tax; △EBIT = % change in earnings before interest and tax.

Source: Elaborated by the authors.

Figure 4.5a shows the results of accounting alchemy (AA) and earnings per share (EPS). The figure presents the results of ordinary least square (OLS), fixed effect (FE), and random effect (RE). In model 1, accounting alchemy (AA) is highly significant, at a 1% level, in explaining earnings per share (EPS). The output of OLS indicates that accounting alchemy has a larger beta coefficient in unequivocal terms than △EBIT and △NPAT. Using OLS and RE, the coefficient of accounting alchemy is 0.1435 and 0.1435, respectively, suggesting that when firms in Sub-Saharan Africa engage in accounting alchemy, it will lead to approximately a 14.4% change in their levels of earnings per share. Besides, accounting alchemy has a high beta coefficient when FE is employed.

The beta coefficient for FE is 0.1434, but both FE and RE are significant at a 1% level. In the case of the FE coefficient (0.1434), it implies that when firms in Sub-Saharan Africa engage in accounting alchemy, it will lead to approximately a 14.3% change in their levels of earnings per share. The t-tests of AA are 5.95, 5.88, and 5.95 for OLS, FE, and RE, respectively; the t-tests of $\triangle$EBIT are 0.18, 0.20, and 0.18 for OLS, FE, and RE, respectively, while $\triangle$NPAT are -1.82, -1.84, and -1.82 for OLS, FE, and RE respectively. The t-test further confirms that $\triangle$EBIT and $\triangle$NPAT are not significant in explaining EPS, but AA is significant in explaining EPS.

In addition, the R-squared (R^2) is 0.1402 and is higher than both FE and RE. F-statistics is 12.99 (p-value = 0.0000), which is highly significant. The f-statistics provide support for the proposition that, first, there is a positive relationship between accounting alchemy and earnings per share among the selected firms in Sub-Saharan Africa; More so, the results of the Hausman specification tests are: Chi2(3) = 0.08 and p-value = 0.9940. This is a clear indication that FE is more efficient than RE. The result of FE showed that the subjects from which measurements are drawn are fixed and that the differences or variation between companies in Sub-Saharan Africa are therefore not of interest; thus, the subjects and their variances are identical.

Given the Wald Ch2-statistics of 38.97 (0.000), it shows that it is highly significant, suggesting that accounting alchemy has a significant association with earnings per share of the selected quoted firms in Sub-Saharan Africa. The hypothesis that accounting alchemy has no association with earnings per share of the selected quoted firms in Sub-Saharan Africa is rejected, while the alternate hypothesis is accepted. This means that accounting alchemy is not the right medicine for firms' earnings per share, especially in the context of Sub-Saharan Africa.

- Model 2: $BVPS_{it} = \alpha_0 + \beta_1 AA_{it} + \beta_2 \triangle EBIT_{it} + \beta_3 \triangle NPAT_{it} + \epsilon_{it}$

(Figure 4.5b)

FIXED AND RANDOM EFFECTS OF ANALYZED VARIABLES: BVPS AND AA

Estimator	OLS (Obs. = 241)		FE (Obs. = 241)		RE (Obs. = 241)	
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
AA	0.2786** (2.45)	0.015	0.2876** (2.51)	0.013	0.2786** (2.45)	0.014

(continue)

(Figure 4.5b (conclusion))

FIXED AND RANDOM EFFECTS OF ANALYZED VARIABLES: BVPS AND AA

Estimator	OLS (Obs. = 241)		FE (Obs. = 241)		RE (Obs. = 241)	
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
△EBIT	-0.0125 (-0.01)	0.992	-0.0894 (-0.07)	0.941	-0.0125 **(-0.01)**	0.992
△NPAT	-0.1444** (-3.84)	0.000	-0.1442** (-3.79)	0.000	-0.1444** **(-3.84)**	0.000
R-Sq.	0.0807					
R-Sq. Adj.	0.0691					
Prob. F.	0.0002					
R-Sq. (within)			0.0814		0.0814	
R-Sq. (between)			0.0073		0.0113	
R-Sq. (overall)			0.0807		0.0807	
Wald Ch2					20.81	
Prob. Ch2					0.001**	
Hausman Test			Chi2(2) = 0.43		Prob > Chi2 = 0.9338	

** Significant at 0.05% level; items in parentheses are t-ratios; Z-test in parentheses, boldfaced; AA = accounting alchemy; △NPAT = % change in net profit after tax; △EBIT = % change in earnings before interest and tax.

Source: Elaborated by the authors.

