

FORMULATION OF WEIGHTED DISCLOSURE INDEX FOR EVALUATING ACCOUNTING DISCLOSURE AND ITS APPLICATION TO JSE LISTED FIRMS

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ABSTRACT

The purpose of this paper is to formulate a weighted disclosure index which can be used by accounting researchers and practitioners to evaluate the level of a firm's compliance to IAS and IFRS. This newly formulated method is then applied to study listed firm on the Johannesburg Stock Exchange (JSE). Presently, there is no existing weighted method for evaluating accounting weighted disclosure index. The existing ones are unweighted disclosure index and partially unweighted disclosure index.

Therefore, applying the scale scoring and dummy scoring techniques, and portfolio weight method, the authors formulate two novel weighted disclosure methods (WDI_{scale}) and WDI_{dummy}) that can be used to evaluate firms' accounting disclosure level using information disclosed in their annual reports, financial statements and on their websites as well as on their regulator's website.

The results of the study show that the average score for website reporting is an impressive 80.1%, indicating that JSE listed firms disclose substantial information on their websites as well as on the website of the JSE. However, the average score for WDI_{scale} is 26% with a maximum score of 52%. When measured using WDI_{dummy} the average score increases to 40% with maximum score increasing to 75%. This imply that even though substantial information is disclosed on their website, content analysis of financial accounting information disclosed, on average is between 26% (WDI_{scale}) and 40% (WDI_{dummy}). Consistent with WDI , the average score using $PUDI$ increases marginally to 43.3% with maximum score of 69%. However, the average score is astronomically 173% with a maximum score of 276% when measured using UDI . Hence, the results show that UDI is an outlier which excessively over estimate disclosure results. Therefore, WDI_{scale} , WDI_{dummy} , and $PUDI$ are consistent methods for measuring corporate accounting disclosures. The multivariate regression finds that an increase in website reporting leads to a reduction in the possibility of a firm experiencing financial distress, thus an increase in WDI_{scale} score leads to 12% increase in a firm's liquidity. Finally, the regression results show that an increase in a firm's $PUDI$ score leads to an increase in its liquidity, however, the increment is a minimal 4.83%. This study is the first to formulate a weighted disclosure method for evaluating corporate accounting disclosures by firms in their annual reports, financial statements and on their websites as well as on the website of their regulator. The implication to stakeholders is that, to achieve accurate results, policy makers, investors and managers should adopt WDI_{scale} , WDI_{dummy} , and $PUDI$.

Keywords: Weighted Disclosure Index (WDI), Unweighted Disclosure Index (UDI), Partially Unweighted Disclosure Index (PUDI), IAS, IFRS, Liquidity, PhD Dissertation Extract.

INTRODUCTION

The foundation of good corporate governance is transparent disclosure (Rahman & Hamdan, 2019, p.87) and reliable accounting information is a crucial function of the structure of every firm (Jensen, 1983, p.319). Corporate accounting disclosure depict a fair presentation of a firm's financial and non-financial information whether mandatory or voluntary. Accounting information must be useful to investors. Essentially, for the accounting information to be useful to investors, it must be relevant and faithfully represent exactly what it purports to represent (Modugu, 2017; Palea, 2013, p.249).

Accounting involves accountability which in turn requires transparency. Generally, financial markets rewards transparency and so firms that are regarded by investors to be highly transparent and provides detailed, timeliness and clarity of accounting disclosures are usually perceived to have a lower default risk and therefore are rewarded through lower cost of borrowing (Sengupta, 1998, pp.472-473). As required by regulators, firms usually release financial statements regularly to communicate financial information to the investment community (Berk & DeMarzo, 2013, p.21). Full disclosure requires providing information beyond what is in the financial statements. It means, in addition to the accounting numbers for accounting items such as revenues, expenses, and assets, narrative and additional numerical disclosures should be provided in the notes accompanying the financial statements. An analysis of financial statements is, therefore, not complete without this additional information. Disclosure regulations often requires that all listed firms provide financial information and qualitative information on a timely basis to its actual and potential investors and this should be information that would be expected to affect the value of its security (Drake & Fabozzi, 2010, p.22, p.67).

In the International Accounting Standards One (IAS 1), the requirement is that when preparing financial statements, management should not reduce the understandability of its financial statements by obscuring material information with immaterial information or by aggregating material items that have different natures or functions. But then, how can accounting researchers measure whether managers have reduced the understandability of its financial statement? or whether managers have obscured material information with immaterial information? There is the need therefore, to formulate a method that can uncover this problem.

The IFRS Foundation explains that, information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that the primary users of general-purpose financial statements make on the basis of those financial statements, which provide financial information about a specific reporting entity. Again, information is obscured if it is communicated in a way that would have a similar effect for primary users of financial statements to omitting or misstating that information. For example, information regarding a material item, transaction or other event is disclosed in the financial statements but the language used is vague or unclear, or/and information regarding a material item, transaction or other event is scattered throughout the financial statements, or/and the understandability of the financial statements is reduced as a result of material information being hidden by immaterial information to the extent that a primary user is unable to determine what information is material. The question requiring an answer here is, how can one measure vague or unclear information disclosed in a financial statement? The primary user here is the investor and they depend on this information to make investment decisions. What is the effect on their investments if they rely on this information? Therefore, the objective of this study is to fill this method gap by formulating a method to measure partially disclosed accounting information in the financial statement that can help better inform investors in their financial decision making.

LITERATURE REVIEW

The issue of financial reporting and corporate accounting disclosure have received considerable attention in academia and practice (e.g. Alnaas & Rashid, 2019; Awodiran & Ogundele, 2022; Appiah et al., 2016; Bepari & Mollik, 2015; Braam & Borghans, 2014; Chantachaimongkol & Chen, 2018; Dayanandan et al., 2016; Gyamerah & Agyei, 2016; Haq & Pratama, 2021; Hienu & Lan, 2015; Isukul & Chezea, 2017; Juhmani, 2013; Nahar et al., 2016; Patel et al., 2002).

However, apart from Appiah et al. (2016), Haq & Pratama (2021), Kolsi (2017), Miihkinen (2008), S&P (2002) and Patel et al. (2002) the rest of the studies have mainly focused on measuring the extent of firm disclosure using the unweighted disclosure index (UDI) by (Cooke, 1989). Haq & Pratama (2021) and Herbert & Harto (2022) used discretionary accruals method. Nonetheless, UDI has been found to be deficient in producing accurate result because it scores an item in an accounting standard as either disclosed or not disclosed. It also assumes that all items in an accounting standard have equal weight (Al-Shiab, 2003; Tsalavoutas et al., 2010). The disclosure score for UDI is obtained by simply adding dichotomous scores and applying division. However, in practice, this method fails to capture the very problems raised by IFRS Foundation stated earlier.

Consequently, other authors such as Al-Shiab (2003), Tsalavoutas et al. (2010) and Alves (2011) developed and proposed the partially unweighted disclosure index (PUDI) to remedy the deficiency of UDI. PUDI measure the extent of compliance for each firm by adding the score of compliance for each standard and then dividing this sum by the number of standards applicable. Tsalavoutas et al. (2010) argued and proofed that the two methods (UDI and PUDI) produce different results and suggested that the two methods be used simultaneously. In a subsequent study, Tsalavoutas & Dionysiou (2014) used UDI and PUDI to examine IFRS mandatory disclosures in Greece and found that consistent with Tsalavoutas et al. (2010) the means between the two compliance methods differ significantly. Following the findings of Al-Shiab (2003) and Tsalavoutas et al. (2010), Kolsi (2017) also used PUDI to study voluntary disclosure in UAE. From the results of these prior studies, PUDI which applies partial weighting, is a little more robust than UDI because after using dummy variables to do scoring, it goes a step further to partially weight them by adding the number of standards applicable and using that number as the denominator.

