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Managing Earnings through Small-Loss Avoidance in South Africa

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Abstract
The issue of earnings management has been of prominent global interests. Earnings management in the forms of loss avoidance have resulted to some notable corporate scandal amongst firms participating in capital markets. The study provides evidence on whether South African firms manipulate earnings to avoid reporting small earnings change and losses. The paper involves all listed firms on the Johannesburg Securities Exchange (2005–2020), but the sample selection adapts to only 205 companies. Based on prior studies, the study supposes prevalence of earnings management towards small profits and applies the nonparametric permutation (Kolmogorov-Smirnov, K-S) test to verify two hypotheses: (a) that managing earnings practice does not differ between financial and non-financial industries (b) that financial crisis does not influence managed earnings phenomenon. Applying the K-S permutation algorithm for three different simulation (1,000, 3,000 and 10,000 replications) using sample of different size (10, 30, and 100) at each bootstrapping, the result provide sufficient evidence to reject our null for all repetitions. The results offer strong evidence to suppose that managing earnings practices differ between financial and non-financial industries and that financial crisis have influence on the distribution of earnings. This has implications for policy purpose to prevent possible corporate scandals through use of discretions.

Key words: Earnings management, Corporate scandal, Permutation testing, Kolmogorov-Smirnov test

Introduction
The issue of earnings management has been of prominent global interests. Earnings management involves exercising professional discretion to manipulate financial items (depreciation, debts, accruals and asset write-offs) and misstate the true earnings of firms to realise predetermined earnings objectives. The management of earnings could be through the accruals earnings management (AEM) or the real earnings management (REM). AEM involves the manipulation of accounting activities of firm's operations (e.g., procedure such as engross in bias selection of financial estimates and policies), while REM engages the manipulation of actual economic activities of the firm (Pacheco-Paredes & Wheatley, 2021). Both accounts receivable and earnings received in advance are managed to avoid earnings losses or decreases, even though they prevent negative earnings shocks (Caylor, 2010). The practice mislead the stakeholders including shareholders, creditors, investors, financial intermediaries and has caused corporate collapse due to billions of dollars losses (Ding, Tan & Kang, 2021).

Earnings management in forms of loss avoidance have resulted to some widespread and notable corporate scandal amongst firms participating in global capital market. In year 2000, the first huge scandal transpired when Xerox overstated its profits with USD1.4 billion within four year. By 2001, about twenty well-publicized scandals including Adelphia, Enron, Global Crossing, Parmalat, Tyco and

WorldCom were revealed. As reported (Dichev, Graham, Harvey & Rajgopal, 2013) in 2012, approximately 20 percent of 169 chief financial officers present distorted financial performance. In South Africa, there are reported cases of firms alleged for corporate management scandals (Pududu, 2016). With greater discretion permitted on the use of professional judgement by managers to report firms' financial information since the 2005 mandatory adoption of the international accounting standard, earnings management could possibly have increased. The practice have raised concerns among regulators, investors, standard setters and researchers.

Research on loss avoidance take different dimension. In verifying evidence of earnings management, pioneer work of Burgstahler and Dichev (1997) use empirical histogram to show the existence of abnormally low frequencies of small losses and remarkably high frequencies of lesser positive earning. The unusual frequency observed would be expected to serve a discontinuity in the distribution behaviour of earnings and/change in earnings and may producing a kink in the distribution density along the interval just lower than zero. Brown and Caylor (2005) verify whether the trends of reported managed earnings have drifted over-time.

Burgstahler and Eames (2006) investigate whether reported earnings align with the true distribution of apriori theoretical expectation. Kerstein and Rai (2007) explore whether reported managed earnings reach certain benchmarks such as profitability and analyst forecasts. Dichev et al. (2013) note that for firms that managed earnings only about 10 percent of earnings per share is managed, and about 50% are based on discretionary accrual. Evidence show that a comparison of the earnings distribution supports the existence of earnings management if a preceding distribution has a kink, as firms listed with small losses transform to the zone of bigger losses, while those with large profits adapt to the zone of small profits.

Alongside other countries Leuz et al. (2003) and Shen and Chih (2005) offer evidence related to Africa with scanty studies. Leuz et al. compare earnings management for South Africa (SA) and US between 1990 and 1999. Both SA and US show lower earnings discretion compare to other countries but there is greater occurrence in SA relative to those in the US. Shen and Chih show evidence that financial firms in the SA manage earnings to avoid losses amongst banks across 48 countries including the SA. Only Pududu and de-Villiers (2016) examine distributions of earnings and earnings-changes solely based on the Johannesburg Securities Exchange (JSE) using equity-scaled profit attributable to shareholders (2003-2011). Using the empirical histogram approach, the study finds no evidence that the SA firms managed earnings to avoid small losses or to avoid reporting decreases in earnings. I suppose that the findings could have been influence by a number of factors. First, the cross sectional include small sample and the histogram bin-width is too wide, hence influence the pattern of the earnings distributions. Second, there is no formal statistical test conducted to determine the existence of earnings management. These notable limitations and gaps motivate the need for a further studies on SA.

This study contributes to literature in two ways. First, unlike previous studies, the paper examines whether the earnings management is unique across sector: providing evidence of possible difference between earnings management practice in financial and non-financial services. Second, since the data period span across the era of financial crisis, the paper verifies possible existence of difference between the earnings management of the SA firms prior and after the events of financial crisis. Verifying both are important in order to offer measures to mitigate possible risk of opportunistic manipulation of earnings. They involve testing to realise the differentials of earnings alongside industry (financial and non-financial) and event (financial and non-financial crisis). The outcomes would be useful to various stakeholders of the financial markets, including the investors and creditors who are the primary carriers of financial risk, as well as to the regulatory agencies involved in the monitoring of policy related to standard-setting process in South Africa. The other parts of the papers are structured as follows: section 2 reviews useful literature and provides hypotheses. The section 3 considered the data selection process and empirical methodology, section 4 is the results of permutation testing and 5 is the conclusions.

Literature and Hypotheses

Literature review

There is handful of evidence on the distributions of managed earnings. Empirical results depends on the measure of earnings considered (Gastón, Jarne & Wroblewski, 2014). Prior research (Burgstahler & Dichev, 1997; Degeorge, Patel & Zeckhauser, 1999; Beatty, Ke & Petroni, 2002; Leuz, Nanda &

Wysocki, 2003; Shen & Chih, 2005; Burgstahler & Eames, 2006; Beaver, McNichols & Nelson, 2007; Kersteina & Rai, 2007; Pududu & de-Villiers, 2016) consider the cross-sectional features of earnings and earnings-change, and discover that the distribution of earnings has a discontinuity.

