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IS THERE EARNINGS DISCONTINUITY AFTER THE IMPLEMENTATION OF IFRS IN NIGERIA?

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Abstract
Earnings metrics are major financial indicators which capital market participants and investors focus on for informed decisions. Because reporting earnings increase may enhance firms' stock price, many managers are motivated to avoid reporting earnings decreases, but prefer to consistently report increase earnings greater than its previous valuation. There is evidence that such practice has led to a situation of conspicuous upward shift in frequency of observations, starting from the left of identified earnings benchmark to the right. Recent studies have shown that a change in accounting regulation may have effects on the shape of the firm-year distribution of earnings. This paper examines the discontinuity evidence for Nigeria, in relation to the adoption of the international financial reporting standard. The aim is to establish whether discontinuity in earnings, represented by the asset-scaled net profits, as well the discontinuity in earnings-change, has reduced following the adoption. According to literature, the study employs three methods – empirical histogram, standardise differences tests and the permutation tests – to validate the aims. The findings suppose evidence for increase in discontinuity, indicating increased in small profits' earnings management, after the adoption. Contrary, the evidence is not sufficient to conclude that the discontinuity has increase for the earnings-change. It can be argued that the adoption has not achieve much in ensuring firms are monitored against earnings management to avoid losses. The study has limitation, since it considers only the distributions of earnings and earnings-changes. The distribution of forecast errors is not investigated because such is influence by forecast management. Future studies may consider this for improvement.

Keywords: Earnings Discontinuity, Implementation of IFRS, Nigeria
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1. Introduction

Accounting earnings, such as profits, earnings per share and others, are considered as the premier information items reported on the financial statements. Studies have documented the significance of earnings on debt contracting, equity valuation and managerial compensation contracts (Cadot et al., 2020; Francis et al., 2003; Graham et al., 2005). They are the major indicators that investors focus on to make informed financial decisions in the capital market. Because investors rely on simple heuristics to depends these measures, the markets react positively (negatively) to unexpected increase (decrease) in reported earnings. Reporting earnings decrease or loss spiral undesirable news, which spreads into the markets and may trigger fall in the firm's

share price. Thus, in order to create optimistic gains, many managers avoid reporting earnings decreases, but consistently report increase earnings greater than previous valuation in order to attract positive market response and enhance firms' stock price (Pretorius & De-Villiers, 2013). Burgstahler and Eames (2006) observe that firms having regular routine of reporting earnings increases sustain higher price-to-earnings ratios, and this may even be larger, the longer the periods of increase reported.

Researchers identify that substantial reporting of earnings above certain benchmark may cause discontinuity in earnings distribution (Enomoto & Yamaguch, 2017; Gilliam et al., 2015). The distribution includes too few observations immediately below the identified benchmark and too higher firm-years immediately above benchmark than are likely. The evidence reports conspicuous upward shift in the frequency of observations, from left of identified earnings benchmark to the right. Researchers maintain that such firm-years in interval just the right of the benchmark are managing earnings to document income above earnings threshold since discontinuity at target cannot be described by managers' normal operations, due to firms' earnings management activities (Burgstahler & Dichev, 1997; Shuto, & Iwasaki, 2015).

After the 2000s major corporate scandals, including WorldCom and Enron in 2002, some corporate financial reporting laws were established in some countries to ensure best financial practices and reporting quality financial statements. The Sarbanes-Oxley Act (or US-SOX) was implemented and recognised in the US. The US-SOX was formulated to lessen opportunistic reporting through ensuring: manager's vetting of financial report accuracy, both managers' evaluation and auditors' audit of internal controls, and sanctioning legitimate penalties for CFOs and CEOs for manipulations. The Japanese approved the Financial Instruments and Exchange Act of 2006 (or the Japanese SOX, J-SOX) after major scandals including Seibu Railway, Kanebo and Livedoor (Enomoto & Yamaguch, 2017; Kerstein & Rai, 2018).

A number of countries require listed firms to report their statements based on regulated standards and policies, such as the international financial reporting standard (IFRS). The IFRS allows flexible in reporting, which makes some managers to communicate bias earnings for their own benefits. IFRS gains popularity when the EU requires that all listed companies in member countries to adopt and comply with the Standards in presenting their consolidated accounts from January 1, 2005. Recent reports show that about 65 percent of the IFRS jurisdictions have converged or adopted the standard worldwide (IFRS, 2023a). Researchers

have conducted studies on the convergence, adoption, compliance and consequence of IFRS on organisation (Cho, Kim et al., 2021; Shruti & Thenmozhi, 2023). There is evidence that IFRS likely impacts accounting quality, and in particular, earnings management (Isaboke & Chen, 2019; Chimonaki & Konstantinos, 2020; Adedokun et al., 2022). Some authors examine the effect of accounting policies and reporting framework in formation of discontinuity (Gilliam, Heflin, & Paterson, 2015; Enomoto & Yamaguchi, 2017; Trimble, 2018; Piosik, 2021).

Before IFRS-adoption, the Financial Reporting Council in Nigeria (FRCN) permits firms to use the Nigeria GAAP (N-GAAP). In July 2010, the Government ordered quoted firms to set up financial reports through the IFRS effective from January 1, 2012 (IFRS, 2023b, 2023c). Many prominent cases of financial scandals have been reported for Nigeria, but so far empirical evidence to investigate the link with IFRS are based on discretionary accrual's earnings management (Adedokun et al., 2022; Kajola et al., 2020; Madugba & Ogbonnaya, 2017; Olayinka et al., 2017). In relation to the IFRS adoption in Nigeria, the paper examines the discontinuity evidence by focusing on whether the adoption has triggered discontinuities on earnings distributions. Providing the evidence of discontinuity provides a unique research view for discontinuity-related literature because currently, there is no known study that has attempted the aim for the country's sample. Hence, discontinuity evidence will provide guidance for policy formulation on the capital market.