However, PUDI also uses dummy scoring method which cannot capture partial disclosure because binary scoring can only capture whether an item has been disclosed or not. Again, PUDI does not apply proportionate weights to each accounting standard. Meanwhile, each contain different number of items required to be disclosed. Therefore, to capture these variabilities among accounting standards, it is imperative to generate weights even if dummy scoring method is used. According to Deloitte (2020), IFRS 9 and IFRS 7 requires firms to make disclosure of information about the significance of financial instruments to the firm, and the nature and extent of risks arising from those financial instruments, both in qualitative and quantitative terms. It goes further to require a special disclosure about financial assets and financial liabilities designated to be measured at fair value through profit and loss, including disclosures about credit risk and market risk, changes in fair values attributable to these risks and the methods of measurement. Again, KPMG (2019, p.74) posits that the firm should disclose information that enable users of its financial statements to evaluate the nature and extent of risks arising from financial instruments to which the firm is exposed to at the reporting date. Qualitative disclosures should also be provided to enable users to link related disclosures and form a general accurate

opinion of the nature and extent of risks arising from financial instruments. These risks generally include market risk, liquidity risk and credit risk. The intent in these standards is to protect risk bearers such as shareholders and debtholders who are of particular interest to this study. These require detailed scoring, but UDI cannot accurately capture it because the issue goes beyond whether an item has been disclosed or not, and PUDI may capture it partially unless the standards are given weights to account for their variability.

The disclosure requirements in IAS 1, IAS 7, IFRS 7, and IFRS 9 require detailed and painstaking scoring techniques to be able to capture the micro details in them. For instance, Rahman & Hamdan (2017, p.98) stated that “a score of 1 indicates that a company disclosed all the relevant items as required by the standards, while a score of 0 means that a company did not disclose any of the relevant items”. In another study, Braam & Borghans (2014, p.143) in studying voluntary disclosure of companies listed on the New York Stock Exchange (NYSE), state that an item is scored 1 if it was disclosed and 0 if it was not disclosed. Several other studies, including Yekini (2009, p.136) employ this technique with the reason that it avoids subjectivity in scoring.

However, in practice, financial disclosures can be complex beyond simply disclosed or not disclosed. Thus, the question that emanates from this binary scoring technique is, what if a firm does not fully disclose an item in a standard, but partially discloses the item? Is it scored 1 or 0? This extreme scoring technique of 1 or 0 has high susceptibility to missing some key micro nuances that fall in between. There should therefore be a way to capture these micro nuances within accounting standards. As a result, developing a suitable alternative approach to mitigate this deficiency, the authors in this present study seek to fill this method gap by empirically formulating a new weighted disclosure method. This new weighted method is completely different from the unweighted disclosure index (UDI) and extremely different from partially unweighted disclosure index (PUDI) used by prior authors (e.g. Appiah et al., 2016; Kolsi, 2017; S&P, 2002; Patel et al., 2002). Another shortfall of PUDI is that, the total dummy score is divided by the summation of the number of standards studied. However, these standards don't have the same number of items required to be disclosed, therefore, giving each standard a weight of 1 and adding them up may produce inconsistent results. Therefore, to make it consistent, each standard must have a weight generated from the number of items required to be disclosed.

The newly formulated weighted disclosure index for estimating disclosure is now posited by this study as Weighted Disclosure Index (WDI). This method is consistent with the continuum scoring scale approach employed by (Copeland & Fredericks, 1968). There are two types of WDI formulated in this study. The first is termed Weighted Disclosure Index Scale Scoring (WDI_{scale}) and the second is termed Weighted Disclosure Index dummy scoring (WDI_{dummy}).

WDI_{scale} is not a dichotomous / binary method. It is a scoring scale method and a weighted method for each standard similar to the calculation of a portfolio return. Being a scoring scale, WDI is more robust than UDI and PUDI in a sense that if an item in a standard is partially disclosed, UDI and PUDI will score it as 1 because something has been disclosed, but a score of 1 represent 100% disclosure. However, using WDI scoring scale, it will be scored either as 0.25, 0.5, or 0.75 because the item has not been fully disclosed. The statistics required goes beyond whether an item has been disclosed or not, the complex side of it is, to what extent has it been disclosed. These micro details cannot be captured by UDI and PUDI. Contrary to prior studies' assertion of subjectivity, the WDI method will rather make the scoring less subjective and minimizes variations in scoring because it gives a range or in other words, it uses a scoring

scale. After using the scoring scale, the next stage is that each standard is given a weight generated from the number of items required to be disclosed.

The authors acknowledge the fact that it is extremely time consuming and enduring to employ the scale scoring method to generate the scores. Therefore, a second method is postulated termed WDI_{dummy} . This second method is an addition to the first and can be used as an alternative if there is time constraint which makes using WDI_{scale} impossible. Although this approach still uses the weighted method, the process of generating the scores is relaxed a little to allow the use of binary scoring. However, after using the binary scoring to generate the scores, each standard is still given a weight, hence, the rest of the procedure follows the WDI_{scale} method. Detailed calculations are shown in the methodology below.

Applying these new methods, this study estimates the extent of disclosure in the annual reports and on each firm's websites as well as on the website of JSE using disclosure checklists for the international financial reporting standards (IFRSs) and international accounting standards (IASs) adapted from (Deloitte, 2020). This measurement method is very important because on the presentation of financial statements, the IAS 1 and IAS 7 requires preparers of financial statements to present fairly, the financial position, financial performance and cash flows of the entity in the financial statements. Fair presentation requires the faithful representation of the effects of transactions, other events and conditions in accordance with the definitions and recognition criteria for assets, liabilities, income and expenses set out in the conceptual framework for financial reporting (KPMG, 2019, p.5). Therefore, it important to establish the precise extent to which listed firms on the JSE comply with these standards and disclose financial information in their annual reports and on their websites in accordance with IAS 1, IAS 7, IFRS 7 and IFRS 9. This present study is very essential at this time because Alnaas & Rashid (2019, p.387) posited that with the increases in global investing, the demand by foreign investors for publicly available information has increased and in response to this demand, firms should increase their disclosure levels.

The disclosure objective stated in IFRS 15 is for an entity to disclose sufficient information (both qualitative and quantitative) to enable users of financial statements to understand the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers (Deloitte, 2019). These notwithstanding, Tawiah & Boolaky (2020, p.48) posited that in spite of the general use of IFRS in Africa for a considerable time, there is little research on IFRS compliance in Africa, and that there is lack of evidence and limited studies in Africa on IFRS and financial performance, therefore, this present study contributes to filling this gap.

Signaling Theory

It is a common practice to see managers quickly disclose to the public any positive information about the firm emanating from their efforts. Basically, what they try to do is to signal their success to the stakeholders. Signaling theory was espoused by (Akerlof, 1970; Spence, 1976; Stiglitz, 1979). It is concerned with how to resolve problems arising from information asymmetry in any business environment. In other words, it suggests that, to reduce information asymmetry, managers who possess more information can send signals or disclose to the other stakeholders. In the field of accounting, this theory encourages full and high corporate accounting disclosure, and suggests that firms with high quality performance indicators should signal this to the market. When this is done, a favorable accounting information will make investors and other stakeholders have positive mindset about the firm, reevaluate the value of the

firm, and then make decisions that are favorable to the firm. Consequently, the positive mindset of the various stakeholders about the firm would make the firm obtain more funding at a lower rate, and therefore reduce the costs of raising capital. There are various means by which companies tend to signal information about themselves and prominent among them is corporate disclosure of accounting information. Investors, thereafter have the choice to do self-selection (Spence, 1976).

