Articles Review

Detecting Earnings Management in The Reporting of Nigerian Banks: The Distribution of Ratios Approach

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Abstract

Earnings management (EM) practice has raised concerns amongst different stakeholders. Analysing financial reports to detect anomalies aims to reduce associated risks to earnings manipulations and safeguard investors' funds. This study verifies two main issues (a) whether annual reports of the Deposit Money Banks (DMBs) reflect evidence of EM and (b) whether the DMBs engage in more manipulations in periods 'After' mandatory adoption of IFRS relative to 'Prior' IFRS periods. The study involves all 19 DMBs in Nigeria, but the established selection criteria constrained the final sample to 17 banks. The final sample comprises 319 observations for each bank-ratio form. We compute 14 bank-specific 'earnings' ratios for the different years from 2001 to 2020, obtain the distribution of ratios and estimate the Kolmogorov-Smirnov statistics to address two issues. The finding confirms endemic EM but that the manipulations are not consistently a yearly phenomenon. The evidence supposes more EM for the banks' financials prior-relative to the post-IFRS adoption. The evidence supposes implications for banks to attenuate earnings misreporting. We offer those bank supervisory agencies should ensure appropriate monitoring and engagement of officials during the reporting of bank financial records to circumvent opportunistic misreporting.

Keywords: *Earnings Management; DMBs; Distribution of Ratios; Kolmogorov-Smirnov Test*

INTRODUCTION

There is a consensus that earnings management (EM) affects the credibility of financial statements (FSs) reporting. EM involves providing earnings information with the potential to alter financial decisions and mislead the users of FSs. Many research has disclosed such practices among firms in developed countries (Bzeouich et al., 2019; Burgstahler & Dichev, 1997). These studies provide evidence of EM with samples that exclude financial institutions and sometimes other overly regulated firms. Burgstahler and Dichev (1997) observe that for regulated firms, there are incentives to report consistent earnings- losses or decreases to regulators whenever they expect economic benefits.

EM in the financial sector is of significant concern for the capital market and the financial system. Shen and Chih (2005) discuss some incentives that drive banks to engage in EM. First, the banking system is constrained by illiquidity that may expose them to opportunistic risk of manipulations, contagion and competition. Banks often maintain incentives for loss avoidance – keeping 'reported' earnings performance far from decreasing to ensure investors' confidence. Second, banks do manage earnings due to uncertainty over their assets and liabilities. The high leverage of banks aggravates this risk over assets, inevitably providing the need to manipulate financials through asset substitution. Third, since banking operations are strictly regulated, some banks resort to EM in order to evade regulation sanctions (Morgan, 2002). In addition, banks operate with public wealth in the form of savings and deposits, so banks run with risks (Nasfi et al., 2022).

There is reported evidence of fraudulent financial practices perpetuated by top management in the banks in Nigeria (Kajola et al., 2020). Despite reports of evident occupational fraud in banking, existing research on EM amongst banks in the country focused only on cause-effect examination of the impact of corporate governance on discretionary accruals' managed earnings (Kajola et al., 2020; Osemene et al., 2018; Madugba & Ogbonnaya, 2017). No study has investigated banks' annual FSs to detect EM. We fill this gap by providing a horizon to test EM on annual statements. The objective of

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this study is to verify (a) whether annual reports of the Deposit Money Banks [DMBs] reflect evidence of EM and (b) whether the DMBs engage in more manipulations in periods 'After' mandatory adoption of IFRS relative to 'Prior' IFRS periods.

In addressing whether the financial report of banks reflects significant EM, we apply the distributions of the ratios approach. The method scrutinises EM derived from each financial report without imposing symmetric assumptions on earnings (Dutta & Nezlobin, 2016), as well as allows for broader verification of manipulations in multiple measures (Beretka, 2019). We obtain distributions of standardised difference according to Burgstahler and Dichev (1997) and Degeorge et al (1999) and compute banks' ratios from the annual reports. The second issue compares the relative magnitude of the managed earnings 'Before' and 'After' the IFRS adoption in 2012. If significant earnings manipulations are established, we will offer measures to mitigate such opportunistic behaviour risk to circumvent future fraud. These frauds can have an effect on banks performance, especially non-performing loan (NPL) financial ratios, and the bank can ultimately suffer losses (Nasfi et al., 2021).

The analysis of earnings management based on a single earnings variable may present biased outcomes and misguide policy directions. The distributional approach depends on the bin width. If the sample is small, the optimal bin width would be considerably wide, ipso facto influencing the outcomes (Pududu & De-Villiers, 2016). For short periods, the analysis based on ratios is more efficient relative to than empirical histogram. The remainder of the paper is structured: section 2 reviews the literature and provides hypotheses, section 3 discusses the data and empirical methodology, while Sections 4 and 5 are results and conclusions.

LITERATURE REVIEW

Brennan (2022) noted that no one explanation is holistic in defining EM. Academics offered descriptions including that EM is a 'big-bathing' that occurs via financial reporting through covert practices involving rearrangement of expenditures, revenue items and management of accruals. The managers use discretion in structuring financial transactions to alter earnings reports to mislead targeted stakeholders about the underlying firm's performance as well as influence contractual outcome that largely depends on the report. Walker (2013) considered EM as sentimental use of managerial discretion over accounting choices, involving making real economic choices to influence underlying economic events, earnings measures and earnings reporting choices. Notably, most motivations for EM are inconsistent (Dichev et al., 2013).

Literature classifies EM into three: *Accruals management*, involving choices within the Generally Accepted Accounting Principles (GAAP) that either 'obscure' or 'mask' the true financial performance; *Fraudulent accounting*, involving accounting practices that violate the GAAP; and Cash flow EM or Real EM (REM), involving firms' actions that change its underlying 'economic' activities to increase current earnings. Some authors (Dichev et al., 2016; Libby et al., 2015) note that most EM research employs archival methods of financial information, with the unavoidable restriction of interpreting unobservable management incentive that drives earnings quality decisions.

Conventional Approaches to Detect EM

Two approaches are followed to detect EM in accounting reports. The first approach focuses on EM estimated with discretionary accruals models. The models detect the opportunistic behaviour of smoothing earnings by quantifying managers' discretion on earnings managed. According to the different models (Modified Jones model and others in Jones model (1991)), the models measure the extent of managers' strategic reporting of overestimated (underestimated) cash flows to generate momentous hedge returns. They rely on identifying accounting noise based on the assumptions made about the earnings' series generating process. The second approach links EM to cross-sectional observations of firms through standard earnings discontinuity models without recourse to the time-series characterization.

1. The Distributional Approach

Burgstahler and Dichev (1997) pioneered the distributional approach using cross-sectional earnings (histogram). They argue that the distribution of earnings is characterised by a jump, in which bin frequency distributions include what is likely to be too few observations nearest the neighbourhood (just) below the benchmark and too higher observations immediately above the same benchmark. They depicted the distribution of equity-scaled income for non-financial firms (Figure 1) and earnings change (Figure 2), revealing discontinuities (kinks) in the distribution. They suggest that the kink is triggered due to firms' manipulation of their cash flow to boost earnings.

Degeorge et al. (1999) observe that earnings that fall closely below the threshold are boosted upwards, while earnings far above the threshold are trimmed downward. They argue that if the manager's remuneration is just a single bonus conditioned on the firm attaining an earning threshold, he would more likely manipulate reports to meet (and surpass) the threshold but any downward manipulation far from the bonus threshold. They interpret the asymmetric histogram pattern of earnings as analogous to the management theory that managers employ economic (real) and accounting (discretionary) decisions to avoid losses and decreases.

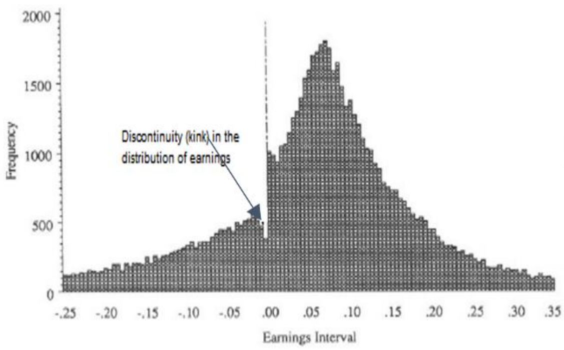

Figure 1. Equity-scaled net income

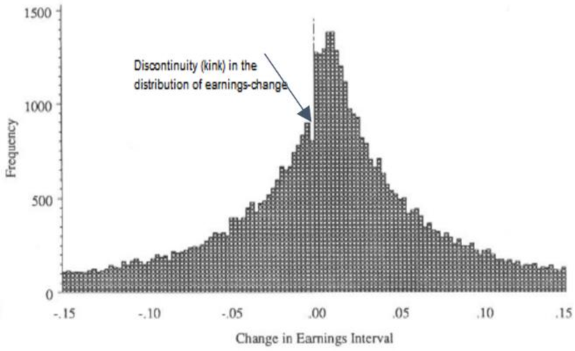

Figure 2. Equity-scaled net income-change

Source: Burgstahler and Dichev (1997)

Figure 1 and 2 provides evidence of the prevalence of small losses (earnings decreases) amongst the US non-financial service. The histograms for earnings and earnings change depict the presence of a break at zero. They show the existence of a noticeable peak in the earnings interval to just the immediate right of zero, implying the prevalence of small profits (earnings increases). The distributions exhibit a significant jump in the smooth interval to the neighbourhood immediately left of point zero (arrowhead), indicating the existence of small losses (earnings decreases). They estimate that about 30–40% of firms with small losses do manage earnings to attain small profits, while about 8–12% of firms with small decreases adjust their earnings to create earnings increases.

2. Standardised difference approach

Some authors (Leuz et al., 2003; Degeorge et al., 1999; Burgstahler & Dichev, 1997) used statistical constructs to meet or beat thresholds. They suggested that the pattern on the histogram, even if visibly depicted EM, needs to be verified with a standardised difference test under the null of no EM. Three indicators (equations 1–3) capture earnings just close below or above an observed kink. First, Burgstahler and Dichev (1997) use the $EM1$ statistics. $EM1$ is the difference between the actual (AQ_i) and expected (EQ_i) number of firm-years in period i for the interval just right (left) of zero divided by the standard deviation of the difference.

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

In equation (1), $SD_i = [Np_i(1-p_i) + 0.25N(p_{i-1}+p_{i+1})(1-p_{i-1}-p_{i+1})]^{1/2}$ is the estimated 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 unrestricted (Total) number of firm-years samples or observations; Np_i = the total estimated standard deviation or SD_i in interval i, p_{i+1}= lag of i or the number in interval $i-1$; p_{i+1}= lead of i or the number in interval $i+1$. $p_i = AQ/N$ is the ratio of the actual observations for interval i to the total firm-years, which represents the probability of observation in interval i; $AQ_{i-1}/N = p_{i-1}$ and $p_{+1} = AQ_{+1}/N$.

Second, Degeorge et al. (1999) used a meat-or-beat threshold test, refer as $EM2$ statistics, to detect EM. Under the null of no EM, the distribution is smooth and continuous at any zero thresholds. Assume p_i is the proportion of an actual number of observations for interval i to firm-years $[\Delta p_j = p_j - p_{j-1}]$ and $E(\Delta p_{-i})$ is the expected (average) value of Δp, excluding p_i, and $SD(\Delta p_{-i})$ is the standard deviation of (change in p_i) Δp, excluding Δp_i, *EM2* is:

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

Third, Leuz et al. (2003) used a ratio, $EM3$, to test earnings manipulations to exceed thresholds. The measure, which is not statistics, is the ratio of the frequency of small- profits to losses. It is the actual number of observations for interval i for small- profits (earnings increase) over observations for interval $i-1$ small- losses (earnings decrease).

$$EM3 = AQ_i/AQ_{i-1} \quad (3)$$

Both *EM1* and *EM2* are standardised difference measures, representing appropriate statistics to evaluate the null hypothesis. On the contrary, *EM3* is only a ratio that cannot evaluate the null hypothesis. Higher *EM3* (above unity) is indicative of greater manipulations by the firms.

A fourth measure (Shen & Chih, 2005; Leuz et al., 2003), the Aggregate Earnings Management (AEM) metric, uses the average ranks of *EM1*, *EM2* and *EM3* vis:

$$EM4 = [Ranks(EM1) + Ranks(EM3) + Ranks(EM3)]/3 \quad (4)$$

This is computed for EM to avoid losses and has a version for earnings decrease avoidance.

Distributions of the Ratio Method

The conventional approach applies discontinuity models to capture the evidence of EM while testing accrual for one or just a few variables. The hypothetical underpinning that anchored such an approach to manipulations is limited (Beretka, 2019). An alternative approach is 'the distributions of the ratio', which can be used to examine EM for financial firms by testing 'all' available variables on the reported annual FSs. This method identifies apriori by supposing that reported earnings approximate firms' true economics such that earnings-ratio are explained without appealing to manipulation (Beretka, 2019). The approach is based on distributional and statistical analysis of all computable ratios from reported statements (Beretka, 2019). The ratios are first standardised based on *EM1* and *EM2*.