The findings suppose evidence for increase in discontinuity, indicating increased in small profits' earnings management, after the adoption of IFRS. Contrary, the evidence is not sufficient to conclude that the discontinuity has increase for the earnings-change. It can be argued that the IFRS has not achieve much in ensuring firms are monitored against earnings management to avoid losses. For the remainder of the work, section 2, 3, 4 and 5, accordingly, provide the literature review and hypotheses, the data and methodology, the results and conclusions.

2. Literature

Evidence

Existing evidences on earnings discontinuity focus on different areas. Earlier studies show that the discontinuity is due to managers' manipulations of earnings to avoid losses (Beatty et al., 2002; Hayn, 1995). There is discontinuity in forecast (error) distribution, supposing firms manipulate earnings to attain analysts' forecast earnings (Donelson et al., 2013; Koh et al., 2008). A strand of studies assumes that the discontinuity depends on the earnings metrics used (Durtschi & Easton, 2005;

2009). Relative to smoothness in earnings distributions, the various studies provide extensive evidence on two main earnings thresholds, which include the profit/loss benchmark (Enomoto & Yamaguchi, 201; Pududu & De-Villiers, 2016;) and earnings from preceding-year (Donelson et al., 2013; Enomoto & Yamaguchi, 2017).

For studies that consider analyst forecast errors, Koh et al. (2008) show that managers' dependence on income-increasing accruals (positive earnings) to meet analyst forecasts declined in the post-SOX/scandals periods compare to the pre-scandals period (1987Q1-2001Q2). Bartov and Cohen (2009) examine fraud cases in the U.S. firms between 1996 and 2004 and find an overall fall in practice of beating analyst forecasts in post-SOX period (2002Q3 to 2006Q4) relative to the late pre-SOX regime (1994Q1 to 2001Q2). Donelson et al. (2013) use restated earnings to provide evidence of earning discontinuity to earnings management via comparing distribution of restated and originally-reported earnings of listed firms that resolve accounting-linked securities litigation and restate managed earnings from alleged local GAAP violation period. The study found that the kinks are present in the originally-reported earnings but absence in the earnings distribution of earnings levels, earnings surprise and analyst forecast errors using the restated earnings.

Some studies examine whether accounting policies or frameworks are responsible for the discontinuities on earnings distribution (Bird et al., 2019; Caylor, 2010; Enomoto & Yamaguchi, 2017; Gilliam et al., 2015; Lobo & Zhou, 2006; Piosik, 2021; Shuto & Iwasa, 2015; Trimble, 2018). Lobo and Zhou (2006) identify that firms become conservative and report slightly lower discretionary accruals since the implementation of the US-SOX. Caylor (2010) offers evidence that firms prefer to apply discretion in deferred income compare to accounts receivable in order to circumvent negative earnings shocks, but that the implementation of the US-SOX continuously mitigated this preference. Both Shuto and Iwasak (2015) and Gilliam et al. (2015) reveal that sample selection, neither scaling as well as income taxes and any other special items explain discontinuity evidence.

Gilliam et al. (2015) find that zero-earnings discontinuity vanishes due to the passage of the Sarbanes–Oxley (SOX) Act. Neither the discontinuity nor the disappearance of discontinuity requires the effects of non-earnings management drives for the zero-earnings kink. Discontinuity was found in all except a year before 2002, and not in any other years after. Shuto and Iwasak (2015) reveals clear existence of discontinuities at the zero threshold in distribution of earnings for Japanese firms. They hypothesise that institutional factors, including tax and

financial regulations, are the cause of the breaks in the earnings distribution. They note that firms that have high marginal tax rates, and very tight interactions with their respective banks would more likely to engage in earnings management.

Trimble (2018) examine the impact IFRS adoption on accounting quality based on the earnings distributions. The study found that while the distribution discontinuity does not completely fade but it severely decreases amongst the firms. Bird et al. (2019) show that policy such as SOX Act lessen earnings managed by 36%, if costs increased. This reduction is bound to occur undermining an increase in benefits, consistent with the market expectations. Piosik (2021) finds that the introduction of IFRS 15 lessens the increase of discretionary revenue, especially, when pre-managed operating income is marginally lower than the fourth quarter consensus analyse forecast and operating income. Adedokun et al. (2022) report significant difference between pre- and post- IFRS discretionary accruals, and based on the panel corrected standard errors analysed, they find only few firms characteristics including the IFRS adoption dummy affect earnings management.

Hypotheses

Prior research on earnings management practice post regulations and implementation of reporting framework provide evidence of improved in earnings quality after the passage of SOX (Lobo & Zhou, 2006; Cohen et al., 2008; Caylor, 2010; Gilliam et al., 2015; Shuto & Iwasak, 2015; Trimble, 2018; Piosik, 2021). Lobo and Zhou (2006) recognise that SOX and its resultant SEC requirement changed management's reporting pattern. They note that managers reported lower abnormal accruals the first two years of post-SOX than the fourth preceding SOX. For Cohen et al. (2008) there is decline in misreporting, but increase shift from accruals to real earnings management after SOX. Caylor (2010) argues the implementation of the SOX mitigated the preference to use discretion in deferred revenue compare to accounts receivable.