Positive Results of Negative Disclosure

Accounting information which must be disclosed may be positive, negative or both. It is important to clarify that disclosure of negative financial information does not necessarily mean that it will have adverse effect on the firm's finance or share price. Indeed, from the perspective of investors, including shareholders, disclosure of negative information on time does have a positive result on their investment. Such disclosure will prompt active investors to make decisive decisions on whether to still hold their shares or take the wall street walk. Other investors such as lenders can also decide whether to trigger certain covenants for protection or exercise lien. All these tend to help the investor to make the right decisions at the right time, therefore, signaling negative information can yield positive results. Essentially, the signaling theory presupposes that manager will be very transparent enough to disclose both positive and negative financial information to stakeholders in equal terms. However, the agency problem makes us understand that managers often make decisions for their self-interest, therefore it is to be expected that to make them look good, positive information will be fully disclosed as a signal of hard work whereas negative information may be suppressed.

Transparency and Accounting Disclosure

In accounting practice, annual financial statements are prepared for the purpose of providing financial information that is useful in making economic decisions (Pietersen et al., 2016). Disclosure of financial information is an effective solution to narrow the information gap between managers and shareholders and reduce information asymmetry. This financial information could be disclosed through the traditional reporting medium such as through annual reports, or an advanced medium using the firm's Website (Abdi et al., 2017, p.468). Damodaran (2015, p. 28) contends that to enhance transparency, managers periodically provide stockholders with better and more updated information so that they can make informed judgments on how well management is doing. Firms with higher transparency and disclosure are valued higher than comparable firms with lower transparency and disclosure (Patel et al., 2002, p.326).

The issue of financial reporting goes beyond technical compliance and borders on effective communication. In preparing the financial statements, firms need to focus more on improving communication by reporting financial information in a meaningful way (KPMG, 2019, p.3). To improve communication, information about the nature and amounts of a firm's economic resources and claims should be effectively communicated so as to help investors to identify the firm's financial strengths and weaknesses (IFRSs Conceptual Framework, para.1.13). Financial information also influences investors' behavior with respect to portfolio selection. This in turn affects security prices and, therefore, the terms on which a firm obtains additional financing (Palea, 2013, p.248). When firms practice greater transparency and better disclosure, they keep corporate stakeholders better informed about the way a firm is being

managed (S&P, 2002, p.5). With the right information available for investors, securities in the market will be optimally priced and there will be efficient allocation of capital.

Corporate Accounting Disclosure Checklist

The methodology for computing Disclosure index involves the use of disclosure checklist at the initial stage. There are two approaches to the use of the disclosure checklist. The first one focuses on the use of the externally developed disclosure checklist while the second involves self-constructing a disclosure checklist for the specific research. This present study employs the first type by adopting an externally developed checklist constructed by (Deloitte, 2020). It is very current and very detailed which covers all the IAS and the IFRS. The checklist selected for this current study are checklist for IAS 1, IAS 7, IFRS 7 and IFRS 9. Scores obtained using these checklists are then used for the computation of the indices.

Different Indices Produce Different Results

Measuring the extent of information disclosed by listed firms is a complex task. That notwithstanding, accounting researchers generally rely on disclosure indices to obtain a proxy for the extent of information disclosed by firms (Bravo et al., 2009, Yekini, 2009). There is no consensus on a single best information disclosure index as such some studies suggest that a particular type of disclosure index is irrelevant to its outcome (Abdi et al., 2017). Yet, in their study of Spanish IBEX 35 stock market index, Bravo et al. (2009, p.272) discovered that the choice of an index instead of another can affect crucially the results of the analysis because different indices produce significantly different rankings of firms in terms of their disclosure.

Again, Tsalavoutas et al. (2010) found that the two indices (unweighted and partially unweighted) produced significantly different overall and relative disclosure scores and that these differences, and consequently the method used to measure disclosure, may have econometric implications affecting the explanatory power of ordinary least squares (OLS) and independent variables. Therefore, the authors recommended that simultaneous application of the two methods would result in a more robust findings and more informative findings to practitioners and academics. Bravo et al. (2009, p.255) also reported that the choice of the index plays a crucial role in empirical disclosure studies and those different indices produce significantly different rankings of firms in terms of their disclosure.

In light of the preceding studies, the present study adapts both methods, and introduces a novel WDI (weighted disclosure index) and employs OLS regression for the analysis. The focus of this study is on corporate governance variables relating to finance and accounting information. Simultaneous application of UDI and PUDI is paucit in literature (eg. Tawiah & Boolaky, 2019). Generally, disclosure studies employ OLS regression which is applied in this study (e.g.Tawiah & Boolaky, 2019). Similar to Al-Shiab (2003), Yekini (2009) information for computations was gleaned from the Statement of comprehensive income, statement of financial position, auditor's report etc.

Unweighted Disclosure Index

The most commonly used method for determining compliance with disclosure requirements by a firm is the unweighted disclosure index (UDI) (eg. Abdi et al., 2017; Agyei-Mensah, 2019; Bepari & Mollik, 2015; Isukul & Chizea, 2017; Kamel & Awadallah, 2017;

Tahat et al., 2016; Agyei-Mensah, 2013; Rouf, 2011). The UDI approach to measuring disclosure employs the binary measurement technique of 1 if an item is disclosed and 0 otherwise. This approach assumes that an item will either be disclosed (1) or not disclosed (0) and overlook the fact that some accounting standards contain more items than others. Abdullah et al. (2015, p.334) describes it as the ratio of the total number (T) of items disclosed (d_i) by company j to the maximum possible number of disclosure items (M) for that company. Tahat et al. (2016) contend that unweighted indices are more suitable research instruments in corporate disclosure studies when the research is focused on all groups who use a firm's annual report rather than the requirements of any specific user category. However, an item can be partially disclosed but UDI technique will fail to accurately capture it.

The index is described as an unweighted index because each item is treated equally. It is used for measuring a combination of voluntary and mandatory disclosures. This method has also been applied by many studies in measuring compliance with IAS/IFRS disclosures (eg Agyei-Mensah, 2013; Agyei-Mensah et al., 2003; Bepari & Mollik, 2015; Street & Bryant, 2000; Street & Gray, 2001; Tawiah & Boolaky, 2019; Khelif et al., 2015; Rahman & Hamdan, 2017). Just like other UDI authors, Abdi et al. (2017) contend that unweighted index is better, even though both weighted and unweighted indices produce no differences in the results between the two indices and that the main advantage of the unweighted method is to avoid the subjectivity which characterized the weighted index. The authors noted that with the weighted index, the same item can be weighted differently by various users. This argument, however, can be valid only if the measuring technique for the index is not properly constructed and not given standard weight. Obviously, if the same checklist is used and the scoring technique is a scoring scale, and each standard is given weight as has been used in this present study, then the result will definitely be the same regardless of who does it and the number of times it is done. In fact, the UDI approach has been found to have a high tendency of producing unjustifiably high scores for some firms because the scoring approach treats all items equally. Tawiah & Boolaky (2019, p.582) emphasised that while UDI approach is simple and understandable, it is limited by giving the same weight to all standards irrespective of the number of disclosure requirements per standards.

Partially Unweighted Disclosure Index

Partially Unweighted Disclosure Index (PUDI) is an enhancement on UDI used by authors such as (Kolsi, 2017; Alves, 2017; Appiah et al., 2016; Abdullah et al., 2015; Lu, 2014; Tsalavoutas et al., 2010; Al-Shiab, 2003). The determination of PUDI goes one step beyond the UDI calculation. After using the binary score (1 or 0), the total score is aggregated to obtain total score for each firm in each category. This figure is further divided by the total number of standards for a firm.