Nigerian Background and Hypotheses

Banking operations in Nigeria can be traced back to the colonial periods when the Bank of British West Africa was established in 1892. The periods between 1892 and 1951 marked tremendous failures of banks, as they operated under a free banking system with the absence of legislation until 1952, when the banking ordinance was formulated for Bank supervision and control. The Central Bank of Nigeria (CBN) created the platform for strict regulations, ethics, corporate governance and prevention of fraud. Despite these efforts, there is evidence of earnings malpractices as some banks use accounting skills to conceal misreporting. The CBN exposed some malicious acts by top management, leading to the liquidation or sanctions of some reputable banks. These scandals have raised concerns about the reliability of banks' FSs.

Prior research on EM of the DMBs in Nigeria has only focused on cause-effect models to examine how corporate governance explains defined discretionary accruals' earnings (Kajola et al., 2020; Osemene et al., 2018; Madugba & Ogbonnaya, 2017). Kajola et al. (2020) used the Jones model to obtain an estimate for EM and examine the effect of board attributes on the measures for some banks. They revealed that board meetings and gender diversity have no significant effect on EM. Osemene et al. (2018) examined how ownership structure and board characteristics of DMBs influence campaigns for EM. They found that directors' tenures and shareholdings significantly negatively affect EM, while gender, board- and firm- size have no significant effects. Madugba and Ogbonnaya (2017) noted that corporate governance enhances superior financial performance to stakeholders. They investigated the liaison between corporate governance and EM in banks. They found that corporate governance has a significant positive influence on earnings per share.

We follow Beretka (2019) to test for evidence of EM. The hypotheses tested are:

a. $\boldsymbol{H_0}$**:** Nigeria's DMBs do not manage financial reports.

b. $\boldsymbol{H_0}$**:** Nigeria's DMBs do not manage financial reports more after IFRS adoption.

RESEARCH METHOD

Sample Selection

We use annual records from the Nigerian Stock Exchange as well as the consolidated and separate interim statements of the DMBs during 2001–2020. The initial sample for each bank- ratio is 380 (= 19 × 20) firm-year, but to assemble the final sample, we set two criteria. First, the bank must have records of at least 45% scope coverage. Only 17 selected DMBs satisfied this condition; hence we eliminated 2 banks established in 2018 and 2019. Second, we consider only earning information that contains all observations in the coverage periods. This criterion decides the number of ratios to examine from the reports. The record obtained excludes some observations for some of the banks' financials [Equity Funds, Total Assets, Total Deposit, Gross Loans, Profit After Tax] needed to construct the *empirical* bank ratios. Hence, we compute 14 bank- ratios for 17 DMBs. Table 1 presents the breakdown and distributions of the sample. Table A1 and A2 in the Appendix presents a list of banks analysed [discloses the measurement for each bank-specific ratio]. The final sample comprises 319 observations for each bank ratio, except for GMI, been an 'Index' variable containing missing observations for each year.

Table 1. Breakdown and distributions of a sample (BDOS)

Panel A: Breakdown of the sample (BOS)

Sample	Nobs
Total	380
Less: Excluded Banks	40
Less: Missing Observations [11 for HBL] & [10 for KB]	21
Final [= N]	319

Panel B: Distributions of the sample (DOS)

S/N	Bank-specific ratio	Nobs	#Miss	%Miss
1	CAD	319	-	-
2	COF	319	-	-
3	ETA	319	-	-

4	ETL	319	-	-
5	GMI	302	17	5.33%
6	GYA	319	-	-
7	LQY	319	-	-
8	LTA	319	-	-
9	LTD	319	-	-
10	NIM	319	-	-
11	NPL	319	-	-
12	PATM	319	-	-
13	ROA	319	-	-
14	ROE	319	-	-

Nobs: Number of observations. #Miss: Number of missing observations. %Miss: The per cent of missing Nobs.
Source: @Authors (2022)

Estimation Procedure

We compute the 14 bank ratios from the FSs. Next, we compute the Base ratios (i.e., Descriptive) statistics for the bank-specific ratios. According to Beretka (2019), we employ two testing designs for '*the* d*istribution of ratios method'* and compute the earnings-management metrics for the 14 bank ratios for only *the* $EM1$ and $EM2$ models. We ignore $EM3$, which is a ratio indicator rather than a standardised measure, therefore cannot evaluate the null. We do not consider $EM4$ in order to keep things simple. We calculate the correlation between the bank ratios and the EM metrics as well as the correlations between each bank ratio' based on the EM1 and EM2 metrics (see Shen & Chih, 2005).

Next, we use One-sample Kolmogorov-Smirnov (KS) test to evaluate the distributions of the ratios from $EM1$ and $EM2$. The statistic quantifies the distance between the observed (empirical) distribution $[F_n(x)]$ and a reference (theoretical) cumulative distribution function, CDF $[F(x)]$ (Dimitrova et al., 2020). The test provides the probability that a sample has been drawn from that (reference) distribution. The result gives a chance that $EM1$ and $EM2$ distributions represent the bank-specific ratios without distortion. The $F_n(x)$ for n independent and identically distributed ordered observations of bank ratio (X_i) and the statistic [KS(z)] are (5) and (6), respectively.

$$F_n(x) = \frac{1}{n}\sum_{i=1}^{n} 1_{[-\infty \leq x]}(X_i), \quad -\infty < x < \infty \tag{5}$$

$$\text{KS(z)} = \sup|F_n(x) - F(x)| \tag{6}$$

In equation (5), $1_{[-\infty \leq x]}(X_i)$ is the indicator function which equals 1 if $X_i \leq x$ and 0 otherwise. The sup (|.|) is the supremum (i.e., largest absolute difference) between the observed (F_n) and theoretical $[F(x)]$ CDF for all x. The CDF has mean sample $\mu = \bar{x}$ sample and variance $\sigma^2 = s^2$, with an $n-1$ denominator. The CDF of the supremum of the Brownian bridge for computing the limiting distribution is $H(z) = 1 - \Sigma_{k=-\infty}^{\infty}(-1)^{k-1}e^{-2k^2z^2}$, for any z, n as, $n \rightarrow \infty$. In line with Beretka (2019), we provide the p-values from (a) Monte Carlo simulation (2-sided) sampling based on Lilliefors statistic for testing against normality with 'certain' estimated parameters and (b) Asymptotic significance (2-sided) test based on Kruskal-Wallis H-statistic, for testing nonparametric distributions with a stochastic dominance.

Lastly, we offer sensitivity checks by extending the simulation to verify the test of each ratio for a 0.95 [0.05] Fiducial [Critical] level to exhibit stronger statistical linkage to reduce the likelihood of committing Type I errors (Beretka, 2019). This is important to strengthen the evidence of manipulations for two reasons. (a) It has an effect on how investors, regulators, and scholars interpret EM based on the performance measure by exemplifying reasonable dynamics of the investigation

(Enomoto & Yamaguchi, 2017) and (b) it demonstrates greater robustness between theory and alternative research design.

FINDINGS AND DISCUSSION

Base Ratio Statistics and Correlations

Table 2 and 3 show descriptive statistics for the Base ratios and correlation matrices, while Table A3 and A4 (Appendix) present the annual and individual bank statistics for Benchmark comparison. All the ratios have positive means. The mean for the CAD ratio is within the permissible limits, and that of the LTD ratio is within the rate proposed by the CBN. Only ETA, ETL PATM and ROE suggest much variability. The distributions for the ratios appear non-normal but positively skewed, except for CAD, ETL, and NIM. LQY, GMI, PATM, and ROA suggest protruded and asymmetrically heavy-tailed distributions.

Table 3 [Panel A] presents the correlation matrix of the bank ratios. The correlation between COF and other variables is high. In Panel B, values above [below] the shaded diagonal indicate the correlation amongst the *EM1* and *EM2* metric variables. The values on the diagonal are the correlation coefficients between *EM1* and *EM2* for each of the 14 ratios. There is a notable high degree of relationship, which is, in fact, significant for nine ratios.

Table 2. Base statistics

Ratio	N	μ	μ_{Se}	m	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$	JB-stat	P_r(JB)
CAD	319	0.217	0.003	0.255	0.049	-0.082	-1.279	20.872	0.000
COF	319	0.020	0.001	0.143	0.341	1.878	2.914	12.625	0.004
ETA	319	0.231	0.011	0.280	6.175	0.518	-0.393	15.165	0.001
ETL	319	0.539	0.008	0.726	12.25	-0.304	-0.352	16.552	0.001
GMI	302	0.850	0.046	0.974	0.641	0.182	5.330	366.66	0.000
GYA	319	0.073	0.003	0.069	0.040	0.437	-0.528	13.050	0.001
LQY	319	0.555	0.025	0.274	0.083	13.53	216.2	15500	0.000
LTA	319	0.409	0.013	0.408	0.230	0.213	-0.702	8.763	0.013
LTD	319	0.629	0.012	0.686	0.214	0.118	-0.739	7.686	0.001
NIM	319	0.068	0.001	0.074	0.018	-0.014	-1.229	18.528	0.000
NPL	319	0.102	0.001	0.054	0.021	0.011	-1.093	10422	0.000
PATM	319	2.880	1.668	0.621	2.674	17.58	309.3	35656	0.000
ROA	319	0.022	0.002	0.026	0.004	5.375	28.192	24.195	0.000
ROE	319	0.231	0.005	0.184	10.45	-0.164	-0.929	116824	0.000

Source: @Authors (2022)

The Kolmogorov-Smirnov Test

The Kolmogorov-Smirnov (KS[z]) test is based on the distribution of the ratios of *EM1* and *EM2* models. Table 4 (*EM1*) and Table 5 (*EM2*) present the results of the one-sample KS tested on an annual basis with the EM metrics model indicated in parenthesis. We evaluate at a 0.01 significance level. For the EM ratios not significant at the chosen critical level, we asterisk [*] the level of statistical significance with a 5% level. The computation compares the ratio distributions of *EM1* and *EM2* with a reference (Normal) test distribution. The simulation could not compute valid cases to perform the test for GMI in the split file for 2001.

Table 4 reveals the likelihood of manipulations of the FSs. The KS[z] test shows that the Monte Carlo and Asymptotic Sig is highly insignificant for all the years for CAD, ETL, GMI, LTD [2005*] and NPL, except for those indicated in parentheses, which is 'asterisked' if significant at 0.05 level. The sample cannot establish sufficient evidence of manipulations for these ratios based on the distributions of the *EM1* metric. The other ratios exhibit highly Asymptotic and Monte Carlo Sig for all years except for those indicated in parenthesis, which is 'asterisked' if significant at 0.05 critical level: COF [2004], ETA [2002, 2003, 2005, 2007–2009, 2013, 2014*, 2017], GYA, LQY [2009–2012, 2017, 2018], LTA [2001–2003, 2004*, 2005–2009], NIM [2001, 2002, 2003*, 2005, 2009, 2018, 2019], PATM [2004, 2006, 2008–2012, 2015, 2017–2019], ROA, ROE [2004–2007, 2009, 2011–2014, 2016, 2017].

Results in Table 4 exhibit Asymptotic but not Monte Carlo Sig in years indicated in parenthesis: COF [2018*], ETA [2014*], LQY [2013*], LTA [2015*] and Monte Carlo but not Asymptotic significance in years indicated in parenthesis: COF [2020*], LQY [2007*], and NIM [2017*]. The results for the *EM1* suggest that bank managers may have employed sophisticated skills to outplay strict financial standards such that outcome is difficult to unilaterally assert on one financial information on reported consolidated and interim statements, but some results arise in diverse areas of the FSs and across several time frames, similar to findings by Beretka (2019) for credit and banking institutions in Hungary. This evidence is in accordance with practice, as managers would most likely engage discretion and manipulations not in parallel periods but in a manner that would see them evade high financial sanctions from regulators.

Table 5 presents the results for the same ratios based on the *EM2*. The outputs based on *EM2* are nearly identical in years relative to those provided by *EM1*. Several studies (Beretka, 2019; Shen & Chih, 2005; Leuz et al., 2003) with other approaches have reported closely significant evidence for *EM1* and *EM2*. The KS[z] reveals both Monte Carlo and Asymptotic insignificance for almost all the years for GMI, LTD and NPL ratios with few exceptions, based on selected differences in the years of significance. The results suppose that at chosen periods, the manager's smooth financial information in diverse areas of the bank reported statements (Beretka, 2019).