Gilliam et al. (2015) find that zero-earnings discontinuity vanishes due to the passage of the Sarbanes–Oxley (SOX) Act. Shuto and Iwasak (2015) reveals clear existence of discontinuities at the zero threshold in distribution of earnings for Japanese firms and identify that institutional factor (e.g., tax and financial regulations) are the cause of the breaks in the earnings distribution. Trimble (2018) argues that while the distribution discontinuity does not completely fade but it severely decreases amongst the firms after the IFRS adoption. Piosik (2021) finds that the introduction of IFRS 15 lessens the increase of discretionary revenue, when pre-managed operating net income is lower than the fourth quarter analyse forecast and income.

Some studies argue that because reporting earnings losses may draw unanticipated adverse attention from investors for small stock exchange, most firms in developing financial market would report earnings increase, and more so, after the implementation of reporting standard that support managerial use of discretion to report earnings (Ugrin, 2017; Ozili & Outa, 2019). Regarding precursory study, Adedokun et al. (2022) identify significant difference between the pre- and post-adoption' discretionary accruals. For the multivariate evaluation, the IFRS adoption was found significant, supposing that earnings is more managed after IFRS.

Given tighter regulations on reporting under IFRS, managers' earnings management practice could decrease, and hence, discontinuity may not be formed. Following Gilliam et al. (2015), the study does not expect increase in discontinuity in the earnings distribution after IFRS implementation for the Nigerian firms, similar to the experienced by the U.S. (Lobo & Zhou, 2006; Caylo, 2010; Gilliam et al., 2015). Hence, to verify whether there is discontinuity in earnings distribution after IFRS use in Nigeria, the following hypotheses are tested:

H1: There is increased discontinuity in earnings after the implementation of IFRS

H2: There is increased discontinuity in earnings-change after the implementation of IFRS

Earnings Distribution's Discontinuity Tests

Empirical histogram method

This literature that focuses on discontinuity of earnings rely on the distributional approach using empirical (albeit, asymmetric) histogram bin frequencies of earnings (level) and earnings-change surprise distributions to detect discontinuities. The empirical histogram method is mostly applied to examine the properties of those observations just above the zero threshold and to detect existence of earnings management (Enomoto & Yamaguchi, 2017). Figure 1 (2) provides an example of the prevalence of small losses (earnings decreases) amongst the US non-financial service, from Burgstahler and Dichev. The Figures identify the existence of a noticeable peak in the earnings interval to just the immediate right of zero, implying the prevalence of small profits.

Since the bin-width controls the smooth characteristic of the baseline histogram, the precise bin-width must be determined. As noted by McNichols (2002), the optimal bin-width holds under the principal assumption that unmanaged earnings population is Gaussian noise. Scott (2009) suggests to compute the optimal Bin-width using $2Q_{IR}(X_i)/\sqrt[3]{N}$, where X_i is the pooled cross-sectional of earnings (for

$i = 1, \ldots, n$), Q_{IR} is the interquartile range Q_3(upper quartile) minus the Q_1(lower quartile), and N is the number of firm-year. One advantage for using the 'distribution of reported earnings' method to detecting discontinuity and earnings management is that it does not require the estimate of noisy abnormal accruals.

Figure 1a **Figure 1b**

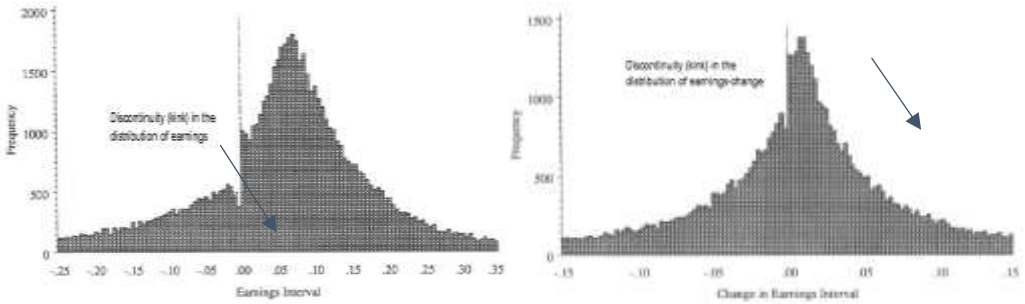

Figure 1a: Equity-scaled net income at year *t* [$\text{Earnings}_t/\text{MVE}_t$]
Figure 1b: Equity-scaled net income-change [(Earnings_t – Earnings_{t-1})/MVE_{t-2}].
Source: Burgstahler and Dichev (1997)

Standardise difference test method

The jumps in earnings distributions at zero is recognised as evidence of earnings management but statistical test is proposed to confirm the discontinuity at the benchmark. There are different variants of the standardize difference tests. Standardized difference score is a unified index that measure the magnitude of difference between groups on baseline variable. Relative to the t-test, the standardized difference test is independent of sample size, hence, the statistics is recommended to compare baseline covariates. In earnings distribution literature, some variants of the test are proposed. The earnings management (EM) statistic is the ratio of difference between the actual (AQ_i) and expected (EQ_i) Nobs for the interval immediately to the right of zero over the estimated standard deviation of the difference.

$$EM1 = (AQ_i - EQ_i)/SD_i \quad (1)$$

Where, $SD_i = [Np_i(1-p_i) + 0.25N(p_{i-1} + p_{+1})(1 - p_{i-1} - p_{i+1})]^{1/2}$ is standard deviation of the difference between (AQ_i) and (EQ_i) around interval *i;* $EQ_i = (AQ_{i-1} + AQ_{i+1})/2$; N is the total number of firm-years observations; p_j= AQ/N, is the ratio of the actual Nobs for interval i to the firm-years; AQ_{j-1}/N = p_{j-1} and $p_{+1} = AQ_{+1}/N$. The test null assumes no discontinuity in earnings distribution.