According to Al-Shiab (2003) and Tsalavoutas et al. (2010) the unweighted index (UDI) suffers from an important limitation, that is the number of disclosure items required by different standards varies considerably and should not be given the same weight. Their argument is especially valid when measuring mandatory disclosure requirement where some standards require a large number of items to be disclosed (e.g. IAS 1 and IFRS 7) while others require only a few (e.g. IAS 7 and IFRS 9). These observations clearly suggest that, standards which require more items to be disclosed, in other words, standards with more items included in the index, are unintentionally and indirectly treated equally with those that require fewer items to be disclosed (Al-Shiab, 2003, p. 222). In order to eliminate this problem, Al-Shiab (2003) proposed an alternative method known as partial compliance (PC) which basically can be termed as partially

unweighted disclosure index (PUDI) approach. With this method, the level of disclosure for each firm is measured by adding the level of disclosure for each item in each standard and then dividing this sum by the number of standards applicable to each firm. This gives partial weight points to each applicable standard and avoids the problem of unintentionally giving less/more weight to a standard with a larger number of items (Tsalavoutas et al., 2010, p.216; Al-Shiab, 2003, p.220). That means, giving different partial weighting to the disclosure items in different standard.

Weighted Disclosure Index

Although PUDI is an enhancement on UDI, it still uses the binary (1 or 0) technique in scoring for whether an item has been disclosed or not and does not generate weight for each standard. Using the binary approach have been identified in this present study to have the tendency of overscoring or underscoring because of the extreme scoring of disclosing nothing (0) or everything (1) unless it is weighted. In other words, the binary technique suggests that, it is either an item is not disclosed at all which translate to zero score (0) or an item is 100 percent disclosed (1). The common scoring technique has been that an item is scored 1 if disclosed and 0 otherwise. Extant literature have mostly used this technique (e.g. Haddad et al., 2020; Siagian & Rahadian, 2013; Boubaker et al., 2012; Chantachaimongkol & Chen, 2018; LU, 2014; Patel et al., 2002; Khanna et al., 2004; Rouf, 2011; Hieu & Lan, 2015). However, this scoring technique has an important drawback which need to be addressed. That is, what if an item in a standard is partially disclosed? Is it scored 1 or 0. Scoring it 1 will results to over scoring and scoring 0 will results to underscoring.

To mitigate this drawback of extreme scoring by both UDI and PUDI, this current study formulates a weighted disclosure index (WDI) which uses a scoring scale technique and generate weight for each standard. This insight of scoring scale is inspired by the prior research work of Copeland & Fredericks (1968), as well as Wardhani (2019, p.381) where the CG Watch report scoring scale was used. The scoring scale is ranked by this present study using the following scale: Full disclosure = 1 point; Very high disclosure = 0.9 – 0.99; Substantial disclosure = 0.70 - 0.89 points; High disclosure: 0.5 - 0.69 points; Average disclosure: 0.30 - 0.49 point; Low Disclosure: 0.01 – 0.29 and Not disclosed / Non-compliant = 0 point. These continuum scoring scale minimize subjectivity by minimizing the range of scores, with the intuition that it is capable of capturing all micro nuances and remedies the wide disparity in score when used by different researchers. Miihkinen (2008) also used a similar technique where on a checklist, a firm is scored 1 for complete disclosure but 0.5 if disclosed information is insufficiently.

Generating Weights for Standards

The concept of generating weights is derived from the concept of a portfolio return. In financial management, investment management and corporate finance, portfolio returns are calculated based on the weight of each security and their expected return. Brealey et al. (2017, p.176) explains that the expected return on a portfolio is the weighted average of the expected returns on the individual assets. Again, Ross et al. (2016, p.338) explains that the expected return on a portfolio is a weighted average of the expected returns on the individual securities.

There is no subjectivity in generating weights using this method hence the issue of bias or subjectivity in assigning weights is eliminated because this method does not assign weights, it generates weights. The authors therefore, apply this concept, conceptualizes and formulates a

novel weighted disclosure index (WDI) for estimating disclosure levels on IASs and IFRSs. The formulation is in five-stages which begins with a disclosure checklist adopted from Deloitte, the scoring process using scoring scale and dummy and the weights and how the weights are generated from each standard. Besides the scoring shortfalls identified in UDI and PUDI, the second gap identified concerns generating weight for each standard which are overlooked by UDI and PUDI. Since some accounting standards require more items to be disclosed than others, it is imperative to generate weight for each standard based on the number of items required to be disclosed. PUDI made an attempt to assign partial weights to the standards but it was not sufficient. This present study applies the concept of the calculation of a portfolio return as stated earlier, and then generate weights for each standard. The method for generating the standard's weights are similar to how weights are generated for each asset in portfolio return. The sum of these weights should equal 1 (100%). This eliminates the limitations of both UDI and PUDI where standards are not weighted. The computation of WDI entails five stages of extensive calculations.

METHODOLOGY

In order to generate the data for WDI, UDI and PUDI, four accounting standards covering IAS and IFRS were first obtained in excel format from (Deloitte & Touche, 2020). The annual reports for each firm covering 2011 to 2020 were obtained as well. The items disclosed in the annual report for each were compared against items required by the standards to be disclosed. They are then assigned a score for each item. The scoring was done in two parts, the first part employs the scoring scale where items disclosed were scored based on their degree of disclosure from 0, 0.25, 0.5, 0.75 to 1 for full disclosure. These scoring were done for all the 231 items for IAS 1 for each year covering ten years for all the 84 sampled firms from the JSE. The scores for each year are then summed up and divided by the total items required to disclosed for IAS 1, there are about 231 items required by IAS 1 to disclosed. Whatever score obtained, is then multiplied by the weight for IAS 1. The weights computed is 0.55 for IAS 1, 0.08 for IAS 7, 0.24 for IFRS 7 and 0.13 for IFRS 9. These results generated becomes the weighted scores for IAS 1, IAS7, IFRS7 and IFRS9, for each firm for each year. This process is repeated for each firm for each year for the entire ten years. The weights obtained for the four standards are added up to generate WDI_{scale} which is then used in the regression.

A similar method is applied to generate WDI_{dummy} , however, the scoring is done using the binary score of either 1 for item disclosed or 0 for not disclosed. This is an alternative method when there is time constraint or for some reason the dummy scoring is preferred. In such situation, the WDI_{dummy} should be used by generating appropriate weights for each standard. Thus, the total score obtained from the dummy scoring is then divided by the total required to be disclosed (231 for IAS1) to get the unweighted disclosure score (UDI). The results is then multiplied by the weight (0.55 for IAS1) to obtain the WDI_{dummy} . The process is repeated for IAS 7, IFRS 7 and IFRS 9 as has been thoroughly explained subsequently below. In all, 84 JSE listed firms with available data over ten years period covering 2011 to 2020 were sampled for this study.

Calculation of Unweighted Disclosure Index

With unweighted disclosure index (UDI), estimation is done using dummy variable approach with no weight. The procedure is that if a required item is disclosed in the annual

report, it is scored as 1 and 0 otherwise (Cooke, 1992. p.115; Al-Shiab, 2003, p.220). This is commonly known as the dichotomous method. The disclosure index for each firm is then calculated as the ratio of the total items disclosed to the maximum possible score applicable for that firm:

$$UDI_j = \frac{TD = \sum_{i=1}^M di}{M = \sum_{i=1}^n di} \quad (\text{eq.1})$$

Where UDI_j is the unweighted disclosure index (score) for each firm and it range between $0 \leq UDI_j \leq 1$ T is the total number of items disclosed di by company j and M is the maximum number of applicable disclosure items for company j that is expected to be disclosed. $di = 1$ if the item is disclosed and 0 otherwise. This method has been applied by many studies in measuring compliance with IAS/IFRS disclosures (eg Agyei-Mensah, 2013; Agyei-Mensah et al., 2003; Bepari & Mollik, 2015; Street & Bryant, 2000; Street & Gray, 2001; Tawiah & Boolaky, 2019; Khlif et al., 2015; Rahman & Hamdan, 2017, Yekini, 2009). However, this approach has a high tendency of producing unjustifiably high scores for firms because the scoring approach treats all standards and items equally.