Burgstahler and Dichev (1997) discuss the distribution of earnings and provide statistically evidence of distribution discontinuity. They applied empirical distribution to test the null that reported earnings follows a theoretically continuous distribution against an alternative of discontinuity. Using the US annual net income scaled by market value of equity, they provide evidence for the distribution for earnings and the distribution earnings-change for non-financial companies. The distributions have significantly fewer observations immediately below zero than would normally anticipated and a conspicuously higher observations closely above zero. Earnings with such pattern is indicative that reported earnings are managed to ensure that they do not fall below threshold.

Degeorge et al. (1999) propose a model to detect managed earnings which produce unique distortions in the distribution of earnings. The model identifies how efforts to surpass certain thresholds induce a specific reference of earnings managed. They notice that observed earnings that fall closely below the thresholds of zero are boosted upwards, while earnings far from the zero thresholds are trimmed downward. Such earnings management patterns would make future thresholds reference more achievable. They argued that the discontinuity of earnings around the threshold of zero is caused by managed earnings through accruals.

Beatty, Ke and Petroni (2002) explore the credibility in management of earnings by examining earnings-changes and their components for public and private banks. They assumed that public banks are managed under greater pressure to reporting increasing earnings relative to private banks. They established that public sector banks engaged in a longer uninterrupted earnings increases than private ones. In reported earnings, the public banks are more likely to employ income-increasing accruals to modify small earnings losses before discretion to small-earnings increases. Leuz et al. (2003) compare earnings management for SA, US and other countries. Both SA and US show lower earnings managed relative to others but there is greater occurrence in SA relative to those in the US.

Durtschi and Easton (2005) underscore that the sample selection criteria, deflation of earnings metrics and the influence of some observations to the left and right of zero are amongst factors that could cause the discontinuity of earnings. Burgstahler and Eames (2006) suggest evidence that for both financial and non-financial services companies observed earnings are managed in upwards direction to meet or beat analyst forecasts, as well as circumvent undesirable earnings surprises. Beaver et al. (2007) suppose that under a null of no earnings management, the distributions still assume a kink at zero because of asymmetric effects of earnings items. They characterised the discontinuity to the asymmetric influence of negative distinct components and effective tax rates for firms, although neither items would cause the observations to change from small profits to small losses and vice versa. Kersteina and Rai (2007) establish shifts in reported earnings distribution to describe the formation kink. They applied a Logistic model to show that at the start of the fourth-quarter, a significantly high percentage of companies with relatively small cumulative profits (or losses) report small yearly profits rather than losses compare to control and benchmark group. The findings supposes that upward-increasing manipulated earnings leaves a break on earnings density.

Some studies (Coates & Srinivasan, 2014; Gilliam et al., 2015; Enomoto & Yamaguch, 2017; Kerstein & Rai, 2018) extend to focus on the effect of policy on earnings distribution. Coates and Srinivasan (2014) indicate that in United States, the US-SOX (Sarbanes-Oxley Act) of 2002 implemented to underline the corporate governance in firms' financial reporting has great effect on the dynamics of earnings management. They show that since the commitment to US-SOX, there has been increase in the post-2002 REM but notable decreased in the accrual-based earnings. Gilliam et al. (2015) observed that with the passage of US-SOX the zero-earnings gap (discontinuity) on the earnings function has disappeared, suggesting that managing earnings to avoid losses has declined in the US.

Enomoto and Yamaguch (2017) examine the effect of the Japan version of SOX (J-SOX) on the distributions of earnings. They observe that the discontinuity on earnings distribution has disappeared after the J-SOX. The zero-earnings discontinuity in the earnings distribution remains, while the zero-earnings change distribution disappeared supposing that managing earnings to avoid decline in earnings become less prevalent. Kerstein and Rai (2018) explore the effect of the 1999 SEC's Staff Accounting Bulletins (SABs) 99 - 100 on the behaviour of earnings. They argue that the major reductions in

manipulated earnings attributes to SOX by some prior research may be due to the SABs. They observe that in the year 2000, there were evidence of severe earnings management practice to avoid small losses. They found evidence that SOX caused enhancement compare to that of the SABs.

Some studies (Lewellyn & Bao, 2017; Al-Shattarat, Hussainey & Al-Shattaral, 2018; Chowdhury & Mollah, 2018; Pinto & Picoto, 2018; Berrill, Campa & O'Hagan-Luff, 2021; Kim & Yasuda, 2021; Pacheco-Paredes & Wheatley, 2021; Lin & Wu, 2022) focus on factors that explains the behaviour of managed earnings using discretionary accruals. These studies employs multivariate regression to examine the explanatory ability and the significance of each test variables as well as the predictive and significance of the overall accruals model.

Lewellyn and Bao (2017) argued that institutional collectivism, corruption and cultural dimensions of power distance serve as institutional forces that stimulus earnings management. Al-Shattarat et al. (2018) use the agency conflicts of REM to explain the relations the effects of REM magnitude on performance amongst the UK firms. They conclude that the manipulation of cash flow activities to has significantly positive effects for firms' future operating performance. Chowdhury and Mollah (2018) propose that insiders manage earnings asymmetrically to obtain profit from informed trade deals. They reveal that insider trading controlled by sell positions has positive effect on the discretionary accruals. Due to asymmetric information, the involvement with some strategic insiders in high accruals is applied for individual gains for firm's growth than in value firms. Pinto and Picoto (2018) analyse the effects of sovereign debts crisis on the earnings reporting amongst European banks institutions. The study indicates decreases in reported earnings for countries severely affected and the overall effect of a post financial crisis decline in managerial discretion remains unclear.

Berrill et al. (2021) provide valuable insights on whether corporate diversification provides favourable setting for earnings management. They observed that international diversification is related with greater accrual and sales manipulations. The combination diversification would increase the real activity manipulation but does not have any effect on accrual management. Kim and Yasuda (2021) investigate how economic policy uncertainty (EPU) affects managed earnings behaviour in Japan. The study found reveals that managers exhibit incentive to ease earnings management when the EPU escalates. The effect of the EPU depends largely on the subcategories on policy uncertainty as well as the degree of the firm's exposure to it. Pacheco-Paredes and Wheatley (2021) examine the relations between audit effort and REM and obtained that REM is related to extended abnormal audit report lags. They observe that if audit firms are not time-limited by accelerated filing, the REM would be associated with greater audit effort. Lin and Wu (2022) investigate how oil implied volatility oil shocks motivate corporate earnings manipulations in China. Supply shocks encourage firms to influence accrual earnings downward. The results indicates that the oil shocks do not explain the accrual-based earnings management behaviour of energy firms.

