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Detecting earnings management: the South African evidence

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DETECTING

EARNINGS MANAGEMENT:

THE SOUTH AFRICAN EVIDENCE

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ABSTRACT

This study provides evidence of the types of accruals that are being manipulated in an effort to avoid reporting a loss, in South African listed companies. These accruals have been identified from data disclosed in the deferred tax and cash flow reconciliation notes as required by IFRS and have been tested using logistic regression, for association with earnings management (EM). The sample of suspected EM firms used in this study was obtained by comparing an empirical earnings distribution to a reference curve determined using Kernel Density Estimation. This study is partly founded on the work of Phillips, Pincus and Rego (2003) who reported that the deferred tax expense could be used as a proxy for discretionary accruals. Phillips, Pincus, Rego and Wan (2004) decomposed the deferred tax assets and liabilities into its components to determine which types of accounts are associated with earnings management activities to avoid an earnings decline. In contrast, this study extracts the types of accounts associated with earnings management from the deferred tax expense note and the reconciliation between profits and cash flows from operations. This study provides evidence that the deferred tax components related to revenue accruals and the cash flow reconciling components related "change to accounts receivable" and to "changes in inventory" are associated with earnings management to avoid a loss. Furthermore, the deferred tax "recognized tax loss" component was found to be positively associated with loss companies as opposed to earnings management firms and the total deferred tax expense was no longer useful at detecting earnings management after deducting the recognized tax loss component. This finding highlights a potential limitation of using the total deferred tax expense as a proxy for discretionary accruals. In addition, this finding exposes a limitation of using earnings distributions curves as a means of identifying suspected EM firms in that the comparison of EM0 and EM1 firms is also a comparison of profit vs loss firms.

DECLARATION

I declare that this dissertation is my own original work and that all sources have been accurately reported and acknowledged. It is submitted for the degree of Masters of Commerce to the University of Witwatersrand, Johannesburg. This research has not been submitted for any degree or examination at this or any other university.

Paula van de Wouw Date

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For Wayne, Joshua, Daniel

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LIST OF ACCRONYMS

Acronym	Description
3SLS	Three stage least squares
AAER	Accounting and Auditing Enforcement Releases
ATO	Asset turnover
CF	Cash flow
CFO	Cash flow from operations before tax
CFOs	Chief financial officers
DTE	Deferred tax expense
ECDF	Empirical cumulative distribution function
EM	Earnings management
EM0	Firms identified off KDE distribution as the control or non-EM firms
EM1	Firms identified off KDE distribution as the “suspected EM firms”
EPS	Earnings per share
GAAP	Generally accepted accounting principles
IAS	International accounting standard
IASB	International accounting standards board
IFRS	International Financial Reporting Standards
IKDE	Integrated kernel density estimate
JSE	Johannesburg Securities Exchange
KDE	Kernel density estimate
MJ model	Modified Jones discretionary accrual model
NIAT	Net income after tax
PBT	Profit before tax
PM	Profit margin
PPE	Property, plant and equipment
SARS	South African Revenue Services
SEC	Securities and Exchange Commission
US	United States
VAA	Deferred tax valuation allowance account
ΔREV	Changes to Revenue

1. INTRODUCTION

The main focus of this work is to identify the accruals that are primarily used by South African firms to manipulate such earnings.

1.1. Background

Wróblewski, Jarne and Callao (2014:137) define earnings management (EM) as *"a purposeful intervention in external financial reporting designed to reach earnings targets, by varying accounting practices. However, it is an action which takes place without necessarily violating accounting regulations, and which takes advantage of the possibilities of choice in accounting policy. The action may mislead stakeholders, causing them to make decisions on the basis of financial reports that they would not have made otherwise."*

The management of earnings has a direct effect on key performance metrics reported such as earnings per share. Graham, Harvey and Rajgopal (2005) reported that US senior executives rank earnings (and more specifically earnings per share) as the most important performance metric utilised in decision making. The popularity and reliance placed on these metrics by both internal and external stakeholders creates an incentive for its manipulation. However some researchers have argued that such manipulation is not necessarily opportunistic (i.e. where the intent is to mislead stakeholders). Subramanyam (1996) maintains that earnings management (EM) is necessary to signal information on future cash flows, to the market, that would otherwise remain unknown. The majority of researchers however agree that EM is opportunistic and that management use the information asymmetry that exists between them and stakeholders to act in their own interests rather than in the interests of stakeholders (agent-principle problem) (Jensen and Meckling, 1976; Watts and Zimmerman, 1978; Schipper, 1989). Furthermore, despite the theoretical debate as to whether earnings management is predictive or opportunistic, the fact remains that earnings management has had detrimental effects on stakeholders and even economies as a whole, particularly as it has escalated to the realm of outright fraud (Rezaee, 2005). Rezaee (2005:277) reported that financial statement fraud[1] perpetrated by US corporates including Enron, WorldCom, Qwest, Tyco, and Global Crossing, have "cost market participants,

[1] Financial statement fraud is an aggressive form of earnings management. Rezaee (2005) defined financial statement fraud as a deliberate attempt by corporations to deceive or mislead users of published financial statements, by preparing and disseminating materially misstated financial statements.

including investors, creditors, pensioners, and employees, more than $500 billion during the past several years."

The prevalence and detrimental results of earnings management have not been quantified in South Africa, however several surveys conducted by audit firms, on the prevalence of economic crime (Ernst&Young, 2014; PricewaterhouseCoopers, 2014) have indicated that earnings management (and more specifically financial statement fraud) are on the rise. PricewaterhouseCoopers (2014)[2] reported that 69% of South African respondents indicated that they had been subjected to some form of economic crime[3] in the 24 months preceding the survey, compared to 37% of global respondents. Moreover, respondents reported significantly more instances of financial statement fraud than their global counterparts (i.e. 35% compared to 22%). Overall, the survey performed by PricewaterhouseCoopers (2014) indicates an increase in the prevalence of financial statement fraud in South Africa since 2011, most of which is perpetrated by senior management officials.
In the 13th EY Global Fraud survey[4], Ernst&Young (2014) reported that 78% of the respondents believed that fraud and corruption in the country as a whole is increasing, thus creating an environment where unethical behaviour becomes acceptable.
The perceived increase in financial statement fraud (or earnings management) in South African companies indicates a need for research into practical methods that could assist stakeholders in detecting EM firms. This need was first highlighted by Healy and Wahlen (1999) who encouraged researchers globally to investigate the accruals being used to manipulate earnings[5]. Although globally, significant progress in the understanding of EM has been made, the concerns of Healy and Wahlen (1999) have yet to be addressed in the context of South African companies.

In order to conduct any research on the methods used by firms to manage earnings it is essential to work with a sample of suspected EM firms. However, one of the principle difficulties encountered to date by EM researchers globally revolves around the issue of obtaining a reliable sample to begin with.

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[2] PWC 2014 Global economic crime survey issued in February 2014: This online survey was conducted by PricewaterhouseCoopers during the fourth quarter of 2013 on 5128 senior businessmen and women from 93 countries to assess the prevalence of economic crime globally and in South Africa.
[3]Economic crime, often also known as "white collar crime" refers to criminal activities that lead to financial gain. Economic crimes include, but are not limited to asset misappropriation, financial statement fraud and management of earnings, bribery and corruption and money laundering.
[4] Ernst & Young 13th Global Fraud survey (2014): This survey was conducted on over 2700 executives across 59 countries. A copy of the report can be downloaded from www.ey.com.
[5] Healy and Wahlen (1999) reported that much of the EM research at that time lacked relevance to standard setters and regulators, particularly with regard to the pervasiveness of EM, the accruals being used to manipulate earnings and the effect of EM on resource allocation decisions.

EM Sample

There are two primary approaches that have been used in obtaining a sample of EM firms to date. The first is to access databases[6] of firms accused of misconduct[7] (Bayley and Taylor, 2007; Dechow, Ge, Larson and Sloan, 2011; Jansen, Ramnath and Yohn, 2012) or of firms that have high incentives for earning management (Jones, 1991). The second is to identify suspected earnings management firms by analysing earnings distributions for discontinuities. A discontinuity is defined by Lahr (2014:560) as "the point at which a density function jumps from a region of lower density to one of higher density or vice versa".

In this study, the latter approach for identifying suspected EM firms is used primarily due to the fact that there is insufficient information available publically in South Africa to use the first approach. As an indication of this, Watson and Rossouw (2012) reported that only 38 South African listed companies were required to restate their financial statements from the period 2002 to 2012.

The underlying premise for using distribution curves as a means of detecting EM is based on the prospect theory (Kahneman and Tversky, 1979) and the transaction cost theory (Burgstahler and Dichev, 1997) which maintain that, due to the cost and complication of processing financial information, stakeholders rely on simple heuristics when transacting with a firm. In other words, instead of looking at absolute levels of wealth, stakeholders would normally base their decision to either lend money, invest in a firm or otherwise transact with a firm, on whether an earnings threshold has been exceeded or not.

There are advantages and disadvantages of using distribution curves as a means of detecting EM. The primary advantage is that it is a relatively simple method of detecting EM especially in light of the fact that databases (of firms that have misstated earnings) are not always available. Another advantage is that the selection bias observed when using "misconduct" databases (Dechow et al., 2011) is eliminated. In other words, all firms engaging in EM should theoretically be identified using earnings distributions.

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[6] "Databases" refer to public information available of which companies are accused of misconduct, such as companies required to restate or of allegedly committing fraud. It also refers to public of which companies have greater incentives to manage earnings, such as companies with initial public offerings.

[7] In the US, databases exist of allegedly fraudulent firms that been identified by the Securities and Exchange Commission (SEC) and documented in the Accounting and Auditing Enforcement Releases (AAER's) (Dechow et al., 2011; Bayley and Taylor, 2007). There are also databases of companies that have had a legal requirement to restate earnings. A disadvantage of using such databases is a strong selection bias in the sample as only firms that have aggressively managed earnings are included in the database.

The disadvantages of using this method however relates primarily to the validity of the discontinuity identified when comparing the empirical earnings distribution with the theoretical/reference distribution. Lahr (2014) observed that the original distribution curves used in EM research (Burgstahler and Dichev, 1997) firstly only explored a discontinuity around zero and secondly presumed that the reference distributions was locally linear around the vicinity of zero. Furthermore, the bandwidth selected by Burgstahler and Dichev (1997) was arbitrary (Bollen and Pool, 2009; Lahr, 2014) and could therefore create the appearance of a discontinuity where none existed. Lahr (2014) addressed these issues by recommending that the reference distribution be constructed using an Epanechnikov kernel density estimate from the data itself. Furthermore, Lahr (2014) identified the optimal interval width needed for the kernel density estimation by using a series of re-iterative bootstrapping tests until the reference curve is indistinguishable globally from the empirical data. The methodology proposed by Lahr (2014) and used by Rabin and Negash (2012) has been adopted in this study.

Other criticisms of using distribution curves to identify the EM sample related to scaling issues and whether earnings before or after tax should be analysed (Durtschi and Easton, 2005; Beaver, McNichols and Nelson, 2007). These researchers were concerned about the deflated earnings figures that were used to construct the empirical distribution. Durtschi and Easton (2005) observed that the use of a *deflated* earnings figure in the construction of the empirical distribution could distort the distribution. They reported that the very act of deflating the earnings by a scalar that is systematically different between profit and loss firms (for example deflating by the market value of shares), could create a discontinuity in the frequency distribution observed around zero. To address this criticism, the deflator chosen for earnings, in this study, is the number of ordinary shares issued as at the end of the reporting period as this deflator was not found to be significantly different between profit and loss firms.

Beaver et al. (2007) observed that asymmetric earnings properties between profit and loss companies (for example the asymmetric tax expense in profits vs loss firms) could exacerbate a discontinuity around zero where no discontinuity actually exists.

Lastly, a fundamental weakness of detecting EM firms by using EM earnings distributions is that such distributions can only reveal the location of suspected EM firms and not the actual EM firms themselves. When doing research using an EM sample derived from earnings distributions, it therefore becomes necessary to validate the sample through the use of discretionary accrual measures or other indicators of EM.

Despite the apparent weaknesses of using earnings distributions for detecting suspected EM firms, Donelson, Mcinnis and Mergenthaler (2013) found direct evidence linking earnings management to earnings discontinuities for a sample of firms that had to settle lawsuits and restate earnings (i.e. a sample where EM was detected *ex post*).

Discretionary Accruals

Much of the prior research concentrates on measuring the level of discretionary accruals[8] (Healy, 1985; DeAngelo, 1986; Jones, 1991; Dechow, Sloan and Sweeney, 1995). In essence if discretionary accruals can be determined or observed, then companies that manage earnings can be detected. Some previous researchers have used discretionary accrual measures to validate the EM sample obtained (Dechow et al., 1995; Phillips et al., 2003). Others have sifted through public information available on the EM sample to establish which accruals are most likely to be discretionary (Phillips et al., 2004) or which financial ratios could point to companies that manage earnings through accruals (Beneish, 1999; Bayley and Taylor, 2007; Dechow et al., 2011).

Estimated discretionary accruals

Healy (1985) and DeAngelo (1986) proposed using total accruals as broad estimators of discretionary accruals. Their simple measure was later refined by Jones (1991) and Dechow et al. (1995) who developed the Jones model[9] and the modified Jones model (hereafter MJ model)[10] respectively to estimate abnormal accruals. These models and variations thereof have been extensively used in prior research as a means to detect and confirm the existence of EM. However, because they are estimated calculations of discretionary accruals, as opposed to amounts that are directly observable from the financial statements (Phillips et al., 2003) they are subject to measurement error and have been criticised for their lack of power to detect substantial upwards earnings management (Dechow et al., 1995; Bayley and Taylor, 2007). Paradoxically, Bayley and Taylor (2007), found that these discretionary accrual models did not perform as well as the simple measure of total accruals at detecting upward EM.

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[8] Discretionary accruals are abnormal accruals recognised by management for the purpose of managing earnings

[9]Discretionary accruals calculated using the Jones model is based on the difference between the total accruals in a company and the non-discretionary accruals. Non-discretionary accruals are estimated using changes in revenue and levels of property, plant and equipment, to control for the portion of total accruals relating to non-discretionary operating activities and depreciation respectively. Refer to chapter 2, section 2.6.1 for a more in depth discussion.

[10] The modified Jones "discretionary accruals" are calculated in a very similar manner to those of the Jones model. The only difference is that changes to accounts receivable are deducted from the changes to revenue in the determination of non-discretionary accruals, in order to control for discretionary accruals of revenue. Refer to chapter 2, section 2.6.1 for a more in depth discussion.

Observed discretionary accruals

As a possible alternate to the difficulty of estimating the discretionary accruals of a firm, Phillips et al. (2003) recommended that the deferred tax expense (DTE) be used as a proxy for discretionary accruals whereby the "temporary difference"[11] as defined in terms of IAS 12: *Income taxes*) reflects the discretionary accruals of a firm. This recommendation is based on the premise that managers prefer to overstate earnings without having a consequential effect on current tax payable (Phillips et al., 2003; Badertscher, Phillips, Pincus and Rego, 2006; Ettredge, Sun, Lee and Anandarajan, 2008). Using an EM sample derived using earnings distributions (BD), Phillips et al. (2003) reported that DTE was incrementally useful at detecting EM beyond estimated discretionary accrual measures (as derived by Dechow, 2002 and Dechow 1995). In contrast however, Rabin and Negash (2012) reported that in South African companies listed on the Johannesburg Stock exchange, estimated discretionary measures (using the MJ model) were incrementally useful beyond DTE at detecting earnings management to avoid an earnings decline or a loss.

In an effort to identify the exact nature of the discretionary accruals recognised as temporary differences in the DTE, Phillips et al. (2004), disaggregated the change in the deferred tax asset/liability into the types of accruals represented by each temporary difference. They then tested the usefulness of each of these components in detecting earnings management to avoid an earnings decline by estimating a system of equations using a full information method (i.e. three stage least squares – 3SLS). Phillips et al. (2004) found that changes in the net deferred tax liability components relating to "revenue and expense accruals and reserves" were useful in detecting EM to avoid a decrease in earnings. In line with Phillips et al. (2004) this study investigates which of the deferred tax expense accruals are associated with EM in South African listed companies. The "3SLS" methodology used by Phillips et al. (2004) to determine the usefulness of these accruals at detecting EM could not be applied for South African listed companies due to sample size constraints. Instead, in this study, the DTE components identified are tested separately, through logistic regression, for association with EM to avoid a loss.