Calculation of Partially Unweighted Disclosure Index

Following prior studies, Al-Shiab (2003) and Tsalavoutas et al. (2010) argued that the unweighted disclosure index (UDI) entails an important limitation, which is that the number of disclosure items required by different standards varies considerably. Their argument is especially valid when measuring mandatory disclosure requirement. In mandatory disclosure, some standards require a large number of items to be disclosed while others require only a few. For instance, IAS 1 on Presentation of financial statements requires about 231 items to be disclosed, including voluntary, whereas IAS 7 requires about 34 items, IFRS 7 requires about 99 items whereas IFRS 9 requires about 54 items (Deloitte, 2020). Due to these observations, standards which require more items to be disclosed or, in other words, standards with more items included in the index are unintentionally and indirectly treated equally with those that require fewer items to be disclosed (Al-Shiab, 2003, p. 222).

Al-Shiab (2003) then conceptualized an alternative method to avoiding this problem, which can be termed partially unweighted disclosure index (PUDI) approach. With this method, the level of disclosure for each firm is measured by adding the level of disclosure for each item in each standard and then dividing this sum by the number of items applicable to each firm in the total points for the selected standards. This gives partial weight points to each standard and avoids the problem of unintentionally giving less/more weight to standards with larger/small number of items in the index (Tsalavoutas et al., 2010, p.216; Al-Shiab, 2003, p.220). That means, giving different partial weighting to the disclosure items in different standards. Tsalavoutas et al. (2010) then proposed this method;

$$PC_j = \frac{\sum_{i=1}^n X_i}{R_j} \quad (\text{eq.2})$$

where PC_j is the total compliance score for each firm and $0 \leq PC_j \leq 1$. X_i is the level of compliance with each standard's mandatory disclosure requirements. This means that, initially, the researcher calculates the compliance with each standard separately. Subsequently, the sum of these compliance scores (X) is divided by the total number of relevant/applicable standards for each firm j, that is R_j .

Calculation of Weighted Disclosure Index

In financial management, investment management and corporate finance, a portfolio return is computed by multiplying the weight of a security by the expected return and then taking the sum of them. This finance concept is applied in this present study to obtain the weighted disclosure index (WDI). That means, this study empirically conceptualizes and formulates a novel weighted disclosure index (WDI) for estimating corporate disclosure levels for both IASs and IFRSs using the portfolio return method. WDI entails five stages and the formulation of this five-stage method begins with weighted scoring scale and how they are scored based on each item in each standard on the disclosure checklist. The weighted scoring scale is ranked using the following scale: Fully disclosed = 1 point; Largely disclosed = 0.75 point; Averagely disclosed = 0.5 point; Marginally disclosed = 0.25 point; and Not disclosed = 0 point.

According to Gitman & Zutter (2013, p.373), a portfolio return is a weighted average of the returns on the individual securities from which it is formed. Other authors such as Ross et al. (2016, p.338) and Brealey et al. (2017, p.176) explains that the expected return on a portfolio is the weighted average of the expected returns on the individual assets. A portfolio return is thus calculated as follows:

$$r_p = (w_1 \times r_1) + (w_2 \times r_2) + (w_3 \times r_3) \dots + (w_n \times r_n) \quad (\text{eq.3})$$

This can be rewritten as;

$$r_p = \sum_{j=1}^n (w_j \times r_j) \quad (\text{eq.4})$$

Where;

w_j = proportion of the portfolio's total value represented by asset j

r_j = return on asset j

Based on the portfolio return concept, the authors now formulate these empirical equations to calculate the weighted disclosure index.

$$WDI_j = \sum_{sds=1}^n WS_{SDS} \quad (\text{eq.5})$$

Equation 5 can be expanded as;

$$WDI_j = WS1_{SDS1} + WS2_{SDS2} + WS3_{SDS3} + WS4_{SDS4} \dots WSn_{SDSn} \quad (\text{eq.6})$$

Where;

WDI is Weighted Disclosure Index

WS_{SDS} is proxy for weighted score for each standard multiplied by SDS

SDS represent each standard's disclosure score

In this study, there are four standards under study (IAS 1, IAS 7, IFRS 7 & IFRS 9) so subscripts SDS 1 to 4 represent each of these standards.

The weight (W) for the four selected standards are: IAS 1 = 0.5526, IAS 7 = 0.0813, IFRS 7 = 0.2368 and IFRS 9 = 0.1292. The weights are calculated based on the number of items required by each standard. Details of the computation of the weights are as follows:

$$IAS1 = \frac{231}{418}(100) = 55.26\% \quad (\text{eq.7})$$

$$IAS7 = \frac{34}{418}(100) = 8.13\% \quad (\text{eq.8})$$

$$IFRS7 = \frac{99}{418}(100) = 23.68\% \quad (\text{eq.9})$$

$$IFRS9 = \frac{54}{418}(100) = 12.92\% \quad (\text{eq.10})$$

Similar to the calculation of portfolio return, to obtain the WS (weighted score), the weight for each standard is multiplied by the SDS (standard disclosure score) as follows:

$$WS = \sum_{s=1}^n w_s \times SDS \quad (\text{eq.11})$$

Where WS represent weighted score, w_s represent weight of a standard, $s=1$ represent standard 1 to n and SDS represent sum of standard disclosure score (scale score or dummy score).

The equation for Standard Disclosure score (SDS) is computed as follows:

$$SDS_j = \frac{\sum_{i=1}^n SNIT_j}{TIR_j} \quad (\text{eq.12})$$

Where:

SNID = score for number of items disclosed within a standard

TIR = total items required to be disclosed

In stage one, the weight for each standard is computed (eq.7 to 10). In stage two, the firm's disclosure level is scored using the scoring scale and the checklist (all items disclosed are scored based on their degree of disclosure for scale score and dummy score). In stage three, compute SDS (eq.12). In stage four, compute WS (eq.11) and finally, in stage 5, compute WDI as shown in equation 5 and 6.

Even though this WDI_{scale} method may involve some minimal subjective scoring (using the scale), it captures enormous amounts of detailed micro information which is grossly overlooked by UDI . The scoring scale approach is reliable, verifiable and can be repeated even

though very time consuming. Contrary to assertion by prior studies, WDI_{scale} minimizes the level of subjectivity in scoring compared to dummy scoring. For instance, as already explained, suppose a firm partially discloses an item in a statement, using UDI, the score will be 1. This implies a 100% score, but this is likely to lead to an overscoring of 25%, 50% or even 75%. However, using WDI_{scale} , the score will either be 0.25, 0.5 or 0.75. This method will accurately capture the true level of disclosure and eliminate subjectivity or reduce it to the lowest minimum.

This notwithstanding, to address the criticism of so-called subjective scale scoring, a second approach is formulated and proposed, named WDI_{dummy} . This is still a weighted disclosure index, however, it uses dummy scoring at first stage and then goes through the same process as WDI_{scale} using each standard's weight. This means instead of scoring using scale, score using dummy but generate and apply weights by following the rest of the steps of WDI_{scale} and obtain WDI_{dummy} .

Calculating other variables

Website Reporting (WebReport) represent website financial reporting of firms. It is measured as a dummy variable which takes the value of 1 if a firm has its financial statement disclosed on its website or on the website of JSE and zero otherwise.

Liquidity = Liquidity can influence a firm's willingness to disclose information. Liquidity is measured by the current ratio (CR). CR is the ratio of current assets over current liabilities (Rashid, 2015, p.188; Dyson, 2007, p.224).

$$\text{Liquidity} = \frac{\text{Current Assets}}{\text{Current Liabilities}} \quad (13)$$

Financial Distress Model (FinDistress)

The authors applied the financial distress model developed by Altman (1968). According to McGregor BFA, Altman (1968) applied the financial distress model to a sample of firms and developed a discriminant function, which classified firms either as failed or successful.