Hypotheses development

Despite widespread literature on earnings managed, predictions and the results of existing research on managed earnings patterns for advanced economies is still unclear (Leuz, Nanda & Wysocki, 2003; Shen & Chih, 2005; Burgstahler & Eames, 2006; Beaver et al., 2007; Jacob & Jorgensen, 2007; Ugrin, Mason & Emley, 2017). In understanding the distribution of earnings management, a major concern confronting research is lack of clarity on establishing the hypotheses based on available evidence. Burgstahler and Dichev supposed testing the hypothesis that firms managed earnings to avoid small losses and earning decreases. Jacob and Jorgensen (2007) argued that the pressure to manage annual earnings is stronger, since year-end provide opportunistic periods on bonuses choice for management.

Previous studies that involve South Africa (Shen & Chih, 2005) suppose testing hypothesis of earnings management in year to year earnings. Beaver et al. (2007) supposed that with a null of no earnings management, the distributions still assume a kink at zero because of asymmetric effects of earnings items. Pududu and de-Villiers (2016) propose testing the hypothesis that the firms do not manage their earnings to avoid reporting small losses. Ugrin et al. (2017) suppose that for most countries, earnings have increase over-time since the adoption of the international accounting standard (IAS). With the IAS, greater discretion is permitted for managers' use of professional judgement to report firms' financial information, therefore earnings management could possibly have increased.

In collaboration with the foregoing, this study adopts three null hypotheses:

H1: There is no significant difference between the reported earnings for small-losses and earnings decrease avoidance, for the financial and non-financial services.

H2: There is no significant difference between the reported earnings for small-losses and earnings decrease avoidance, before and after financial crisis.

The hypothesis that SA managers earnings managed to avoid losses is adopted for two reasons. First, there is constraints of inadequate developed institutions for investor rights protection which contribute to managers to possibly misstatement the company's financials in SA (Pududu & de-Villiers, 2016). Second, evidence suggest that only countries with compelling differences between domestic accounting standards and the IAS experience improve accounting quality after IAS adoption (DeFond et al., 2018). H1 and H2 are analysed with the individual firms annual earnings scaled by the book value of equity for year *t*. In evaluating for the earnings-change to access small-earnings decrease avoidance, I employ the difference between earnings for current year *t* and preceding year *t–1*.

Methodology

Data

The paper includes all JSE-listed firms with financial records available on McGregor BFA and financial statements. The periods adopted is limited to era after the ramification of the IAS which permits managers discretion in reporting financial parameters. JSE-firms are grouped into 10 Industries based on the Industry Classification Benchmark, 19 Supersectors, 41 Sectors with 114 Subsectors but data obtained has 38-sectors. The study selects sample conditioned on two criteria. First, the firms must have listed and in one of the 10 sectors. Second, the firm publish data related and on earnings components. Base on these restrictions, six sectors (Beverages, Electricity, Insurance, Oil Equipment, Services & Distribution, Tobacco and Utility) are eliminated because of incomplete data. Finally, the study is left with 32-sectors adapted into 7 classifiers using SiCode [01 – 07] for the empirical simplification. The study uses the profit after tax reported earnings (Kent & Routledge, 2015), which is normalised by scaling with the lagged of total assets earnings measures, as supposed by literature (Durtschi & Easton, 2005; 2009).

Table 1 presents the Industry-wise and firm-year distribution of sample which are summarised by Figure 1A. Table 2 presents a résumé of the sector-Sicode classification and the sector-wise sample distribution, which are also summarised by Figure 1B. The distribution shows the number of listed firms in the associated industry (#Firm), number (N) and percent (%Firms) of observations employed. The financial service sector, which contains 31 firms constitute about 15.12% of the sample, making it the largest (based on the JFE classification adopted) single sector considered with 496 observations adopted. However, industrial is the largest single industry (21.88%) containing about 7 sectors.

The data was examined for the outliers, and there was the need to smoothen prevent mismatch. All the continuous covariates are then winsorized at both the first and penultimate (99th) percentiles before the estimation. Sequel to the data restrictions, the sample selection procedure provides a total sample of 3,280 number of observations for earnings. The process of obtaining the earnings change involves loss of some earnings observations for the cross-sections. The data selection and restrictions produce a total of 3,075 observations for the earnings-change variable. The total sample would represent between 50.62% - 57.91% of annually JSE-listed firms (2005 and 2020). Figure 1A – A3 displays the statistical snapshots (box-diagrams) of the winsorized values of earnings for the industries and years, while Figure A4 and A5 show the industry and annual earnings distributions.

Table 1:
Breakdown of sample

Panel A:	Industry-wise Breakdown of Sample			
N(j)	SiCode [Industry]	N	#Firms (industry)	%Firms [%#Obs.]*
1	Basic Materials	368	23	11%
2	Consumers**	944	59	29%
3	Financials	864	54	26%
4	Health Care	112	7	3%
5	Industrials	608	38	18%
6	Oil & Gas	64	4	2%

7	Technology & Telecomm.	320	20	10%
##	Total	3280	205	100%

Panel B: Year-wise BOS Breakdown of Sample

T(t)	Year	#Firms (Total)	#Listed (Listed)	%Listed (Year)
1	2005	205	405	50.62%
2	2006	205	403	50.87%
3	2007	205	406	50.49%
4	2008	205	407	50.37%
5	2009	205	406	50.49%
6	2010	205	405	50.62%
7	2011	205	403	50.87%
8	2012	205	402	51.00%
9	2013	205	401	51.12%
10	2014	205	400	51.25%
11	2015	205	400	51.25%
12	2016	205	395	51.90%
13	2017	205	388	52.84%
14	2018	205	377	54.38%
15	2019	205	372	55.11%
16	2020	205	354	57.91%
##	Total	3280		

*%Firms (industry),**Consumer goods and services. JSE uses the Industry Classification Benchmark (ICB) method of categorising companies.
#sector: number of sectors in the class, S*j* = SiCode (Industry Code/classification), S*k* = SiCode (Sector Code), N = number of observations.
Source: Authors (2022)

Fig 1A:

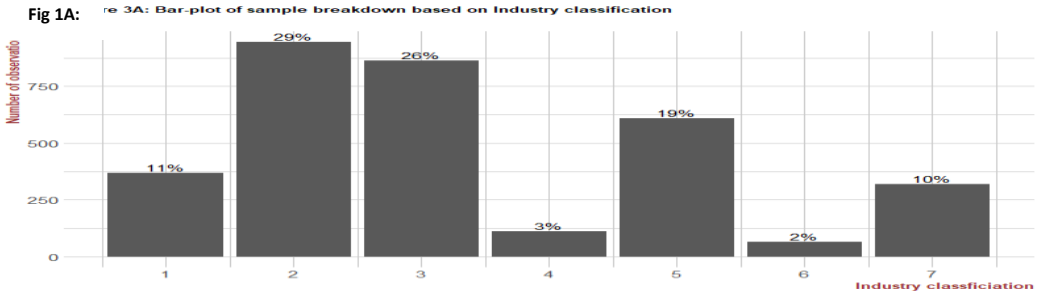

Figure 3B: Bar-plot of sample breakdown based on sector classification

Fig 1B:

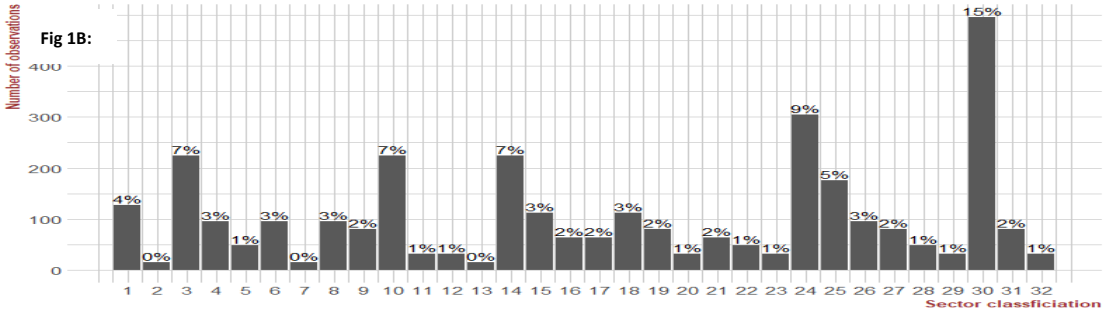

Table 2:
Industry and Sectors on the JSE

Sector on JSE	Sector	SiCode	#Firm	%Firms	N
Aerospace & Defence	S01	05	01	0.49%	16
Automobiles & Parts	S02	05	02	0.98%	32
Banks	S03	03	05	2.44%	80
Chemicals	S04	01	06	2.93%	96
Construction & Materials	S05	05	14	6.83%	224
Electronic & Electrical Equipment	S06	07	02	0.98%	32
Financial Services	S07	03	31	15.12%	496

Fixed Line Telecommunications	S08	07	04	1.95%	64
Food & Drug Retailers	S09	02	05	2.44%	80
Food Producers	S10	02	11	5.37%	176
Forestry & Paper	S11	01	02	0.98%	32
General Industrials	S12	05	07	3.41%	112
General Retailers	S13	02	14	6.83%	224
Health Care Equipment & Services	S14	04	04	1.95%	64
Household Goods & Home Construct.	S15	01	01	0.49%	16
Industrial Engineering	S16	05	02	0.98%	32
Industrial Metals & Mining	S17	05	07	3.41%	112
Industrial Transportation	S18	05	05	2.44%	80
Life Insurance	S19	03	05	2.44%	80
Media	S20	07	03	1.46%	48
Mining	S21	01	14	6.83%	224
Mobile Telecommunications	S22	07	02	0.98%	32
Nonlife Insurance	S23	03	03	1.46%	48
Oil & Gas Producers	S24	06	04	1.95%	64
Personal Goods	S25	02	02	0.98%	32
Pharmaceuticals & Biotechnology	S26	04	03	1.46%	48
Real Estate Investment & Services	S27	03	06	2.93%	96
Real Estate Investment Trusts	S28	03	01	0.49%	16
Software & Computer Services	S29	07	06	2.93%	96
Support Services	S30	02	19	9.27%	304
Technology Hardware & Equipment	S31	07	06	2.93%	96
Travel & Leisure	S32	02	08	3.90%	128
Total	##		205	100.00%	3280

Methods

Burgstahler and Dichev (1997) discuss the distribution of earnings and provide statistically evidence of discontinuity. They apply empirical distribution to test the null that reported earnings follows a theoretically continuous distribution against an alternative of discontinuity. Takeuchi (2004) obtain statistical derivation of Burgstahler and Dichev statistics and verify 'disjointness' in the density function under the null of standardize normal distribution. He conducts Monte Carlo of moderate sample size to affirm discontinuity for small jump in earnings distribution. Usually, bootstrap simulation is limited since it is based on the location parameters, both the mean and variance of the distribution. This paper applies a more robust approach – the permutation testing of difference in the distributions. Contrary to the bootstrap, the permutation approach does not test the difference in the location parameters rather it focuses on the difference in the distributions of the random variables.

The permutation testing is a non-parametric approach, and information-free method, which is presumed to be more powerful than the parametric procedure if the distribution is skewed or the parametric distribution's assumption is unknown. From the deterministic characterisation (Table 5), the paper supposes that the assumption of normality does not hold. The permutation method conducted is based on the Kolmogorov-Smirnov (KS) statistic that measures the maximum absolute difference between two empirical with the common distribution function, F. The KS is the most appropriate if the samples have different sizes. Assume two distributions X_{1i} $(i = 1, \dots, n)$ and X_{2j} $(j = 1, \dots, m)$ be independent observations with an unknown common cumulative distribution function (cdf), F, with distribution function (empirical $d.f.$) defined as:

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

Note that both n and m may not necessarily be equal. The Kolmogorov-Smirnov test statistics of H_0 versus H_1. $F_0(x_j)$ is the hypothesized cdf and $F_n(x)$ is the empirical $d.f.$

The nonparametric (test) algorithm is subsumed as:

- The paper formulates the test hypotheses below for the permutation testing:

$$\text{Hypotheses} \begin{cases} H_0: F(x) = F_0(x) & -\infty < x < \infty. \\ H_1: F(x) \neq F_0(x) & \text{for some } x. \end{cases} \tag{2}$$

- The observed test statistic is computed:
  $D_0 = \hat{\theta}(X_1, X_2) = \sup |F_n(x) - F_n(x)|.$ (3)
- A pooled sample $Z_i = (X_{1i}, X_{2i})$, is created, where Z_i $[i = 1, 2, \dots, (n + m)]$ is the ordered set of all X_1 and X_2 and apply the index r. For each replicate indexes $r = 1, 2, \dots,$ R.
  The study draws a resample of size h from Z_i, without replacement to represent X_1. And, use the remaining observations from Z_i to represent X_2 and compute $D^* = \hat{\theta}(Z_i)$.
- If large values of D_0 support the alternative, compute the empirical *p*-value defined as:
  $\hat{p} = (1 + \sum_r^R I(D^* \geq D_0)/R + 1$ (4)
  For a two-sided test, $\hat{p}$ is multiplied by 2 to obtain, and the decision rule below is followed.
- Reject the null, at the significant level (α), if and only if $\hat{p} \leq \alpha$.
  The test provides a 2-sided statistic, to evaluate the study hypotheses, **H1** and **H2**.