An alternative source of information on the accruals of firms, which internationally has not been previously investigated, can be obtained from the cash flow reconciliation note disclosed in published financial statements. The cash flow reconciliation is a reconciliation of profits to cash

[11]Temporary differences are differences between the carrying amount of an asset or liability in the statement of financial position and its tax base.

flow from operations[12]. In essence, the reconciling differences represent the total accruals of the company, as defined by Healy (1985)[13]. Due to past legislative requirements (RSA, 1973) South African companies have mostly continued to provide disclosure of the reconciliation of profits to cash flow from operations. This disclosure specifies the types of accruals recognised by a firm and is potentially a source of information on the discretionary accruals recognised by South African companies. In this study, the cash flow reconciliation note is decomposed into separate types of accruals and each accrual identified was tested separately, through logistic regression, for association with EM to avoid a loss.

1.2. Problem Statement

Healy and Wahlen (1999) reported that much of the EM research at that time lacked relevance to standard setters and regulators, particularly with regard to the pervasiveness of EM, the accruals being used to manipulate earnings and the effect of EM on resource allocation decisions. In response to Healy and Wahlen (1999), this research focuses on identifying the types of accruals used by management of firms to manipulate earnings.

EM research in South Africa has historically been limited and possibly as a consequence of this, only a few firms have been required to restate financials as a result of detected earnings management activities. Watson and Rossouw (2012) reported that from the period 2002 to 2012, a mere 38 South African listed companies were required to restate their financial statements of which 15 of the required restatements resulted from a recommendation that employee share trusts be consolidated and not because of earnings management per se. This observation could indicate that either South African firms do not manage earnings or that earnings management in South African firms is not being detected. With the perceived increase in financial statement fraud in South Africa (Ernst&Young, 2014; PricewaterhouseCoopers, 2014), it seems more likely that the reason so few companies are required to restate their financial statements could be due to the inability of auditors, regulators and other stakeholders to detect earnings management practices of firms. The challenge in detecting EM is a consequence of the gap in the overall awareness of the methods used by South African companies to perpetrate EM. As such, this could become

[12] The cash flow reconciliation is only a requirement in terms of IAS 7 when using the indirect method of disclosing the statements of cash flow. Up until December 2007, this reconciliation was also a requirement in terms of the South African Companies Act (RSA, 1973). However, this study found that the large majority of South African companies continue to disclose this reconciliation regardless of which method they use to prepare the statement of cash flow.

[13] Healy (1985) defined accruals as the difference between profits and cash flow from operations.

detrimental to investors, lenders and other stakeholders with vested interests. Undetected EM could, for example result in investors over-paying for their shares or lenders increasing their lending based on an incorrect credit-risk assessment.

1.3. Purpose of the study

In an effort to address the gap in the awareness of EM practices in South Africa, this study specifically investigates the types of accruals used by South African listed firms to manage earnings upwards to avoid reporting a loss (i.e. negative earnings).

This research is quantitative in nature and follows a scientific, positivist approach. Accruals identified using data from the published financial statements of a sample of firms suspected of EM are tested using a logistic regression for association with earnings management firms. As such, each type of accrual identified represents an independent variable in the regression. The dependent variables used in the regression represent a sample of suspected EM firms (EM1 firms), as well as a control group of firms (EM0 firms).

The EM0/EM1 sample used in this study was kindly provided by Rabin and Negash (2012). This sample was obtained from a population of 1 862 firm year observations covering all South African firms listed on the Johannesburg Securities Exchange (JSE) over a truncated period from 2000[14] to 2010 with the exception of financial institutions and the mining sector as these are regulated industries.

From this population a sample of 225 control (EM0/non-EM) firms and 496 "suspected EM" (EM1 firms) were identified. This was done by Rabin and Negash (2012) by comparing the empirical earnings distribution, of all South African firms, with a theoretical distribution constructed using a kernel density estimate to locate discontinuities in the earnings distribution (Lahr 2014). In this research, a discontinuity in the distribution of earnings levels deflated by number of shares in issue at the end of the reporting period was located at zero; in line with Burgstahler and Dichev (1997) and Lahr (2014) this was interpreted as evidence of earnings management.

1.4. Research question and overall hypotheses tested

The primary question that is being researched is as follows:

[14] The research of Rabin and Negash (2012) investigated companies from 1997 to 2000. This study however used only the data for the period 2000 to 2010.

Which accruals are used, by management of South African listed firms, to manage earnings upwards in order to avoid reporting a loss (negative earnings)?

To answer the research question, this study tests the following primary hypotheses:

H1: The total deferred tax expense is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss.

H2: Each separately identified **c**omponent of the deferred tax expense[15] is significantly associated with suspected upward EM to avoid reporting a loss.

H3: Each separately identified accrual observed in the reconciliation between profit before tax and cash flow from operations[16] is significantly associated with suspected upward EM to avoid reporting a loss.

Furthermore, this study tests an ancillary hypothesis to further validate the outcome of hypothesis 1, as follows:

H4: The residual deferred tax expense[17] is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss.

1.5. Research Design

The types of accruals recognised by firms are identified from two of the notes disclosed in the financial statements, these being the deferred tax note[18] and the cash flow reconciliation note[19].
The deferred tax note is disaggregated into seven categories of accruals viz. capital allowances, employee compensation, expense accruals, fair value adjustments, prepayments, revenue accruals

[15] Separately identified **c**omponents of the deferred tax expense are identified with reference to the changes in each type of temporary difference of the net deferred tax liability (or asset). These include capital allowances, employee compensation, expense accruals, fair value adjustments, prepayments, revenue accruals and recognised tax losses.
[16] Separately identified accruals observed in the reconciliation between profit before tax and cash flow from operations include: changes in accounts payable, changes in accounts receivables, changes in inventory, depreciation, employee costs, equity accounted profits, fair value adjustments, foreign exchange movements, profits/losses on disposal of assets and provisions.
[17] The residual total deferred tax expense (residual DTE) is calculated by deducting the deferred tax on recognised tax losses from total deferred tax expense.
[18] The deferred tax note is required in terms of IAS 12, para 81g (i)
[19] The cash flow reconciliation note is only a requirement for companies reporting the cash flow statement using the indirect method, in terms of IAS 7, para 20. However, up until December 2007, the South African Companies Act (RSA, 1973) required all publically traded companies to disclose this reconciliation. Despite the fact that this is no longer a Companies Act requirement, most publically traded companies in South Africa continue to disclose the cash flow reconciliation in terms of "best practice".

and recognition of tax losses. These components are tested separately, through logistic regression[20], for association with EM to avoid a loss.

The cash flow reconciliation note is decomposed into ten categories of accruals viz. changes in accounts payable, changes in accounts receivable, changes in inventory, depreciation, employee costs, equity-accounted profits, fair value adjustments, foreign exchange differences, profits or losses on disposal and provisions. As with the deferred tax components listed above, these accruals are tested separately, through logistic regression, for association with EM to avoid a loss.

1.6. Significance of the Study

In order for earnings management to be detected by stakeholders, it is important for researchers to unravel the manner in which firms are manipulating earnings. This study should highlight any disclosure that could be helpful in detecting such accrual-based manipulation as well as assist standard setters in identifying which international standards are prone to abuse.

This research is the first of its kind in South Africa and is relevant internationally because it re-examines the use of the deferred tax expense as a proxy for detecting earnings management (Phillips et al., 2003) and drills down to unravel the relationship between the deferred tax on specific accruals with EM firms. Furthermore it is also, internationally, the first study of its kind to utilise the cash flow reconciliation note disclosure (as previously required for all South African listed companies) to identify discretionary accruals. If the individual reconciling items from the cash flow reconciliation note are found to be associated with EM, the IASB could consider making this disclosure compulsory, regardless of the method chosen by the entity to present the statement of cash flows. These reconciling items could be indicative of the accruals that should be scrutinised for possible manipulation.

1.7. Assumptions and Limitations

EM Sample

An overall limitation of using earnings distributions to obtain a sample of EM firms arises from the fact that this methodology indicates the location of the suspected earning management in the

[20] The first sets of logistic regressions were performed for each individual variable separately, controlled for performance and industry. A multivariate regression could not be performed due to the constraints of sample size.

earnings distribution but does not indicate which of the firms have in fact managed earnings. Furthermore, the EM sample of suspected EM firms identified includes firms that manipulate earnings through real EM activities as well as those that manipulate earnings through accrual-based EM. This study however, focuses only on the identification of the accruals used in accrual-based EM. Consequently data obtained from "real" EM companies is not necessarily consistent with or relevant to this accrual-based EM study. Moreover, the sample of suspected EM firms identified does not only include EM firms, but could also include legitimate profit-making firms. This limitation could distort some of the results (or associations found with EM). For example, where a result indicates an association of a particular variable with suspected EM firms, this association could potentially have arisen due to the financial characteristics of "profit-making" firms instead of EM. To address this issue, supplementary tests have been performed which validate the results obtained in this study.

Identification of discretionary accruals

The use of DTE as a proxy for discretionary accruals is based on the underlying assumption that managers avoid the cost of paying taxes when recognising discretionary accruals (Phillips et al., and Ettredge et al., 2008). Consequently it is assumed that deferred tax is recognised on all discretionary accruals. Erickson, Hanlon and Maydew (2004) however found that some EM firms were in fact willing to pay taxes on discretionary accruals in an attempt to make these more inconspicuous. A limitation therefore, of using DTE as a proxy for discretionary accruals, is the fact that EM that is perpetrated through the recognition of abnormal accruals and that do in fact have current tax consequences or on the other hand, have no tax consequences will remain undetected. This limitation has been addressed by looking at an alternate source of accrual information, *viz*. the cash flow reconciliation.

Secondly, as there is no strict guidance in IAS 12: *Income taxes* or in IAS 7: *Statement of cash flows* as to the types of accruals (or deferred tax on accruals) that must be disclosed, such categorisation and disclosure is at the discretion of the entity. The discretion allowed leads to inconsistency in the manner in which firms aggregate and present classes of accruals which could have an impact on the quality of the data (or rather the "purity" of the accrual data) used in this study.

Finally, there is an additional limitation created by the fact that firms do not all disclose or use the same type of accruals. This limitation results in a reduced "accrual" sample size that can be tested for association with EM at any one time. More specifically, it is not possible to simultaneously test the association of various accrual types (independent variables) with EM1 firms in a multi-variate logistic regression due to "accrual" sample-size constraints. Instead, each accrual-type identified from the financial statements of EM1 and EM0 firms have to be tested individually and separately from other accruals, for association with EM. This could result in a risk of misspecification which may create an

estimate (coefficient) bias towards the null hypothesis of no association between the dependent and independent variables (Begg and Lagakos, 1990). In other words, this study runs the risk of not identifying all the accruals that are associated with EM when such an association does in fact exist.

1.8. Delimitations

This research explores only earnings manipulation achieved through accruals and does not consider the management of earnings through the manipulation of real activities. Furthermore, this work focuses only on upward earnings management to avoid reporting an accounting loss, although it is acknowledged that meeting or beating earning changes and analysts forecast is also a motivation for earnings manipulation (Degeorge, Patel and Zeckhauser, 1999).

1.9. Theoretical framework for research hypotheses tested and for EM1/EM0 sample used

Chapter	Heading	Theory	Hypotheses tested	Method
3: Methodology and Hypotheses				
3.1.1	Incremental usefulness of total DTE to abnormal accrual measure	Phillips et al. (2003) proposed that deferred tax expense (DTE) be used as a proxy for discretionary accruals. This was confirmed when they established that DTE is incrementally useful to accrual measures in detecting earnings management.	**H1:** The total deferred tax expense is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss.	Logistic regression.
Assumptions and Limitations	1. This test is based on the assumption that managers avoid the cost of paying tax when recognising discretionary accruals (Phillips et al., and Ettredge et al., 2008). A limitation thereof is that EM that is perpetrated through accruals that do in fact have either current tax consequences or no tax consequences will not be included in the total DTE tested.			
3.1.2	Accruals identified through the deferred tax note	Following the theory that the total DTE is incrementally useful in detecting earnings management (Phillips et al., 2003), the individual DTE component parts (representing DT on various accruals) of the total DTE should indicate the types of accruals used for earnings management (Phillips et al, 2004).	**H2:** Each separately identified **c**omponent of the deferred tax expense is significantly associated with suspected upward EM to avoid reporting a loss.	Logistic regression.
Assumptions and Limitations	1. As for 3.1.1 above, this test is based on the assumption that managers avoid the cost of paying tax when recognising discretionary accruals (Phillips et al., 2003; Ettredge et al., 2008). A limitation thereof is that EM that is perpetrated through the recognition of discretionary accruals that do in fact have current tax consequences or on the other hand, have no tax consequences will remain undetected. 2. As there is no specific guidance in IAS 12: *Income taxes* as to which "type" of temporary difference (indicating an accrual) must be disclosed, classification of temporary differences is foremost at the discretion of the preparer. Consequently it is assumed that data obtained from published financial statements on types of accruals used by specific entities have been categorised and aggregated correctly and consistently into one of seven categories of variables tested.			

	3. There is risk of misspecification in this study, as a multivariate logistic regression cannot be estimated due to the constraints of sample size. This limitation could cause an estimate (coefficient) bias towards the null hypothesis of no association between the dependent and independent variables (Begg and Lagakos, 1990). In other words, this study runs the risk of not identifying all the accruals that are associated with EM when such an association does in fact exist. This risk is specific to logistic regressions used to test hypotheses 2 and 3 (below).			
3.1.3	Total accruals identified through the cash flow statement	Healy (1985) and DeAngelo (1986) proposed looking at total accruals as broad estimators of discretionary accruals. Furthermore, Healy (1985) defined accruals as the difference between earnings and cash flows from operations.	**H3:** Each separately identified accrual observed in the reconciliation between profit before tax and cash flow from operations is significantly associated with suspected upward EM to avoid reporting a loss.	
Assumptions and Limitations	1. As there is no specific guidance in IAS 7: *Statement of cash flows* as to which categories of reconciling differences (representing types of accruals) must be disclosed (other than the changes in working capital movements), classification of the reconciling differences is primarily at the discretion of the preparer. Consequently, it is assumed that data obtained from published financial statements on types of accruals used by specific entities have been categorised and aggregated correctly and consistently into one of seven categories of variables tested.			

Chapter	Description	Theory	Hypotheses tested	Method
5: Supplementary tests				
5.1.1	Effect of recognised tax losses on usefulness of total DTE to detect EM	The deferred tax expense is incrementally useful to accrual measures in detecting earnings management (Phillips et al., 2003). The discretion allowed for the recognition of deferred tax on tax losses is in itself a tool for the manipulation of earnings (Phillips et al., 2004)	**H4:** The residual deferred tax expense is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss.	Logistic regression
5.1.2	Deferred tax expense component – The effect of growth on the DTE "revenue accrual" component.	The comparison of high growth companies to companies with lower growth rates could distort the significance of the regression results when comparing EM0 and EM1 firms (Phillips et al., 2003).	Robustness test to validate outcome of Hypothesis 2, i.e. to test that accruals identified as being associated with EM are not in fact arising as a result of comparing higher growth companies to companies with lower growth rates.	Logistic regression performed on significant DTE – revenue accruals component, in the presence of control variable for growth (average growth in revenue and average growth in total assets).
5.1.3	Cash flow components – The effect of profit vs loss characteristics on changes in accounts receivable, changes in inventory and depreciation accruals.	Profit and loss companies often possess dissimilar financial characteristics (Beaver et al. (2007), Jordan and Clark (2011); Ferrando and Mulier (2013)). These dissimilarities could distort the significance of the regression results when comparing EM0 and EM1 firms.	Robustness test to validate outcome of Hypothesis 3, i.e. to test that accruals identified as being associated with EM are not in fact arising as a result of dissimilar financial characteristic between profit and loss firms.	Logistic regressions performed on significant CF components deflated by their "drivers" (distinctive financial characteristics).