The Altman's Model:

$$\text{FinDistress} = 0.012 \times 1 + 0.014 \times 2 + 0.033 \times 3 + 0.006 \times 4 + 0.0999 \times 5 \quad (14)$$

Where:

x1 = net working capital / total assets.

x2 = retained earnings / total assets.

x3 = EBIT / total assets.

x4 = market value of common and preferred stock/book value of debt.

x5 = sales / total assets.

McGregor BFA explained that the first four variables are expressed as percentages, but not as decimals. Further, Altman (1968) found that the mid-point of his distribution was 2.675 and that a zone of ignorance existed from 1.81 to 2.99. This meant that when the model is applied to a firm and a score of between 1.81 and 2.99 is obtained, a classification could not be made with certainty. However, if the score falls below 1.81, then the firm is almost certain to fail, whereas if the score falls above 2.99 then the firm is almost certain to succeed.

Board Size (BoDSize)

This is a corporate governance variable which is measured as the total number of board members on the board (Kolsi, 2017 p.260). It is expected to be positive for ideal board size of between 7 and 11 and should be negative otherwise.

Investment Spread = Return on Capital (%) – WACC (%)

WACC = weighted average cost of capital which includes both the cost of debt and equity finance. Following Makhija & Trivedi (2020) and ACCA (2011) WACC is estimated as;

$$WACC = \left(K_e \times \frac{E}{V} \right) + \left[\left(K_d (1 - T_c) \times \frac{D}{V} \right) \right] \dots\dots\dots(eq.15)$$

Where:

K_e = required rate of return on equity finance (cost of equity)

$K_d(1-T_c)$ = after tax rate of return on *debt* finance (Drake and Fabozzi, 2015, p.470)

D = total *debt* capital

T_c = corporate tax rate

E = total equity capital

The cost of equity consists of the cost of using shareholders’ equity capital (Zhang & Aboud, 2019, p.598)

$$V = D + E$$

Debt capital refers to short-term loans and long-term loans provided by creditors other than commercial liabilities such as accounts payable, notes payable and other payables (Zhang & Aboud, 2019, p.598).

Firm Size (LnTA); measured as the natural log of total assets (Alnaas & Rashid, 2019, p.391; Braam & Borghans, 2014; Kolsi, 2017, p.259; Rashid, 2015, p.188). Because its large value might cause heteroscedasticity, it is adjusted by natural logarithm (Zhang & Aboud, 2019, p.604). Bokpin (2013) found that firm size has a positive nexus with the disclosure level of firms. Used as control variable in this study, LnTA has also been reported to be a factor that influence the quality and the quantity of firm disclosure.

Firm Age (Age): age in years measured as the natural log of years a firm has been in business. Expected sign can be positive or negative depending on age (Alnaas & Rashid, 209, p.391; Herbert & Harto, 2022, p.8; Rashid, 2015, p.188). Bokpin (2013) found that firm age is positive and significant determinants of corporate disclosure.

RESULTS AND ANALYSIS

Table 1 DESCRIPTIVE STATISTICS					
Variable	Obs	Mean	Std. Dev.	Min	Max
WebReport	840	0.801	0.399	0	1
WDIScale	839	0.258	0.11	0	0.521
WDIdummy	838	0.4	0.163	0	0.75
UDI	838	1.731	0.803	0	2.761
PUDI	838	0.433	0.201	0	0.69
FinDistress	837	2.813	33.416	-135.836	760.698
BoardSize	840	10.485	3.174	4	26
Spread	837	-6.908	113.377	-3061.46	555.71
Size	698	22.527	2.49	13.832	28.864

Age	840	39.458	29.171	3	172
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The average score for website reporting is an impressive 80.1%, indicating that JSE listed firms disclose substantial information on their website as well as on the website of the JSE. The following disclosure scale has been self-designed to interpret the level of disclosure: Full disclosure = 1 point; Very high disclosure = 0.9 – 0.99; Substantial disclosure = 0.70 - 0.89 points; High disclosure: 0.5 - 0.69 points; Average disclosure: 0.30 - 0.49 point; Low Disclosure: 0.01 – 0.29 and Not disclosed / Non-compliant = 0 point.

The descriptive statistics show that the average score for weighted disclosure index using scale scoring (WDI_{scale}) is 26%. This can be categorized as low disclosure. This imply that even though substantial information is disclosed on their website, content analysis of financial accounting information disclosed, when subjected to the WDI_{scale} test, the average score is only 26%. The low average score can be attributed to the fact that this study studied total disclosure. Their average WDI_{scale} score on mandatory disclosure will be higher than 20%. It can also be attributed to excessive focus on the signaling theory where managers dedicated substantial part of the report to issues such as advertising, report of good performance from other jurisdictions, awards received, corporate social responsibilities etc. It could also be a strategy by managers to purposely avoid full disclosure because their competitors also read their reports, not just investors. However, the maximum score of these same firms is 52% which can be categorized as high disclosure, implying that although average disclosure is low, some firms performed above the average and scored high.

The average test score for the weighted disclosure index using binary scoring method (WDI_{dummy}) is 40%. This can be categorized as average disclosure. However, the maximum score for WDI_{dummy} is 75% which can be categorized as substantial disclosure, an indication of good performance. When measured using the partially unweighted disclosure index (PUDI), the average disclosure score increases marginally to 43.3% which still fall within average disclosure. However, its maximum score is 69% which can be categorized as high disclosure, also and indication of good performance. However, the average score is astronomically 173% when measured using unweighted disclosure index (UDI). This confirms the assertion by prior authors that UDI produces unjustifiably high results due to its flaws.

The deviation from the mean is just 11% for WDI_{scale} , 16% for WDI_{dummy} , and 20% for PUDI. These are indications of very low inconsistencies. However, it is a substantial 80% for UDI. Clearly, the results show that UDI is an outlier which excessively over estimate disclosure results with very high inconsistencies. Therefore, WDI_{scale} , WDI_{dummy} , and PUDI are consistent methods for measuring corporate disclosure. The findings here is that, consistently, the results for WDI_{scale} , WDI_{dummy} , and PUDI indicated that at maximum, JSE listed firms' disclosure level can be categorized to be between low disclosure, high disclosure and substantial disclosure.

The maximum z score is 760.69 which is far above the threshold of 2.99, indicating that these firms are certain to succeed. However, the average z score for financial distress is 2.81, which is almost 2.99. According to Altman (1968), a score between 1.81 to 2.99 cannot be classified as certain to fail or certain to succeed; hence, it falls within a zone of ignorance. This therefore imply that on average, JSE listed firms, even though fall within the ignorance zone, they are very close to 2.99, thus, they are most likely to succeed as their average score is 2.81, however, not with certainty.

The results also show that the average board size of JSE listed firms is 10, the average spread is negative 6.91 and the average age of these sampled listed firms is 39 years. This implies that, on average, these sampled firms made a negative net return during the study period.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) WebReport	1.000									
(2) WDIscale	0.761*	1.000								
(3) WDIdummy	0.786*	0.968*	1.000							
(4) UDI	0.814*	0.921*	0.943*	1.000						
(5) PUDI	0.814*	0.921*	0.943*	1.000*	1.000					
(6) FinDistress	-0.014	-0.019	-0.007	-0.006	-0.006	1.000				
(7) BoDSize	0.193*	0.217*	0.231*	0.226*	0.226*	-0.085*	1.000			
(8) Spread	-0.003	0.021	0.022	0.001	0.001	0.098*	0.053	1.000		
(9) Size	0.119*	0.216*	0.208*	0.194*	0.194*	-0.023	0.552*	0.088*	1.000	
(10) Age	-0.080*	-0.075*	-0.056	-0.062*	-0.062*	-0.053	0.169*	0.013	0.311*	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The pairwise correlation results show that there is a significant positive correlation between website reporting and weighted disclosure index scale score. This implies that when firms increase the amount of financial accounting information they disclose on their website and on the website of JSE, they tend to score higher in WDIscale. There is also a positive significant correlation between website reporting and weighted disclosure index dummy score. This implies that even when weighted disclosure index is computed using the binary scores, an increase in a firm's website reporting leads to an increase in their score for WDIdummy. There is also positive correlation between website reporting and UDI and PUDI. The implication is that, an increase in website reporting leads to higher score in both unweighted disclosure index (UDI) and partially unweighted disclosure index (PUDI).