Results

Summary statistics

In Table 3 to 5, Panel A provides the basic statistics for the earnings, while Panel B shows the deterministic statistics for earnings-change. The scaled earnings has a mean (μ) 0.089 and standard deviation (σ) 2.375. After winsorizing, the mean is 0.028 and the earnings has a more reliable standard deviation of 0.262. The financial services (FS) industry has average and spread 0.068 and 0.317, and the non-financial service (NFS) has 0.095 and 0.239 as average and standard deviation, respectively. The post financial crisis has a mean reported earnings of 0.085 and a spread of 0.263. Panel A discloses that the median for earnings is reasonably close to the mean, and all the distribution are supposedly asymmetric with negative skewness ($\tilde{\mu}_3$). Sequel to the adjustment for outliers, the skewness the managed earnings variable was largely reduced.

In panel B, due to the differencing there is reduction in the numbers of observations presented. The change in earnings reduces except for the actual data (0.073) due to influence of outliers. There is slight difference in the variability of the earnings-change. The median of the earnings-change is closely zeros, for all the categories with a now relatively lesser skewness. As would be seen before adjusting for outlier, the change variable was largely skewed, but after the adjustment the data was closely normal with a modest positive asymmetrical (0.411) indicating a right tail.

Table 4 (Panel A) reports the basic statistics by industry classes for managed earnings. The health sector (I04) sector appears to have more earnings managed relative to others based on the mean value. Except for I05, the median of earnings is relatively closer to the mean counterparts. Due to adjusting for outliers, the financial service (I03) supposedly have the highest the standard deviation of the earnings variable (0.317). As would be expected, the number of observations reduce in Panel B when the changed variable is considered. Unlike the earnings variables, the distribution for the earnings-change for all the industry appears to be closely normal but with moderate right asymmetric. Table A (Appendix) reports the earnings, and earnings-change statistics based on the 32 sectoral classifiers.

Table 3:
The distributions statistics of earnings for sample

	N	μ	$\mathbb{Q}_1$	M_d	$\mathbb{Q}_3$	μ_l	μ_p	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
Panel A: Earnings										
Actual	3,280	0.089	0.040	0.100	0.161	-0.053	0.110	2.375	-6.656	47.55
Winsorized	3,280	0.028	0.040	0.100	0.161	0.079	0.097	0.262	-2.237	12.46
Fin. Cri. (FC)	410	0.105	0.040	0.103	0.182	0.080	0.131	0.259	-1.619	9.653
Non Fin. Cri. (NFC)	2,870	0.085	0.040	0.100	0.159	0.076	0.095	0.263	-2.323	12.82
Panel B: Change in Earnings										
Actual	3,075	0.072	-0.076	0.000	0.085	-0.017	0.162	2.541	8.365	94.96
Winsorized	3,075	0.008	-0.075	0.000	0.083	-0.004	0.018	0.315	0.411	14.51
Fin. Cri. (FC)	410	0.000	-0.114	0.000	0.106	-0.032	0.031	0.325	0.550	9.139
Non Fin. Cri. (NFC)	2,665	0.000	-0.075	0.000	0.081	-0.012	0.012	0.334	-0.087	13.39

N ≡ Number of observations, μ ≡ Arithemetic mean, $\mathbb{Q}_1$ ≡ first quartile, M_d ≡ Median for each earnings category, $\mathbb{Q}_3$ ≡ third quartile, μ_l ≡ lower class limits for earnings, μ_p ≡ upper class limits for earnings, σ ≡ Standard deviation,

$\tilde{\mu}_3$ ≡ Skewness, and $\tilde{\mu}_4$ ≡ Kurtosis value for the reported earnings based. Panel A reports the distribution statistics (N, $\mu, \mathbb{Q}_1, \mathrm{M}_d, \mathbb{Q}_3, \mu_l, \mu_p, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) for the various classification (Uncensored or Actual, Winsorized, Financial sector and Non FS. Panel B provides same for the earnings-change to access small-earnings decrease avoidance.

Table 4:
The distributions statistics of earnings for industry classifiers

	N	μ	$\mathbb{Q}_1$	M_d	$\mathbb{Q}_3$	μ_l	μ_p	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
Panel A: Earnings										
I01	368	0.092	0.041	0.090	0.163	0.063	0.121	0.283	-1.999	11.484
I02	944	0.104	0.049	0.108	0.168	0.091	0.117	0.206	-2.910	21.995
I03	864	0.068	0.029	0.099	0.147	0.046	0.089	0.317	-1.960	8.156
I04	112	0.140	0.068	0.122	0.188	0.102	0.178	0.203	0.423	2.115
I05	608	0.086	0.041	0.096	0.158	0.068	0.104	0.225	-2.515	15.809
I06	64	0.102	0.072	0.116	0.186	0.033	0.170	0.273	-2.095	7.881
I07	320	0.072	0.000	0.093	0.181	0.040	0.105	0.297	-1.697	8.008
Panel B: Change in Earnings										
I01	345	0.012	-0.068	-0.002	0.075	-0.027	0.051	0.367	0.507	14.156
I02	885	0.001	-0.072	-0.002	0.075	-0.015	0.017	0.247	1.104	28.185
I03	810	0.016	-0.064	0.000	0.080	-0.009	0.042	0.375	0.382	9.166
I04	105	0.002	-0.060	0.000	0.084	-0.053	0.056	0.280	0.131	2.240
I05	570	0.004	-0.080	0.001	0.087	-0.019	0.026	0.274	0.493	16.686
I06	60	-0.015	-0.123	-0.014	0.066	-0.108	0.077	0.359	0.427	4.239
I07	300	0.010	-0.097	0.008	0.119	-0.027	0.047	0.326	-0.900	11.486

Panel A reports the distribution statistics (N,$\mu, \mathbb{Q}_1, \mathrm{M}_d, \mathbb{Q}_3, \mu_l, \mu_p, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) for the various classification (I01 – I07) of earnings data. Panel B provides the statistics for earnings-change (earnings in current year *t* and preceding year *t–1)*.