Chapter	Heading	Theory	Hypotheses tested	Method
8: Appendix A				
8.1.3	EM firms identified using the discontinuity in earnings distributions.	Prospect and transaction cost theory suggest that preparers will use earnings management to avoid reporting losses thereby changing small losses to small profits which will cause a discontinuity in earnings distributions.	Sample provided by Rabin and Negash (2012).	Rabin and Negash (2012) based their work on that of Lahr (2014) who used KDE to explore discontinuities in earnings distributions.
Assumptions and Limitations	1. A limitation of using earnings distributions to obtain a sample of suspected EM firms is that the EM1 interval includes legitimate profit-making firms which have distinctive financial characteristics to the non-EM firms (loss-making entities). 2. The earnings deflator used could, in itself, introduce discontinuities in the earnings distribution (Durtschi and Easton, 2005) .			

The remainder of this dissertation is organized as follows. Chapter 2 reviews previous literature on this topic. Chapter 3 describes the methodology used. Chapter 4 presents the results of the primary tests. Chapter 5 discusses the methodology and results of the supplementary tests and chapter 6 concludes.

2. LITERATURE REVIEW

This chapter commences with a broad overview of earnings management in order to provide a context and background for this study. Firstly, earnings management is defined. Subsequently, the motivations for and consequences of EM and the types of EM activities are discussed. Thereafter, the focus of the chapter narrows as accrual-based earnings management is reviewed, followed by a discussion on the methodologies used to identify the sample of EM firms and the specific accruals used in this study.

In a survey performed on over 400 US senior financial executives, (Graham et al., 2005) found that nearly two-thirds of the respondents ranked earnings (and more specifically earnings per share) as the most important metric used by stakeholders to assess the performance of a company. Although several other key metrics for the measurement of financial performance may be available, for example revenue or cash flow from operations (Graham et al., 2005) argued that investors require a simple metric that not only summarizes corporate performance but is also easy to understand, and is, to an extent, comparable across companies and industries. Further, analysts tend to focus on a single number when predicting future value and their success is often evaluated by how well they were able to predict reported earnings per share (EPS). Finally, the EPS metric is the single, most widely covered metric by the media.

The dependence of stakeholders and employers on this fundamental metric creates an inadvertent incentive for managers to manage earnings for the purpose of meeting stakeholder/employer expectations. Healy and Wahlen (1999:368) stated that "earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers".

2.1. Definition of earnings management

An alternative, and perhaps more complete definition of earnings management is that of Wróblewski et al. (2014:137) who define earnings management (EM) as "*a purposeful intervention in external financial reporting designed to reach earnings targets, by varying accounting practices. However, it is an action which takes place without necessarily violating accounting regulations, and which takes advantage of the possibilities of choice in accounting*

policy. The action may mislead stakeholders, causing them to make decisions on the basis of financial reports that they would not have made otherwise."

2.2. Motivation for earnings management

Literature presents two opposing views when describing the underlying motivation for earnings management. On the one hand, earnings management is described as being the result of opportunistic behaviour, i.e. with the intent to mislead. In this instance, management would select accounting policies according to their own self-interests, with the objective of increasing personal wealth (reflecting the agency problem) (Schipper, 1989; Healy and Wahlen, 1999). In other words, managers would take advantage of the information asymmetry that exists between themselves and stakeholders to increase their personal benefits.

The alternative interpretation of the motivation for earnings management is that management view such activity as a necessary tool for efficiently communicating the true representation of a firm's performance and firm value: i.e. the efficiency perspective (Subramanyam, 1996). Managers may, for example, use their discretion in accruals to "communicate private information about the firm's profitability, which is yet to be reflected in the historical cost-based earnings" (Subramanyam, 1996:251). This information should help stakeholders form and predict more accurate expectations regarding the firm's future performance. Subramanyam (1996) found evidence that discretionary accruals helps to predict future cash flows which suggests that such accruals do indeed add informational content to earnings. Furthermore, Linck (2013) found that firms manage earnings through discretionary accruals to credibly signal positive investment opportunities to the market in an attempt to reduce financing constraints.

Examples of incentives for earnings management

Earnings could be managed upwards or downwards. Attempts of opportunistic upward EM could be motivated by the need to meet analysts' estimates, influence stock prices, reach targets set by compensation contracts or debt covenants (Watts and Zimmerman, 1978) or avoid reputational damage (Graham et al., 2005). In a survey of top US executives, Graham et al. (2005) documented that most executives believe that the main reason to meet or beat earnings benchmarks relates to stock prices. Over 80% of respondents believed that meeting benchmarks builds credibility with the capital market and helps maintain or increase the company's stock price. Another prominent reason for managing earnings is the concern that chief financial officers (CFOs) have about their own reputation in the market. Graham et al. (2005) reported that

many CFOs believe that an inability to reach an earnings target is seen by the executive labour market as a "managerial failure."

This study focuses on firms that manage earnings upward in order to avoid reporting losses. Graham et al. (2005) reported that the failure to meet earnings benchmarks (for example to exceed zero profits) is believed to increase uncertainty about the company's future prospects. It also creates a perception in the market that the company is facing “deep, previously unknown problems” (Graham et al., 2005:30). The increased uncertainty and fear arising from the firm not reaching an earnings benchmark leads to an over-reaction by market participants, with a consequential sudden decrease in the share price (Skinner and Sloan, 2002; Graham et al., 2005).

Incentives for opportunistic downward EM would include the reduction of stock prices prior to the granting of stock options to employees (Baker, Collins and Reitenga, 2003; Coles, Hertzel and Kalpathy, 2006; McAnally, Srivastava and Weaver, 2008) or prior to a company share-repurchase on the open market (DeAngelo, 1986; Gong, Louis and Sun, 2008).
Other reasons to lower earnings would be to create “cookie jar” reserves when unmanaged current earnings exceed the required targets (Healy, 1985; Levitt, 1998; Badertscher, Phillips, Pincus and Rego, 2009). The eventual release of such reserves into profit or loss would make it easier for opportunistic companies to meet earnings thresholds in the future. At times, loss-making companies choose to manage earnings even further downwards and thereby exacerbate their losses (big-bath effect). Although this behaviour appears to be paradoxical, it is an attempt to improve the prospect of reporting positive growth in future periods by charging as much as possible into profit or loss during the reporting period.

The alternative interpretation for the different behaviours mentioned above is that they are, in fact, not opportunistic, but rather the means by which managers are able to increase the information content of earnings, particularly where earnings are viewed as a tool in which to predict future cash flows (Subramanyam, 1996).

2.3. Consequences of earnings management

Earnings management is often the result of a short-term goal of management (for example to increase/decrease share prices) that may not always be in the best interest of the entity or its shareholders. As such, EM could lead to significant long-term losses for stakeholders, where both

company and shareholder value is diminished. As an example, a purposeful delay of discretionary expenses such as research and development or employee training could result in a loss of market share or reduced productivity respectively (Clikeman, 2003; Graham et al., 2005; Gunny, 2005). Furthermore, Dechow, Sloan and Sweeney (1996) reported that firms that managed earnings experienced significant increases in their costs of capital when the manipulation was made public.

Notwithstanding the fact that companies found to manage earnings may incur costly penalties and be required to restate financial statements, a second consequence of earnings management is the effect it has on resource allocation – both internally and externally. Bergstresser, Desai and Rauh (2006) found that the opportunistic management of the long-term rate of return in pension assets not only affected the earnings of the company but also influenced the allocation of resources (by the company) to the pension plan. McNichols and Stubben (2008) found that manipulating firms reported a substantial "over-investment" in fixed assets. This could be because management is either "over-optimistic or unaware of the misstatement that increased the levels of earnings – and invest accordingly" (McNichols and Stubben, 2008:1572). Healy and Wahlen (1999) documented some of the effects that earnings management has on *external* resource allocation. New equity issues, for example, could be overpriced due to earnings management prior to the issue; stock prices could plummet upon allegations of earnings management and banks could extend financing to firms based on their managed earnings performance.

Lastly, top management involved in EM could be the root of eroding ethical standards within the organisation as a whole. Management that "bend the rules" send a message to employees that "this kind of behaviour is acceptable" and thereby create a climate for other indiscretions (including fraud) to occur (Clikeman, 2003). Clikeman (2003:77) describes earnings management as a "slippery slope, with relatively minor accounting gimmicks becoming more and more aggressive until they create material misstatements in the financial statements."

2.4. Types of EM activities

In their definition of earnings management (as stated above), Wróblewski et al. (2014:137) propose that earnings management is "a purposeful intervention in external financial reporting to reach earnings targets, by varying the accounting practices". Broadly, there are three ways in which the accounting practices could be varied in order to reach specified earnings per share targets: through real activities management (real EM) (Graham et al., 2005; Gunny, 2005; Roychowdhury, 2006); through the use of discretionary accruals (Dechow et al., 1995) and

through the repurchase of shares (Bens, Nagar, Skinner and Wong, 2003; Hribar, Jenkins and Johnson, 2006; Myers, Myers and Skinner, 2007).

The research at hand focuses specifically on "accrual-based" earnings management. Consequently, the management of earnings through the manipulation of real activities or through the repurchase of shares is not within the scope of this study. It is however important to discuss these other methods of EM briefly, in order to provide a context for accrual-based EM and to impart a greater understanding of the practices that a single company could take to manage earnings.

2.4.1. Real earnings management

"Real earnings management occurs when managers undertake actions that deviate from best practice in order to increase reported earnings" (Gunny, 2005:1). Roychowdhury (2006:3) defines real earnings management as "departures from normal operational practices, motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations." An example of real EM activities would be to implement a special discount to boost sales near the end of a year. Other examples would include selling non-current assets at a profit when such a sale is untimely or, more commonly, curtailing the activities of the research and development division in order to reduce reported expenses (Graham et al., 2005; Gunny, 2005; Roychowdhury, 2006).

Real EM is normally costly to the firm in the long term as management sacrifice future cash flows for current profits (Gunny, 2005). Ball and Shivakumar (2006) state that managers willingly engage in costly real EM activities as such actions are more inconspicuous, making them harder to detect within the business environment.

2.4.2. Share-repurchases

Previous research has found evidence suggesting that firms use share repurchases to increase earnings per share (EPS) in order to avoid missing analysts' EPS estimates, to meet certain EPS growth targets, or to avoid an EPS decrease, respectively (Bens et al., 2003; Hribar et al., 2006; Myers et al., 2007).

Both share-repurchases and real earnings management, as previously mentioned, are costly. In the presence of debt-financing constraints, Farrell, Unlu and Yu (2014) observed that firms appear to increase the use of accruals based earnings management and reduce the use of the other earnings management techniques. Furthermore, Ferrando and Mulier (2013) investigated the link between the financial characteristics of a firm and its financing constraints and found that companies with increased profitability measures[21] have reduced financing constraints. In other words, loss making-firms would normally have greater debt-financing constraints compared to profit-making firms and as such would have an increased incentive to use accrual based EM as opposed to real EM or share repurchases to boost earnings per share.

2.4.3. Accrual-based earnings management

Accrual-based EM is often used by management to "obscure" true economic performance or "smooth" away volatility in financial statements. As the accrual basis of accounting is an underlying assumption in the preparation of financial statements (as per the conceptual framework for financial reporting issued by the International Accounting Standards Board), not all accruals are illegitimate. However, measurement and recognition principles in the accounting standards are sometimes subjective, encouraging discretion and judgement on the part of the preparers of financial statements. Consequently, these standards may offer management the means to modify the true earnings of a firm through the use of discretionary accruals (Healy, 1985). The total accruals of a firm are therefore likely to comprise both legitimate (non-discretionary) accruals and discretionary accruals.

2.5. Identifying EM or suspected EM firms

Broadly speaking, there are two methods, documented in literature, of identifying a sample of EM firms, these being: 1) the use of databases of companies accused of misconduct and 2) the identification of a discontinuity in the empirical distribution curve.

Much of the EM research performed to date has been based on databases of US companies that have been subject to enforcement actions by the Securities and Exchange Commission (SEC) for

[21] This study was based on a survey on the access to finance of SMEs for a sample of more than 10 000 firms in the euro area. The financial data of the firms was obtained off the Bureau van Dijk Amadeus database. The researchers investigated which financial characteristics were correlated with financial constraints. They regressed the financials constraint variable to a set of financial characteristics (profitability, leverage and liquidity) and found that profitability was important in explaining access to external finance. Profitability measures regressed included profit margins and return on equity.

allegedly manipulating their financial statements (Feroz, Park and Pastena, 1991; Bayley and Taylor, 2007; Dechow et al., 2011). Alternative sources of information, such as databases of restated annual financial statements have also been used (Richardson, Tuna and Wu, 2002; Donelson et al., 2013) where restated firms are assumed to be a proxy for earnings management firms. The criticism of using data from these sources is that these are likely to be a biased selection of companies. Only the more aggressive manipulators (and possibly fraudulent companies) receiving an enforcement action from the SEC or required to restate their financial information are included in these databases (Dechow et al., 2011). Results from the use of these databases may therefore not be entirely representative of the practices used for *"within GAAP"*[22] earnings management.

A second limitation of using databases of firms required to restate financial information or of firms identified as earnings manipulators, is that such databases may not be readily available in all countries, particularly in emerging markets where the monitoring of company activity is not as extensive, established, or stringent as the SEC. Extensive databases of manipulating firms do not exist in South Africa.

The use of earnings distribution curves to detect the location of EM firms is therefore the only method available for identifying a sample of EM firms in South Africa and has consequently been the method used in this study.

The observation of earnings management using earnings distribution curves is based on the underlying assumption that earnings are manipulated for the purpose of meeting or beating specified earnings thresholds. The immediate section that follows (2.5.1) will establish the theoretical basis for using distribution curves in the detection of earnings management. This is followed by a review of previous use of distribution curves, documenting both the shortfalls and evolution of such curves.

[22] Management of earnings within the legal confines of the International Financial Reporting Standards, through the discretion allowed in these standards.

2.5.1. Theoretical basis for using distribution curves: earnings management to meet or beat thresholds

An important question to ask is, "at what level of profitability would management be more likely to manipulate the reported earnings?" In other words, does EM occur randomly or do managers only manage earnings for specified reasons (for example to meet or beat certain thresholds or to smooth income)?

Much of the research in EM particularly that using earnings distribution curves as a means of detecting earnings management is founded on the premise that stakeholders rely on simple heuristics when transacting with the firm (Kahneman and Tversky, 1979; Burgstahler and Dichev, 1997; Degeorge et al., 1999).

The prospect theory postulates an aversion to absolute and relative losses (Kahneman and Tversky, 1979). This theory was substantiated by Skinner and Sloan (2002) who found that the stock markets react strongly and asymmetrically to negative earnings surprises. Furthermore, Bartov, Givoly and Hayn (2002) found that firms that meet or beat current analysts' earnings expectations benefit from higher returns. These findings substantiate the proposal that management are incentivised to meet or beat certain thresholds rather than achieving arbitrary, absolute levels of wealth (Burgstahler and Dichev, 1997; Degeorge et al., 1999).

The argument for "meeting or beating earnings thresholds" is strengthened through the transaction cost theory which explains that transaction costs of processing information are high and some stakeholders are inadequately prepared to interpret the financial information presented which is based on international financial reporting standards (Burgstahler and Dichev, 1997; Degeorge et al., 1999). As a result of these high costs, stakeholders are more likely to determine the terms of their transactions with the firms based on heuristic cut-offs at zero levels or zero changes in earnings instead of attempting to decode the information presented in financial reports. Examples include situations where banks grant loans only to companies that report positive earnings, analysts' recommendations are dependent on achieving certain earnings targets and executives are compensated for meeting designated benchmarks (Degeorge et al., 1999).