Figure 4.5b shows the results of accounting alchemy (AA) and book value per share (BVPS). In model two (2), accounting alchemy is significant at a 1% level in explaining book value per share. The output of OLS indicates that accounting alchemy has a superior beta coefficient in aggregate terms than △EBIT and △NPAT. By means of the OLS and RE results, the coefficients of accounting alchemy are 0.2786 and 0.2786, respectively, indicating that, when firms in Sub-Saharan Africa engage in accounting alchemy, it will lead to approximately a 27.9% change in their levels of book value per share.

In addition, accounting alchemy has a high beta coefficient when FE is utilized; the beta coefficient for FE is 0.2786, but both FE and RE are significant at a 1% level. In the case of the coefficient of FE (0.2786), it implies that, when firms in Sub-Saharan Africa engage in accounting alchemy, it will lead to approximately a 27.9% change in their levels of book value per

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share; however, this result remained unchanged when OLS and RE are applied. The t-tests of AA are 2.45, 2.51, and 2.45 for OLS, FE, and RE, respectively; the t-tests of $\triangle$EBIT are -0.01, -0.07, and -0.01 for OLS, FE, and RE respectively, while $\triangle$NPAT are 3.84, -3.79, and -3.84 for OLS, FE, and RE respectively. The t-test further confirms that $\triangle$EBIT is not significant in explaining BVPS, but AA and $\triangle$NPAT are significant in explaining BVPS.

Furthermore, a negative sign is attached to $\triangle$NPAT, suggesting that it negatively affects BVPS. However, R^2 is 0.0807 and is lower than both FE and RE. F-statistics is 6.94 (p-value = 0.0002), which is highly significant. The f-statistics provides support for the proposition that: first, there is a positive relationship between accounting alchemy and book value per share among the selected firms in Sub-Saharan Africa. The results of the Hausman specification tests are: Chi2(3) = 0.43 and p-value = 0.9338; this implies that FE is more efficient than RE.

In view of the fact that the Wald Ch2-statistics is 20.81 (p-value = 0.001), showing that it is highly significant, it thus implies that there is a significant association between accounting alchemy and book value per share of selected quoted firms in Sub-Saharan Africa. The hypothesis that accounting alchemy has no association with book value per share of selected quoted firms in Sub-Saharan Africa is rejected, while the alternate hypothesis is accepted. This means that accounting alchemy is not the right medicine for a firm's book value per share, particularly in the milieu of Sub-Saharan Africa.

5. CONCLUSIONS

Accounting alchemy remains antagonistic in the accounting literature, given the fact that there is no plausible measure aimed at measuring or estimating accounting alchemy. As a matter of fact, accounting alchemy is problematic to delineate from the bulk of earnings management literature. While the bulk of earnings management literature submits that incomes and expenses are the most manipulated items in the financial statements of entities, accounting alchemy proposes that, aside from incomes and expenses, assets of firms are also alchemized. More so, accounting alchemy models provide corrective measures (e.g., changes in earnings before interest and extraordinary items and profit after tax) aimed at accounting for the hypothetical forecast error associated with accounting numbers, as well as unraveling accounting measures of performance (hypothetical) to become real performance (actual). This, perhaps, is the view that gave birth to the conception of accounting alchemy.

In this paper, it was investigated whether accounting alchemy is still viewed as the right medicine for firm's earnings per share and book value per share. The primary aim of this paper is to delineate between earnings management and accounting alchemy; to propose an accounting alchemy model; and to empirically test the proposed accounting alchemy models on certain financial performance measures (book value per share and earnings per share) so as to see if accounting alchemy is still the right medicine. In order to achieve this, the ex-post facto research design was adopted, and secondary data of earnings per share, book value per share, earnings before extraordinary items, cash flow from operations, net profit after tax, revenue, and total assets were obtained and computed for the selected quoted firms in Sub-Saharan Africa countries such as Nigeria, South Africa, and Kenya during the period from 2012 to 2016.

Consequently, a total of 64 quoted consumer and industrial goods firms sampled from Kenya, Nigeria, and South Africa were obtained in the study. The use of descriptive (mean, standard deviation, minimum and maximum values, and correlation) and inferential statistics (regression, fixed, and random effects) were employed. The results of the Hausman specification tests clearly show that FE is more efficient than RE; thus, the study relied heavily on the results of FE. The result of FE revealed that the companies from which measurements are drawn from are fixed and that the variation between companies in Sub-Saharan Africa is not of interest in view of the fact that the companies and their variances are identical.

Given the views of prior researchers such as Dechow et al. (1995), Cairney and Murdoch (1998), Kasznik (1999), Verracchia (2009), Barth (2010), Nejad et al. (2013), Siti et al. (2013), Cole (2017), among others, to resolve the puzzles of whether accounting alchemy is the right medicine for firms, we proposed two hypotheses: that accounting alchemy is not the right medicine for firm's earnings per share and book value per share; and that and this hypothesis is valid for companies in Sub-Saharan Africa countries.