Table 5:
Annual distributions statistics of earnings

	μ	$\mathbb{Q}_1$	M_d	$\mathbb{Q}_3$	μ_l	μ_p	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
A: Panel A: Earnings									
2005	-0.014	-0.132	0.095	0.211	-0.079	0.052	0.475	-1.477	2.391
2006	0.094	0.047	0.110	0.231	0.052	0.136	0.307	-2.144	7.508
2007	0.055	0.020	0.095	0.172	0.008	0.101	0.338	-2.288	7.355
2008	0.105	0.038	0.110	0.235	0.060	0.149	0.322	-1.731	7.422
2009	0.107	0.042	0.102	0.180	0.071	0.143	0.260	-1.506	9.692
2010	0.104	0.038	0.103	0.184	0.068	0.140	0.259	-1.722	9.485
2011	0.110	0.052	0.100	0.150	0.083	0.137	0.196	-0.228	6.482
2012	0.104	0.056	0.103	0.159	0.076	0.131	0.197	-1.507	12.666
2013	0.108	0.044	0.107	0.157	0.082	0.133	0.184	-2.011	20.928
2014	0.097	0.025	0.093	0.149	0.070	0.125	0.198	-1.625	17.100
2015	0.096	0.041	0.107	0.146	0.066	0.126	0.221	-2.151	16.998
2016	0.063	0.044	0.095	0.150	0.027	0.100	0.267	-2.822	14.266
2017	0.107	0.057	0.108	0.152	0.077	0.137	0.218	-1.205	14.192
2018	0.084	0.040	0.084	0.126	0.057	0.112	0.197	-0.814	18.503
2019	0.092	0.058	0.096	0.136	0.069	0.116	0.170	-3.272	27.620
2020	0.095	0.049	0.092	0.128	0.071	0.120	0.178	-2.067	25.049
Panel B: Change in Earnings									
2006	0.108	-0.124	0.036	0.362	0.032	0.184	0.554	0.106	2.336
2007	-0.040	-0.109	-0.007	0.072	-0.088	0.008	0.348	-1.367	9.836
2008	0.050	-0.070	0.014	0.126	0.003	0.097	0.343	0.537	8.775
2009	0.002	-0.111	0.000	0.103	-0.045	0.050	0.346	0.437	9.123
2010	-0.003	-0.122	-0.001	0.114	-0.044	0.039	0.303	0.697	8.442
2011	0.006	-0.099	-0.001	0.081	-0.034	0.046	0.291	2.482	18.718
2012	-0.007	-0.060	0.002	0.060	-0.040	0.027	0.242	0.045	11.526
2013	0.004	-0.078	0.004	0.084	-0.032	0.040	0.260	-2.087	29.252
2014	-0.010	-0.061	-0.011	0.045	-0.040	0.019	0.214	1.187	13.832
2015	-0.001	-0.065	0.002	0.065	-0.042	0.039	0.294	1.193	19.503

2016	-0.033	-0.070	-0.002	0.073	-0.076	0.010	0.313	-1.013	23.945
2017	0.043	-0.043	0.004	0.103	0.006	0.081	0.270	3.019	20.169
2018	-0.022	-0.082	-0.017	0.032	-0.063	0.019	0.299	1.735	29.232
2019	0.008	-0.045	0.009	0.069	-0.027	0.042	0.252	-2.840	34.743
2020	0.003	-0.066	-0.001	0.070	-0.028	0.034	0.224	0.949	19.460

Panel A reports the distributions statistics (N, $\mu, \mathbb{Q}_1, \mathrm{M}_d, \mathbb{Q}_3, \mu_l, \mu_p, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) for the various annual earnings (2005 – 2020). Panel B provides the statistics for earnings-change.

Table 5 presents the statistics by year, of the earnings and earnings-change variable. The evidence would reveals a negative, albeit modest asymmetrical distribution for each year based on the skewness coefficient. The total number of observations reduces smoothly from 3280 to 3075 (untabulated) due to loss of all observations in 2005 for all the cross-section after differencing but remains constant (at 205) for each yearly observations from 2006 to 2020, for the 205 firms. With exception of for mean of 2005 (-0.014), both mean and median for the earnings are positive throughout the annual sample. However, this is not the case for earnings-change throughout the sample period from 2006 to 2020. The mean and the median for the earnings-change has a rather irregular and, sometimes alternating pattern in some cases, with negative means observed nearly half of the periods.

Permutation test of difference in the distribution of earnings

Table 6 presents the results of the K-S permutation tests. The asymptotic K-S test is significant, $(\hat{p} = 0.002) < (\alpha = 0.05)$ supposing that the test rejects the null of no significant difference between the managed earnings for small loss avoidance, between financial and non-financial services. For the earnings change and earnings decrease avoidance, the test rejects the null of no significant dissimilarity between the distributions of earnings for financial and the non-financial services. In addition, the test is significant $(\hat{p} = 0.000) < (\alpha = 0.05)$ supposing that the test reject the null of no significant difference between the reported earnings for small-losses and earnings decrease avoidance, before and after financial crisis. This supposes that financial crises affect the distributions of earnings.

Table 6:
K-S permutation test

	[Asymp. Sig.]		K-S [Bootstrap (Monte Carlo Sig.)]								
			R=1000			R=3000			R=10000		
	D_0	$\hat{p}$	h=10	30	100	h=10	30	100	h=10	30	100
Earnings Distr.											
FS/NFS	1.872	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Prior FC/After FC	2.372	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ΔEarnings Distr.											
FS/NFS	1.620	0.040	0.018	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Prior FC/After FC	1.420	0.015	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

When the K-S standard bootstrap and permutation algorithm is applied to confirm if repeated sampling for three different Bootstrap simulation (R =1,000; 3,000 and 10,000 replications) using drawn and resample of size (h = 10, 30, and 100) samples at each bootstrapping, the result (p values, $\hat{p}$, in bold) provide sufficient evidence to reject the null for all repetitions. The result confirms the earnings distribution for the management of small profits (managing earnings upward) and small losses (managing earnings downward) is significantly different, providing us to strong evidence to reject H1. There is more tendency to management profit upward amongst the SA firms. Likewise, the result establish that the earnings distributions prior the periods of financial crisis (2005–2008) is significantly different from selected periods after (2008–2020), providing us to strong evidence to reject H2.