Degeorge et al. (1999) found evidence that earnings management activity was more pronounced around three thresholds, these being: avoiding reporting a loss, reporting a growth in profits and meeting the analysts' consensus forecasts. Degeorge et al. (1999) also reported that, in terms of hierarchy, exceeding the threshold of zero earnings (i.e. reporting profits) was of paramount

importance, followed by reporting growth in earnings and lastly meeting analysts' forecasts. This study is focussed on the detection of accrual-based, upward earnings management to avoid a loss (i.e. to exceed the threshold of zero earnings).

EM to meet or beat specified thresholds is, however, not restricted to income-increasing behaviour. Degeorge et al. (1999) found that managers appear to systematically manipulate reported earnings downwards when pre-managed earnings exceed threshold earnings by a substantial amount. This is particularly true where employees are required to meet certain compensation targets, but exceeding this target would not increase their level of compensation.

2.5.2. Previous use of frequency earnings distribution curves

Hayn (1995) and Burgstahler and Dichev (1997), identified earnings management firms by analysing the distribution of reported earnings for a discontinuity at zero. Burgstahler and Dichev (1997) identified EM firms by exploring the frequency distribution of earnings levels and changes deflated by the market value of equity. They compared this frequency distribution, around the zero mark, to a normal and smooth distribution of no earnings management[23] (mean 0 and standard deviation of 1). The histograms showed that the frequency of small losses and small earnings decreases were abnormally low in the interval just below zero, while the frequencies of small positive earnings and small earnings increases were abnormally high in the interval just above zero. Burgstahler and Dichev (1997) concluded that the discontinuity at zero, in the distribution curve, was evidence of earnings management. In other words, loss-making companies manipulate profits upwards to avoid a loss and thereby show a small profit and companies with negative growth in earnings, manipulate earnings upwards to avoid reporting a decline in earnings.

Although promising, the methodology proposed by Burgstahler and Dichev (1997) to detect EM firms has been criticised by several researchers (Durtschi and Easton, 2005; Beaver et al., 2007; Lahr, 2014). The main critique revolves around the misclassification of firms as a result of the possibility of misidentifying a discontinuity between the empirical and the reference distributions.

[23]In order to identify the location of the discontinuity in the empirical distribution, Burgstahler and Dichev (1997) performed a statistical test of significance across the empirical and reference distributions where they compared the actual and expected number of observations around zero, divided by the estimated standard deviation of the difference.

Some of the reasons for the potential misclassification of EM firms are listed below. These are discussed, by author, to a greater extent thereafter.

1. Only the discontinuity around zero is explored (Lahr, 2014) as the empirical distribution (i.e. other than the area around zero) is presumed to be smooth
2. The empirical distribution is compared to a reference distribution which is presumed to be locally linear around the vicinity of zero (Lahr, 2014).
3. The selection of the bandwidth is arbitrary and at the discretion of the researcher (Bollen and Pool, 2009). An incorrect bandwidth could cause the appearance of a discontinuity where none exists.
4. The deflator (market value of equity at the beginning of the year) of the earnings measure used could itself cause the discontinuity (Durtschi and Easton, 2005)
5. Components of earnings that are naturally asymmetric between profit vs loss companies such as tax expense could exacerbate the discontinuity at zero (Beaver et al., 2007).

2.5.3. Key critiques of Lahr (2014)

Constructing the reference distribution

The reference curve constructed by Burgstahler and Dichev (1997) was based on the assumption, under the null hypothesis of no earnings management, that the cross-sectional distributions of earnings and earnings changes are smooth[24]. This therefore infers that a kink observed in the empirical distribution (i.e. significant differences in the frequency of earnings immediately above and below zero) is evidence of earnings management.

In a later study of earnings management in hedge funds, Bollen and Pool (2009), suggested the use of a kernel density estimation of the empirical data in order to construct a reference distribution. This non-parametric method is a commonly used approach where a continuous density function is required and it is certainly more robust than assuming a locally linear density in the distribution of earnings (Lahr, 2014). Bollen and Pool (2009) used a Gaussian kernel in their density estimation of the empirical data. By taking all sample observations into account, a Gaussian kernel can however, result in highly inflated test statistics due to the effect (or "pull") that outlier observations have on the reference distribution (Lahr, 2014).

[24] The definition of smoothness used by Burgstahler and Dichev (1997) is that the expected number of observations in a given interval of the distribution is the average of observations in the two immediately adjacent intervals (in other words, a locally linear density function). The assumption of smoothness was an arbitrary one and was not based on any underlying theory.

Lahr (2014) suggested an improvement on the methodology of Bollen and Pool (2009) by using the Epanechnikov kernel as opposed to the Gaussian kernel when constructing a reference distribution. The Epanechnikov kernel excludes extreme outlier observations that could potentially and erroneously affect the shape of the distribution.

Interval bands

Bollen and Pool (2009) argued that the bin width or interval width of the distribution is the most important parameter that determines the statistical properties of a histogram. If a bin width is too small, a histogram can feature discontinuities where none exist and if it is too large, discontinuities in the underlying distribution may become concealed (Bollen and Pool, 2009). The choice of interval width can therefore significantly affect the number of suspected EM firms identified and consequently, the results and conclusions of any study that depends on distribution curves to identify such earnings management firms (Glaum, Lichtblau and Lindemann, 2004). Burgstahler and Dichev (1997) used, what appears to be an "arbitrary" interval width of 0.005 for scaled earnings levels, ranging from -0.25 to +0.35 and an interval width of 0.0025 for scaled changes in earnings ranging from -0.15 and +0.15. They however did not provide an explanation for the histogram width used in their research.

Bollen and Pool (2009), on the other hand, used Silverman's (1986) rule of thumb for determining the bandwidth which is theoretically optimal for normally distributed data. Silverman's (1986) rule of thumb, however, is not universally suited for data with different or non-parametric distribution properties (Lahr, 2014). Lahr (2014) observed that standardized earnings are more than often not normally distributed, but are instead moderately skewed with excess kurtosis. This observation is consistent with the shape of the distribution of deflated earnings in South African listed companies.[25]

In addition to this, Lahr (2014) did not presume a bandwidth, but instead identified the optimal interval width needed for the kernel density estimation from a bootstrapping test. More specifically, Lahr (2014) employed two tests for determining the bandwidth and the reference curve (KDE), as follows: 1) a Kolmogorov-Smirnov test was broadly used to detect any differences between the integrated kernel density estimate (IKDE) and the empirical cumulative distribution function (ECDF) and 2) confidence bands were constructed for the kernel density estimate that agree with the empirical distribution. The confidence bands were obtained by bootstrapping from the original sample. The bootstrap errors for the difference between the ECDF

[25] South African earnings data is skewed, exhibiting excess kurtosis (Rabin and Negash, 2012)

and the IKDE were reiteratively fine-tuned by adjusting the kernel bandwidth, to yield a kernel density estimate that agrees with the data at a precise confidence level. Lahr (2014) thereby succeeded in constructing a density estimate that could not be distinguished globally from the empirical data. After establishing the reference distribution Lahr (2014) conducted a statistical test of significance (using a simple z-test or t-test) at the point of maximum difference between the ECDF and the IKDE in order to identify the location of a discontinuity.

Remaining empirical distribution is smooth

Finally, certain EM firms may go undetected when using the methodology of Burgstahler and Dichev (1997) because the assumption that the remaining empirical distribution (other than the area around zero) is smooth precluded them from observing potentially other discontinuities along the distribution (Lahr, 2014). Holland and Ramsay (2003) and Coulton, Taylor and Taylor (2005) found that the distribution of earnings for Australian firms was not smooth, as assumed by Burgstahler and Dichev (1997), but significantly skewed. This observation has been echoed by Rabin and Negash (2012) when examining the earnings distribution of South African listed companies.

In summary, the strength of Lahr's (2014) work lies in the fact that he was able to identify the exact location of discontinuities in the earnings distribution, offered a procedure to test for the existence of a local discontinuity and reduced the researcher's degrees of freedom when selecting bin widths.

Rabin and Negash (2012) found that the methodology used by Burgstahler and Dichev (1997) was not a suitable method for analysing the distribution of earnings for South Africa listed companies as it identified more than the expected number of observations in the interval to the right of zero, but did not identify significantly fewer than the expected number of observations to the left of zero. Following previous research on earnings management in South Africa by Rabin and Negash (2012), this study has also adopted the approach described by Lahr (2014) to identify the location of suspected EM firms in South African listed companies.

2.5.4. Key critiques raised by Durtschi and Easton (2005), Durtschi and Easton (2009) and Beaver, McNichols and Nelson (2007)

The research done by Burgstahler and Dichev (1997) implicitly assumes that deflation (by market value of equity) does not distort the underlying distribution of net income. Degeorge et al. (1999)

recognised that deflation of earnings by any deflator that differs in magnitude between profit and loss firms could lead to a spurious build-up of observations in the distribution around zero. This was further investigated by Durtschi and Easton (2005), who suggested that the discontinuity in earnings levels and changes reported by Burgstahler and Dichev (1997) is due to the fact that investors value small profit firms differently from small loss firms. More specifically, loss-making firms have significantly lower share prices than do profit-making firms. Consequently, when scaling income by this market value, loss-making firms will naturally be pulled further away from zero and profit-making firms will converge toward zero. This will result in the appearance of fewer loss firms immediately to the left of zero and a greater concentration of firms immediately to the right of zero. Durtschi and Easton (2009) expanded their work by comparing the means and medians of other potential deflators (including total assets) across profit and loss intervals of the same size on the earnings distribution curve and found them to be statistically different between these two groups. Accordingly, they concluded that if the deflator differs systematically between profit and loss firms the empirical distribution will be distorted - again contributing to the discontinuity of the frequency distribution around zero. The only deflator that did not differ systematically between profit and loss observations[26] was "number of shares outstanding" (as used in the determination of earnings per share). Durtschi and Easton (2005) could therefore find no evidence that this deflator affected the shape of the earnings distribution.

Furthermore, Durtschi and Easton (2005) noted that the problem is exacerbated when using a lagged deflator (for example the price at the beginning of the year). In these circumstances, the sample size may be reduced, as prior period information is not always available. In fact, Durtschi and Easton (2005) found that where a greater proportion of loss observations (compared with the proportion of profit observations) are deleted from the sample for this reason – sample selection bias can occur and affect the discontinuity observed at zero.

Beaver et al. (2007) opposed the view held by Durtschi and Easton (2005) which purported that deflation by the market value of shares could cause a distortion in the distribution. In contrast to Durtschi and Easton (2005), they showed that scaling by the lagged market value of shares did not distort the distribution and in fact the distribution was distorted when using number of shares as a deflator. They observed that the market value of equity was relatively symmetrical around zero,

[26] In contrast to Durtschi and Easton (2005) who found no evidence of a systematic difference in number of shares between profit and loss firms, Durtschi and Easton (2009) found that the means and medians of common shares (as used in the calculation of basic earnings per share) differed significantly across various intervals of net income in profit vs loss firms.

whereas the number of shares outstanding was systematically higher for loss firms than for profit firms[27], creating a pull in loss observations towards zero and reducing the discontinuity in the share deflated distribution of earnings.

In their comparison of the empirical distribution to the reference distribution, Durtschi and Easton (2005) assumed that the reference distribution should be flat around zero. In contrast, Beaver et al. (2007) assumed the reference distribution to be smooth around zero (calculated using a similar standardised methodology to that of Burgstahler and Dichev (1997)). The difference in the methodology used by Durtschi and Easton (2005) and Beaver et al. (2007) makes it difficult to compare the two arguments.

In summary, both Durtschi and Easton (2005) and Beaver et al. (2007) caution researchers against interpreting a kink in the distribution of earnings as *ipso facto* evidence of earnings management. Durtschi and Easton (2009) advises future researchers to examine the mean and median of possible deflators between loss and profit firms to determine whether scaling variables will contribute to the discontinuity in the frequency distribution of earnings.
As a response to the concerns of Durtschi and Easton (2005) and Durtschi and Easton (2009), the earnings distribution curve used in this study to identify the location of earnings management, was generated using earnings (i.e. net income after tax) scaled by the number of ordinary shares in issue at year end.

2.5.5. Asymmetric effects of components of earnings on distribution of earnings

Beaver et al. (2007) explored the effect that taxes have in the distribution of earnings. Their investigation uncovered significant asymmetry in the tax expense between profit and loss companies. The mean and median effective tax rates in the region immediately around zero were vastly different; firms with a pre-tax loss had significantly lower effective tax rates, on average, than firms with a pre-tax profit. The consequence of this asymmetry is that after tax is deducted, pre-tax profit making firms are pulled towards zero in the earnings distribution as larger tax expenses have the effect of reducing net earnings.

[27]Beaver et al. (2007) examine the behaviour of the number of shares outstanding across the entire distribution of undeflated net income partitioned into interval widths of $100 000. They observe that the number of shares outstanding is systematically higher for loss firms than for profit firms (Durtschi and Easton, 2009).

The findings of Beaver et al. (2007) are intuitive. Taxation on profits is normally accrued for immediately (either as current tax or deferred tax expense). However, companies reporting negative earnings, often also have tax losses (assessed losses). Tax benefits arising on these losses (in the form of future tax deductions) can only be recognised as a deferred tax asset, to the extent of taxable temporary differences unless it is probable that future taxable profit will be available against which the unused tax credits can be deducted (IAS 12 para 34). It therefore seems likely that loss companies that do not foresee immediate profits delay the recognition of the tax benefit relating to the tax loss. In essence, this asymmetric treatment of tax in profit vs loss companies will result in higher effective tax rates being reported in profit companies than in loss companies, as confirmed by Beaver et al. (2007). Beaver et al. (2007) reported that there is little evidence to suggest that firms manage tax expense to avoid reporting losses. Instead, the evidence is most consistent with an asymmetric tax effect for profit and loss firms driving a large portion of the discontinuity in the distribution of earnings.

In this study, the deferred tax on the recognition of tax losses was examined in order to assess whether suspected EM firms (i.e. loss firms in the EM1 band, suspected of managing earnings upwards) manage earnings upwards by recognising deferred tax assets on tax losses (i.e. increase profits by reducing the deferred tax expense).

Despite the various critiques of using earnings distribution curves to detect EM, Donelson et al. (2013) provide direct evidence linking earnings management to earnings discontinuities for a sample of firms that had to settle lawsuits and restate earnings (i.e. a sample where EM was detected *ex post*). Donelson et al. (2013) analyzed the impact of earnings management on the distribution of earnings[28], by plotting the same sample of firms using both restated "unmanaged" and originally reported "managed" earnings. Issues raised by Durtschi and Easton (2005) and Beaver et al. (2007) relating to deflation, sample selection bias or the asymmetric effects of accounting items were therefore not applicable in this study as EM firms were in essence being compared to themselves (i.e. empirical distribution of managed earnings compared to a reference distribution of unmanaged earnings of the same firms). Donelson et al. (2013) concluded that even though it is possible that other factors could contribute to the discontinuity at zero "actual

[28]Donelson et al. (2013): For earnings levels, income before extraordinary items was scaled by the market value of equity at the end of the quarter, and observations were assigned 0.005 interval width. For earnings changes, income before extraordinary items was scaled by the market value of equity at the end of the quarter, and observations were assigned 0.0025 interval width.

instances of earnings management do also create sizable discontinuities in earnings distributions".[29]

2.6. Detecting accrual-based earnings management

Once a sample of EM firms has been obtained, researchers have traditionally used a technique to validate or confirm the firms' status as an EM firm. The most common techniques used entail:

1. the estimation of discretionary accruals through the use of discretionary accrual models (Healy, 1985; McNichols and Wilson, 1988; Jones, 1991; Dechow et al., 1995; Beaver et al., 2007)
2. the analysis of financial ratios and indices for unusual/abnormal movements (Beneish, 1999; Bayley and Taylor, 2007; Dechow et al., 2011; Jansen et al., 2012).

A review of these techniques is discussed in the section that follows (2.6.1).

2.6.1. The use of discretionary accrual models to detect EM

Discretionary accruals are those accruals that arise from the manipulation of earnings. As discretionary accruals cannot be directly observed and its measurement is impossible, researchers have proposed several models to estimate discretionary accruals.