In view of the analysis based on the outcome of the ordinary least square, FE and RE, the study revealed that accounting alchemy has significant and positive associations with earnings per share and book value per share among the selected quoted firms in Sub-Saharan Africa. Thus, the study concludes that accounting alchemy is not the right medicine for firm's earnings per share and book value per share. On this note, researchers and regulatory framework of accounting must strive towards resolving the controversy about choices of an accounting alternative in order to abet this undesirable medicine called accounting alchemy. As a matter of fact, firms should keep

a close watch on whether there are arbitrary trends in the book value per share and earnings per share so as to moderate accounting alchemy.

6. FUTURE STUDIES

This study assessed whether accounting alchemy is still the right medicine for firm's earnings per share and book value per share in the context of Sub-Saharan Africa using a total of sixty-four (64) quoted consumer and industrial goods firms sampled from Kenya, Nigeria, and South Africa. Therefore, future studies may consider testing the proposed accounting alchemy models of this study in Asia, Europe, and other parts of the world in order to see if the study results can be replicated in these regions of the world.

In addition, other regions of Africa may be considered, and the study period may be extended to include firms in other sectors apart from the consumer and industrial goods subsector so as to see if accounting alchemy is still the right medicine for firms in other sectors. In another context, future studies may consider extending data beyond 2016 for the sampled Sub-Saharan Africa countries of the study. Future research may consider using financial statement numbers such as return on assets, return on equity, Tobin's Q, among others, so as to see if accounting alchemy is still the right medicine for the financial statement numbers in Africa, Europe, and other continents of the world.

A ALQUIMIA CONTÁBIL AINDA É O REMÉDIO CORRETO PARA OS GANHOS DA FIRMA E O VALOR CONTÁBIL? EVIDÊNCIA DA ÁFRICA SUBSAARIANA

RESUMO

Objetivo: Uma grande linha da literatura contábil que se mantém como uma questão polêmica refere-se ao fato de a alquimia contábil poder ser modelada. O artigo constrói modelos de provisão (*accrual*) existentes ao propor um modelo de alquimia contábil e testar se ainda é o remédio correto para os ganhos e o valor contábil das firmas. O modelo de alquimia contábil foi baseado em mecanismos de ganhos, valor contábil, ganhos antes de itens extraordinários, lucro líquido depois das taxas,

fluxo de caixa das operações, receita e total de ativos. Modificamos os modelos de acumulados com a visão de que modelos de acúmulo sugerem que renda/despesas são os mais manipulados; ao contrário, a alquimia contábil propõe que os ativos sejam alquimizados.

Originalidade/valor: Este trabalho propõe um novo modelo empírico de alquimia contábil e praticamente avalia a validade do modelo na África subsaariana onde não existem estudos. O modelo proposto de alquimia contábil pode ser usado na Ásia, Europa e em outras partes do mundo para ver se os resultados do estudo podem ser repetidos.

Design/metodologia/abordagem: Utilizaram-se o modelo ex post facto (a partir do fato passado) e os dados secundários obtidos por firmas selecionadas citadas na África subsaariana, incluindo Nigéria, África do Sul e Quênia, entre 2012 e 2016. Selecionaram-se amostras de 64 firmas dos setores de bens de consumo e industriais, e os dados foram analisados por meio de estatísticas descritivas (média, desvio padrão e correlação) e inferenciais (regressão, efeitos fixos e aleatórios).

Resultados: Os resultados indicaram que os ganhos e o valor contábil são significativamente afetados pela alquimia contábil. Isso implica que a alquimia contábil não é o remédio correto para os ganhos e o valor contábil da firma. O resultado tem aplicação prática para pesquisadores e estrutura regulatória de contabilidade.

PALAVRAS-CHAVE

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AUTHOR NOTES

Edesiri G. Okoro, Ph.D. from the Faculty of Management Sciences, Nnamdi Azikiwe University; **Chizoba M. Ekwueme**, Ph.D. from the Faculty of Management Sciences, Nnamdi Azikiwe University.

Edesiri G. Okoro is now an assistant professor at the Faculty of the Social Sciences of Delta State University; Chizoba M. Ekwueme is now professor of Accounting at the Faculty of Management Sciences of Nnamdi Azikiwe University.

Correspondence concerning this article should be addressed to Okoro G. Edesiri, Department of Accounting/Finance, Faculty of the Social Sciences, PMB 1, Delta State University, Abraka, Delta State, Nigeria, ZIP Code 330106.
E-mail: egokoro@delsu.edu.ng; edesirioracle@yahoo.com