Degeorge et al. (1999) provide an alternative distribution discontinuity statistic to test earnings management of the underlying histogram. Under the null of no earnings management, then the distribution is smooth and continuous at the (zero earnings or zero earnings-changes) threshold point (Burgstahler & Eames, 2006). The test statistics is statistics:

$$EM2 = [\Delta p_i - E(\Delta p_{-i})]/SD(\Delta p_{-i}) \quad (2)$$

Where p_i is the proportion of the actual Nobs for interval i to firm-years, and change in p_i $[\Delta p_j = p_j - p_{j-1}]$. $E(\Delta p_{-i})$ is the expected (average) value of Δp, excluding p_i, and $SD(\Delta p_{-i})$ is standard deviation of (change in p_i) Δp, excluding Δp_i.

Logit-based test approach

Unlike the histogram-based test which detects distribution discontinuity, and examines properties of earnings (Roychowdhury, 2006), the 'logit-based tests' is conditional probability multiple explanatory variables model to detect the possible determinants of distribution discontinuity (or earnings management) around the benchmark (Shuto & Iwasaki, 2015). Empirical literature on the determinants of discontinuity in earnings management has been verified in isolation of an existing formal economic theory. In absence of an extent formal theory, empirical investigations conducted often have to depend on some assumptions, related or not related to with and earnings management, about the firms' distinctive business operations and about the functional (accounting) form of the earnings (Dechow & Dichev, 2002).

Conditional discontinuity test

The test, from Byzalov and Basu (2019), is based on the existence of multiple explanatory variables to detect possible determinants of earnings management. The discontinuity tests based on Burgstahler and Dichev (1997)'s framework does not accommodate multiple explanatory variables. In detecting discontinuity, Burgstahler and Dichev test allows to compare histograms of two asymmetric partitions for just one variable (e.g., earnings-losses versus earnings-profits of firms). Byzalov and Basu (2019) estimate a relatively smooth frequency distribution of pre-managed earnings with each model's component conditioned on some explanatory variables. The discontinuity is verified with standard t-test for each coefficients estimated. Relative to the standard logit model, the simulation from this test provides better Type-I errors and greater statistic power of test. The test has not been well exploited in empirical applications due to the complexities of implementation.

Monte Carlo simulation approach

Takeuchi (2004) applies to Monte Carlo simulation to detect discontinuity in an empirical distribution of reported earnings. Takeuchi (2004) follows that reported earnings (X_i) is a random variable (for $i = 1, \dots, n$) with a function defined as, F. If the distribution is evenly spaced with space points $-\infty = g_0 < g_1 < \cdots < g_k = \infty$, where $\left(g_j - g_{j-1} = h\right)$ for $j = 2, \dots, k-1$, then an empirical distribution, Y_j, defined by the empirical process $\sum_{i=1}^{n} l\{X_i \in (g_{j-1}, g_j]\}$ $(j = 1, \dots, k)$] in $(g_{j-1}, g_j]$ would assume a multinomial probability function, $p_j = P\left(X \in \left(g_{j-1}, g_j\right]\right) = F\left(g_j\right) - F\left(g_{j-1}\right)$. Where the mean of Y_j is $E(Y_j) = np_j$, and the variance is $E(Y_j - Y)^2 = np_j(1 - p_j)$. The degree of the empirical smoothness of the distribution is $[p_j = (p_{j-1} + p_{j+1})/2]$. The Burgstahler and Dichev (1997)'s B-D statistic (τ_{BD}) is denoted:

$$\tau_{BD} = \frac{((\hat{p}_{j-1}+\hat{p}_{j+1})/2)-\hat{p}_j)}{\sqrt{var(((\hat{p}_{j-1}+\hat{p}_{j+1})/2)-\hat{p}_j)}} \quad (3)$$

Where;

$$\hat{p} = Y_j/n; \quad (4)$$

$$var(((\hat{p}_{j-1} + \hat{p}_{j+1})/2) - \hat{p}_j) = \frac{1}{n}p_j(1 - p_j) + \frac{1}{4n}(p_{j-1} + p_{j+1})(1 - p_{j-1} - p_{j+1}) + \frac{1}{n}p_j(p_{j-1} + p_{j+1}) \quad (5)$$

The statistic (τ_{BD}) detects the 'disjointness' in the distribution (density) function under a null of standardize normality in the distribution of earnings. Takeuchi (2004) formulate τ_{BD} for three different bin-width h [h = 0.20σ, 0.10σ, & 0.05σ, where σ is standard error of X_i] to confirms 'disjointness' in the density under the null of normality of the earnings. He conducted Monte Carlo experiment to indicate discontinuity for the jump in earnings continuous distribution. The test has not been well exploited in empirical applications due to the rigour require in conducting the bootstrap simulations.

3. Methodology

The paper uses data (2001–2021) from the Nigerian Exchange (NGX) and other financial records, for assets-scaled profit after tax as a proxy for accounting earnings. The focus on 2001 was to ensure a substantial number of years are captured in the pre-IFRS periods (2001–2011). The post-IFRS periods (2012–2021), which information is assumed to have been applied under greater flexibility and discretions toward the improvement of earnings quality based on the

international framework are well captured. Because the number of NSE firms is small relative to studies for advanced economies with large capital market and firm size (Shuto & Iwasa, 2015; Enomoto & Yamaguchi, 2017), the study uses all firms, including financial and non-financial industries in accordance with Pududu and De-Villiers (2016).