Healy (1985) and DeAngelo (1986) proposed looking at total accruals as broad estimators of discretionary accruals. Jones (1991) attempted to split total accruals into two elements, viz. discretionary and non-discretionary accruals (Jones Model). Dechow et al. (1995) enhanced Jones' model by developing the modified Jones model, hereafter MJ model. Subsequently, there have been several attempts at improving the MJ model (Peasnell, Pope and Young, 2000; Kothari, Leone and Wasley, 2005; Ball and Shivakumar, 2006) however, broadly speaking, the MJ model has retained its prominence as a reference model in literature (Bayley and Taylor, 2007). The Jones and MJ models are discussed below.

[29] Donelson et al. (2013) acknowledged that their study is based on a unique set of firms accused of extreme EM and cannot necessarily be extrapolated to broad samples of data.

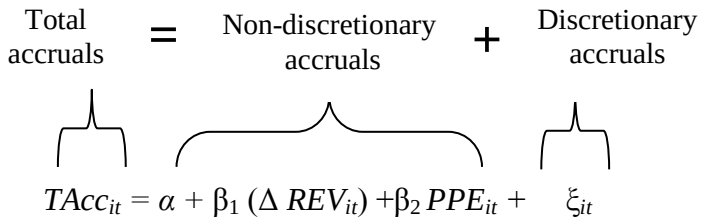
The Jones and Modified Jones models

Jones (1991) proposed a model that attempted to control for the effects of changes in a firm's economic circumstances on non-discretionary accruals. As total accruals is the sum of discretionary and non-discretionary accruals, Jones (1991) suggested that if non-discretionary accruals could be estimated, then the discretionary component could be determined.

In the Jones Model, the estimation of the non-discretionary accruals included the calculation of changes in revenues (ΔREV) and gross property, plant and equipment (PPE).

Jones (1991) regressed total accruals on proxies for the non-discretionary component using the series of data immediately prior to the event period *t.* Thereafter, the firm-specific parameter estimates of α, β_1 and β_2 from this regression (reflecting the proportion of accruals that are non-discretionary) were combined with data from the event year *t* to generate estimated discretionary accruals.

The Jones Model for non-discretionary accruals in the event year is calculated as follows:



Where:

$TAcc_{it}$	total accruals for firm i in period t; defined as: firm i's income per the income statement in year t; minus firm i's cash flows from operations in year t;
ΔREV_{it}	change in firm i's revenue from period t-1 to t;
PPE_{it}	gross property, plant and equipment for firm i in period t;
ξ_{it}	error term or residual which represents the discretionary portion of total accruals

The ΔREV and gross PPE terms were designed to control for the non-discretionary component of total accruals associated with changes in operating activity and level of depreciation. Total accruals includes changes in working capital accounts, such as accounts receivable, accounts payable and inventory that depend to some extent on changes in revenue.

In the Jones Model, revenues are used to control for the economic environment of the firm because they are an objective measure of the firms' operations before nominal accrual-type

earnings management and gross property, plant and equipment are included to control for the portion of total accruals related to non-discretionary depreciation expense.

Discretionary accruals can therefore be estimated using the following regression:

Discretionary accruals = Total accruals - Non-discretionary accruals

$$DAcc_{it} = Tacc_{it} - [\alpha + \beta_1 (\Delta REV_{it}) + \beta_2 PPE_{it}]$$

Where $DAcc_{it}$ is the estimated discretionary accruals in firm *i* in period *t.*

The Jones model implicitly assumes that discretion is not exercised over revenue in either the estimation period or the event period. Consequently, the Jones model was modified by Dechow et al. (1995), by incorporating the changes in credit sales (ΔREC) to the standard Jones model in the event period. In other words, revenue was reduced by changes in credit sales. This adjustment is based on the assumption that outstanding credit sales are all discretionary in nature.

Discretionary accruals for the MJ model are estimated as follows:

Discretionary accruals = Total accruals - Non-discretionary accruals

$$DAcc_{it} = Tacc_{it} - [\alpha + \beta_1 (\Delta REV_{it} - \Delta REC_{it}) + \beta_2 PPE_{it}]$$

where ΔREC_{it} represents the change in accounts receivable from period *t-1* to *t.* All other variables are as previously defined.

Dechow et al. (1995) evaluated several accrual based models (including basic models developed by Healy (1985) and DeAngelo (1986), the Jones and the MJ models for detecting earnings management and concluded that all the methods reviewed were reasonably well specified among random samples (i.e. low type I error[30]), but that they lacked power to detect earnings

[30]Type I error: under the null hypothesis of no earnings management, type I error arise when the null hypothesis is rejected when it is true, i.e. it is the risk of identifying EM when none exists. Type II error: under the null hypothesis of no earnings management, type II error arise when the null hypothesis is rejected when it is false, i.e. it is the risk of not identifying EM when it does exist.

management of plausible magnitudes (i.e. high type II error). Nevertheless, Dechow et al. (1995) found that the MJ model exhibited the most power in detecting earnings management.

Guay, Kothari and Watts (1996) and Young (1999) evaluated the specification and power of test statistics across the discretionary accruals models and also concluded that none of the accrual models examined generated a reliable measure of the discretionary component of total accruals.

Bayley and Taylor (2007:4) contend that "in practice, investors, regulators and auditors are likely to be far more concerned with the power of methods to detect earnings management than they are with wrongly concluding that some firms have engaged in earnings management. In effect, the practical cost of a type II error is often far higher than a type I error of similar magnitude".

Despite the concerns of using discretionary accrual models, the use thereof in EM research remains common practice. Bayley and Taylor (2007) and Dechow et al. (2011) have both expressed the necessity for future EM research to move away from discretionary accrual models and instead to focus on insights from financial statement analysis.

2.6.2. Deferred tax used as a proxy for discretionary accruals

As the various abnormal accrual models estimate discretionary accruals with error (Dechow et al., 1995; Guay et al., 1996 ; Young, 1999; Bayley and Taylor, 2007), Phillips et al. (2003) proposed that deferred tax expense (DTE) be used as a proxy for discretionary accruals. The principle advantage of using DTE as opposed to discretionary accrual models is that DTE is an observed figure as opposed to a calculated one. Theoretically, it should therefore be subject to less measurement error.

The use of DTE as a proxy for discretionary accruals is based on the premise that managers prefer to overstate earnings without having a consequential effect on taxable income (Phillips et al., 2003; Badertscher et al., 2006; Ettredge et al., 2008). The difference between the accounting earnings figure and taxable income (representing the "book-tax difference" or "temporary difference" as described in terms of IAS 12: *Income taxes*) should therefore contain many, if not

most of the tax consequences of the discretionary accruals[31]. Book-tax differences have been extensively shown to be indicators of earnings management (Mills and Newberry, 2001; McAnally et al., 2008). As DTE is the deferred tax effect on such book-tax differences, it is likely also to include the deferred tax effect of discretionary accruals.

Using the methodology of Burgstahler and Dichev (1997) to obtain a sample of suspected EM firms, Phillips et al. (2003) found that DTE was incrementally useful at detecting such EM firms beyond two abnormal accrual measures - forward-looking Jones Model as described by Dechow and Dichev (2002) and MJ model as described by Dechow et al. (1995), and total accruals in detecting earnings management to avoid a loss. Rabin and Negash (2012)[32] however, found that for South African companies listed on the Johannesburg Stock exchange, the discretionary accruals calculated using the MJ model were incrementally useful beyond DTE at detecting earnings management to avoid an earnings decline and to avoid a loss.

The usefulness of DTE in detecting aggressive EM was confirmed by Ettredge et al. (2008) who reported an association between DTE and earnings overstatement fraud in a sample of fraudulent companies with positive pre-tax income. Furthermore, Ettredge et al. (2008) observed higher deferred tax expenses for fraud firms in the year prior to the fraud onset, which they interpreted as being indicative of earnings management behaviour preceding fraud.

A limitation of using DTE as an indicator of EM, as shown in the research of Phillips et al. (2003) and Ettredge et al. (2008) arises from the assumption that managers avoid the cost of paying tax when manipulating earnings. Although DTE is likely to represent the tax effect of a substantial portion of the discretionary accruals, some researchers have found that management may actually be willing to pay tax (by simultaneously reporting managed tax earnings) in order to conceal the manipulation of earnings (Erickson et al., 2004; Badertscher et al., 2006). Erickson et al. (2004) reported that on average, the firms in their sample sacrificed eleven cents in additional income taxes per dollar of inflated earnings and in total paid an average of $11.84 million in taxes on

[31] In the absence of current tax, the upward manipulation of earnings should normally affect the deferred tax expense. This increase arises from the fact that upward EM would lead to a consequential increase/(decrease) in the carrying amount of an asset/(liability). As an example, if earnings were managed upward by underestimating the allowance for credit losses, this would result in a reduced "bad debt" expense through the statement of profit or loss and an increased "accounts receivable" balance in the statement of financial position. As the tax base would not be affected by the manipulation of earnings, a consequential effect of the adjustment to earnings would be an increase in the deferred tax expense. In other words, discretionary accruals should have a consequential effect on deferred tax.

[32] Rabin and Negash (2012) identified suspected EM firms through the distribution of earnings of all South African listed companies from 1997 to 2010. Suspected EM firms were identified by comparison of the empirical distribution (net income after tax scaled by number of ordinary shares in issue at year end) with a kernel density estimated reference distribution.

overstated earnings of approximately $124.5 million[33]. If companies are in fact willing to pay current tax on discretionary accruals and if this behaviour is pervasive, then the use of DTE as a surrogate for discretionary accruals would be erroneous.

Earnings management which also affects taxable income has been referred to as conforming EM (Badertscher et al., 2006). Conforming EM is likely to be more prevalent in "loss-making companies" that manage earnings upwards in order to avoid reporting losses. Because such firms potentially also have tax losses which they can use to set off against any discretionary profits, they have the ability to manipulate accounting earnings without any consequent effect on tax or deferred tax (Ettredge et al., 2008).

In short, deferred tax might not reveal the full extent of discretionary accruals (this would reduce the power of deferred tax to identify EM firms – type II error). An additional shortcoming in using DTE as a proxy for discretionary accruals is that not all accruals for which deferred tax is provided are discretionary (this would increase type I error of mis-specification).

Analysis of DTE components

Principally, the DTE represents the movement (or part of the movement) between the opening and closing deferred tax balances. As IAS 12: *Income taxes* para 81g (i) requires companies to disclose the deferred tax asset or liability by nature of temporary difference[34], it is "theoretically" also possible to determine which of the accruals are potentially discretionary.

Phillips et al. (2004) increased the depth of their analysis of DTE by identifying the underlying accruals on which deferred tax is based[35] and testing these for association with EM. More specifically, Phillips et al. (2004) investigated which of the accruals are used to manage earnings

[33]Erickson et al. (2008) tested whether a sample of 27 firms that were accused by the SEC of fraudulently overstating their earnings paid taxes on misstated earnings

[34] Temporary differences (i.e. the carrying amount of the assets/liabilities less the tax bases) reflect the accruals of the firm that are not immediately subject to current tax. The change in the deferred tax balance (per temporary difference) for any given period is, in many cases, equivalent to the deferred tax expense or income, per temporary difference. By analysing the deferred tax per category (or component) of temporary difference, one could identify the most likely discretionary accruals being used for EM to avoid a loss.

[35] Phillips et al., (2004) used the footnote disclosures of deferred tax required in terms of the Statement of financial Accounting Standards No. 109 (SFAS no. 109 to decompose the total change in a firm's net deferred tax liability into components relating to: (1) revenue and expense accruals and reserves, (2) compensation, (3) depreciation of tangible assets,(4) other asset valuation (e.g., expenses related to intangible assets, inventory, and leases), (5) miscellaneous items, (6) tax carry-forwards, (7) unrealized gains and losses from securities, and (8) the deferred tax asset valuation allowance account. Thereafter they examined whether each of the DTL components were useful to detect EM to avoid an earnings decline. There methodology included the use of a simultaneous "3SLS" system of equations.

upwards in order to avoid an earnings decline. They found that "revenue and expense accruals and reserves" could be used to detect EM to avoid a decrease in earnings. Furthermore, they observed that the "other valuation accruals" was associated with EM to avoid an earnings decline when using a sample of firms with negative deferred tax liability changes.

Although most temporary differences would be affected by the level of discretionary accruals, there is a second type of temporary difference that is not driven by accounting accruals, but by the recognition of tax losses[36]. Whilst upward EM, through discretionary accruals, would most often result in a consequential increase in DTE, it would be interesting to investigate whether companies would choose the discretion allowed to them for the recognition of tax losses, as an additional attempt to manage earnings upwards by decreasing the level of DTE being recognised. The only way in which this could be done would be to manipulate the timing and/or the level of recognition of tax losses thereby reporting deferred tax assets relating to such losses, when in fact the deferred tax asset is not recoverable. Phillips et al. (2004) reported that the "deferred tax valuation allowance account" (VAA)[37] was associated with EM to avoid an earnings decline when using a sample of firms with positive deferred tax liability changes. This indicates that managers could use the discretion allowed in recognising the tax expense (in particular, through the VAA) as a mechanism to manipulate earnings. Cook, Huston and Omer (2008) confirms that the tax expense represents an opportunity for firms to manage earnings. Dhaliwal, Gleason and Mills (2004) observed that managers decrease their annual estimated tax rate from the third quarter to the fourth quarter to avoid missing the consensus forecast. In other words, firms decrease their tax expense as a last attempt to manage earnings, where other non-tax sources of EM are insufficient.

This research investigates the association of accruals (that have deferred tax consequences) with

[36]IAS 12 para 29: "When there are insufficient taxable temporary differences relating to the same taxation authority and the same taxable entity, the deferred tax asset is recognised to the extent that: (a) it is probable that the entity will have sufficient taxable profit relating to the same taxation authority and the same taxable entity in the same period as the reversal of the deductible temporary difference (or in the periods into which a tax loss arising from the deferred tax asset can be carried back or forward). In evaluating whether it will have sufficient taxable profit in future periods, an entity ignores taxable amounts arising from deductible temporary differences that are expected to originate in future periods, because the deferred tax asset arising from these deductible temporary differences will itself require future taxable profit in order to be utilised; or (b) tax planning opportunities are available to the entity that will create taxable profit in appropriate periods".

[37] In terms of the statement of financial accounting standard (SFAS) No. 109, VAA is a contra "deferred tax asset account" reducing the value of the deferred tax asset to the extent the future tax benefits are "more likely than not" to be realized. In other words, the FASB requires companies to recognise the gross deferred tax effect of tax losses, but to then reduce this balance through the VAA. The VAA does not exist in International Financial Reporting Standards, as used in South Africa. Instead the deferred tax asset recognised is itself limited to future taxable income.

earnings management in South African firms. Furthermore, this study investigates whether the recognition of tax losses is associated with EM firms reporting small profits.

2.6.3. Cash flow reconciliation as a tool to identify discretionary accruals in a firm

Cash flows from operating activities are those cash flows derived from the core-revenue producing activities of an entity. The reason that profit or loss differs from the cash from operating activities is that the conceptual framework requires profit or loss to be calculated using the accrual basis of accounting.

In terms of IAS 7: *Statement of cash flows* para 18, an entity is required to report cash flows from operating activities using either the direct method, whereby major classes of gross cash receipts and gross cash payments are disclosed; or the indirect method, where the profit or loss figure from the income statement is reconciled to cash flows from operating activities through adjustments for the effects of working capital changes, non-cash items (such as depreciation, provisions, unrealised foreign currency gains and losses, and undistributed profits of associates) and other items for which the cash effects are investing or financing cash flows. Hereafter, this reconciliation is referred to as the cash flow reconciliation.

Although IAS 7*: Statement of cash flows* para 19, encourages entities to report cash flows using the direct method, this research proposes that the cash flow reconciliation provides useful information in assessing how a company may be involved in EM activities, which cannot be observed when using only the direct method.

By defining accruals as the difference between earnings and cash flows from operations (Healy, 1985), one can broadly state that the cash flow reconciliation reveals the nature or types of accruals processed by the firm. A positive association between individual accruals and EM would indicate which of the accounts are discretionary (used to manage earnings upwards).