The evidence suggests we may refute the first 'Null' for the significant periods. Only two ratios (GMI and NPL) show overall highly statistically insignificant for all the financial years; therefore, the first 'Null' holds for GMI and NPL ratios in all the years. Our findings for GMI and COF, considered as Rate Paid on Funds in Beretka (2019), are consistent with the evidence for the Hungarian banks. The outcomes for LTA and NIM ratios are inconsistent with Beretka (2019). The LTD was only significant for *EM1* (2005, at 5%) and *EM2* (2002, 2009, and 2005, at 5%) in the years indicated in parenthesis but highly insignificant for other years. GYA and ROA (*EM1*), and ROA (*EM2*) are highly significant for all years based on both metrics, hence supposing sufficient evidence to refute the null for the variables. Both pieces of evidence do not align with the reported evidence by Beretka (2019).

The insignificance of the capital adequacy, equity to loan, gross margin index, and non-performing loan coverage ratios indicates that these banks' earnings are well managed without the likelihood of misreporting. Appropriate capital adequacy presumes a minimal risk of insolvency. This may be connected to the strict regulations by the CBN, which ensures banks operate with adequate capital that guarantees efficiency and stability of the financial system. The coverage of the non-performing loan is evidently well-reported. Sufficient and timely coverage is necessary to harness credit losses and bank failure (Bhattarai, 2020).

Some indexes' statistical output may conflict with the reality of the Nigerian DMBs' operations. For instance, while the coverage of the non-performing loan (all years) and the loan to the asset (since 2011) ratios exhibit evidence of statistical insignificance, in reality, the banks still have issues with their NPL and have high lending that is discouraging, hence reduces the LTA ratio. Nwosu et al. (2020) reference that the bank's financials may indicate that outstanding loans are nearest minimal since the 2010's Asset Management Corporation of Nigeria absorption of the DMBs' NPLs. That, in addition to the bank's restructuring of its risk management teams, may have justified the evidence we obtained. The evidence calls for more policy intervention to ensure a sound and safe system that guarantees banks' capacity to meet financial obligations and protect investors' funds.

Table 3. Correlation coefficients

Bank Ratio	CAD	COF	ETA	ETL	GMI	GYA	LQY	LTA	LTD	NIM	NPL	PATM	ROA	ROE
	Panel A: Correlation matrix of bank-specific ratios													
CAD	1.000													
COF	0.046	1.000												
ETA	-0.052*	-0.721***	1.000											
ETL	-0.072	-0.242***	0.411***	1.000										
GMI	-0.084*	-0.045*	0.007	-0.023	1.000									
GYA	-0.051	-0.727***	0.985***	0.408***	0.019	1.000								
LQY	0.076*	-0.024	0.028	0.067	-0.046	0.013	1.000							
LTA	-0.042	-0.749***	0.965***	0.200***	0.019	0.953***	0.010**	1.000						
LTD	-0.047	-0.406***	0.701***	0.244***	-0.040	0.681***	-0.049	0.678***	1.000					
NIM	0.009	-0.014	0.050	-0.064	-0.053	0.027	-0.036	0.071	0.027	1.000				
NPL	-0.090*	0.086*	-0.062	0.041	-0.073	-0.060**	0.003	-0.079	-0.047	0.003	1.000			
PATM	-0.011**	-0.027**	0.047**	0.044*	-0.034**	0.027**	0.026**	0.033**	0.109*	-0.013***	-0.090*	1.000		
ROA	-0.008	-0.031	0.006	-0.021	-0.028	0.008	0.083	0.033	-0.069	-0.053	-0.021	-0.013	1.000	
ROE	0.080	0.002	-0.009	-0.035	-0.025	-0.008	0.050	0.011	0.001	0.015	0.002	-0.059	-0.023	1.000
EM Ratio	Panel B: Correlation matrix of EM1 and EM2 metrics													
CAD	**0.103*** **	0.046	-0.052	**-0.072**	**-0.084**	-0.051	**0.076**	-0.042	-0.047	0.009	**-0.090**	-0.011	-0.008	**0.080**
COF	-0.033	0.003	**-0.721**	**-0.242**	-0.045	**-0.727**	-0.024	**-0.749**	**-0.406**	-0.014	**0.086**	-0.027	-0.031	0.002
ETA	-0.004	**0.053**	**0.002* **	**0.411**	0.007	**0.985**	0.028	**0.965**	**0.701**	0.050	**-0.062**	0.047	0.006	-0.009
ETL	0.014	0.023	-0.010	**0.049*** **	-0.023	**0.408**	**0.067**	**0.200**	**0.244**	**-0.064**	0.041	0.044	-0.021	-0.035
GMI	0.050	-0.020	0.009	-0.013	**0.084*** **	0.019	-0.046	0.019	-0.040	-0.053	**-0.073**	-0.034	-0.028	-0.025
GYA	-0.012	**-0.049**	0.128	-0.036	0.025	-0.025	0.013	**0.953**	**0.681**	0.027	**-0.060**	0.027	0.008	-0.008
LQY	0.012	**0.069**	-0.046	-0.028	0.046	**0.129**	**0.064*** **	0.010	-0.049	-0.036	0.003	0.026	0.083	0.050
LTA	-0.025	0.047	0.024	-0.067	0.009	0.011	-0.038	-0.042	**0.678**	**0.071**	**-0.079**	0.033	0.033	0.011
LTD	0.035	-0.009	**0.146**	**-0.053**	0.030	**-0.077**	0.054	0.051	-0.012	0.027	-0.047	**0.109**	-0.069	0.001
NIM	-0.010	-0.047	0.003	0.032	-0.040	-0.047	0.034	-0.071	0.070	**-0.104*** **	0.003	-0.003	**-0.053**	0.015
NPL	-0.050	**0.061**	0.014	**-0.082**	0.003	-0.042	0.024	0.031	-0.019	**0.099**	**0.058*** **	**-0.090**	-0.021	0.002
PATM	0.034	-0.032	-0.034	**-0.077**	**0.068**	**-0.107**	**-0.078**	**-0.081**	0.010	-0.008	-0.001	**0.097*** **	**-0.013**	**-0.059**
ROA	**0.101**	0.017	**0.080**	**-0.135**	-0.001	0.034	-0.022	0.044	0.032	0.050	**0.135**	-0.052	**0.086** **	-0.023
ROE	**-0.051**	0.009	**-0.067**	0.036	-0.013	0.004	**-0.083**	0.026	-0.019	0.037	0.022	0.056	**0.068**	-0.014

Table 3 presents the Pearson ordinary correlation coefficient of the bank ratios ratio pairs for the periods. The asterisk (***, **, *) indicates statistical significance using probability, $p|t| = 0$, at 1%, 5% or 10% levels. The (shaded) diagonal in Panel B shows the correlation between EM1 and EM2, values above [below] the shaded diagonal indicate the correlation amongst the earnings management EM1 [EM2] metric. The **Bold** figure discloses statistical significance.

Source: @Authors (2022)