Further, there is a negative correlation between website reporting and financial distress, implying that an increase in website reporting leads to a reduction in the possibility of a firm experiencing financial distress. The correlation between webreport and board size is positive and significant indicating that firms with large board size disclose more information on their website and on the website of JSE. The correlation between webreport and interest rate spread is negative indicating that when firms disclose more financial accounting information, they tend to record less interest rate spread. This implies that high transparency in financial reporting leads to normal profit whereas less transparent financial reporting leads to super normal profit. The results also show a positive correlation between webreport and firm size indicating that large firms usually disclose more information their websites and on the website of the JSE. However, there is a negative correlation between webreport and firm age indicating that older firms disclose less information.

The correlation between WDI_{scale} and WDI_{dummy} is positive and significant indicating that although WDI_{dummy} uses binary scoring, they both move in the same direction, hence, an increase

in WDI scale leads to a corresponding increase in WDI_{dummy}. The correlation between WDI (scale and dummy) and UDI and PUDI are positive and significant indicating that they all move in the same direction, hence that score positive in WDI also score positive in UDI and PUDI. There is, however, a negative correlation WDI (scale & dummy) and financial distress indicating that when succeed in increasing their score for WDI, they tend to reduce their possibility of getting into a financial distress. Board size has a positive and significant correlation with WDI (scale & dummy) indicating that firms with large board size (around the average of 10) tend to score higher in WDI (scale & dummy). Interest rate spread has a positive correlation with WDI (scale and dummy) indicating that an increase in WDI (scale and dummy) score leads to an increase in return on investment (profit). This correlation implies that managers should pay particular attention to their score in WDI (both scale and dummy) and by extension, the content of their financial disclosure because it has direct correlation with their profit.

Econometric Models

The authors employed multivariate least-squares regression model to further examine the relationship between the variables. The general form of the linear regression model according to Gupta and Sikarwar (2016), Baltagi (2014), and Wooldridge (2013) can be specified as:

Theoretical Model

$$Y_{it} = \alpha_0 + \beta_1 X_{it} + \varepsilon_{it} \quad (\text{model 1})$$

$$i = 1, \dots, N$$

$$t = 1, \dots, T$$

This is derived from the general equation of a straight line to get the line that best fits the data.

Y_{it} is the dependent variable (endogenous) for firm i in year t . It is assumed to be random or stochastic in nature, that means it has a probability distribution.

Subscript i denotes the cross-sectional dimension (firm) $i = 1 \dots N$

Subscript t denotes the time-series dimension (time) $t = 1 \dots T$ (2011 to 2020)

α_0 is the intercept for all periods (t), and specific to a firm-specific effect (i)

β_1 is a $k \times 1$ vector of parameters to be estimated on the independent variables (coefficient/slope parameter). This is interpreted as the change in the mean of y for a unit change in x .

X_{it} is a $1 \times k$ vector of observations on the variables (exogenous) in the model which include the control variables. The X variables are assumed to have non-stochastic values (fixed) in repeated samples. Which means all of the variables contained in the X matrix are assumed to be exogenous, that is, their values are determined outside of the equation.

μ_{it} is a statistical disturbance term, that is the random variable that accounts for the failure of the model to fit the data exactly (Montgomery, Peck & Vining, 2012; Kumar & Sharma, 2011).

Therefore, the empirical multivariate regression model below tests the nexus between liquidity, weighted disclosure indices (WDI) and other independent variables to establish the effect of a firm's disclosure score and its liquidity.

Empirical Multivariate Regression Model

$$Liquidity_{it} = \beta_0 + \beta_1 WDI_{scale_{it}} + \beta_2 WDI_{dummy_{it}} + \beta_3 PUDI_{it} + \beta_4 WebReport_{it} + \beta_5 BoDSize_{it} + \beta_6 Spread_{it} + \beta_7 FinDistress_{it} + \beta_8 Age_{it} + \lambda_i + \mu_i + \varepsilon_{it} \quad (\text{model 2})$$

Where: WDI_{scale} = Weighted Disclosure Index scale score, WDI_{dummy} = Weighted Disclosure Index dummy score, PUDI = Partially Unweighted Disclosure Index, WebReport = Website report disclosure, BoDSize = Size of board of directors, Spread = Investment spread, FinDistress = Altman's Z score for financial distress, Age = years a firm has been in business.

λ_i = denotes the unobservable time effect which accounts for any time-specific effect that is not included in the regression.

μ_i = denotes the unobservable individual effect.

ε_{it} = denotes the stochastic disturbance term which represent all those factors that affect the dependent variable (s) but are not taken into account explicitly.

Regression Results

Liquidity	Coef.	Robust St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
WDI _{scale}	11.558	0.497	23.27	0.000	10.57	12.546	***
WDI _{dummy}	-17.666	0.363	-48.72	0.000	-18.387	-16.944	***
PUDI	4.828	0.299	16.13	0.000	4.232	5.423	***
WebReport	.218	0.064	3.42	0.001	0.091	0.345	***
BoDSize	-.018	0.01	-1.84	0.070	-0.038	0.002	*
Spread	0	0	-4.07	0.000	0	0	***
FinDistress	0	0	1.28	0.205	0	0.001	
Age	0.384	0.009	44.02	0.000	0.367	0.401	***
Constant	-9.31	0.406	-22.95	0.000	-10.117	-8.503	***
Mean dependent var	3.295		SD dependent var	13.097			
R-squared	0.999		Number of obs	694			
F-test	116792.027		Prob > F	0.000			
Akaike crit. (AIC)	227.962		Bayesian crit. (BIC)	268.844			

*** $p < .01$, ** $p < .05$, * $p < .1$

With a very strong R² of 99% and Prob>F = 0.000, the results show a significant and robust regression results. The coefficient for WDI_{scale} is positive and its p-value is significant at 1% indicating a positive nexus between liquidity and WDI_{scale}. This implies that an increase WDI_{scale} score leads to 12% increase in a firm's liquidity. This can be attributed to the stringent method used to measure WDI_{scale}, which enables it to carefully extract the real financial accounting information disclosed. The WDI_{scale} is therefore able to correctly measure the financial health of a firm and by extension, its liquidity. This explains their positive nexus and strong significance level (p-value of 0.000).

The coefficient for WDI_{dummy} however, is negative and its p-value is significant at 1% indicating a negative nexus between liquidity and WDI_{dummy}. This implies that an increase WDI_{dummy} score leads to a 17.67% decrease in a firm's liquidity. This can be attributed to the fact that although WDI_{dummy} is a weighted disclosure index, the method for scoring is binary. The

binary scoring could inflate the WDI_{dummy} score to make look like it is increasing when in fact, it may not. Therefore, the nexus between WDI_{dummy} and liquidity should be interpreted with care.

The coefficient for PUDI is positive and statistically significant at 1% indicating a positive linear nexus between liquidity and PUDI. This implies that an increase in a firm's PUDI score leads to an increase in its liquidity, however, the increment is a minimal 4.83%.