The South African environment provides a unique opportunity to test the usefulness of the reconciling items in detecting EM. Up until the end of 2007, there was a requirement per the South African Companies Act (RSA, 1973) for all companies to provide a reconciliation "between operating income for the period as shown in the income statement and cash generated by operations[38] stating adjustments for non-cash items included in income for the period". This

[38] Cash flows from *operations* (as opposed to cash flows from *operating activities*) is stated before taking into account the cash effect of taxation, dividends and finance charges/income. As such, most companies presenting this reconciliation have reconciled

requirement was retracted for "widely held companies" through the "Corporate Laws Amendment Act 2006[39]", which became effective on the 14th December 2007. However, in line with "best-practice", companies in South Africa have continued to disclose this reconciliation regardless of the method chosen for reporting cash flows from operating activities. This reconciliation allows the users of financial statements to assess the quality of the operating profit by evaluating the ability of the firm to convert operating profit into cash. The adjustments required in the cash flow reconciliation (i.e. the total accruals) help to explain why the operating profit has not resulted in an equal amount of cash.

The total accruals identified through the cash flow reconciliation may have one of two effects on taxation, as follows:

1. Affects current tax, where the South African Revenue Services (SARS) accepts the accrual in the measurement of taxable income in the same period. An example of this would be increases in accounts receivable due to an increase in credit sales that are taxed immediately by SARS;
2. Affects deferred tax, where the accrual represents a temporary difference between accounting and tax authority treatments. These accruals should affect the deferred tax expense (DTE) in the period of the accrual. Examples of this would be where there are provisions, allowances or deductions for credit losses reported for accounting purposes, but where SARS would only grant a deduction upon the actual cash outflow or write-off of the debt.

Furthermore, it is possible for the accruals not to have an effect on tax (i.e. be exempt of tax effects). The extent of this type of accrual can be determined when analysing the tax reconciliation note.

The advantage of utilising the cash flow reconciliation as a source of information to identify discretionary accruals, is that all the accruals are evident, regardless of whether these affect current tax or not. Consequently, the analysis of the cash flow reconciliation may reveal a more complete picture of discretionary accruals than does the deferred tax expense. Analysing the components of the deferred tax expense in order to isolate discretionary accruals is limited to

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profit/loss *before tax* to cash flow from operations. This study has used this form of the reconciliation to identify the reconciling items. In other words, accruals relating to taxation, dividends or finance charges have not been identified or tested.

[39]Schedule 4, 4A (b) of the "Corporate laws amendment Act states that the disclosure per Schedule D, para 51 of the Companies Act, 1973 is no longer required for widely held companies (RSA, 1973). Companies listed on the Johannesburg Stock exchange would be considered widely-held companies.

accruals that affect deferred tax (in other words accruals that give rise to temporary differences between the accounting carrying amount and the tax base).

This research tests whether accruals, as identified from the cash flow reconciliation are associated with earnings management to avoid a loss.

2.6.4. The use of fundamental financial statement analysis to detect EM

A more recent approach at detecting EM is to use fundamental ratio analysis often in the form of an EM-score developed to identify firms that are likely to be EM firms (Beneish, 1999; Bayley and Taylor, 2007; Dechow et al., 2011).

Feroz et al. (1991)[40] documented that receivables and inventory are commonly misstated accounts. Beneish (1999)[41] found that the probability of aggressive earnings manipulation (generally identified by the SEC) increased with unusual increases in receivables, total accruals and sales and deteriorating gross margins. The variables, or indices, that were found to be significant in misstating firms included: days sales in receivable and days sales in inventory; growth margin; sales growth indices and depreciation and asset quality indices.

Bayley and Taylor (2007)[42] reported that total accruals, supplemented by financial statement indicators (such as the ratio of receivables to sales; inventory indices; and operating accrual measures), had greater power in identifying earnings overstatements than the MJ discretionary accrual model. This was to some extent confirmed by Dechow et al. (2011)[43] who observed that working capital accruals, particularly changes in receivables and inventory were more powerful than discretionary accrual models at detecting EM.

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[40]Feroz, Park and Pastena (1991) examine 224 AAERs (Accounting and Auditing Enforcement Releases) between 1982 and 1989, covering 188 firms.

[41]Beneish (1999) specifically looked at 74 firms, from the period 1987 to 1993, that had manipulated earnings and were either subject to the SEC's accounting enforcement or had been identified as manipulators by the news media, their findings could be of value to "within GAAP" earnings management.

[42]Bayley and Taylor (2007) examined 129 non-financial companies identified as earnings manipulators from AAERs listed on the SEC website between 1996 and 2003.

[43] Dechow et al. (2011) examined 676 unique firms that had misstated earnings during the period between 1982 and 2005 and which were subjected to enforcement actions by the US Securities and Exchange Commission (SEC). The AAER's released by the SEC in respect of these companies provided a source of data about the firms' misconduct and the effect thereof on financial statements.

Jansen et al. (2012) suggests that changes in the asset turnover (ATO: ratio of sales to net operating assets) and profit margin (PM: ratio of operating income to sales) ratios in opposite directions could signal earnings management.
In a study of fraudulent companies, Erickson et al. (2004) found most EM attempts occur through the improper recognition and/or measurement of inventory (overstatement), fixed assets (overstatement), leases, revenue and expenses. Bayley and Taylor (2007) observed overstatements of revenue in 112 of the 129 sample earnings manipulators.

In a survey of 253 auditors, Nelson, Elliott and Tarpley (2002) found that common areas for earnings manipulation included revenue, business combination accounting and the measurement of intangibles, fixed assets, investments and leases. However they reported that the most frequently identified attempts of EM involved reserves.

Overall, the cited research appears to be moving away from calculated discretionary accrual models towards observable financial information to detect EM. Furthermore, the companies investigated were either firms identified from the AAER's (misstating firms identified by the US Securities and Exchange Commission and documented in the Accounting and Auditing Enforcement Releases) or firms identified from other databases as having restated earnings. These sources therefore reflected firms that have predominantly engaged in aggressive EM or fraud and do not necessarily include "*within-GAAP"* suspected EM firms.

In conclusion, the main challenges of investigating accrual-based earnings management revolve around issues of determining an appropriate and reliable EM sample and of assessing the nature and the levels of discretionary accruals in an EM firm.

In an effort to identify the location of EM firms, Burgstahler and Dichev (1997) and Hayn (1995) constructed histograms of earnings distributions around zero using arbitrarily selected bandwidths. The use of the histograms was based on both prospect and transaction cost theory (Kahneman and Tversky, 1979) that posits that preparers will manipulate earnings upwards in order to avoid reporting small losses. This research follows Bollen and Pool (2009) and Lahr (2014) who suggest that the entire distribution of earnings should be analysed for discontinuities and that the

suitable reference distribution of no earnings management is drawn using kernel density estimation where bandwidths are estimated from the data itself using bootstrapping procedures.

The second issue arising in accrual-based EM research relates to the identification of discretionary accruals used by manipulating firms. Jones (1991) and Dechow (1996) were amongst the first researchers toestimate the level of discretionary accruals in EM firms. These discretionary accruals models were however found to measure discretionary accruals with error and to lack power at detecting EM firms (Guay et al., 1996 ; Young, 1999; Bayley and Taylor, 2007). Consequently Phillips et al. (2003) suggested the use of an alternate and observable source of information relating to discretionary accruals, the deferred tax note. Following the work of Phillips et al. (2003), this study investigates evidence of discretionary accruals by examining the accruals identified from the deferred tax note. Furthermore, this study expands on previous research by investigating an additional and alternative source of accrual information, the cash flow reconciliation note.

3. METHODOLOGY AND HYPOTHESES

The purpose of this study is to identify the discretionary accruals used most often by managers of South African listed companies during the period from 2000 to 2010. Suspected EM firms were identified by comparing the empirical earnings distribution (distribution of net income after tax deflated by ordinary number of shares in issue at year end) to a reference distribution obtained through kernel density estimation (KDE) of the empirical cumulative distribution as documented by Lahr (2014) and Rabin and Negash (2012). Discontinuities in the curve were identified at the point of maximum difference between the empirical and the kernel density distribution. These points indicated the location of suspected EM firms. Appendix A has a detailed discussion of the methodology used to identify the sample of EM0 and EM1 firms in this study. Once the suspected EM firms were identified, the incremental usefulness of total DTE to the modified Jones discretionary accrual measure was tested. Furthermore, specific accruals observed in 1) the deferred tax note and; 2) the cash flow reconciliation note in the annual financial report were tested through logistic regression to determine whether or not there is an association of each individual accrual component with earnings management.

The remainder of the chapter is structured as follows:
The hypotheses are stated immediately below followed by the underlying research paradigm adopted in this research (section 3.1 and 3.2). This is followed by a description of the sample and data collection methods used in this study (section 3.3). This chapter ends with an overview of the development of the research instrument and analysis of the data (section 3.4) followed by a brief discussion on the validity and reliability of the methodology used (section 3.5).

3.1. Hypothesis development

The research question seeks to identify the accounts (or discretionary accruals) that are being used by management to manipulate earnings upwards in an attempt to avoid reporting a loss.
Unlike prior research that estimates discretionary accruals through the use of abnormal accrual models (Jones, 1991; Dechow et al., 1995) this report identifies potential earnings management activity by analysing the components of the deferred tax note and the cash flow reconciliation note. Both these notes contain information about the types of accruals recognised by a firm and could possibly be used as a source of information about discretionary accruals.

3.1.1. Incremental usefulness of total DTE to abnormal accrual measure

Phillips et al. (2003) found that DTE was incrementally useful beyond abnormal accrual methods at detecting EM to avoid a loss. Consequent to this finding, they proposed that deferred tax expense (DTE) be used as a proxy for discretionary accruals. Rabin and Negash (2012) tested the incremental usefulness of DTE to several discretionary accruals measures for a sample of South African firms. They found that the abnormal accrual measures were incrementally useful to DTE at detecting EM to avoid a loss.

To place this study in the context of prior research, the following hypothesis was tested:

H1: The total deferred tax expense is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss.

3.1.2. Accruals identified through the deferred tax note

In terms of IAS 12: *Income taxes*, the objective of providing for deferred tax is to account for the "future tax consequences of the future recovery (settlement) of the carrying amount of assets (liabilities) that are recognised in an entity's statement of financial position".

Consequently, if the carrying amount of an asset or liability is altered due to earnings management, this should have an effect on the future tax consequences (deferred tax) of the asset/liability. Deferred tax could therefore act as a proxy for discretionary accruals.

In this research the deferred tax expense was disaggregated into the deferred tax recognised for each type of accrual (component) to which it relates. This was done by identifying the movements between the opening and closing deferred tax asset/liability for each type of temporary difference. Temporary differences have been classified into the most commonly disclosed categories (accrual accounts). Seven categories were identified and are listed below (refer to data collection).

Accordingly, the following hypothesis was tested:

H2: Each separately identified **c**omponent of the deferred tax expense (as observed through the changes in each type of temporary difference of the net deferred tax liability (asset)), including capital allowances, employee compensation, expense accruals, fair value adjustments, prepayments, revenue accruals and recognised tax losses is, in its own right, significantly associated with suspected upward EM to avoid reporting a loss.

3.1.3. Total accruals identified through the cash flow statement

Healy (1985) defined accruals as the difference between reported earnings and cash flow from operations. Consequently, the comparison of the profit before tax (PBT) to the cash flow from operations before tax (CFO) should reveal the total accruals of a firm. An examination of the reconciling items between these two measures of performance could therefore identify those accruals associated with earnings management (i.e. discretionary accruals).

Individual accruals (reconciling items) were identified through the cash flow reconciliation note to the financial statements (reconciliation of PBT to CFO). Each accrual identified was classified into one of ten "commonly disclosed" categories. These are listed below (refer to data collection).

Accordingly, the following hypothesis was tested:

H3: Each separately identified accrual (as observed in the reconciliation between profit before tax and cash flow from operations) including changes in accounts payable, changes in accounts receivables, changes in inventory, depreciation, employee costs, equity accounted profits, fair value adjustments, foreign exchange movements, profits/losses on disposal of assets and provisions is, in its own right, significantly associated with suspected upward EM to avoid reporting a loss.

3.2. Research paradigm

This research follows a scientific, positivist approach. Positive theories attempt to describe real world situations as they are, without the subjectivity of human emotion (Inanga and Schneider, 2005; Coetsee, 2010).

Positive theory is grounded on a specific scientific approach or framework. Firstly, the relevant phenomenon is observed from whence a problem question arises. A hypothesis is developed around the problem and relevant data is collected for analysis and testing (Inanga and Schneider, 2005). A crucial part of this approach is the choice of research method and research instrument required to test the hypothesis. Statistical tests often form an integral part of both the analysis of the data and the presentation of the results. Finally the ability to replicate and critically evaluate the results is an imperative part of positivist research (Ryan, Scapens and Theobald, 2002).

In short, the scientific, positivist approach is usually based on abstraction (a theory), reductionism (method of reasoning based on a premise or theory) and statistical methods. Many of the leading

researchers of earnings management have used a scientific approach (Dechow et al., 1995; Burgstahler and Dichev, 1997; Phillips et al., 2003; Phillips et al., 2004; Rabin and Negash, 2012; Lahr, 2014). Further, as earnings management is largely quantitative in nature, it naturally lends itself to the scientific, positivist approach.

In this study, a sample of firms suspected of earnings management has been identified by comparing the empirical earnings distribution of all listed South African companies from 2000 to 2010, to its kernel density estimate (refer to Appendix A for a detailed discussion). The observation of a discontinuity in the curve at zero has been interpreted as evidence of earnings management (Burgstahler and Dichev, 1997; Phillips et al., 2003; Lahr, 2014). This approach is based on both prospect and transaction cost theory. Prospect theory (Kahneman and Tversky, 1979) stipulates that stakeholders will value small gains and small losses asymmetrically creating an incentive for managers to manipulate earnings above the zero thresholds whereas the transaction cost theory explains that stakeholders with high costs of processing information will opt to evaluate performance based on heuristic cut-offs at zero levels or zero changes in earnings. Consequently the interval to the left of zero, on the distribution curve, should theoretically show a smaller number of firms than expected and the interval to the right should show a larger number of firms than expected (Degeorge et al., 1999; Bayley and Taylor, 2007). The intervals to the right and left of zero therefore represent the location of suspected EM firms (EM1) and non-EM firms (EM0 / control group) respectively. Statistical tests were then performed on the specified accrual information collected, for each EM1 and EM0 firm identified, to validate or reject the hypotheses formulated above.

3.3. Sample and data collection

This study uses secondary data obtained from two sources. Firstly, the sample of EM0 and EM1 firms used were kindly provided by Rabin and Negash (2012). The methodology used in identifying this sample is discussed in 3.3.1 below and in Appendix A. Secondly, the deferred tax and cash flow reconciliation data analysed, in the sample of EM0 and EM1 firms, was obtained off published financial statements from the INET BFA database. This is further discussed in 3.3.2 below.

3.3.1. Sample of EM0 and EM1 firms used

Earnings management firms and non-EM firms were identified by comparing the empirical distribution of earnings to a reference distribution of no earnings management constructed using an Epanechnikov KDE from the underlying data (refer to Appendix A for a detail discussion on the methodology used to identify the sample of EM firms). A significant discontinuity in the KDE distribution of earnings over number of ordinary shares in issue was observed at zero. The sample of firms used in this study consist of 496 suspected EM firm years observed in the interval immediately to the right of zero (EM1 firms) and 225 firm years in the intervals to the left of zero (non-EM firms / EM0 firms / control group) as discussed in Appendix A. The financial data collected and analysed from the annual financial statements of the sample group of companies is of a continuous nature.