Table 4. One-sample Kolmogorov-Smirnov test (based on EM1)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CAD	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	0.00	-0.02	-0.07	0.01	0.01	0.05	0.04	0.01	0.02	0.03	0.00	0.04	-0.02	-0.03	0.00	0.01	-0.03	-0.03	-0.02
	σ	1.03	0.96	1.07	0.93	0.84	1.05	0.83	0.98	0.91	1.25	0.79	0.97	1.12	0.97	0.91	0.91	0.97	0.95	1.09	1.15
	KS[z]	0.120	0.127	0.670	0.207	0.982	0.862	0.174	0.126	1.192	0.209	0.209	0.130	0.179	0.142	0.134	1.199	0.110	0.158	1.018	1.020
	Asymp.	0.766	0.800	0.590	0.682	0.396	0.320	0.810	0.837	0.244	0.878	0.861	0.800	0.749	0.800	0.682	0.071	0.680	1.100	0.211	0.216
	M.C.	0.893	0.988	0.443	0.695	0.327	0.253	0.937	0.973	0.237	0.793	0.686	0.880	0.816	0.765	0.875	0.089	0.794	0.085	0.196	0.188
COF	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.01	-0.01	0.03	0.06	0.04	0.04	0.04	0.02	0.06	0.01	-0.04	-0.02	-0.04	-0.03	-0.02	-0.03	-0.03	-0.03	0.00	-0.02
	σ	0.84	1.01	0.83	1.27	1.47	1.16	1.45	1.17	1.47	1.09	0.41	0.82	0.58	0.62	1.00	0.55	0.54	0.51	0.89	1.06
	KS[z]	1.895	2.569	1.997	1.325	2.089	2.038	2.287	2.126	1.725	1.999	2.453	1.868	2.159	2.546	2.376	2.019	1.872	1.121	1.773	1.360
	Asymp.	0.000	0.000	0.002	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010	0.000	0.061
	M.C.	0.001	0.000	0.000	0.089	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.080	0.000	0.033
ETA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	0.02	-0.04	-0.04	-0.04	-0.04	-0.01	0.00	-0.03	0.00	0.02	0.02	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.02
	σ	0.947	1.187	0.931	1.085	0.970	0.969	1.185	1.295	1.152	1.232	0.909	0.937	1.008	0.949	0.963	0.730	0.853	0.733	1.076	0.875
	KS[z]	1.915	0.564	1.129	2.520	0.528	1.970	0.891	1.281	1.250	2.195	2.116	2.894	0.392	1.291	2.449	2.388	0.154	2.538	1.800	2.293
	Asymp.	0.000	0.240	0.110	0.000	0.298	0.000	0.140	0.168	0.091	0.000	0.000	0.000	0.540	0.027	0.000	0.000	0.640	0.000	0.000	0.000
	M.C.	0.000	0.226	0.117	0.000	0.396	0.000	0.142	0.132	0.107	0.000	0.000	0.000	0.472	0.051	0.000	0.000	0.946	0.000	0.000	0.000
ETL	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.06	-0.05	-0.01	0.03	-0.01	0.02	-0.01	-0.05	0.05	-0.02	-0.06	-0.02	0.04	0.01	0.00	0.01	0.01	0.03	-0.01	0.02
	σ	1.045	1.112	1.103	0.877	1.018	0.912	1.162	1.062	0.956	1.285	1.091	1.071	0.927	0.908	1.035	0.811	0.899	1.049	0.928	0.795
	KS[z]	0.101	0.171	0.165	0.152	0.145	0.139	0.134	0.203	0.152	0.159	0.095	0.101	0.173	0.148	0.159	0.163	0.154	0.186	0.183	0.101
	Asymp.	0.803	0.898	0.721	0.992	0.690	0.971	0.863	0.632	0.918	0.915	0.986	0.738	0.898	0.880	0.805	0.730	0.723	0.279	0.772	0.912
	M.C.	0.994	0.709	0.749	0.828	0.868	0.893	0.917	0.703	0.826	0.784	0.996	0.986	0.823	0.790	0.722	0.690	0.750	0.532	0.947	0.986
GMI	n	14	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17
	μ	0.07	-0.01	0.00	0.01	0.00	0.01	0.00	-0.01	0.01	-0.01	-0.02	-0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	σ	1.88	1.45	1.09	0.81	0.77	0.90	1.08	1.30	1.35	1.21	0.60	0.57	0.73	0.96	0.82	1.04	0.93	1.13	0.93	0.37
	KS[z]	-	1.144	0.176	0.182	0.291	0.163	0.300	0.192	0.274	0.211	0.180	0.221	0.167	0.269	0.230	0.250	0.125	0.212	0.211	0.143
	Asymp.	-	0.213	0.939	0.894	0.505	0.676	0.284	0.740	0.444	0.393	0.998	0.311	0.792	0.773	0.393	0.378	0.820	0.304	0.420	0.862
	M.C.	-	0.239	0.876	0.634	0.625	0.759	0.307	0.870	0.374	0.455	0.649	0.360	0.662	0.840	0.487	0.380	0.918	0.373	0.377	0.823
GYA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	0.02	-0.04	-0.04	-0.04	-0.04	-0.01	-0.01	-0.04	0.00	0.02	0.02	0.03	0.01	0.02	0.02	0.01	0.00	0.00	0.02
	σ	0.97	1.17	0.94	1.00	0.92	0.93	1.16	1.29	1.14	1.16	0.94	0.94	1.13	0.90	0.98	0.73	0.87	0.76	1.04	0.91
	KS[z]	2.610	1.993	2.056	2.701	2.523	1.842	2.180	2.067	1.993	3.420	3.187	3.899	2.350	2.091	2.337	2.119	2.148	2.652	2.295	1.868
	Asymp.	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
	M.C.	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
LQY	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	μ	-0.03	-0.01	-0.05	-0.05	-0.04	-0.04	0.04	0.03	0.01	-0.02	0.05	0.01	0.00	0.02	-0.01	-0.03	-0.03	-0.04	-0.02	0.20
	σ	0.36	0.46	0.32	0.37	0.30	0.31	0.53	0.46	0.46	0.45	0.66	0.40	0.35	0.34	0.32	0.29	0.33	0.25	0.33	3.95
	KS[z]	2.128	1.903	1.968	2.089	1.936	1.933	1.658	2.176	0.180	0.434	0.167	0.117	1.698	2.257	1.748	2.248	0.221	0.171	2.388	2.538
	Asymp.	0.000	0.003	0.001	0.000	0.000	0.000	0.083	0.000	0.810	0.217	0.620	0.823	0.036	0.000	0.000	0.000	0.427	0.198	0.000	0.000
	M.C.	0.000	0.001	0.003	0.000	0.000	0.000	0.050	0.000	0.661	0.186	0.701	0.949	0.051	0.000	0.000	0.000	0.326	0.633	0.000	0.000
LTA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.03	0.04	-0.08	-0.02	-0.02	-0.02	-0.02	-0.01	0.00	-0.01	0.00	0.00	0.01	0.01	0.07	0.07	0.03	0.01	0.02	0.05
	σ	0.97	1.24	0.91	1.12	0.98	1.10	1.09	1.27	1.16	1.14	0.77	0.90	0.93	1.01	0.92	0.71	0.82	0.73	1.08	0.87
	KS[z]	0.146	0.176	0.207	1.427	0.716	0.788	0.635	0.756	0.838	1.649	3.553	1.784	1.958	2.066	1.413	2.068	1.632	2.354	2.084	2.210
	Asymp.	0.800	0.821	0.884	0.015	0.122	0.157	0.200	0.081	0.131	0.000	0.000	0.000	0.000	0.000	0.058	0.000	0.000	0.000	0.000	0.000
	M.C.	0.678	0.739	0.799	0.019	0.112	0.099	0.141	0.098	0.172	0.000	0.000	0.000	0.000	0.000	0.069	0.000	0.000	0.000	0.000	0.000
LTD	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	0.19	0.06	0.20	0.04	1.09	0.03	0.46	0.12	0.07	1.06	-0.02	0.01	-0.21	0.15	0.20	-0.30	-0.22	0.08	0.03
	σ	0.70	1.01	1.08	1.08	1.05	1.07	1.01	1.16	1.11	0.96	0.89	1.15	1.06	1.01	0.93	0.80	1.05	1.00	1.18	0.98
	KS[z]	0.088	0.130	0.127	0.168	1.470	0.144	0.211	0.181	0.139	0.212	0.266	0.151	0.182	0.235	0.189	0.119	0.124	0.178	0.134	0.154
	Asymp.	0.980	0.910	0.800	0.920	0.014	0.852	0.771	0.800	0.800	0.768	0.904	0.900	0.839	0.680	0.909	0.890	0.900	0.856	0.800	0.790
	M.C.	0.950	0.933	0.936	0.883	0.067	0.919	0.813	0.861	0.824	0.812	0.864	0.893	0.699	0.718	0.928	0.936	0.832	0.847	0.819	0.689
NIM	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	-0.01	0.03	-0.01	0.02	0.01	-0.02	0.04	-0.03	0.00	-0.02	0.00	0.01	-0.02	-0.01	-0.02	-0.03	0.05	0.00	0.04
	σ	1.03	1.00	0.97	1.06	1.02	1.03	1.21	1.05	0.81	1.08	1.30	0.84	1.19	1.02	1.08	1.01	0.76	0.69	0.85	0.99
	KS[z]	1.475	1.064	1.636	1.743	1.266	2.136	2.183	1.866	1.295	1.757	1.887	1.855	1.604	1.676	2.110	3.128	1.485	1.411	1.289	2.211
	Asymp.	0.092	0.222	0.042	0.000	0.232	0.000	0.000	0.000	0.060	0.008	0.000	0.000	0.002	0.000	0.000	0.000	0.062	0.093	0.111	0.000
	M.C.	0.058	0.215	0.030	0.000	0.217	0.000	0.000	0.000	0.088	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.039	0.088	0.140	0.000
NPL	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.07	0.01	0.20	0.07	0.01	-0.02	0.00	0.00	0.00	0.00	0.01	-0.02	0.01	0.01	-0.31	0.16	0.11	-0.10	-0.02	-0.13
	σ	1.18	1.15	0.98	0.85	0.76	1.09	0.99	1.02	0.94	0.88	0.85	0.96	1.02	0.97	1.07	0.96	1.08	1.13	1.09	0.85
	KS[z]	0.175	0.122	0.169	0.195	0.120	0.147	0.150	0.103	0.109	0.238	0.101	0.118	0.165	0.188	0.201	0.106	0.124	0.137	0.149	0.136
	Asymp.	0.706	0.975	0.662	0.706	0.847	0.638	0.313	0.503	0.888	0.579	0.850	0.650	0.612	0.555	0.937	0.930	0.799	0.758	0.840	0.891
	M.C.	0.678	0.958	0.723	0.554	0.963	0.857	0.841	0.993	0.986	0.310	0.992	0.949	0.680	0.514	0.439	0.981	0.924	0.861	0.785	0.868
PATM	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.07	-0.07	-0.08	-0.07	0.11	-0.07	-0.06	-0.03	-0.02	-0.08	-0.05	-0.05	-0.04	-0.08	-0.04	-0.05	-0.03	-0.05	-0.06	-0.05
	σ	0.05	0.05	0.03	0.03	4.61	0.03	0.05	0.08	0.10	0.03	0.06	0.06	0.11	0.02	0.07	0.07	0.09	0.03	0.06	0.11
	KS[z]	1.718	2.403	1.870	1.306	3.353	1.441	1.970	1.328	1.370	1.663	1.720	1.406	1.918	2.013	1.535	1.954	1.889	0.945	1.094	2.393
	Asymp.	0.004	0.000	0.013	0.112	0.000	0.034	0.000	0.022	0.055	0.021	0.023	0.024	0.000	0.000	0.018	0.000	0.000	0.160	0.160	0.000
	M.C.	0.008	0.000	0.009	0.077	0.000	0.055	0.000	0.025	0.015	0.050	0.012	0.017	0.000	0.000	0.013	0.000	0.076	0.181	0.108	0.000
ROA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
	σ	0.74	0.39	0.74	0.58	0.51	1.13	1.26	0.82	2.71	1.25	0.70	0.26	0.41	0.72	0.42	0.58	0.71	0.78	0.35	0.41
	KS[z]	1.606	1.144	1.839	1.840	1.958	1.972	2.273	2.107	2.432	2.036	1.866	1.802	2.048	2.191	1.809	2.119	2.360	2.243	1.683	2.101

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Asymp.	0.009	0.117	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000
	M.C.	0.007	0.110	0.001	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
ROE	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.41	-1.19	-0.30	-2.50	-0.50	-0.84	-1.75	-0.53	0.16	-0.58	0.44	-0.56	0.42	-10.35	-0.50	-1.05	-1.49	-1.13	-2.18	-2.80
	σ	0.95	1.03	0.95	1.15	1.01	1.04	0.93	0.90	1.00	0.91	1.09	0.81	1.05	1.00	1.06	1.06	1.01	0.97	0.80	1.21
	KS[z]	1.738	1.843	1.815	0.175	0.106	0.155	0.127	1.931	0.115	2.586	0.104	0.108	0.104	0.137	2.023	0.121	0.123	1.699	2.021	2.311
	Asymp.	0.002	0.001	0.001	0.810	0.800	0.834	0.832	0.000	0.800	0.000	0.900	0.900	0.810	0.910	0.000	0.810	0.670	0.008	0.000	0.000
	M.C.	0.003	0.001	0.001	0.679	0.990	0.806	0.942	0.000	0.976	0.000	0.990	0.977	0.983	0.863	0.000	0.938	0.930	0.002	0.000	0.000

Table 4 presents the Number of yearly observations (n), Mean (μ), Standard Deviation (σ), KS[z] statistic, p-values of Monte Carlo (2-sided) based on Lilliefors [M.C.], and Asymptotic significance (2-sided) based on Kruskal-Wallis [Asymp.] outputs of each ratio [2001-2020]. We untabulated the 99% (upper and lower bounds) Confidence Intervals, Most Extreme Differences [Absolute, Negative and Positive] cases of the outputs.
Source: @Authors (2022)

Table 5. One-sample Kolmogorov-Smirnov test (based on EM2)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CAD	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.24	-0.29	0.24	0.24	-0.27	0.18	0.23	-0.26	-0.37	-0.21	-0.05	-0.34	0.17	-0.05	-0.02	-0.40	0.06	0.27	0.03	0.25
	σ	0.74	0.69	0.77	0.66	0.60	0.75	0.59	0.70	0.65	0.90	0.57	0.70	0.81	0.70	0.45	0.58	0.77	0.66	0.83	0.74
	KS[z]	1.254	0.671	0.796	2.951	1.588	1.104	0.542	0.736	0.516	0.171	1.822	3.160	0.210	3.141	2.188	0.512	2.151	0.202	1.813	2.220
	Asymp.	0.153	0.312	0.253	0.006	0.046	0.118	0.519	0.335	0.530	0.907	0.025	0.000	0.717	0.000	0.008	0.415	0.005	0.799	0.047	0.001
	M.C.	0.106	0.378	0.294	0.001	0.082	0.144	0.499	0.297	0.626	0.858	0.017	0.000	0.687	0.000	0.032	0.695	0.009	0.687	0.021	0.000
COF	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.11	-0.61	-0.28	-0.17	-0.46	0.81	-0.12	-1.30	0.17	-0.85	-0.15	0.57	0.10	-1.15	-0.62	0.49	1.49	0.38	0.79	0.71
	σ	1.54	2.45	1.80	2.37	1.99	1.34	2.44	2.42	1.46	1.69	2.16	1.50	1.83	1.84	1.68	1.69	1.56	1.63	1.59	4.87
	KS[z]	1.992	3.563	1.672	2.337	2.416	1.914	1.246	2.088	1.462	2.122	1.254	1.444	1.528	1.570	1.861	1.717	2.163	1.630	1.341	1.560
	Asymp.	0.000	0.000	0.009	0.000	0.000	0.000	0.202	0.000	0.026	0.000	0.213	0.012	0.025	0.023	0.000	0.001	0.005	0.009	0.209	0.016
	M.C.	0.001	0.000	0.010	0.000	0.000	0.000	0.230	0.000	0.031	0.000	0.258	0.011	0.030	0.019	0.001	0.000	0.000	0.018	0.182	0.021
ETA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.01	-0.01	-0.01	0.00	-0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.02	0.00	0.01	-0.01	-0.01	0.00	0.01
	σ	1.33	0.17	0.18	2.74	0.79	2.55	3.27	0.98	1.54	0.72	1.75	5.22	2.47	3.23	3.39	3.52	1.41	2.69	0.49	0.63
	KS[z]	1.107	0.620	0.822	1.556	3.034	1.978	2.001	0.646	1.590	2.268	1.400	2.977	1.849	0.398	2.482	2.667	2.345	2.580	1.072	2.293
	Asymp.	0.281	0.323	0.181	0.080	0.000	0.000	0.000	0.413	0.049	0.000	0.356	0.000	0.023	0.692	0.000	0.000	0.000	0.000	0.311	0.000
	M.C.	0.268	0.315	0.166	0.045	0.000	0.000	0.000	0.385	0.066	0.000	0.319	0.000	0.012	0.517	0.000	0.000	0.004	0.000	0.283	0.000
ETL	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.12	-0.06	0.00	-0.02	-0.01	-0.13	-0.05	0.10	-0.04	-0.06	-0.01	0.00	0.12	0.06	0.03	0.06	0.00	-0.20	0.04	-0.20
	σ	0.64	0.22	0.16	1.60	0.94	1.11	0.56	1.24	0.42	2.37	0.41	0.96	0.99	0.68	2.97	1.84	3.15	1.94	1.65	1.81
	KS[z]	0.101	1.571	0.165	1.152	1.545	0.139	0.134	0.203	0.152	1.159	0.095	0.101	0.173	3.148	1.159	2.163	0.154	1.986	0.183	1.561
	Asymp.	0.855	0.052	0.776	0.345	0.048	0.988	0.694	0.484	0.531	0.265	0.973	0.799	0.837	0.000	0.268	0.001	0.873	0.036	0.779	0.050