Implications and Conclusions

Implications

The evidence reported has implications for policy and would be important to regulators to prevent possible future corporate scandals. The evidence is not sufficient to assume that financial service firms would invariably apply more discretionary in avoiding loses. As noted by (Sun and Rath, 2010), earnings management crosses performance thresholds for contracts, triggers bonuses and most importantly, translates losses into profits. The evidence rejects the presumption that financial crisis does not influence managed earnings phenomenon, hence the implication is that economic shocks may not necessarily be a motivation for the firms' involvement in earnings management, an assumption implicit in some prior literature (Cimini, 2015). Cimini (2015) finds decrease in earnings misreporting by majority of the European firms, following the burst of the financial crisis. The fallouts pose a question regarding general issues of earnings management supposedly by JSE firms, as the financial service managers may not necessarily be managing earnings differently. JSE managers may covertly favour the use of other performance indicators not conflicting any regulatory disclosure requirement. The result could have been influenced by the notable difference in the number of financial and non-financial firms as well as the short periods recorded for financial crisis relative to others in the study.

Conclusions

Earnings management, which involves exercising discretion to manipulate financials and misstate the true earnings of the firm, has been of global prominent concern. Previous studies provide the pattern of the distribution of earnings in most advanced economies (Burgstahler and Dichev, 1997; Jacob & Jorgensen, 2007; Chowdhury & Mollah, 2018). Burgstahler and Dichev provide evidence of the prevalence of earnings losses and earnings decreases avoidance amongst non-financial service in the US suggesting the existence of discontinuity and kink on the distribution earnings. The nature of the distribution of earnings for developing and African countries have been under-studied. This paper offer response to the issue whether manager of JSE firms managed earnings to avoid small losses and target earnings increases. The study supposes that managed earnings could differ between financial and non-financial industries, and that financial crisis have influence on the distribution of earnings. The study considers substantial sample of South African firm-years and report evidence that managing earnings phenomena differ across sectors and events (time).

Applying a nonparametric and robust permutation testing to confirm the predictions, the results show evidence for the existence of management of small profits and earnings increase discretions amongst managers of SA firms. Perceived difference may be attributable to the less important which are not sufficient to affirm general differential in corporate governance consciousness. Hence, the paper offers that analyst, regulators, and research should always consider alternative or better still multiple performance indicators in the consideration of evidence of earnings management practice. The study offers that regulators should subject financial reports and in particular earnings indicators to such thorough scrutiny in order to improve the usefulness of financial information, protect investor and creditors' funds as well as built confidence in the capital market.

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Appendix

Table A:
Sectoral statistics of earnings and earnings-change

	Panel A: Earnings						Panel A: Earnings-change					
	N	μ	M_d	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$	N	μ	M_d	σ	$\tilde{\mu}_3$	$\tilde{\mu}_4$
S01	16	0.055	0.076	0.216	-0.068	-0.634	15	0.012	0.016	0.243	-0.542	-0.010
S02	32	0.106	0.112	0.129	-0.694	3.708	30	0.008	0.007	0.185	0.441	1.202
S03	80	0.057	0.100	0.202	-4.828	29.750	75	0.030	0.000	0.214	4.160	26.309
S04	96	0.066	0.094	0.162	-0.855	3.340	90	-0.014	-0.004	0.188	-1.015	5.455
S05	224	0.048	0.084	0.271	-2.850	12.746	210	0.006	0.002	0.325	1.033	16.321
S06	32	0.188	0.120	0.227	0.812	1.120	30	0.037	0.009	0.273	-0.106	0.160
S07	496	0.058	0.100	0.340	-1.909	6.932	465	0.017	0.001	0.440	0.185	6.789
S08	64	0.011	0.050	0.325	-1.856	6.646	60	-0.013	0.009	0.429	-2.242	13.154
S09	80	0.049	0.079	0.254	-4.310	22.056	75	0.046	0.010	0.278	3.457	15.518
S10	176	0.106	0.110	0.157	-0.506	4.364	165	-0.006	-0.014	0.180	0.445	3.121
S11	32	0.122	0.093	0.372	-1.327	6.633	30	0.043	-0.005	0.396	1.245	4.147
S12	112	0.114	0.107	0.190	-1.842	9.426	105	0.014	0.001	0.234	1.259	9.246
S13	224	0.136	0.116	0.186	-1.504	16.409	210	-0.003	-0.006	0.238	2.418	35.058
S14	64	0.129	0.107	0.197	0.913	2.958	60	-0.011	-0.012	0.263	-0.198	2.206
S15	16	0.151	0.150	0.075	0.006	-0.682	15	0.008	0.039	0.128	-0.317	-1.003
S16	32	0.176	0.123	0.234	1.055	0.651	30	-0.039	0.009	0.243	-1.330	2.462

S17	112	0.113	0.104	0.132	-0.564	7.700	105	0.004	0.000	0.169	0.434	2.367
S18	80	0.081	0.089	0.240	-2.114	15.995	75	-0.005	-0.011	0.337	-1.021	9.961
S19	80	0.037	0.055	0.264	-3.566	17.936	75	0.037	0.008	0.245	2.615	12.568
S20	48	0.054	0.100	0.231	-4.916	27.763	45	0.036	-0.002	0.259	4.054	20.769
S21	224	0.095	0.083	0.317	-2.042	9.520	210	0.019	-0.001	0.428	0.362	11.265
S22	32	0.096	0.123	0.420	-1.492	4.617	30	0.064	0.005	0.327	1.803	5.436
S23	48	-0.110	0.058	0.395	-1.172	2.106	45	-0.033	-0.003	0.362	0.619	6.282
S24	64	0.102	0.116	0.273	-2.095	7.881	60	-0.015	-0.014	0.359	0.427	4.239
S25	32	0.049	0.037	0.198	1.332	3.857	30	-0.021	0.047	0.243	-1.407	2.412
S26	48	0.155	0.142	0.212	-0.133	1.311	45	0.019	0.025	0.304	0.368	1.805
S27	96	0.239	0.137	0.259	0.394	-0.352	90	0.006	-0.006	0.284	-0.539	3.517
S28	16	0.121	0.087	0.114	1.786	2.613	15	-0.025	-0.014	0.131	-0.157	0.781
S29	96	-0.007	0.065	0.249	-2.532	9.593	90	0.017	0.013	0.278	1.252	8.804
S30	304	0.120	0.120	0.227	-3.243	22.043	285	-0.005	-0.002	0.280	0.138	29.490
S31	96	0.146	0.145	0.267	-1.678	9.766	90	-0.009	-0.009	0.311	-0.969	2.697
S32	128	0.056	0.079	0.205	-4.093	26.949	120	0.010	0.005	0.239	0.839	19.504