3.3.2. Data collection

Financial statements for all firm years identified either in the EM0 band or the EM1 band were obtained from the INET BFA database. The information required for testing was collected directly from the deferred tax note and cash flow reconciliation note in the financial statement of each firm identified as being either an EM1 firm or an EM0 firm. The accruals identified through: 1) deferred tax on temporary differences and 2) reconciling differences between profit before tax and cash flow from operations, were analysed, aggregated and classified to a particular category (component/variable) of accruals being tested. For comparability purposes, the categories analysed were broadly based on the categories identified by Phillips et al. (2004)[44]. However, in conjunction with an assessment of the categories identified by Phillips et al. (2004), a review of a random selection of financial statements from 20 firms was conducted to determine whether the common disclosures of deferred tax categories in South African firms are similar to those identified by Phillips et al. (2004). This exercise resulted in most of the key categories of Phillips et al. (2004) being used in this study (refer to table 15 in Appendix C for a comparison of the categories used by Phillips et al. (2004) and the categories used in this study).

Differences between the deferred tax categories used by Phillips et al. (2004) and those used in this study arose for two reasons. Firstly, there were constraints in obtaining the level of detail used in some of the categories used by Phillips et al. (2004), particularly in relation to depreciation where Phillips et al. (2004) was able to identify whether the depreciation related to tangible assets

[44]Phillips, Pincus et al. (2004) analysed the following deferred tax movements: (1) revenue and expense accruals and reserves, (2) compensation, (3) depreciation of tangible assets, (4) other asset valuation (e.g. expenses related to intangible assets, inventory, and leases) (5) miscellaneous items; (6) income tax carryforwards (7) unrealized gains and losses on securities and the (8) deferred tax asset valuation allowance.

or not. This study included the depreciation and amortisation for both tangible and intangible assets in one category. The second reason for the difference in deferred tax categories arose because, in some instances, Phillips et al. (2004) combined two or more types of accruals into a single category, for example "revenue and expense accruals and reserves". As this study was able to identify each of these accruals separately, such accruals were then classified separately into two categories. This is beneficial in analysing the impact of each of these accrual types on EM. To the extent possible, the accruals identified through the cash flow reconciliation were grouped into categories of a similar nature to those of the deferred tax analysis. All categories used in the analysis of deferred tax expense and the cash flow reconciliation components are depicted in tables 1 and 2 below.

The list of common categories identified is generalised. Some companies may disclose more categories than identified in this study, but most do not disclose every category identified. As each category identified is tested for association with EM separately (refer to section 3.4.2:i.b), the number of observations for each test varies in accordance with the companies actually reporting that component-type.

The sample size (number of observations) for each category is depicted under the tables of results shown under chapters 4 and 5.

All DTE and cash flow components were scaled by number of ordinary shares in issue at the end of the year[45]. All deflated variables are continuous in nature and were winsorised at the 1% and 99% level to remove the most influential outlier observations.

The components (or accruals) identified from the deferred tax and the cash flow reconciliation notes are discussed in more detail below (sections i and ii).

i. Deferred tax expense movements

The deferred tax note is a summary of the deferred tax asset or liability recognised on each type of temporary difference (component) at year end (IAS 12 para 81g. (i)). The total deferred tax

[45] Suspected EM firms were identified using an empirical distribution of NIAT scaled by number of shares (refer to Appendix A). In other words, they were identified based on their level of NIAT scaled by number of shares. As such, in order to identify the earnings management activities of those suspected EM firms, it follows that the components (independent variables) tested should also be scaled by number of shares. Furthermore, the number of shares is a neutral deflator presenting no significant difference between loss vs profit companies (refer to tables 13 and 14 in appendix C).

asset/liability per the note should therefore reconcile to the deferred tax presented in the statement of financial position (balance sheet).

This research identifies the components of the deferred tax expense as the movement between the closing balance and the opening balance[46] of the deferred tax asset/liability per type of temporary difference. In the presence of upward earnings management through accruals, there should be an increase in the consequent deferred tax expense (Phillips et al., 2003; Rabin and Negash, 2012) and therefore one would expect a positive association between EM1 firms and an increase in DTE. Movements in deferred tax balances recognised through "other comprehensive income" or equity, or relating to mergers, acquisitions or divestitures could, however, create "noise" when attempting to identify the deferred tax movement that was recognised through profit or loss.

Firm years, in which there were significant unknown and irreconcilable differences between the sum of the deferred tax component movements and the total deferred tax expense, were excluded from the analysis of DTE components altogether (251 firm year exclusions)[47]. A further limitation in the categorisation of deferred tax components relates to the manner in which each individual company classifies the types of temporary differences. As there is no specific guidance in IAS 12: *Income taxes* as to which "type" of temporary differences must be disclosed, classification of temporary differences is foremost at the discretion of the preparer. As an example, a provision for unpaid leave pay could be categorised as "employee compensation", or as an "expense accrual".

Notwithstanding the difficulties mentioned above in identifying the DTE components, seven categories of components were identified. These represent the majority of temporary differences classified in firms, and are presented in table 1.

[46] Opening balances on deferred tax assets or liabilities are obtained from prior period comparative data in the annual financial statements.

[47] Sample of firms used to obtain DTE component and cash flow component note disclosures from annual financial statements

	DTE analysis	Cash flow analysis
Sample of EM 1 firms	496	496
Sample of EM0 firms	225	225
	721	721
Exclusions (insufficient disclosure)	-251	-20
Total sample utilised*	470	701

*Total sample of firms from which note disclosures could be extracted from annual reports

Table 1: Description of DTE variables

	DTE Variable*	Description of DTE variable
1	Capital Allowances	Depreciation, amortisation and impairments of property, plant and equipment and intangible assets
2	Employee Compensation	Compensation (including share based payments, leave pay provisions and post-retirement benefits)
3	Expense Accruals	Expense accruals and provisions
4	Fair value adjustments	Fair value adjustments (in particular of financial instruments and investment property)
5	Prepayments	Prepaid expenses
6	Revenue accruals	Revenue accruals and reserves (including allowance for credit losses and deferred revenue)
7	Recognised tax Loss	Recognised tax losses

* These variables represent the DTE on the various types of temporary differences.

ii. Cash flow reconciliation components

The components reconciling the profit before tax to the cash flow from operations are in essence a representation of the total accruals through the statement of profit or loss (Healy, 1985). An examination of these reconciling items could therefore indicate the accrual accounts being used for upward EM (i.e. discretionary accruals).

As found when identifying the DTE components, the categorisation of the reconciling components (accruals) is restricted by the manner in which each individual company classifies the reconciling differences. As there is no specific guidance in IAS 7: *Statement of cash flows* as to which categories of differences must be disclosed (other than the changes in working capital movements), classification of the reconciling differences is primarily at the discretion of the preparer. As an example, a provision could be categorised separately or be assumed as part of the movements of working capital.

Furthermore, there were some firms in which the cash flow reconciliation components, hereafter cash flow components, could not be categorised (either because they were not disclosed or because of poor disclosure). Data pertaining to these firms was excluded (21 firm years excluded).

Notwithstanding this limitation, the researcher identified ten categories of components that represent the majority of accruals identified through the cash flow reconciliation, as follows:

Table 2: Description of cash flow components investigated

	Variable	**Description of accruals included in this category**
1	Changes in accounts payable	Changes in accounts payable between the beginning and the end of the reported period
2	Changes in accounts receivable	Changes in accounts receivable between the beginning and the end of the reported period
3	Changes in inventory	Changes in inventory between the beginning and the end of the reported period
4	Depreciation	Depreciation, amortisation and impairments of property, plant and equipment, intangible assets and goodwill
5	Employee costs	Employment costs (including Share-based payment expense, employee benefits and leave pay provisions)
6	Equity accounted profits	Equity accounted profits (primarily of associate companies, but could also include profits of certain joint ventures).
7	Fair value (P/L)	Fair value adjustments recognised through profit and loss (financial instruments and investment property)
8	Foreign exchange differences	Unrealised foreign exchange gains and losses
9	Profit on disposal	Profits or losses on disposal of assets
10	Provisions	Provisions (where separately disclosed from accounts receivable and accounts payable)

3.4. Research instrument and data analysis

The descriptive and empirical tests were applied to the total DTE, the residual DTE (total DTE less deferred tax relating to recognised tax losses) and to all components (accruals/independent variables) identified in both the deferred tax note and in the cash flow reconciliation note.

3.4.1. Descriptive tests

All independent variables were winsorised at 1% and 99% to limit the undue effects of outlier observations. Descriptive statistics are presented for each winsorised variable across the EM1 and the EM0 firms.

The means and medians of each independent variable scaled by number of ordinary shares in issue were compared across EM1 and EM0 firms to establish whether they were significantly different.

The means of the independent variables of the EM1 group and of the EM0 group were compared using a general linear model. The general linear model was chosen to facilitate the clustering of the information by firm. In order to obtain a reliable output, this test was not carried out for a sample of less than 30 observations.
The medians of the independent variables of the EM1 group and of the EM0 group were compared using a clustered form of the Wilcoxon rank sum test.

3.4.2. Empirical tests

i. Logistic regression

a. Incremental usefulness of total DTE to abnormal accrual measure and association with EM

To place this study in the context of prior research (Phillips et al., 2003; Phillips et al., 2004) and thereby test whether DTE could be used as a proxy for discretionary accruals in the South African environment, the incremental usefulness of the total DTE to the MJ discretionary accrual measure in detecting EM to avoid a loss was assessed using logistic regression (refer to equation 1 below).

b. Association of deferred tax expense variables and cash flow components with EM

Phillips et al. (2004) estimated a system of equations using a full information method (i.e. 3SLS) to identify the components of DTE that were useful in detecting EM to avoid an earnings decline. This methodology however could not be used in this study because of the constraints of sample size. As mentioned before (section 3.3.2), individual EM0 or EM1 firms do not disclose every DTE or cash flow category in their financial statements, that have been identified in this study. Furthermore different companies will disclose a different mix of DTE and cash flow categories. As a regression can only be performed on firms with information for the full set of independent variables being tested, the sample size in this study decreased significantly (to irrelevance) with the introduction of more than one variable at a time.

The purpose of this study is primarily to assess the association of the DTE and cash flow components with EM to avoid a loss. Consequently, either probit regressions or logistic regressions could have been used to test the binary dependent variable (EM0/EM1). (Phillips et al., 2003) and Phillips et al. (2004) used probit regressions to test whether the total DTE was incrementally useful to various accrual models at detecting EM. However, in accordance with the methodology used by other researchers who have tested the association of accruals with EM (Bayley and Taylor, 2007; Ettredge et al., 2008; Dechow et al., 2011) this study has used logistic

regression to assess whether, individually, the DTE and the cash flow components are associated with upward EM to avoid a loss (refer to equation 2 below).

Although probit regressions normally produce similar results to logit regressions, logistic regression was chosen in this study because the assumption that the underlying response data should be normally distributed is not required, whereas it is an assumption that is required when using probit regression (Finney, 1952). Logistic regression is a non-parametric regression used to model relationships between independent and dependent, binary variables. The dependent variable is a dichotomous variable coded 'one' for earnings management companies, and 'zero' for the control firms. In logistic regressions, binomial (sigmoid shaped) data is transformed through logarithms into linearity.

Logit regressions are also simpler to interpret than probit regressions. The odds ratio on a logit regression indicates the likelihood of a particular variable being associated with earnings management, i.e. the odds of a particular firm being EM1 vs EM0. If the odds ratio is greater than one this increases the odds that the firm is EM1. If the odds ratio is less than one, this would increase the odds of the firm being an EM0 firm. An alternative way of interpreting the results of the logit regression is by assessing the coefficient of the independent variable. A significant *p* value indicates that there is a significant difference between the coefficient and zero (i.e. where the odds ratio is significantly different to 1).

For the DTE variables analysis, a positive co-efficient would suggest that as the variable increases, so the likelihood of it being associated with EM1 firms also increases. This would be the status quo if the DTE variables were found to be associated with earnings management, as increases in DTE (through increased taxable temporary differences or reduced deductible temporary differences) are associated with greater profits. Increases in DTE variable are positive and decreases in DTE variables are negative in the data inputs.

In the actual reconciliation of profit before tax to the cash flow from operations, profits/gains are negative and expenses are positive, for example, profit on disposal of assets (gain) is subtracted from profit before tax, whereas depreciation (an expense) is added back to profit before tax in order to reconcile to the cash flow. However, in order to simplify the interpretation of the results, the signs on these data inputs have been reversed so that expenses (or decrease in profits) are negative and gains are positive. Consequently, a positive co-efficient would suggest that as the

independent variable increases, so the likelihood of it being associated with EM1 firms also increases.

It is important to emphasize that, because of data constraints, this research is testing one explanatory variable at a time. In other words, this study does not build a multivariate logistic regression model of variables that together are able to predict or explain the dependent variable[48]. The CFO variable has been included as a control variable for performance. Following the work of Phillips et al. (2003), the regressions are estimated using the level of cash flow from operations (CFO) as a control variable for performance. More specifically, CFO controls for the fact that high performance companies should theoretically also have higher levels of cash flows. Furthermore, companies with high levels of cash flows should have a reduced incentive to manage earnings and *vice versa* (Lee, Ingram and Howard, 1999).

The formulae for the logistic regressions performed (equations 1 and 2) are shown under section ii immediately below. In addition, a series of supplementary tests were performed on "total DTE less deferred tax on recognised tax losses" and on individual and statistically significant DTE variables and cash flow components. These are discussed under chapter 5.

ii. Estimation of logistic regressions

a. Incremental usefulness of DTE to abnormal accrual measure

The incremental *usefulness* of total DTE to discretionary accruals (as calculated through the MJ model) was assessed using logistic regression as represented by equation 1. Each independent variable, with the exception of discretionary accruals, was scaled by number of ordinary shares in issue at the end of the reporting period. The modified Jones discretionary accruals were calculated in accordance with the model proposed by Dechow et al. (1995) and were consequently scaled by total assets at the beginning of the period.

[48] A multivariate logistic regression can only run for firms that possess data points for each and all independent variables within that model. As different companies utilise different types of accruals and do not use every potential type of accrual (independent variable) identified in this study, firms which do not report a particular accrual, i.e. possess missing data points would therefore be excluded from a multivariate analysis. Consequently, if a multivariate regression were to be performed in this study, the sample size of firm years observations would decrease substantially with an increase in the number of explanatory variables, rendering the outcome potentially invalid and unreliable.

EQUATION 1: $\text{Logit}(p) = \beta_0 + \beta_1 DTE_{it} + \beta_2 CFO_{it} + \beta_3 DAMJ_{it} + \beta_4 \text{ industry} + \mu_{it}$

Where:

logit (p)	is the odds ratio; i.e. logit (p) = p / (1-p)
P	is the probability of EM_{it}=1 given an independent variable (IV) i.e. p = P(EM_{it}=1 | IV)
EM_{it} = 1	Where firm i has been identified as an EM firm using KDE distribution. EM_{it}=0 has been chosen as the reference and the equation is modelling EM1 firms.
DTE_t	this represents the total deferred tax expense
CFO_{it}	this represents firm i's total cash flow from operations.
$DAMJ_{it}$	Discretionary accruals computed using the MJ model (Dechow et al., 1995) as total accruals *(Tacc)* less non-discretionary accruals. Non-discretionary accruals are estimated as $Tacc_{it} = \alpha + \beta_1 (\Delta REV_{it} - \Delta REC_{it}) + \beta_2 PPE_{it} + \xi_{it}$ where ΔREV_{it} is change in firm *i*'s sales from period *t-1* to *t*; ΔREC_{it} is changes in firm *i's* receivables from year *t-1* to *t*, PPE_{it} is gross property, plant and equipment for firm *i* in period *t*. All variables are scaled by lagged total assets.
Industry	this categorical variable controls for the industry for a particular observation. The industries controlled for are: Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunications and Utilities

b. Association of deferred tax expense variables and cash flow components with EM

The primary empirical analysis in this study is to assess the association of accruals identified from the deferred tax note and the cash flow reconciliation note with EM to avoid a loss. This analysis was performed using the logistic regression, as depicted by equation 2 below.