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	M.C.	0.994	0.099	0.749	0.298	0.068	0.893	0.917	0.503	0.826	0.284	0.996	0.986	0.923	0.000	0.222	0.005	0.750	0.022	0.847	0.086
GMI	n	14	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17
	μ	-0.07	-0.19	0.02	0.31	-0.46	-0.13	-0.22	0.19	0.09	-0.42	-0.37	0.33	0.34	-0.08	0.31	0.23	-0.45	-0.38	0.26	0.18
	σ	0.18	1.16	0.87	0.64	0.62	0.72	0.86	1.04	1.08	0.97	0.48	0.45	0.58	0.77	0.66	0.83	0.74	0.91	0.74	0.30
	KS[z]		1.134	0.176	0.182	1.229	0.163	0.300	1.192	0.940	1.311	0.180	0.221	0.167	0.269	0.230	1.504	0.125	0.212	0.211	0.143
	Asymp.		0.231	0.682	0.894	0.221	0.910	0.501	0.182	0.313	0.152	0.832	0.518	0.815	0.703	0.698	0.061	0.676	0.578	0.552	0.770
	M.C.		0.198	0.676	0.634	0.165	0.759	0.457	0.201	0.309	0.174	0.649	0.660	0.662	0.640	0.687	0.082	0.918	0.373	0.377	0.823
GYA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.09	-0.05	0.00	-0.02	-0.01	-0.10	-0.04	0.08	-0.03	-0.05	-0.01	0.00	0.06	0.03	0.01	0.03	0.00	-0.10	0.02	-0.10
	σ	1.63	0.35	0.20	1.78	1.16	1.10	1.95	1.36	1.04	1.67	1.05	1.86	1.58	1.30	1.67	1.68	0.66	1.36	1.02	1.34
	KS[z]	1.931	1.571	2.251	1.676	2.351	2.611	2.824	1.520	1.158	2.017	1.930	1.953	1.037	1.957	2.023	1.936	1.648	1.307	2.143	3.134
	Asymp.	0.008	0.086	0.000	0.043	0.000	0.000	0.000	0.084	0.294	0.000	0.000	0.002	0.330	0.001	0.000	0.008	0.064	0.188	0.000	0.000
	M.C.	0.003	0.062	0.000	0.038	0.002	0.000	0.000	0.038	0.300	0.000	0.000	0.002	0.268	0.008	0.003	0.003	0.048	0.200	0.004	0000
LQY	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.05	0.00	-0.02	-0.02	-0.01	0.00	0.00	0.02	0.01	-0.02	-0.01	-0.02	-0.03	0.02	-0.01	-0.04	-0.02	0.03	-0.05	0.50
	σ	0.16	0.21	0.15	0.17	0.14	0.14	0.24	0.21	0.21	0.20	0.30	0.18	0.16	0.15	0.14	0.13	0.15	0.11	0.15	1.78
	KS[z]	2.133	1.309	1.994	1.183	1.417	2.005	1.773	2.306	1.985	1.104	0.173	0.172	1.559	2.329	2.750	2.257	0.883	0.243	2.417	2.619
	Asymp.	0.000	0.090	0.000	0.280	0.081	0.000	0.025	0.000	0.017	0.117	0.822	0.787	0.082	0.000	0.000	0.000	0.227	0.698	0.000	0.000
	M.C.	0.000	0.087	0.000	0.239	0.063	0.000	0.013	0.000	0.006	0.186	0.701	0.949	0.066	0.000	0.000	0.000	0.266	0.633	0.000	0.000
LTA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	0.200	0.11	0.16	0.42	-0.16	0.25	0.18	-0.16	-0.14	0.11	-0.16	-0.17	0.13	0.11	0.04	-0.08	0.21	0.12	0.05	0.05
	σ	0.25	0.12	1.02	1.46	0.92	1.00	1.52	1.08	0.13	1.09	0.18	0.73	1.02	1.37	0.16	0.55	0.97	1.05	0.31	1.22
	KS[z]	0.819	0.987	1.157	1.304	1.102	1.213	0.978	1.164	1.490	2.827	4.254	2.858	2.456	2.443	1.909	3.116	2.128	3.017	3.124	1.958
	Asymp.	0.220	0.120	0.115	0.230	0.012	0.086	0.120	0.128	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	M.C.	0.186	0.117	0.148	0.229	0.054	0.092	0.168	0.157	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LTD	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.06	-0.29	0.05	0.11	-0.14	0.18	0.17	0.18	-0.11	0.32	-0.15	-0.51	0.34	0.30	-0.09	0.12	-0.21	-0.37	0.05	0.64
	σ	0.08	1.13	0.60	0.63	0.25	1.55	0.16	0.01	0.23	0.19	3.06	0.95	0.19	2.01	2.07	1.05	2.66	0.00	0.40	1.29
	KS[z]	0.588	1.871	0.849	1.123	1.736	1.162	1.014	0.521	2.029	0.420	1.183	3.015	0.452	2.503	1.666	0.795	1.628	0.679	0.569	0.073
	Asymp.	0.309	0.011	0.345	0.212	0.062	0.266	0.130	0.251	0.002	0.538	0.210	0.000	0.597	0.001	0.048	0.373	0.083	0.484	0.526	0.990
	M.C.	0.416	0.006	0.394	0.204	0.038	0.224	0.189	0.268	0.000	0.487	0.256	0.000	0.533	0.000	0.043	0.394	0.076	0.384	0.465	0.925
NIM	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.12	-0.20	-0.45	0.10	-0.45	0.29	0.11	-0.08	-0.25	0.34	-0.44	-0.24	0.13	0.24	-0.27	0.21	-0.31	-0.38	-0.40	0.03
	σ	0.44	3.30	4.25	1.95	0.42	0.98	0.73	0.02	0.65	2.46	1.29	0.87	0.42	5.51	2.00	0.51	2.74	0.26	3.04	1.12
	KS[z]	1.792	1.210	1.861	1.791	1.954	2.430	2.483	2.122	1.734	1.999	2.147	1.769	1.825	1.907	1.763	1.830	1.902	1.055	0.966	0.902
	Asymp.	0.015	0.122	0.001	0.009	0.001	0.000	0.000	0.000	0.015	0.001	0.000	0.014	0.004	0.002	0.008	0.003	0.000	0.105	0.120	0.142
	M.C.	0.020	0.154	0.008	0.012	0.000	0.000	0.006	0.000	0.001	0.001	0.000	0.011	0.000	0.000	0.005	0.000	0.002	0.112	0.156	0.178
NPL	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.43	0.09	-0.32	0.34	0.15	-0.29	0.16	-0.10	-0.29	-0.04	0.22	-0.13	0.23	0.16	0.20	-0.14	0.02	0.04	-0.49	-0.19

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	σ	0.50	1.83	1.64	1.56	0.20	1.25	0.35	0.17	0.23	1.03	0.80	1.10	0.21	1.65	1.31	1.19	1.95	0.22	1.26	0.57
	KS[z]	0.375	0.122	0.169	0.195	0.120	0.147	0.150	0.103	0.109	0.238	0.101	0.111	0.165	0.188	0.201	0.106	0.124	0.137	0.149	0.136
	Asymp.	0.517	0.509	0.851	0.831	0.686	0.851	0.933	0.864	0.713	0.894	0.977	0.910	0.855	0.802	0.671	0.665	0.802	0.885	0.669	0.895
	M.C.	0.565	0.798	0.603	0.862	0.803	0.714	0.701	0.993	0.986	0.610	0.992	0.949	0.680	0.814	0.739	0.981	0.924	0.861	0.785	0.868
PATM	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.34	0.19	0.30	-0.30	-0.15	-0.28	-0.04	-0.09	0.21	0.08	-0.12	-0.03	-0.28	-0.09	-0.29	-0.08	-0.17	0.30	-0.37	-0.46
	σ	1.42	1.53	0.85	1.00	137.25	0.93	1.52	2.37	2.99	0.79	1.85	1.82	3.33	0.61	2.23	1.99	2.76	1.01	1.80	3.20
	KS[z]	1.598	1.354	1.607	1.442	1.714	1.622	1.845	2.467	1.564	1.837	1.901	1.983	2.119	2.224	1.695	2.159	1.086	1.044	1.102	2.644
	Asymp.	0.024	0.213	0.061	0.082	0.086	0.049	0.006	0.000	0.085	0.006	0.002	0.008	0.000	0.000	0.008	0.000	0.189	0.220	0.180	0.000
	M.C.	0.062	0.226	0.026	0.085	0.049	0.084	0.005	0.000	0.052	0.000	0.000	0.003	0.000	0.000	0.012	0.000	0.213	0.208	0.321	0.000
ROA	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.38	-0.28	0.20	-0.45	-0.34	0.00	-0.37	-0.18	-0.20	0.21	-0.41	-0.09	0.14	0.12	-0.33	0.13	-0.42	0.12	0.54	0.38
	σ	0.26	0.14	0.26	0.21	0.18	0.40	0.45	0.29	0.96	0.44	0.25	0.09	0.15	0.25	0.15	0.20	0.25	0.28	0.12	0.15
	KS[z]	1.627	1.760	1.822	1.990	1.836	2.311	1.911	2.400	1.686	1.953	2.420	1.967	2.361	2.919	1.969	2.508	1.935	1.907	2.280	2.335
	Asymp.	0.020	0.009	0.004	0.004	0.005	0.000	0.003	0.000	0.006	0.002	0.000	0.007	0.000	0.000	0.002	0.000	0.008	0.000	0.000	0.000
	M.C.	0.001	0.008	0.003	0.006	0.001	0.000	0.006	0.000	0.008	0.001	0.001	0.005	0.007	0.000	0.000	0.000	0.002	0.000	0.000	0.000
ROE	n	15	15	15	15	15	15	15	15	15	15	16	17	17	17	17	17	17	17	17	17
	μ	-0.04	0.10	-0.75	0.03	0.54	0.20	0.19	0.15	0.02	0.05	0.95	-0.02	0.01	0.02	0.17	0.19	0.20	-0.03	0.20	-0.03
	σ	0.287	0.104	0.108	1.99	2.76	0.225	0.121	0.123	0.189	0.113	0.146	0.120	0.113	0.175	0.106	0.155	0.127	0.103	0.07	0.11
	KS[z]	1.945	2.049	1.110	2.095	0.113	0.096	0.083	2.191	0.843	2.740	0.107	1.421	0.336	2.275	1.821	1.515	0.285	1.892	2.272	2.460
	Asymp.	0.000	0.000	0.155	0.000	0.800	0.890	0.880	0.000	0.280	0.000	0.800	0.098	0.260	0.000	0.042	0.810	0.088	0.004	0.000	0.000
	M.C.	0.000	0.000	0.135	0.000	0.899	0.996	0.914	0.000	0.276	0.000	0.990	0.077	0.283	0.000	0.009	0.838	0.050	0.009	0.000	0.000

Table 5 presents the Number of yearly observations (n), Mean (μ), Standard Deviation (σ), KS[z] statistic, p-values of Monte Carlo (2-sided) based on Lilliefors [M.C.], and Asymptotic significance (2-sided) based on Kruskal-Wallis [Asymp.] outputs of each ratio [2001-2020]. We untabulated the 99% (upper and lower bounds) Confidence Intervals, Most Extreme Differences [Absolute, Negative and Positive] cases of the outputs.
Source: @Authors (2022)

Sensitivity: IFRS and EM

We analyse EM by comparing evidence of manipulations 'before' and 'after' adopting the International Financial Reporting Standards (IFRS). Nigerian banks have reported consolidated FSs in line with the IFRS since 2012. The IFRS allows managers to use professional judgment in reporting FSs. We verify the second null with the output of the KS[z] statistics [Tables 4 and 5] based on the EM1 and EM2 for ratios with significant years. We could not verify CAD, ETL, GMI and NPL because they show no evidence of manipulations according to EM1 as well as GMI and NPL, which reveal no manipulations based on EM2.

We examine other ratios (COF, ETA, GYA, LQY, LTA, NIM, PATM, ROA, and ROE) that show at least a year's evidence of significance, in which the KS[z] statistics refute the nulls in Tables 4 and 5. We only consider evidence that exhibits more manipulation strings following the 'Discretion' based IFRS relative to the 'Rule-based' GAAP of reporting periods. We compare the number of significant years for the Prior-IFRS (denoted as Np) to the number of significant years for the After-IFRS (denoted as Na). The sample periods contain more years of the Prior-IFRS. To rectify the biased that this may cause in the comparison, we considered only 2001–2009 for the Prior-IFRS, whereas the Post-IFRS remains 2012–2020, leaving us a 9 year-regime apiece. No additional simulation was involved in the 'comparison' extracted from reports in Tables 4 and 5. Table 6 reports the years of statistical significance (i.e., evidence of manipulation) based on the KS test for the EM1 [Panel A] and EM2 [Panel B].

Table 6 [Panel A] reveals evidence that most managed ratios (COF, ETA, LTA, NIM) are misreported in more years of the Post-IFRS relative to the Prior-IFRS regime $(Na > Np)$. This is marginal for COF [9 to 8] and NIM [7 to 5], moderate for ETA [6 to 3], but excessive for LTA [8 to 1], as indicated in the parenthesis. Both LQY [6 to 8] and PATM [7 to 8] exhibit a tendency for lesser, albeit moderate, years of manipulation in the Post- relative to the Prior-IFRS regime, while GYA, ROA and ROE show equal numbers of manipulation years. Kousay (2019) shows that IFRS has no influence on EM for listed Canadian firms. In Panel B of Table 6, the IFRS shows more significant evidence of bank ratios (CAD, ETA, ETL, LTA and ROE). LTA reveals excessive evidence of manipulations for almost all post-adoption years.