The coefficient for website reporting and liquidity is positive and statistically significant at 5% indicating a positive linear nexus between webReport and liquidity. This implies that liquid firms disclosed much more information on their websites and on the website of JSE. This is consistent with the signaling theory which posit that managers generally signal to the market when they have positive information to increase their reputation.

The coefficient for board size is negative and its p-value is statistically significant at 10% indicating a negative linear nexus between liquidity and board size. This implies that an increase in the number of board members beyond the normal size leads to a decrease in its liquidity. This can be attributed to the marginal cost incurred on additional member as well as the possibility of a decrease in rapidity of decision making.

The coefficient for spread and financial distress is zero indicating that there is no linear nexus between liquidity and any of them. Firm age is used as a control variable, that notwithstanding, its coefficient is positive and its p-value is statistically significant at 1%. This indicate that there is a positive linear nexus between liquidity and a firm's age. This implies that the longer a firm operate in its industry, the more liquid it becomes.

The authors find that the average score for website reporting is an impressive 80.1%, indicating that JSE listed firms disclose substantial information on their website as well as on the website of the JSE. However, the average score for weighted disclosure index using scale scoring (WDI_{scale}) is 26%. This imply that even though substantial information is disclosed on their website, content analysis of financial accounting information disclosed, when subjected to the WDI_{scale} test, the average score is only 26%, and the test score for its weighted disclosure index using binary scoring method (WDI_{dummy}) is 40%. This finding is consistent with Lev who contended that there is a wide-spread and growing dissatisfaction with the relevance and usefulness of information disclosed in financial reports, particularly among investors. This dissatisfaction is due the paucity of the financial accounting information disclosed. Then again, after reassessing the value of corporate reporting using a survey of 500 report users in the UK, US, and Canada, ACCA also found that majority of respondents confirmed that annual report is their primary or only source of information but it is difficult to assess a firm's performance using the annual report.

When measured using the partially unweighted disclosure index (PUDI), the disclosure score increases marginally to 43.3%, just about the same as WDI_{dummy} (40%). However, the average score is astronomically 173% when measured using unweighted disclosure index (UDI). These results show that UDI is an outlier which excessively over estimate disclosure results. Therefore, the authors conclude that WDI_{scale} , WDI_{dummy} , and PUDI are consistent methods for measuring corporate disclosure. This finding is consistent with Tsalavoutas & Dionysiou (2014) who found that the means between the two compliance methods (PUDI and UDI) differ significantly. It is also consistent with Bravo et al. (2009) who posited that the choice of an index instead of another can affect crucially the results of the analysis.

A comparative analysis of their deviations from the means discovers that WDI_{scale} has a very minimal standard deviation of 11%. This indicate that there is no wide disparity in scores among the firms. WDI_{dummy} also recorded a minimal standard deviation of 16% indicating

minimal disparity in scores. PUDI also shows a good level of consistency with WDI by recording a 20% deviation from the mean. However, UDI recorded 80% standard deviation, indicating that there is wide disparity in the scores among the firms. This shows that the scores generated by UDI are very likely to be unreliable and inconsistent. The implication to stakeholders is that, to achieve accurate results, policy makers, investors and managers should adopt WDI_{scale}, WDI_{dummy}, and PUDI.

The average score for financial distress is 2.813, which is almost 2.99. According to Altman (1968), a score between 1.81 to 2.99 cannot be classified as certain to fail or certain to succeed, hence, it falls within a zone of ignorance. This therefore imply that on average, JSE listed firms, even though fall within the ignorance zone, they are very close to 2.99, thus, they are most likely to succeed as their average score is 2.813, however, this cannot be stated with certainty. Further, the study finds that an increase in website reporting leads to a reduction in the possibility of a firm experiencing financial distress.

The results also show that the average board size of JSE listed firms is 10, indicating that the ideal board size should be around 10 members. The average spread is negative 6.91 which implies that, on average, these sampled firms made a negative net return during the study period.

The study finds that when firms increase the amount of financial accounting information they disclose on their website and on the website of JSE, they tend to score higher in WDI_{scale} and when weighted disclosure index is computed using the binary scores, an increase in a firm's website reporting leads to an increase in their score for WDI_{dummy}. Then again, an increase in website reporting leads to higher score in both UDI and PUDI.

It also finds that firms with large board size disclose more information on their website and on the website of JSE. Another interesting finding is that when firms disclose more financial accounting information, they tend to record less interest rate spread. This imply that high transparency in financial reporting leads to normal profit whereas less transparent financial reporting leads to supernormal profit.

The results also show a positive correlation between website reporting and firm size indicating that large firms usually disclose more information on their websites and on the website of the JSE. However, there is a negative correlation between website reporting and firm age indicating that older firms disclose less information. This is consistent with the findings of Bokpin (2013) who found that firm size has a positive nexus with the disclosure level of firms. Firm size has also been reported to be a factor that influence the quality and the quantity of firm disclosure. This is because larger firms are more likely to be exposed to litigation than their smaller counterparts and, therefore, they may disclose more voluntarily to avoid this cost. Juhmani (2013) found that size has positive association with disclosure. This finding supports S&P (2002, p.14) view that smaller firms generally provide less disclosure.

FINDINGS AND CONCLUSION

The correlation between WDI_{scale} and WDI_{dummy} is positive and significant indicating that although WDI_{dummy} uses binary scoring, they both move in the same direction, hence, there is consistency between them, hence, an increase in WDI_{scale} leads to a corresponding increase in WDI_{dummy}. Then again, the correlation between WDI (scale & dummy) and UDI and PUDI are positive and significant indicating that they all move in the same direction, hence firms that score positive in WDI also score positive in UDI and PUDI.

There is, however, a negative correlation WDI (scale & dummy) and financial distress indicating that when firms succeed in increasing their score for WDI, they tend to reduce the

possibility of them getting into a financial distress. The authors also find that firms with large board size (more than the average of 10) tend to score higher in WDI (scale & dummy). Probably, this could be due to stronger shareholder and other stakeholders' interest and pressure.

Consistent with expected sign, interest rate spread has a positive correlation with WDI (scale & dummy) indicating that an increase in WDI (scale and dummy) score leads to an increase in return on investment (profit). This correlation implies that managers should pay particular attention to their score in WDI (both scale and dummy) and by extension, the content of their financial disclosure because it has direct correlation with their profit.

The regression coefficient for liquidity and WDI_{scale} is positive and its p-value is significant at 1% indicating a positive nexus between liquidity and WDI_{scale} . This implies that an increase in WDI_{scale} score leads to 12% increase in a firm's liquidity. This can be attributed to the stringent method used to measure WDI_{scale} , which enables it to carefully extract the real financial accounting information disclosed. The WDI_{scale} is therefore able to correctly measure the financial health of a firm and by extension, its liquidity. This explains their positive nexus and strong significance level (p-value of 0.000). This is consistent with Wardhani (2019) who found that financial disclosure provides economic consequences by reducing cost of equity and enhances liquidity. The regression results also show that an increase in a firm's PUDI score leads to an increase in its liquidity, however, the increment is a minimal 4.83%. It also shows that liquid firms disclosed much more information on their websites and on the website of JSE. This is consistent with the signaling theory which posit that managers generally signal to the market when they have positive information so as to increase their reputation. Finally, the study finds that an increase in the number of board members beyond the normal size (10 members) leads to a decrease in its liquidity. This can be attributed to the marginal cost incurred on additional member as well as the possibility of a decrease in rapidity of decision making.

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Received: 04-Sep-2022, Manuscript No. AAFSJ-22-12508; **Editor assigned:** 06-Sep-2022, PreQC No. AAFSJ-22-12508(PQ); **Reviewed:** 21-Sep-2022, QC No. AAFSJ-22-12508; **Revised:** 21-Nov-2022, Manuscript No. AAFSJ-22-12508(R); **Published:** 29-Nov-2022