N ≡ number of observations, μ ≡ Arithemetic mean, $\mathbb{Q}_1$ ≡ first quartile, M_d ≡ Median for each earnings category, $\mathbb{Q}_3$ ≡ third (highest) quartile, μ_l ≡ lower class limits for earnings, μ_p ≡ upper class limits for earnings, σ ≡ Standard deviation, $\tilde{\mu}_3$ ≡ Skewness, and $\tilde{\mu}_4$ ≡ Kurtosis value for the reported earnings. Panel A reports the distribution statistics (N, $\mu, \mathbb{Q}_1, M_d, \mathbb{Q}_3, \mu_l, \mu_p, \sigma, \tilde{\mu}_3, \tilde{\mu}_4$) for the various sectoral classification of earnings. Panel B provides same for the earnings-change to access small-earnings decrease.

Source: Authors (2022)

Fig A1: 4A: Financial/Non-financial services

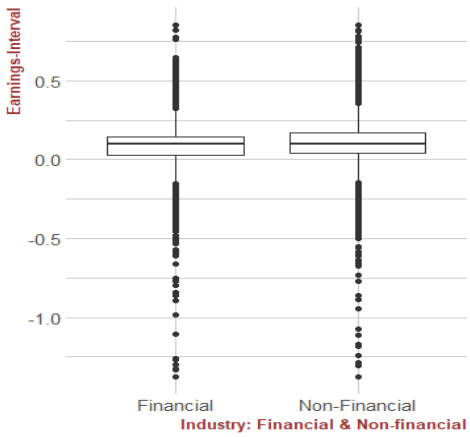


Fig A2: 4B: Industry classifications

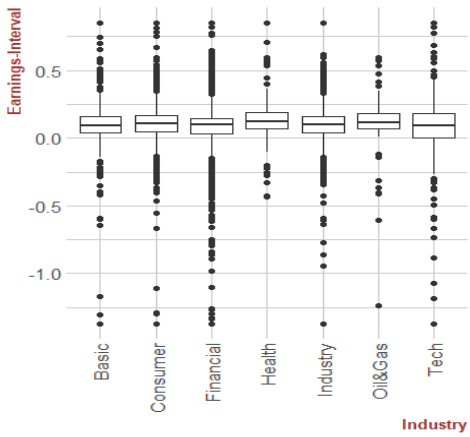
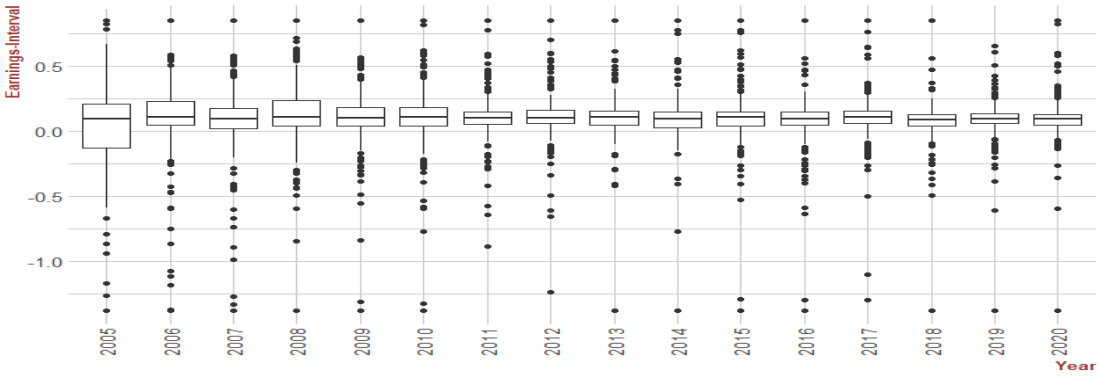
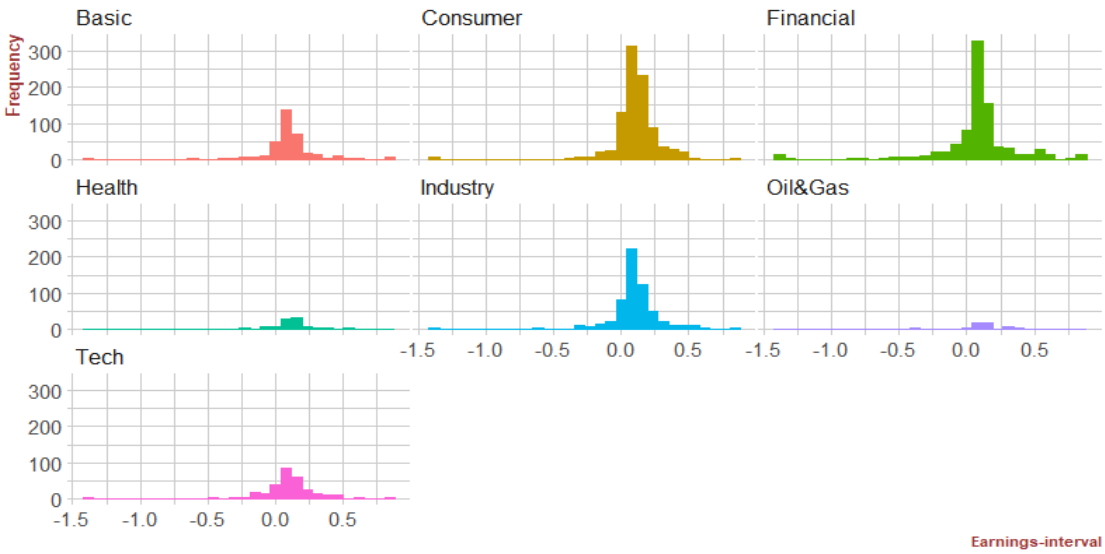


Fig A3: Annual distribution of earnings



Earnings

Fig A4: **Industry distributions of accruals-based earnings**



Earnings-Change:

Fig A5: **Industry distributions of accruals-based earnings**