Table 1:
Industry-wise Breakdown of sample

Industry	#Firms	#Firm-year	%Firms
Agriculture	10	200	6.41%
Conglomerates	5	100	3.21%
Construction/Real Estate	8	160	5.13%
Consumer Goods	21	420	13.46%
Financial Services	45	900	28.85%
HealthCare	7	140	4.49%
ICT and Tech	11	220	7.05%
Industrial Goods	16	320	10.26%
Natural Resources	5	100	3.21%
Oil and Gas	9	180	5.77%
Services	19	380	12.18%
Total	**156**	**3,120**	**100.00%**

Note: N# = No. of firm-year. #Firms = No. of firm in indicated industry. %Firms = Industry percent of firm of total sample [#Firms/155]. The sample for financial (non-financial) service is 29% (71%), and pre- and post- IFRS include 1,560 firm-years.

From the full sample, firms with incomplete observations for the considered periods are eliminated. The final sample relapsed to 156 firms, with a total of 3,120 observations, and to 2,964 firm-years for the earnings change variables after taking the difference between earnings for current year (t) and the preceding year (t–1) for each firm, with the pre-IFRS. Table 1 presents the breakdown of Sample according to the sectors included in the final sample. The financial sector constitutes about 29% of the sample compositions.

Empirical Procedure

The paper focuses on investigating discontinuity on actual earnings due to the implementation of IFRS. Previous paper (e.g., Gbadebo et al., 2022) tests the significance of IFRS on discretionary accruals to examine earnings management believed to be the cause of discontinuity. Because there is wide range in the firms' profits earnings and assets due to their different sizes, this may infuse outliers on the earnings-distribution if the actual profit is used. According to literature

standard, the paper computes the normalised (i.e., asset-scaled) PAT for the firm-years of profits (Gbadebo et al., 2022; Kent & Routledge, 2015).

The study normalises $PAT_{i,t}$ earnings measures, as supposed by literature (Durtschi & Easton, 2009; Donelson *et al.,* 2013; Kent & Routledge, 2015; Gbadebo et al., 2022) by scaling with the lagged of total assets ($TA_{i,t-1}$) as denoted by Equation (6).

$$PAT_{i,t}{}^{*} = PAT_{i,t}/TA_{i,t-1} \quad (6)$$

And the earnings change is computed using the difference between earnings for current year t and preceding year t–1 for each firm i and at time t as depicted:

$$\Delta PAT_{i,t}{}^{*} = PAT_{i,t}{}^{*} - PAT_{i,t-1}{}^{*} \quad (7)$$

Equation (6) is the assets-scaled profit ($PAT_{i,t}{}^{*}$), and Equation (7) is the assets-scaled profits ($PAT_{i,t}{}^{*}$). The normalised results are pooled and control for outliers' effects on the cross-section of the $PAT_i{}^{*}$ and $\Delta PAT_i{}^{*}$ metrics[1]. This is implemented by completing winsorisation at the first (1st) and penultimate (99th) percentiles. Because, the focus is on the interval to left and right of the various category to conjecture the possible existence of discontinuity, the process excludes the zeros PAT according to standard requirement. The exclusion eliminates complexity links with the zero-samples. The study presents preliminary assessment of the distributions of earnings using basic statistics. Afterward, the empirical histogram, t-tests (mean and median tests), standardised difference tests, and permutation tests are applied to evaluate the hypotheses. The procedure for the permutation test is presented.

The permutation test

The permutation test, in particular the Kolmogorov-Smirnov (KS), is a non-parametric method that often used when the assumption of the parametric distribution is unknown or when the distribution is skewed (i.e., normality does not hold). The permutation (Kolmogorov-Smirnov, KS) test provides statistic to evaluate the formulated null hypotheses, H1 and H2. The test is based on the highest absolute difference between two empirical distributions with a common function, F. Suppose two independent distributions of observations with sizes n and m, which may not necessarily be equal represent the earnings metrics ($PAT_{i,t}{}^{*}$ and $\Delta PAT_{i,t}{}^{*}$) for the before $[X_{1i}\ (i = 1, \dots, n)]$ and after $[X_{2j}\ (j = 1, \dots, m)]$ the implementation of the IFRS, have common cumulative distribution function (cdf), F, with distribution function:

$$F_n(x) = \frac{1}{n}\sum_{i=1}^{n} 1_{(X_i \leq x)}, \quad -\infty < x < \infty \tag{8}$$

Assume $F_0(x_j)$ is the hypothesised cdf and $F_n(x)$ is the empirical $d.f$, the KS statistic evaluates the hypothesis H_0 against H_1, using these steps:

- Formulation of the hypotheses (H_0 against H_1):

$$\text{Hypotheses} \begin{cases} H_0: F(x) = F_0(x) & -\infty < x < \infty. \\ H_1: F(x) \neq F_0(x) & \text{for some } x. \end{cases} \tag{9}$$

- Estimation of the observed test statistic using:

$$D_0 = \hat{\theta}(X_1, X_2) = \sup |F_n(x) - F_n(x)|. \tag{10}$$

- Generate a pooled sample, $Z_i = (X_{1i}, X_{2i})$, where Z_i $[i = 1, 2, \dots, (n + m)]$ are the ordered set for X_1 and X_2 and apply the index r $(r = 1, 2, \dots, \mathrm{R})$, which is replicated for the index.
- Take a resample of size h from Z_i (without replacement) to represent X_1, use the remaining observations from Z_i to represent X_2 and then compute $D^* = \hat{\theta}(Z_i)$.
- If large values of estimated D_0 holds for the H_1, compute the empirical p-value denoted:

$$\hat{p} = (1 + \sum_{r}^{R} I(D^* \geq D_0)/R + 1 \tag{11}$$

  $\hat{p}$ is then multiplied by 2 to accommodate the two-sided test, and the decision rule is such that the paper rejects the null at α (significant level), if and only if $\hat{p} \leq \alpha$.