The evidence supposes more manipulations for the banks' financial information prior-IFRS relative to the post-adoption. This is inconsistent with the accrual-based evidence by Ozili and Outa (2019) that IFRS lower earnings smoothing of Nigerian banks. Several studies on accruals-based EM (see Cadot et al. (2020) and Guermazi and Khamoussi (2018)) provide evidence of misreporting after IFRS. Cadot et al. (2020) disclose that IFRS resulted in more managed earnings for derivatives reporting. The fact that misreporting of some variables has reduced after adoption indicates that managers manipulated components of their FSs.

An alternative way –the 'Relativeness Index (RI)'– allows using the default 'Prior IFRS' as 2001–2011 [11 years] and 'After IFRS' as 2012–2020 [9 years]. RI for each ratio compares the years of significance for the Prior-adoption relative to After-IFRS under the assumption that both are equal. We circumvent concern about the year differences with an equalising process. The sample indicates for each year of After-IFRS observations, there are $11/9$ [= 1.22] years of the Prior-IFRS observations. We equalised both by multiplying (scaling up) the numbers of years of After-IFRS with 1.22 to provide the 1:1 ratio needed for a levelled comparison. Table 5A [Appendix] presents snapshots to examine each ratio's years of significance and misreporting and the computed RI for comparison of the evidence between the Prior- and After- IFRS adoption. This method reveals less evidence of EM After-IFRS relative to Prior-IFRS adoption. This may be due to the unbalance sample observations being biased in favour of the Prior-IFRS.

We perform another sensitivity test to verify the 0.95 [0.05] confidence interval [significance] level for EM1 and EM2 models. The results at 0.05 levels [untabulated] provide similar evidence to previous findings for the *EM1* and *EM2* model. The outcomes collaborate with reported evidence by Beretka (2019) for Hungarian Banks. The outcomes for the *EM1* and *EM2* metric of 0.95 Fiducial (0.05 Critical) limits (untabulated) suppose parallel evidence.

Table 6. Years of Statistical Significance [Manipulation Evidence] of Bank Ratios

	Panel A: Based on EM1				Panel B: Based on EM2			
Ratio	GAAP	Np	IFRS	Na	GAAP	Np	IFRS	Na
CAD	No EM	0	No EM	0	[2004, 2005*,a]	2	[2012, 2014, 2015*,a, 2017, 2019*,a,m, 2020]	6
COF	[2001-2003, 2005-2009]	8	[2012-2017,2018*,a, 2019, 2020*,m]	9	[2001-2006, 2008, 2009*,a,m]	8	[2012-2017, 2018*,a, 2020*,m]	8
ETA	[2001, 2004, 2006]	3	[2012, 2015, 2016, 2018-2020	6	[2004*,m, 2005-2007, 2009*,a]	5	[2012, 2013*,a,m, 2015-2017, 2018, 2020]	7
ETL	No EM	0	No EM	0	[2005*,a]	1	[2014, 2016, 2018*,a,m, 2020*,a]	4
GMI	No EM	0	No EM	0	No EM	0	No EM	0
GYA	[2001-2009]	9	[2012-2020]	9	[2001, 2003, 2004*,a,m, 2005-2007, 2008*,m]	7	[2012, 2014-2016, 2017*,m, 2019, 2020]	7
LQY	[2001-2006, 2007*,m, 2008]	8	[2013*,a, 2014-2016, 2019, 2020]	6	[2001, 2003, 2006, 2007*,a,m, 2008, 2009*,a]	6	[2014-2016, 2019, 2020]	5
LTA	[2004*,a,m]	1	[2012-2020]	8	[2005*,a, 2009*,a,m]	2	[2012-2 020]	9
LTD	[2005*,a]	1	No EM	0	[2002, 2005*,m, 2009]	3	[2012, 2014, 2015*,a,m]	3
NIM	[2003*,a,m, 2004, 2006-2008]	5	[2012-2016, 2017*,m, 2020]	7	[2001*,a,m, 2003, 2004*,m, 2005-2009]	8	[2012*,a,m, 2013-2017]	6
NPL	No EM	0	No EM	0	No EM	0	No EM	0
PATM	[2001,2002, 2003*,a,m, 2005, 2006*,a, 2007, 2008*,a,m, 2009*,m]	8	[2012*,a,m, 2013, 2014, 2012*,a,m, 2016, 2017,a, 2020]	7	[2001*,a, 2003*,m, 2005*,m, 2006*,a, 2007, 2008]	6	[2012-2014, 2015*,m, 2016, 2020]	6
ROA	[2001-2009]	9	[2012-2020]	9	[2001-2009]	9	[2012-2020]	9
ROE	[2001-2003, 2008]	4	[2015, 2018-2020]	4	[2001, 2002, 2004, 2008]	4	[2014*,a, 2015, 2017*,m, 2018-2020]	6

Source: @Authors (2022)

Table 6 reports the numbers of- and years of Statistical significance (i.e., Evidence of Earnings Management, EM) for the Bank ratios based on the *EM1* (Panel A) and *EM2* (Panel B) metric models. All the reported ratios are significant at 0.01, except where the asterisk (*) indicates, which is statistical significance at 0.05 level. *a, m: Both Asymptotic and Monte Carlo Sig.; *a: Asymptotic but not Monte Carlo Sig.; *m: Monte Carlo but not Asymptotic Sig for each ratio in the corresponding year indicated. The shaded cells are for banks ratios which do not have any evidence of manipulations, as reported in Tables 4 (*EM1*) and 5 (*EM2*). Both GMI and NPL (grey area) show no evidence of manipulations in all the years based on *EM1* and *EM2*, whereas CAD and ETL (shaded blue) reveal no manipulation based on only *EM1*. No additional simulation, parametric engagements or restrictions are involved in the 'enumeration' of the Table. #Np and #Na denote the numbers of years that the ratios are significant for the Prior and the After IFRS, respectively. To obtain #Np, we considered the Prior-IFRS periods as 2001–2009 to have equal numbers of years with the After-IFRS of 2012–2020. Generally, the evidence reveals more EM for the After-IFRS relative to the Prior to IFRS for both the *EM1* and *EM2* metrics. An extended version is reported in Table 5A (Appendix) in which the full sample is considered under a pseudo-scale-up with Prior-IFRS set as year-numeraire to equalise, for theoretical purposes, the number of years for the Prior- and After- IFRS.

CONCLUSIONS

The thrust of this study is to detect evidence of EM amongst Nigerian DMBs. The study computes 14 bank-specific 'earnings' ratios and obtains the distribution of ratios and the Kolmogorov-Smirnov statistics, which were applied to verify whether or not the DMBs' annual reports reflect evidence of EM as well as whether the DMBs engage in more manipulations 'After' as compare to 'Prior' the period of IFRS adoption. The evidence identifies that manipulation is not a consistent yearly practice. The banks manipulate in an unpredictable way to evade sanctions. The evidence supposes more EM for the banks' financials prior- relative to the post-IFRS adoption.

The result has policy importance for regulations. The evidence requires policymakers to tighten efforts to enhance their monitoring role of managers and corporate boards of Nigerian banks. Earnings management is overtly deceitful and could mislead the users of banks' financial statements, including resulting in economically undesirable outcomes and misguiding optimal investment decisions. Since funds are at risk, and if such is allowed to persist, it may ruin the integrity of the capital market and limit foreign investment.

Policymakers should give the issue more serious concerns, including enforcing zero-tolerance regulations in the banks, owing to the dire consequences it would have on the financial system if the practice becomes endemic over time. Banks' supervisory agencies should ensure appropriate monitoring and engagement of their officials during the reporting of bank records to circumvent misreporting. Otherwise, they should always scrutinise banks' financials according to ratio tests to detect likely EM. Stricter sanctions, in the form of 'penalty fees for misreporting', should be legislated to discourage misreporting.

LIMITATION & FURTHER RESEARCH

The study has limitations. Bank ratios preclude 'actual' values of assets or liabilities. The ratios exclude reversal accrual effects, which may increase the power of the test relative to 'accrual-based models. Any rejection of the null for ratios computed with the assets and/or liabilities has a tendency to admit many types I error. All the ratios investigated are key earnings indicators of the banks' Financials. This opens opportunities for future research to complement our analysis of financial reports by examining other bank ratios covering solvency, profitability, efficiency and financial strength. Future studies may include fraud detection involving the analysis of the cash flow statement.

REFERENCES

Beretka, E. (2019). Detecting earnings management. An analysis of credit institutions' (banks) trading in Hungary. *Research Association for Interdisciplinary Studies*. https://doi.org/10.5281/zenodo.3549951.

Bhattarai, B. P. (2020). Effect of non-performing loan on the profitability of commercial banks in Nepal. *European Business & Management*, *6*(6), 164–70. https://doi.org/10.11648/j.ebm.20200606.15.

Brennan, N. M. (2022). Connecting earnings management to the real world: What happens in the black box of the boardroom? *The British Accounting Review, 53* (6), 101036. https://doi.org/10.1016/j.bar.2021.101036

Burgstahler, D. & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics*, *24*, 99–126. https://doi.org/10.1016/S0165-4101(97)00017-7.

Bzeouich,B., Lakhal, F., & Dammak, N. (2019). Earnings management and corporate investment efficiency: Does the board of directors matter? *Journal of Financial Reporting and Accounting*, *17*(4), 650–670, https://doi.org/10.1108/JFRA-06-2018-0044

Cadot, J., Rezaee, A. & Chemama, R. B. (2020). Earnings management and derivatives reporting: evidence from the adoption of IFRS standards in Europe. *Applied Economics*, *53*(14), 1628-1637. https://doi.org/10.1080/00036846.2020.1841085.

Degeorge, F., Patel, J. & Zeckhauser, R. (1999). Earnings management to exceed thresholds. *The Journal of Business*. *72*(1),1–33. https://www.jstor.org/stable/10.1086/209601.

Dichev, I. D., Graham, J. R., Harvey, C. R., & Rajgopal, S. (2013). Earnings quality: Evidence from the field. *Journal of Accounting and Economics, 56*(2–3), 1–33. https://doi.org/10.1016/j.jacceco.2013.05.004

Dichev, I., Graham, J., Harvey, C. R., & Rajgopal, S. (2016). The misrepresentation of earnings. *Financial Analysts Journal, 72*(1), 22–35. https://doi.org/10.2469/faj.v72.n1.4

Dimitrova D. S, Kaishev, V. K. & Tan, S. (2020). Computing the Kolmogorov–Smirnov distribution when the underlying cdf is purely discrete, mixed or continuous. *Journal of Statistical Software*. *95*(10), 1–42. https://doi.org/10.18637/jss.v095.i10.

Dutta, S. & Nezlobin, A. (2016). Dynamic effects of information disclosure on investment efficiency. *Journal of Accounting Research*, *55*(2), 329-369. https://doi.org/10.1111/1475-679X.12161.

Enomoto, M & Yamaguch, T. (2017). Discontinuities in earnings and earnings change distributions after J-SOX implementation: Empirical evidence from Japan. *Journal of Accounting and Public Policy*, *36*(1), 82–98. https://doi.org/10.1016/j.jaccpubpol.2016.11.005.

Guermazi, W. & Khamoussi, H. (2018). Mandatory IFRS adoption in Europe: effect on the conservative financial reporting. *Journal of Financial Reporting and Accounting*, *16*(4), 543-563. https://doi.org/10.1108/JFRA-08-2017-0070.

Jones, J. (1991). Earnings management during import relief investigations. *Journal of Accounting Research*, *29*, 193–228. https://doi.org/10.2307/2491047.

Kajola, S. O., Sanyaolu, W.A., Tonade, A.A. & Adeyemi, A. (2020). Corporate board attributes and earnings management in Nigerian banking sector. *Journal of Sustainable Development in Africa*, *22*(4), 1520–5509.

Kousay, S. (2019). The Impact of IFRS adoption on earnings management-results from Canada. *Journal of Economics and Business*, *2*(3), 540–554. https://doi.org/10.31014/aior.1992.02.03.107.

Leuz, C., Nanda, D. & Wysocki, P. D.(2003). Earnings management and investor protection: An international comparison. *Journal of Financial Economics*, *69*, 505–527. https://doi.org/10.1016/S0304-405X(03)00121-1.