4. Results

Earnings Information

Before the required tests to evaluate the hypotheses, the paper presents (Table 2) the basic statistical characteristics of the annual assets-scaled profits after tax's earnings and earnings change. Following the winsorisation to regularised the earnings information for possible outliers, the data identify that for the full sample (2002-2021), the mean (μ) and median (med) of the asset-scaled PAT_i are respectively 0.067 and (0.075), while the mean and median of the e change in tasset-scale (ΔPAT_i) are 0.001 and (0.002). The normalised PAT_i relates to a lower spread of 0.145 relative to the PAT with spread of 0.172. For the pre-IFRS, the data recognize a mean (median) of the asset-scaled PAT_i as 0.057 (0.073), with a lower spread of 0.144, for the earnings levels, whereas the mean (median) of the asset-scaled PAT_i of 0.003 (0.003) with a higher spread of 0.172, for the earnings change distribution.

(0.076), with a higher spread of 0.148, for the earnings levels, which point at the earnings management hypothesis, and therefore suppose possible existence of increase discontinuity, for the Assets-scaled PAT. This is not the case for the earnings-change, which indicate a lower mean (0.001) but higher median (0.005), and therefore supposes possible existence of decrease earnings management and discontinuity, for the change in assets-scaled PAT. PAT_i shows some degree of skewness (-0.577) and kurtosis (4.688), while ΔPAT_i shows skewness and kurtosis' coefficients as -0.026 and 3.245, respectively, which not be significant.

Table 2:
Assets-scaled PAT (Earnings and earnings-change)

	Full Sample 2002-2021		Pre-IFRS 2002-2011		Post-IFRS 2012-2021	
Statistics	PAT_i	ΔPAT_i	PAT_i	ΔPAT_i	PAT_i	ΔPAT_i
N	3120	2964	1560	1560	1560	1404
min	-0.669	-0.876	-0.669	-0.876	-0.659	-0.831
$\tilde{q}_1$	0.011	-0.055	0.011	-0.051	0.010	-0.057
med	0.075	0.002	0.073	0.003	0.076	0.003
$\tilde{q}_3$	0.130	0.059	0.130	0.056	0.130	0.064
max	0.669	0.944	0.669	0.842	0.648	0.944
μ	0.067	0.001	0.057	0.001	0.068	0.005
μ_{se}	0.003	0.003	0.004	0.004	0.004	0.005
σ	0.146	0.172	0.144	0.172	0.148	0.173
μ_{skew}	-0.577	-0.026	-0.529	-0.246	-0.620	-0.205
μ_{kurt}	4.688	3.245	4.681	5.096	4.671	4.978

Note: Table 2 shows the statistics for full sample, and the Pre and Post IFRS scaled profits $[PAT_i]$ and change in scaled profits $[\Delta PAT_i]$. $N, min, \tilde{q}_1, med, \tilde{q}_3, max,\ \mu, \mu_{\text{se}}, \sigma, \mu_{skew}$ and μ_{kurt} are respectively the No. of firm-years, minimum, 1st quartile, median (2nd quartile), 3rd quartile, maximum, mean, standard error of mean, standard deviation, skewness and kurtosis.
Source: Author (2023)

Empirical Histograms

The study depicts histograms for pooled cross-section of PAT_i and ΔPAT_i for the full samples (Figure 2a and 2b); earnings-level for the pre-IFRS (Figure 3a) and post-IFRS samples (Figure 3b); and the earnings-change for the pre-IFRS (Figure 4a) and post-IFRS (Figure 4b). The focus is on distinct visual examination of the pattern of the distribution obtained according to defined optimal Bin-width (Scott, 2009). For PAT_i (earnings-level) and ΔPAT_i (earnings change), the optimal bin-width of 0.0118 percent [0.0175] are applied, respectively, for the empirical

configurations. In support of the basic statistic, Figure 2a shows that the distribution of PAT_i appears less likely symmetrical at zero, exhibits some degree of skewedness and kurtosis, and discontinuity is affirmed, at least visibly.

Contrarily, Figure 2b could not visibly depict discontinuity, although some degree of skewedness and kurtosis are noticeable, but they may not be significant upon testing. The immediate interval over zero ($0 < PAT_i \leq 0.0118$) exhibits higher frequency of firms reporting small positive PAT_i compare to the just interval under zero. This is consistent with earnings discontinuity predictions of earnings management that indicates earnings slightly greater than zero, occurs unusually than would be expected, and that most earnings pattern has significantly too few observations immediately below zero than anticipated (Kent & Routledge, 2015). The distribution for ΔPAT_i looks likely symmetric with a bell shape. The evidence shows that the ΔPAT_i series has significantly too few observations immediately after zero than, hence, assuming no clear evidence of discontinuity.

The paper compares the earnings-level distribution for the pre-IFRS (Figure 3a) and the post-IFRS samples (Figure 3b). Both Figures indicate discontinuities. Figure 3a shows the interval just left of the zero [-0.0118, 0.000] has unusually low regularity, and the just right of zero [0.000, 0.0118] exhibits remarkably high frequency. Figure 3b shows the interval just left of zero threshold [-0.0175, 0.000] has low frequency, and the just right of zero threshold [0.000, 0.0175] exhibits significantly high frequency. The distributions confirm the discontinuities consistent with earnings management predictions (Enomoto & Yamaguchi, 2017).

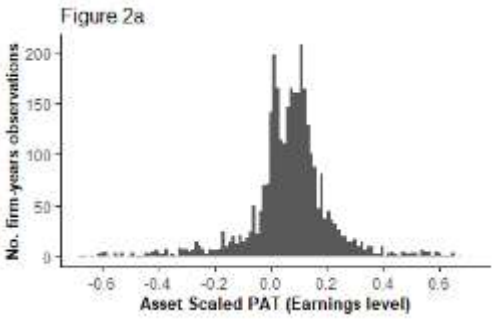

Figure 2a: Asset Scaled PAT (Earnings level)

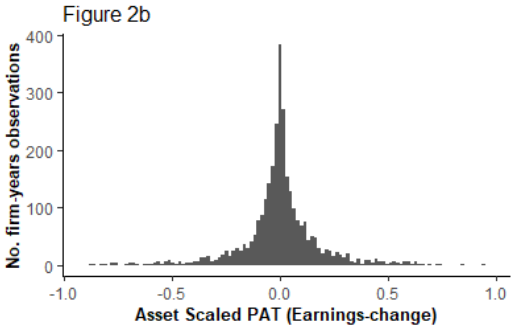

Figure 2b: Asset Scaled PAT (Earnings-change)

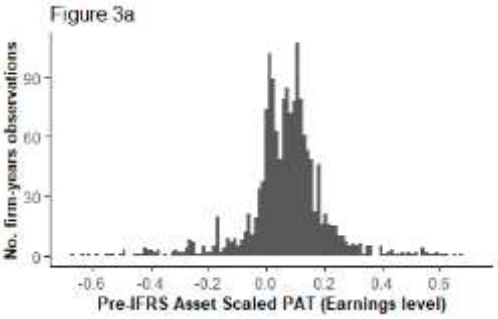

Figure 3a: Pre-IFRS Asset Scaled PAT PAT (Earnings)

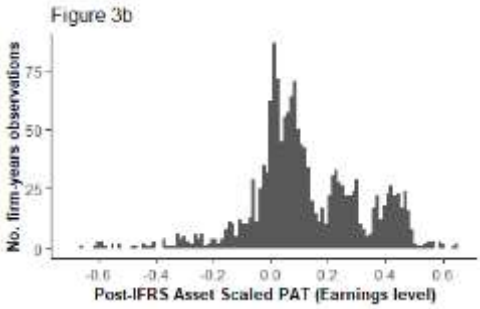

Figure 3b: Post-IFRS Asset Scaled (Earnings)

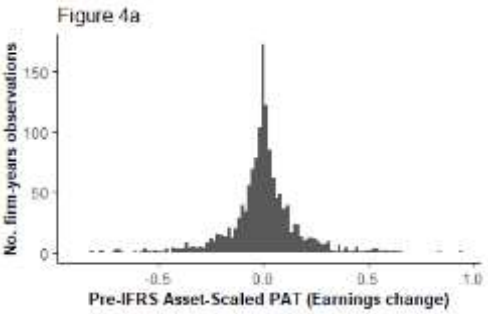

Figure 4a: Pre-IFRS Asset Scaled PAT (Earnings-change)

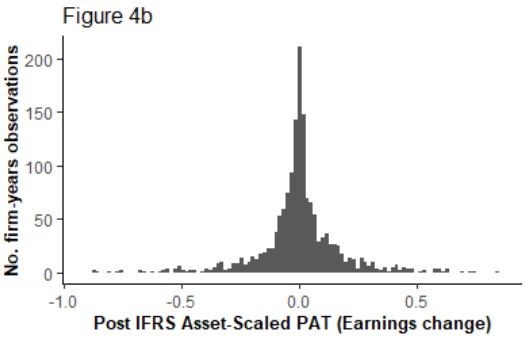

Figure 4b: Post-IFRS Asset Scaled PAT (Earnings-change)

Source: Author's plot (2023)

Standardised Difference Tests

However, as Gbadebo (2022) noted, the histogram plots are not sufficient to ascertain which is more discontinuous and therefore greater evidence of earnings management is required. Table 3 presents empirical evidence based on the standardised difference statistics. Because the interest is on the evidence of discontinuity in earnings (earnings-change) before and after the implementation of IFRS, the study focuses on the standardised difference tests in comparing only Figure 3a and 3b (Figure 4a and 4b). To compute standardised difference statistic for the small-loss (profit) based on the earnings levels (PAT_i) for the pre-IFRS, the firm-years used is 311 (1,249), and for the post-IFRS, the firm-years used is 289 (1,271), a sign of possible increase small profit's earnings management relative the pre-IFRS for the earnings-change. Likewise, for the earnings-change variable (ΔPAT_i), the small-earnings decrease (increase) for the pre-IFRS is 673 (809) and

for the post-IFRS is 769 (713). This supposes decrease in increase earnings management relative the pre-IFRS for the earnings-change.

Regarding the standardised difference test for earnings-level for the pre-IFRS period, the test for the interval just left of zero (small-loss test) has a test statistic of -18.183, and significantly negative, whereas the interval just right of zero (small-profit) has a test statistic of 3.161, and significantly positive. This reveals that the managers manage earnings to avoid earnings losses (small profit) during the GAAP periods. For the post-IFRS periods, the test for the interval just left of zero (small-loss test) has a statistic of -15.33, and significantly negative, whereas the interval just right of zero (small-profit) has a test statistic of 6.861, and significantly positive, therefore indicating that the managers manage earnings to avoid earnings losses despite the implementation of IFRS met to prevent such practices. When the paper compares the increase in small profit (interval just right of zero), since standardised difference statistic for the post-IFRS (6.861) is greater than that for the pre-IFRS (3.161), the finding indicates there has been increased in earnings management and discontinuity after the adoption of IFRS in Nigeria. The evidence supposes that the first null (H1) that discontinuity has increased for earnings after the implementation of IFRS holds.