Libby, R., Rennekamp, K. M., & Seybert, N. (2015). Regulation and the interdependent roles of managers, auditors, and directors in earnings management and accounting choice. *Accounting, Organisations and Society, 47*, 25–42. https://doi.org/10.1016/j.aos.2015.09.003

Madugba, J. U. & Ogbonnaya, A. K. (2017). Corporate governance and earnings management in money deposit banks in Nigeria. *Journal of Finance and Accounting*, *8*(8), 147–153. https://www.iiste.org/Journals/index.php/RJFA/article/view/36783

Morgan, D. P. (2002). Rating banks: Risk and uncertainty in an opaque industry. *American Economic Review*, *92*(4), 874–888. https://doi.org/10.1257/00028280260344506

Nasfi, N., Yunimar, Y., & Prawira, A. (2022). The role of Fintech in Sharia Rural Bank West Sumatra. *International Journal of Social and Management Studies*, *3*(2), 13-19.

https://doi.org/10.5555/ijosmas.v3i2.110

Nasfi, N., Yunimar, Y., Sabri, S., Febrianti, E., & Asnah, A. (2021). The effect of profit sharing and financing ceiling on non-performing financing islamic banks. *INOVASI*, *17*(4), 841-849. http://dx.doi.org/10.29264/jinv.v17i4.10274

Nwosu, C., Okedigba, D., & Anih, D. (2020). Non-performing loans and profitability of the Nigerian commercial banks. *Economic and Financial Review*, *58*(3), 35-58.

Osemene, O. F., Adeyele, J. S., & Adinnu, P. (2018). The impact of the ownership structure and board characteristics on earnings management in Nigeria's listed deposit money banks. *Economic Horizons*, 20(3), 209–220. https://doi.org/10.5937/ekonhori.8032150.

Ozili, P. K., & Outa, E. R. (2019). Bank earnings smoothing during mandatory IFRS adoption in Nigeria. African Journal of Economic and Management Studies, *10*(1), 32-47 https://doi.org/10.1108/AJEMS-10-2017-0266.

Pududu M., L., & De-Villiers, C. (2016). Earnings management through loss avoidance: Does South Africa have a good story to tell?. *South African Journal of Economic and Management Sciences*, *19*(1), 18–34. http://dx.doi.org/10.17159/2222-3436/2016/v19n1a2.

Shen, C. & Chih, H. (2005). Investor protection, prospect theory and earnings management: An international comparison of the banking industry. *Journal of Banking and Finance*, *29*, 2675–2697. https://doi.org/10.1016/j.jbankfin.2004.10.004.

Walker, M. (2013). How far can we trust earnings numbers? What research tells us about earnings management. *Accounting and Business Research,* *43*(4), 445–481. https://doi.org/10.1080/00014788.2013.785823

APPENDIX

Appendix A

Table A1. List of Banks

S/N	Tickers	Banks	Data**
1	ACB*	Access Bank Plc.	
2	CTB	Citibank Nigeria Limited	
3	EB	Ecobank Nigeria	
4	FB*	Fidelity Bank Plc.	
5	FBN	First Bank of Nigeria Limited	
6	FCMB*	First City Monument Bank Limited	
7	GTB*	Guaranty Trust Holding Company Plc.	
8	HBL	Heritage Bank Plc.	2012–2020
9	IBTC	Stanbic IBTC Bank Plc.	
10	KB	Keystone Bank Limited	2011–2020
11	SB	Sterling Bank Plc.	
12	SCB	Standard Chartered Bank	
13	UB	Unity Bank Plc.	
14	UBA*	United Bank for Africa Plc.	
15	UBN*	Union Bank of Nigeria Plc.	
16	WB	Wema Bank Plc.	
17	ZB*	Zenith Bank Plc.	

*Banks with International Authorization, and others are Banks with National Authorization.
** Except as indicated, data used to access each ratio spans 2001–2020 for the individual bank.

Table A1 provides the Tickers to corresponding banks [e.g., ACB for Access Bank Plc., FBN for First Bank of Nigeria, and so on].

Table A2. Measurement of the Bank-specific ratios

Ratio	Descriptions	Measurement [Computation Formula]
CAD	Capital Adequacy*	$\text{Eligible Capital}_t/\text{Risk-Weighted Assets}_t$
COF	Cost of Funds*	$\text{Cost of Debt}_t + \text{Cost of Equity}_t$
ETA	Equity to Assets	$\text{Average Equity}_t/\text{Assets}_t$
ETL	Equity to Loan	$\text{Equity}_t/\text{Loan}_t$
GMI	Gross Margin Index	$\text{Gross Margin}_{t-1}/\text{Gross Margin}_t$
GYA	Gross Yield on Assets	$\text{Total Interest Income}_t/\text{Total Assets}_t$
LQY	Liquidity Ratio*	$\text{Cash}_t + \text{Accounts Receivables}_t + \text{Marketable Securities}_t/\text{Current Liabilities}_t$
LTA	Loans to Assets	$\text{Loans}_t/\text{Assets}_t$
LTD	Loans to Deposits*	$\text{Loans}_t/\text{Deposits}_t$
NIM	Net Interest Margin*	$(\text{Total Interest Income}_t - \text{Total Interest Expense}_t)/\text{Total Assets}_t$
NPL	Non-performing Loan Coverage*	$\text{Loan-Loss Allowance}_t/\text{Total Non-performing loans}_t$
PATM	Profit Margin*	$\text{PAT}_t/\text{Net Interest}_t$
ROA	Return on Average Assets*	$\text{PAT}_t/\text{Assets}_t$
ROA	Return on Average Equity*	$\text{PAT}_t/\text{Equity}_t$

Table A2 contains summary descriptions of each bank-specific ratio. For 2001–2010, N = 15; for 2011, N= 16 (except for GMI, which N=15); for 2012, N= 17 (except for GMI, N=16); and for 2013–2020, N = 17.

Note: These ratios are also refer as the corresponding name in parenthesis: Capital Adequacy [capital-to-risk weighted assets] ratio, Equity to Assets [Leverage] Ratio, Loans to Deposits [Credit-deposit] Ratio, Cost of Funds [Rate Paid on Funds] and Profit Margin [Cost to Income] Only GMI is Index, others are ratios. Total Assets were used in the computation; thus, the reference GYA instead of Gross Yield on Earning Assets, GYEA (Beretka, 2019). Unless otherwise specified, Asset [Equity] used as denominator in the computation means 'Average' Assets (Equity), while those used on the numerators are 'Total' Assets (Equity).

See CBN (2009) for the component of 'Eligible Capitals' of Nigerian Banks.
PAT: Profit after Tax.
*Obtain from various Financial sources: Bank reports, NSE records, and Fitch Ratings Reports.

COF replaces the Rate Paid on Funds (RPF), whereas secondary sourced Cost to Income is used as a proxy for PATM in Beretka (2019). As directed by CBN, the DMBs use a stricter test of liquidity (Quick Ratio) in the computation of liquidity ratio (CBN, 2009).

Computations: Other ratios (ETA, ETL, GYA, LTA) are calculated from reported Bank Financials using the corresponding Measurement [defined in column 3]. Except otherwise indicated, each ratio is computed for the bank within the same time frame, e.g., Bank 'i' in the year, t. Where:

- Gross Margin = $(\text{Total Interest Income}_t - \text{Total Interest Expense}_t)/\text{Total Interest Income}$
- Average Equity = $(\text{Equity}_t + \text{Equity}_{t-1})/2$.
- Average Asset = $(\text{Asset}_t + \text{Asset}_{t-1})/2$.
- Cost of Debt = Interest Expenses $\times$ $(1 -$ Tax Rate$)/$Total Debt.
- Cost of Equity = Risk Free Rate of Return $+$ (Beta of the stock $\times$ Market Risk Premium).

Where Market Risk Premium = Market Rate of Return $-$ Risk Free Rate of Return. Market Rate of Return is the rate of interest, Beta of the stock is a measure of the stock's volatility relative obtained from NSE or computed as standard deviation of stock price. The Treasury Bill rate is predominantly standard for the risk-free rate of return in Nigeria.

Table A3. Bank ratios statistics [Based on annual statistics]

Ratio	2001	200	200	200	200	2006	200	200	200	201	201	201	201	201	201	201	201	201	201	202
CAD: μ	0.20	0.15	0.14	0.12	0.16	0.18	0.15	0.17	0.22	0.24	0.20	0.22	0.23	0.24	0.34	0.26	0.29	0.32	0.26	0.24
σ	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
COF: μ	0.01	0.02	0.01	0.00	0.00	0.01	0.03	0.02	0.01	0.02	0.03	0.01	0.02	0.03	0.02	0.02	0.02	0.04	0.03	0.05
σ	0.35	0.36	0.10	0.22	0.21	0.25	0.56	0.12	0.41	0.33	0.23	0.02	0.82	0.25	0.20	0.43	0.45	0.39	0.61	0.52
ETA: μ	0.20	0.18	0.21	0.14	0.22	0.09	0.19	0.15	0.24	0.20	0.12	0.21	0.19	0.28	0.34	0.32	0.31	0.30	0.38	0.34
σ	8.18	3.82	2.18	3.20	9.29	5.18	5.42	3.68	4.02	2.23	1.37	5.18	2.19	14.1	12.1	10.4	6.16	12.4	5.20	7.17
ETL: μ	0.46	0.43	0.52	0.48	0.50	0.33	0.42	0.56	0.46	0.48	0.56	0.62	0.52	0.71	0.62	0.66	0.59	0.68	0.62	0.66
σ	10.4	24.5	12.5	8.12	8.64	15.3	12.4	6.15	5.39	7.18	9.15	18.3	16.3	14.3	20.1	16.5	9.72	11.2	9.83	8.98
GMI: μ	NA	0.82	0.86	0.68	0.57	0.68	0.78	0.98	1.07	1.11	0.88	0.73	0.85	0.75	0.81	0.86	0.89	0.94	0.92	0.88
σ	NA	0.26	0.57	0.64	0.62	0.52	0.28	0.56	0.61	0.67	0.48	0.95	0.58	0.77	0.66	0.83	0.74	0.91	0.74	0.80
GYA: μ	0.07	0.08	0.05	0.05	0.05	0.06	0.07	0.07	0.06	0.07	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.08
σ	0.04	0.05	0.04	0.04	0.04	0.04	0.05	0.06	0.05	0.05	0.04	0.04	0.05	0.04	0.04	0.03	0.04	0.03	0.05	0.04
LQY: μ	0.57	0.51	0.52	0.43	0.64	0.65	0.43	0.67	0.56	0.89	0.66	0.66	0.53	0.38	0.52	0.56	0.42	0.54	0.58	0.49
σ	0.16	0.09	0.10	0.03	0.00	0.04	0.06	0.13	0.01	0.10	0.09	0.08	0.12	0.05	0.11	0.13	0.02	0.11	0.15	0.08
LTA: μ	0.45	0.45	0.31	0.29	0.28	0.31	0.35	0.38	0.33	0.41	0.43	0.44	0.47	0.43	0.48	0.48	0.44	0.41	0.43	0.46
σ	0.22	0.29	0.21	0.26	0.23	0.25	0.25	0.29	0.27	0.26	0.18	0.21	0.22	0.23	0.21	0.16	0.19	0.17	0.25	0.20
LTD: μ	0.63	0.67	0.64	0.67	0.64	0.59	0.66	0.68	0.58	0.63	0.61	0.63	0.63	0.59	0.66	0.67	0.57	0.58	0.65	0.64
σ	0.13	0.22	0.23	0.23	0.22	0.23	0.22	0.25	0.24	0.21	0.19	0.20	0.23	0.22	0.20	0.17	0.22	0.21	0.25	0.21
NIM: μ	0.07	0.07	0.08	0.07	0.08	0.08	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.07	0.07
σ	0.01	0.01	0.03	0.04	0.02	0.02	0.02	0.02	0.01	0.02	0.03	0.00	0.02	0.00	0.02	0.02	0.01	0.01	0.03	0.02
NPL: μ	0.01	0.05	0.06	0.09	0.05	0.05	1.01	0.02	0.05	0.06	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05
σ	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
PATM: μ	0.78	0.80	0.64	0.99	36.1	0.85	1.05	1.01	0.44	0.63	1.01	1.42	1.78	0.65	1.77	1.63	2.02	1.39	1.35	1.45
σ	1.45	1.58	0.85	3.50	4.65	2.93	5.52	2.37	2.99	2.79	1.85	1.82	3.33	2.61	2.23	3.99	2.06	3.01	1.95	1.89
ROA: μ	-0.01	0.02	0.01	0.01	0.01	-0.01	0.00	0.00	0.03	0.00	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.01	0.02
σ	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00
ROE: μ	0.22	0.18	0.20	0.25	0.15	0.20	0.18	0.39	0.20	0.19	0.18	0.19	0.24	0.26	0.27	0.31	0.25	0.20	0.24	0.20
σ	11.8	15.9	12.0	9.10	13.9	12.2	11.0	9.62	8.99	6.58	8.67	6.07	10.9	9.09	13.6	14.4	10.5	8.08	7.07	9.51

Table A3 could serve as a Benchmark Analysis for yearly comparison against the overall Base ratio statistical (deterministic) characterisation in Table 2.