The result for earnings-change for the pre-IFRS shows that the statistic for the decrease (increase) is -0.669 (1.805), and not significant. This reveals that discretions are not utilised to avoid earnings decrease (increase) during the GAAP periods. The post-IFRS result shows that the standardised difference for the earnings decrease (increase) is -0.575 (1.449) and insignificantly, indicating no sufficient evidence that the earnings change is managed after the mandatory implementation. Comparing the earnings increase (i.e., for the interval just right of zero), since standardised difference statistic for the post-IFRS (1.449) is lesser than that for the post-IFRS (1.805), the study concludes there has been declined in existing discontinuity after the IFRS-ramification. The null (H2) that discontinuity has increased for earnings-change after the implementation is refuted. In sum, the tests suppose evidence for increase in discontinuity for the earnings-level, but not sufficient to conclude same for the earnings change.

Table 3:
Discontinuity (standardised difference) tests

Earnings	Pre-IFRS		Post-IFRS	
	Sdiff [Loss]	Sdiff [Profit]	Sdiff [Loss]	Sdiff [Profit]
PAT_i	-18.183*	3.161**	-15.33*	6.861*
	Sdiff [-]	Sdiff [+]	Sdiff [-]	Sdiff [+]
ΔPAT_i	-0.669	1.805	-0.575	1.449

Note: The Table reports the standardised differences (Sdiff) test based on BD. * ; ** indicates the test-statistics is significance at 1%, and 5%.

Parametric and Permutation Tests

Here, the paper uses statistical methods to test if the difference in the means and median for the scaled-earnings categories (levels and change) for pre- and post-IFRS is significant. For the parametric test, the mean differences for the considered asset-scaled profits (levels and change) is examined based on the Welch (**Wilcoxon)** statistics for a 2-side paired sample. For the non-parametric test, the distribution difference for the asset-scaled profits (levels and change) is examined based on one sample Kolmogorov-Smirnov (KS) test. Table 4 reports the results of the earnings difference tests.

Table 4:
Results of the earnings-statistic difference tests

	Parametric test				Non-parametric
Earnings	Mean Difference		Median Difference		K-S permutation[a]
	(Welch) test		**(Wilcoxon)** test		
PAT_i	-4.38*	(0.000)	-1.98**	(0.028)	(0.002)
ΔPAT_i	-1.29	(0.376)	-2.93	(0.001)	(0.561)

The mean differences for the considered asset-scaled profits (levels and change) is examined based on the Welch (**Wilcoxon)** statistics for a 2-side paired sample, while the distribution difference for the asset-scaled profits (levels and change) is examined based on one sample Kolmogorov-Smirnov (KS) test.

*, ** implies significant at 1%, 5% level.
[a] The statistic tests the difference in distribution rather than testing the mean difference based on bootstrapping.

The evidence based on the parametric testing indicates that the mean of the pre and post-IFRS earnings differs, but the difference in the mean of the earnings change is not significant, with a p-value of 0.376. For the distribution-based test, the

asymptotic K-S test is significant for earnings ($\hat{p} = 0.002$) $<$ ($\alpha = 0.05$), hence, a rejection of the null of no significant difference in the managed earnings, between the two regimes (pre and post-IFRS). The null holds for the earnings change, implying there is no significant dissimilarity between the distributions of earnings for the two financial reporting regimes. That is there seems to be possible non-disappearance (disappearance) of the earnings discontinuity asset scaled profits (asset scaled profits change) distribution at zero threshold after IFRS implementation.

The findings have far reached implications. The IFRS appears more effective than the GAAP in monitoring firms to ensure reduction of earnings management to avoid losses. More than the GAAP's statement of accounting standards (SAS), the international standards involve stricter measures for organisation's internal control and audit assessment. The IFRS replicates high standard quality financial information of firms on organised documentation and prediction of earnings, cash-flows, investments and capital inflow. The Standards attempt to improve the effectiveness of financial reports, ensure value for the information on financial statements, and enhance the comparability and transparency of financial statements among global capital markets.

The discontinuity evidence provides guidance for policy formulation and regulators in enforcement processes in the capital market. In addition, the managers under the IFRS are much concern about the need to present trusted earnings of firms because of global integration since they comply with the implementation under expectations that the standards will heighten them towards global opportunities and lead to improved financial performance. Reporting earnings loss definitely spiral undesirable information for investment because the news surprises spread into the markets and triggers fall in the firm' share price' (Chowdhury et al., 2018), but this has undesirable on the firms, particularly, as it would discourage expected foreign investors.

5. Conclusion

Earnings metric on the financial reports represent information that guide investors in making informed decisions in the capital market. The indicators have significant effect on the performance of stock price, and may largely influence the expected stock price. Researchers have observed that because reporting earnings increase may enhance firms' stock price, many managers they consistently report increase earnings relative to certain threshold, particularly, greater than their previous earnings valuation. There is evidence that such practice has led to a situation of

conspicuous upward shift in the frequency of observations, from left of identified earnings benchmark to the right. In addition, recent studies have shown that changes in accounting regulations may have effect on the shape of the distribution of earnings. The paper examines the discontinuity evidence for Nigeria, in relation to the adoption of IFRS.

There is reduced discontinuity (increase discontinuity) for the earnings-level (earnings change). The evidence provides the existence of distribution, and by implication earnings management. The findings have research and regulatory implications. The established evidence offers new insight and guidance for policy formulation and regulators in enforcement processes in the capital market. Because the effectiveness of an accounting regulation depends on the institutional mechanisms available to implement and enforce the frameworks, the put in place effective institutions and stricter measure in monitoring firms' earnings reports. Earnings manipulating firms should also be sanctioned, in order to maintain financial market integrity. In addition, the paper expands the frontier of extant literature, and offer references for future research. The study's limitation is that it considers only the distributions of earnings and earnings-changes. The distribution of forecast errors is not investigated because such is influence by forecast management (Brown & Higgins, 2005). Future studies may consider this for improvement.

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