Source: @Authors (2022)

Table A4. [Bank ratios statistics: Based on Individual bank]

Ratio	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CAD: μ	0.201	0.187	0.205	0.254	0.265	0.253	0.311	0.223	0.231	0.206	0.260	0.147	0.203	0.218	0.156	0.155	0.213
σ	0.051	0.047	0.054	0.048	0.048	0.054	0.050	0.055	0.049	0.049	0.041	0.043	0.043	0.046	0.050	0.053	0.054
COF: μ	0.020	0.021	0.024	0.016	0.025	0.018	0.019	0.017	0.014	0.023	0.021	0.013	0.018	0.022	0.017	0.025	0.019
σ	0.008	0.036	0.068	0.042	0.009	0.023	0.022	0.011	0.020	0.018	0.044	0.021	0.012	0.001	5.511	0.042	0.006
ETA: μ	0.177	0.193	0.213	0.148	0.291	0.265	0.208	0.328	0.314	0.256	0.169	0.154	0.297	0.196	0.245	0.283	0.184
σ	5.012	8.153	10.162	2.169	4.189	3.222	2.176	9.144	1.196	15.196	4.213	7.202	2.211	9.155	12.178	6.184	3.211
ETL: μ	0.624	0.562	0.641	0.602	0.454	0.696	0.680	0.340	0.652	0.543	0.427	0.531	0.417	0.621	0.381	0.596	0.394
σ	13.175	8.140	6.117	10.149	4.127	18.13	6.182	32.49	14.08	12.129	9.131	15.15	3.124	18.13	20.18	8.120	10.14
GMI: μ	0.660	0.649	0.626	0.938	0.814	0.698	0.763	0.838	1.134	0.998	0.818	1.136	0.876	1.194	0.665	0.728	0.920
σ	0.581	0.302	0.414	0.595	0.548	1.088	1.168	0.982	0.544	0.653	1.074	0.566	0.603	0.533	0.650	0.217	0.476
GYA: μ	0.070	0.074	0.087	0.063	0.069	0.076	0.054	0.076	0.093	0.072	0.063	0.086	0.074	0.073	0.059	0.071	0.085
σ	0.053	0.038	0.037	0.044	0.044	0.049	0.041	0.031	0.056	0.045	0.048	0.045	0.053	0.038	0.042	0.047	0.047
LQY: μ	0.689	0.509	0.794	0.610	0.541	0.409	0.684	0.577	0.301	0.387	0.40	0.555	0.706	0.543	0.716	0.354	0.659
σ	0.069	0.107	0.051	0.064	0.089	0.064	0.051	0.093	0.109	0.064	0.075	0.019	0.059	0.088	0.068	0.166	0.124
LTA: μ	0.366	0.421	0.473	0.364	0.388	0.455	0.325	0.459	0.453	0.391	0.357	0.477	0.399	0.422	0.335	0.397	0.478
σ	0.255	0.194	0.193	0.201	0.249	0.267	0.227	0.189	0.248	0.242	0.266	0.231	0.249	0.197	0.235	0.231	0.233
LTD: μ	0.569	0.640	0.686	0.611	0.588	0.646	0.537	0.623	0.566	0.597	0.605	0.685	0.650	0.695	0.635	0.657	0.709
σ	0.242	0.185	0.187	0.218	0.222	0.242	0.202	0.153	0.299	0.232	0.232	0.217	0.234	0.157	0.180	0.192	0.230
NIM: μ	0.069	0.062	0.083	0.067	0.081	0.073	0.047	0.068	0.055	0.064	0.079	0.053	0.071	0.069	0.073	0.051	0.089
σ	0.022	0.021	0.016	0.015	0.020	0.021	0.015	0.019	0.024	0.016	0.020	0.018	0.019	0.017	0.020	0.018	0.016
NPL: μ	0.119	0.089	0.113	0.104	0.102	0.107	0.095	0.119	0.088	0.112	0.058	0.102	0.085	0.116	0.100	0.112	0.115
σ	0.024	0.022	0.021	0.022	0.017	0.020	0.023	0.015	0.022	0.024	0.017	0.020	0.021	0.021	0.018	0.024	0.029
PATM: μ	0.928	0.829	0.771	0.949	0.865	1.474	1.594	1.432	0.807	1.115	1.236	0.890	1.894	1.145	2.128	1.761	29.14
σ	1.955	2.359	2.497	1.016	0.829	2.996	1.816	2.313	0.848	1.362	1.664	1.282	1.685	1.090	1.722	1.538	18.48
ROA: μ	0.012	0.022	0.032	0.021	0.028	0.025	0.031	0.018	0.015	0.021	0.016	0.031	0.018	0.030	0.022	0.012	0.025
σ	0.002	0.008	0.007	0.009	0.004	0.005	0.006	0.004	0.003	0.001	0.001	0.007	0.002	0.000	0.001	0.003	0.007
ROE: μ	0.219	0.248	0.175	0.213	0.149	0.241	0.182	0.382	0.172	0.163	0.326	0.211	0.252	0.202	0.336	0.168	0.267
σ	4.071	10.50	12.878	8.082	17.13	26.99	5.393	4.115	9.085	8.080	5.347	8.170	14.80	13.95	12.74	5.191	10.81

Table A4 provides a report for the Bank ratios statistics on the basis of Individual banks. The Table could serve as a Benchmark Analysis for each bank's information as compared against the overall Base ratio statistical (deterministic) characterisation in Table 2.

Source: @Authors (2022)

Table A5. Relative evidence for Prior- and After- IFRS based on EM1 and EM2

Ratio	Prior-IFRS [GAAP] Years of Significance**	NSp	Years of Insignificance***	NIp	After-IFRS [IAS] Years of Significance**	NSa	Years of Insignificance***	#NIa	Computations Scale-up NSa****	RI	Remarks
	Panel A: Based on EM1										
CAD	Nil	0	[2001-2011]	11	Nil	0	[2012-2020]	9	0.000	0.000	No EM
COF	[2001-2003, 2005-2011]	10	[2004]	1	[2012-2017,2018*[a],2019, 020*[m]]	9	Nil	0	10.98	0.911	IFRS
ETA	[2001, 2004, 2006, 2010, 2011]	5	[2002, 2003, 2005, 2007-2009, 2011]	6	[2012, 2015, 2016, 2018-2020]	6	[2013, 2014, 2017]	3	7.320	0.683	IFRS
ETL	Nil	0	[2001 -2011]	11	Nil	0	[2012-2020]	9	0.000	0.000	No EM
GMI	Nil	0	[2001 -2011]	11	Nil	0	[2012-2020]	9	0.000	0.000	No EM
GYA	[2001-2011]	11	Nil	0	[2012-2020]	9	Nil	0	10.98	1.002	GAAP
LQY	[2001-2006, 2007*[m], 2008]	8	[2009-2011]	3	[2013*[a], 2014-2016, 2019, 2020]	6	[2012, 2017, 2018]	3	7.320	1.093	GAAP
LTA	[2004*[a,m], 2010, 2011]	3	[2001-2003, 2005-2009]	8	[2012-2014, 2016-2020]	8	[2015]	1	9.760	0.307	IFRS
LTD	[2005*[a]]	1	[2001-2004, 2006-2011]	10	Nil	0	[2012, 2017, 2018]	9	0.000	0.000	No EM
NIM	[2003*[a,m], 2004, 2006-2008, 2010, 2011]	7	[2001, 2002, 2005, 2009]	4	[2012-2016, 2017*[m], 2020]		[2018, 2019]	7	8.540	0.820	IFRS
NPL	Nil	0	[2001 -2011]	11	Nil	0	[2012-2020]	9	0.000	0.000	No EM
PATM	[2001, 2002, 2003*[a,m], 2005, 2006*[a], 2007, 2008*[a,m], 2009*[m], 2010*[a,m], 2011*[a,m]]	10	[2004]	1	[2012*[a,m], 2013, 2014, 2015*[a,m], 2016, 2017[a], 2020]	7	[2018, 2019]	2	8.540	1.171	GAAP
ROA	[2001-2011]	11	Nil	0	[2012-2020]	9	Nil	0	10.98	1.002	GAAP
ROE	[2001-2003, 2008, 2010]	5	[2004-2007, 2009, 2011]	6	[2015, 2018-2020]	4	[2012-2014, 2016, 2017]	5	4.880	1.025	GAAP
	Panel B: EM2										
CAD	[2004, 2005*[a], 2011*[a,m]]	3	[2001-2003, 2006-2010]	8	[2012, 2014, 2015*[a], 2017, 2019*[a,m], 2020]	6	[2013, 2016, 2018]	3	7.320	0.333	IFRS
COF	[2001-2006, 2008, 2009*[a,m], 2010]	9	[2007, 2011]	2	[2012-2017, 2018*[a], 2020*[m]]	8	[2019]	1	9.760	1.125	GAAP
ETA	[2004*[m], 2005-2007, 2009*[a], 2010]	6	[2001-2003, 2008, 2011]	5	[2012, 2013*[a,m], 2015-2017, 2018, 2020]	7	[2014, 2019]	2	8.540	0.857	IFRS
ETL	[2005*[a]]	1	[2001-2004, 2006-2011]	10	[2014, 2016, 2018*[a,m], 2020*[a]]	4	[2012, 2013, 2015, 2017, 2019]	5	4.880	0.205	IFRS
GMI	Nil	0	[2001 -2011]	11	Nil	0	[2012 -2020]	9	0.000	0.000	No EM

Ratio	Prior-IFRS [GAAP] Years of Significance**	NSp	Years of Insignificance***	NIp	After-IFRS [IAS] Years of Significance**	NSa	Years of Insignificance***	#NIa	Computations Scale-up NSa****	RI	Remarks
GYA	[2001, 2003, 2004*[,a,m], 2005-2007, 2008*[,m], 2010, 2011]	9	[2002, 2009]	3	[2012, 2014-2016, 2017*,m, 2019, 2020]	7	[2013, 2018]	2	8.540	1.286	GAAP
LQY	[2001, 2003, 2006, 2007*[,a,m], 2008, 2009[,a]]	6	[2002, 2005, 2004, 2010, 2011]	5	[2014-2016, 2019, 2020]	5	[2012, 2013, 2014, 2017, 2018]	4	6.100	1.200	GAAP
LTA	[2005*[,a], 2009*[,a,m], 2010, 2011]	4	[2001-2003, 2005-2008]	7	[2012-2020]	9		0	10.98	0.444	IFRS
LTD	[2002, 2005*[,m], 2009]	3	[2001, 2003, 2004, 2006-2008, 2010, 2011]	8	[2012, 2014, 2015*,a,m]	3	[2013, 2016-2020]	6	3.660	1.000	Equal
NIM	[2001*[,a,m], 2003, 2004*[,m], 2005-2011]	10	[2002]	1	[2012*[,a,m], 2013-2017]	6	[2018-2020]	3	7.320	1.667	GAAP
NPL	Nil	0	[2001-2011]	11	Nil	0	[2012 -2020]	9	0.000	0.000	No EM
PATM	[2001*[,a], 2003*[,m], 2005*[,m], 2006*[,a], 2007, 2008, 2010, 2011]	8	[2002, 2004, 2009]	3	[2012-2014, 2015*[,m], 2016, 2020]	6	[2017-2019]	3	7.320	1.333	GAAP
ROA	[2001-2011]	11	Nil	0	[2012-2020]	9	Nil	0	10.98	1.222	GAAP
ROE	[2001, 2002, 2004, 2008, 2010]	5	[2003, 2005-2007, 2009, 2011]	6	[2014*[,a,]2015,2017*[,m,],2018-2020]	6	[2012, 2013, 2016]	3	7.320	0.833	IFRS

* indicate Sig. @0.05, otherwise 0.01. EM is earnings management. **: (Statistical) 'Significance' implies evidence of EM, while ***: (statistical) 'Insignificance' indicates no evidence of EM. ****Scaling index to equalise sample partition points. We use the Prior/After [Scale-up] approach, which is read as for 'every one year of IFRS, there is 1.22 years of GAAP'; hence, we multiply the numbers of significance years [column. NSa] by the ratio [1.22]. An alternative approach is the After/Prior [Scale down] approach, which reads as every one year of GAAP in the study corresponds to 0.82 years of IFRS. For Significant years, the 'Relativeness ratio' for the pre- to post-IFRS is indicated in the parenthesis against each bank-specific ratio. For instance, the Table is read: based on EM1, numbers of significance (i.e., EM) years for ETA are [2001, 2004, 2006, 2010, 2011], the ratio of EM years for Prior/After is 5/6 = 0.833 (untabulated) but with the scale-up [$5/6 \times 1.22$, i. e. , $5/7.320$].