EQUATION 2: $\text{Logit}(p) = \beta_0 + \beta_1 \text{DTE / CF component}_{it} + \beta_2 CFO_{it} + \beta_3 \text{ industry} + \mu_{it}$

Where:

logit (p)	is the odds ratio; i.e. logit (p) = p / (1-p)
P	is the probability of EM_{it}=1 given an independent variable (IV) i.e. p = P(EM_{it}=1 | IV)
EM_{it} = 1	Where firm i has been identified as an EM firm using KDE distribution. EM_{it}=0 has been chosen as the reference and the equation is modelling EM1 firms.
DTE/CF component	the individual explanatory variables (DTE variables or CF components) that are being tested for association with EM (in accordance with hypothesis 2 and 3).
CFO_{it}	this represents firm i's total cash flow from operations.
Industry	this categorical variable controls for the industry for a particular observation. The industries controlled for are: Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunications and Utilities

Each independent variable was scaled by number of ordinary shares in issue at the end of the reporting period. The logistic regression was performed for each type of deferred tax movement and each cash flow component separately (i.e. one at a time). In addition, separate logistic regressions were performed for "total DTE" and "residual DTE" (Total DTE excluding the recognised tax loss component).

iii. Diagnostic tests

Diagnostic tests on the data were performed for all logistic regressions performed, including tests for multi-collinearity, outliers and influential points and heteroskedasity. The data was found to be suitable for logistic regressions (see Appendix B for a discussion of diagnostic tests performed).

As the sample size for all variables exceeded the minimum requirements, no variables were excluded[49].

All observations were clustered by company name, to take into account the fact that data from the same firm over a number of years is not independent.

3.5. Validity and reliability

All relevant assumptions underlying the logistic regressions have been tested (as detailed above). Further all the independent variables used were selected because they are associated with some form of accrual measure. The logistic regressions were performed to determine whether the independent variables were associated with accrual-based EM, i.e. to test whether they represent discretionary accruals used to manipulate earnings upwards to avoid a loss. Based on this, the independent variables used are valid.

Further, the independent variables used were sourced directly off the annual financial statements reported by the firms. As such, the information tested is reliable. The statistical tests used were appropriate for binary response variables. The highest protocol was followed when conducting these tests. The methods and results were reviewed by an independent statistician.

[49] The number of observations should be at least 5 times the number of parameters to be estimated (Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. and Tatham, R. L. (2006) *Multivariate data analysis,* Vol. 6, Pearson Prentice Hall, Upper Saddle River, NJ.).

4. RESULTS AND DISCUSSION

4.1. Incremental usefulness of total DTE to abnormal accrual measure

Phillips et al. (2003) proposed that deferred tax expense (DTE) be used as a proxy for discretionary accruals. This recommendation was based on the finding that DTE was incrementally *useful* to various discretionary accrual measures at detecting EM to avoid a loss. In the South African environment however, the first hypothesis was rejected. This study showed that total DTE was not incrementally useful, but rather equally as useful as the MJ abnormal accruals at detecting EM to avoid a loss with both independent variables reflecting positive and significant coefficients in the estimation of the logistic regression ($p<0.0001$)[50].

Accordingly, the descriptive statistics revealed that the total DTE was found to be significantly lower in EM0 firms than in EM1 firms (from tables 3 and 4: means of -0.015:0 for EM0:EM1 with $p<0.0001$ and medians with $p<0.0001$).

4.2. Association of DTE variables and cash flow components with EM

4.2.1. Deferred tax components

Phillips et al. (2004) "decomposed" the DTE in order to identify which accounts are used in the manipulation of earnings. The disaggregation of the DTE was done through an analysis on the movement of deferred tax assets/liabilities for the period (i.e. comparing opening and closing deferred tax balances in the deferred tax note) by type of temporary difference. They then established the usefulness of each of the deferred tax components at detecting EM through a system of simultaneous equations (3 SLS).

In a similar approach, this study identified the accruals associated with EM by "decomposing" the deferred tax expense of South African listed companies, into its individual components.

[50] Outcome on logistic regression performed on total DTE (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years and using Modified Jones abnormal accruals as an additional control variable.

	N	Coefficient (β)	Standard error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio		Coefficient (β) Abnormal Accruals	Pr > Chi-Square Abnormal Accruals
Total DTE	618	18.385	3.9117	22.0903	<.0001	>999.99	>999.99	>999.99	8.0959	<.0001

However, in contrast to Phillips et al. (2004) who used 3SLS to establish whether the accruals identified were useful at detecting EM to avoid an earnings decrease, this study tested the association of each of the accruals (individually) with EM to avoid a loss by using logistic regressions. Firms managing earnings upwards are expected to have a higher DTE, and as such, positive and significant coefficients on logistic regressions are expected for DTE components associated with upward EM to avoid a loss.

Descriptive statistics of the DTE components as well as clustered mean and median tests are presented in tables 3 and 4. The results of the logistic regressions performed on the DTE components are presented in table 5. Variables with significantly different means and/or medians across EM0 and EM1 are shaded in grey.

Recognised tax losses and Revenue Accruals

The only two DTE components identified as having significant and positive coefficients in the logistic regressions performed related to "revenue accruals" and "recognised tax losses". These are discussed below.

i. *Revenue Accruals*

An increase in revenue accruals due to upward EM would lead to an increase in the deferred tax expense. Although the means and medians of the DTE component relating to revenue accruals, were not found to be significantly different between EM0 and EM1 firms (table 4), it is interesting to note that in the means, medians, 25^{th} and 75^{th} percentile of the observations (per table 3), the magnitude of this DTE component in the EM0 companies was lower (or the same) as this component in the EM1 firms. In other words, EM1 companies had a higher deferred tax expense relating to revenue accruals than did EM0 companies. This is confirmed by the results of the logistic regression where the coefficient for this variable was positive and significant (β=53.19 and p= 0.006 per table 5). This outcome suggests that as this DTE component increase, so the likelihood of the firm being and EM1 firm also increases.

This finding concurs with prior research where revenue and sales accruals were found to be linked to EM (Beneish, 1999; Nelson et al., 2002; Phillips et al., 2004; Dechow et al., 2011).

ii. *Recognised tax Losses*

The recognition of tax losses (or tax credits) could potentially be used as a direct tool in upward earnings management (Dhaliwal et al., 2004). Tax losses do not arise from normal accounting accruals. The calculation thereof is based on tax legislation and it represents the amount that will

be deductible against future taxable income. In other words, the deferred tax expense (or saving) relating to this component, in itself, represents an accrual for future tax deductions. In terms of IAS 12: *Income taxes* para 34, deferred tax assets relating to tax losses can be recognised "to the extent that it is probable that future taxable profit will be available against which the unused tax losses can be utilised". The expectation and projection of future taxable profits is subjective and open to manipulation that could lead to EM.

Firms using the discretion available in the recognition of tax losses to manipulate profits would reflect lower DTE as opposed to firms that have not used this discretion to manipulate profits. In other words, if the recognition of tax losses was used for upward EM, one would expect a significant, but ***negative*** coefficient i.e. one would expect that as the DTE relating to this component decreases (i.e. increased tax savings/gains), so the likelihood of the firm being an EM1 firm increases.

The descriptive statistics revealed that both the means and the medians of this component were significantly larger (not smaller) in EM1 firms than in EM0 firms (means of -0.029:-0.004 for EM0:EM1 firms with p =0.0013 and medians of -0.007:0 for EM0:EM1 firms with p=0.0004).

Further, the results of the logistic regression (table 5) indicate that the coefficient is positive and significant (β=23.19 and $p<0.0001$). This suggests that as DTE ***increases*** (i.e. an increase in a tax expense or a reduction in tax gains), so the likelihood of the firm falling into the EM1 bandwidth also increases.

However, suspected EM firms (loss firms in the EM1 band) that use the discretion available to them in the recognition of tax losses to manage earnings upwards, should reflect a decrease, not an increase in DTE compared to non-EM firms. The results are therefore not indicative of earnings management.

A characteristic of all EM0 firms is that they are all loss-making firms as they are found in the intervals to the left of zero. The EM1 band, to the right of zero is comprised of loss firms that have manipulated earnings upwards as well as legitimate profit-making firms. These results are therefore revealing a distinctive financial characteristic of loss vs profit firms i.e. that loss firms, by nature, generate (and recognise) more tax losses than profit firms. The significant and positive coefficient on the logistic regression suggests that as the DTE component increases (i.e. as the recognition of tax losses decreases), so the firm is more likely to be a ***profit-making firm***.

This finding has therefore uncovered a limitation of using earnings distributions to identify EM firms, i.e. that the location of "EM1" firms is not exclusive for loss firms that have managed earnings upwards, but is also the location for a large component of legitimate profit firms. It

therefore becomes necessary to control for the presence of profit firms in the EM1 band when attempting to identify the characteristics of suspected EM firms.

Although the use of distribution curves promises to be a simple and valuable tool (Donelson et al., 2013) for detecting EM firms, additional research is required to unravel which firms within the EM1 interval are in fact managing earnings to avoid a loss.

Consequent to this outcome, supplementary tests were performed to examine whether the DTE component relating to recognised tax losses affected the usefulness of total DTE to detect EM to avoid a loss. The methodology used and results of the supplementary tests are discussed in chapter 5.

iii. *Components with significant but negative coefficients*

Although the coefficient on the "fair value adjustments" DTE component was also found to be significant (β=-179.6 and p=0.0094), it is negative, which does not make sense in the context of upward earnings management. If fair value adjustments were manipulated to avoid a loss, they would increase in magnitude, which would have a consequential effect on the deferred tax expense (i.e. an increase in the deferred tax expense). An increase in the deferred tax expense would be reflected through a positive coefficient. A negative coefficient in this instance is therefore counter-intuitive for upward EM. Further, the number of observations available for testing this component was only 53 which may be too low to draw meaningful and reliable conclusions. The results for this category are therefore inconclusive and do not warrant any further discussion.

Table 3: Descriptive statistics for deferred tax expense variables (scaled by number of ordinary shares in issue at year end)

Variable	EM	N	Mean	Std Dev	Min	Max	Median	25th Pctl	75th Pctl	z(skew)	z(kurt)
Capital Allowances	0	114	0.01	0.059	-0.095	0.33	0	-0.003	0.01	13.67	30.73
Capital Allowances	1	278	0.008	0.035	-0.095	0.33	0.001	-0.001	0.009	40.54	176.61
Compensation	0	22	-0.001	0.007	-0.02	0.01	0	-0.001	0	-2.43	2.55
Compensation	1	88	-0.002	0.006	-0.024	0	-0.001	-0.002	0	-10.90	14.19
Expense Accruals	0	90	-0.006	0.028	-0.11	0.05	0	-0.003	0.001	-8.89	12.76
Expense Accruals	1	202	-0.002	0.01	-0.045	0.04	-0.001	-0.003	0.001	0.79	18.10
Fair value adjustments	0	21	0.004	0.026	-0.042	0.11	0	-0.001	0.002	5.96	13.45
Fair value adjustments	1	42	-0.004	0.014	-0.084	0.01	0	-0.003	0	-12.94	36.05
Prepayments	0	52	0	0.002	-0.006	0.01	0	-0.001	0.001	-0.62	1.79
Prepayments	1	123	0	0.005	-0.02	0.02	0	0	0.001	-2.75	16.79
Revenue accruals	0	51	-0.005	0.018	-0.075	0.02	0	-0.004	0.001	-8.47	13.36
Revenue accruals	1	122	0	0.009	-0.042	0.03	0	-0.002	0.001	-1.16	18.48
Recognised tax loss	0	115	-0.029	0.07	-0.367	0.1	-0.007	-0.03	0.001	-11.95	21.22
Recognised tax loss	1	251	-0.004	0.044	-0.367	0.1	0	-0.01	0.006	-29.92	120.19
Total DTE	0	225	-0.015	0.04	-0.164	0.08	0	-0.016	0	-12.68	16.37
Total DTE	1	496	0	0.027	-0.164	0.08	0	-0.005	0.006	-15.55	56.80

Table 4: Results of null hypothesis of no significant difference between means and medians of deferred tax expense variables (scaled by number of ordinary shares in issue at year end) in EM1 firms vs EM0 firms

Variable	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
Capital Allowances	0.66	0.094
Compensation	0.38	0.097
Expense Accruals	0.13	0.52
Fair value adjustments	0.20	0.30
Prepayments	0.48	0.46
Revenue accruals	0.091	0.45
Recognised tax loss	0.0013	0.0004
Total DTE	<0.0001	<0.0001

Significant differences at the 5% level are shaded in grey.

Table 5: Outcome on logistic regressions performed on deferred tax variables (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years

Variable	N	Expected Coefficient[1]	Actual Coefficient (β)	Standard Error	Wald Chi-Square	Pr > Chi-Square
Capital Allowances	390	Positive	-1.5521	3.6331	0.1825	0.6692
Compensation	101	Positive	22.4579	42.528	0.2789	0.5974
Expense Accruals	290	Positive	10.563	6.7783	2.4285	0.1191
Fair value adjustments	53	Positive	-179.6	69.1582	6.7462	0.0094
Prepayments	169	Positive	23.8885	37.6928	0.4017	0.5263
Revenue accruals	165	Positive	53.1938	19.2198	7.6599	0.0056
Recognised tax loss	358	Negative	23.1923	5.7523	16.2555	<0.0001
Total DTE	717	Positive	14.6794	3.5086	17.5047	<0.0001

A similar table depicting odds ratio is shown under Appendix C table 16

Significant differences at the 5% level are shaded in grey

[1] Expected coefficient in the presence of upward EM to avoid a loss

4.2.2. Cash flow components

The use of the DTE as a proxy for discretionary accruals is based on the assumption that management choose to manipulate earnings without affecting tax ((Phillips et al., 2003). Although this is certainly the most cost-efficient manner in which earnings are managed, prior research (Erickson et al., 2004) has indicated that managers are willing to manage earnings and pay tax thereon if this would make EM more inconspicuous.

In contrast, when utilising the cash flow reconciliation as a source of information to identify discretionary accruals, most of the accruals are apparent, regardless of whether these affect current tax or not. In other words, the reconciling items between profit before tax and cash flow from operations represent the total accruals of the company. Consequently, the analysis of the cash flow reconciliation may reveal a more complete picture of discretionary accruals as compared to the deferred tax note.

The cash flow components associated with EM to avoid a loss are expected to have significant and positive coefficients in the logistic regressions.

Descriptive statistics as well as clustered mean and median tests are presented in tables 6 and 7. The results of the logistic regressions performed on the cash flow components are presented in table 8. Variables with significantly different means and/or medians across EM0 and EM1 are shaded in grey.

The only three variables found to have significantly different means and medians across EM0 and EM1 firms were: 1) “changes in accounts receivable” (means of -0.002: 0.046 for EM0:EM1 firms with $p=0.0042$ and medians of -0.001: 0.013 for EM0:EM1 firms with $p<0.0001$); 2) “changes in inventory” (means of -0.029: 0.015 for EM0:EM1 firms with $p=0.027$ and medians of 0.00: 0.003 for EM0:EM1 firms with $p=0.000$) and; 3) “depreciation” (means of -0.178: -0.081 for EM0:EM1 with $p=0.0004$ and medians of -0.036: -0.029 for EM0:EM1 firms with $p=0.0025$).

Furthermore, all three of these variables were also found to have significant (at 5% level) and positive coefficients (table 8) in the logistic regressions, as expected for upward EM to avoid a loss.

Changes in accounts receivable and changes in inventory are two accrual types that have been widely identified in previous research as being typical areas that are susceptible to upward

earnings management (Feroz et al., 1991; Beneish, 1999; Nelson et al., 2002; Dechow et al., 2011). Although, some researchers have documented "depreciation" as being an area for manipulation (Nelson et al., 2002), others have found no evidence that this accrual is used for EM, primarily due to its very conspicuous nature (Dechow et al., 2011). Furthermore, this study did not find an association of the related DTE accrual (capital allowances) with EM to avoid a loss (table 5 and table 16 in Appendix C). As a result of this potential disparity between the DTE and the cash flow findings relating to "depreciation" supplementary tests were performed on each of the three variables identified as being associated with EM. The methodology used and results of the supplementary tests are discussed in chapter 5.

i. CF components with significant but negative coefficients

Equity accounted earnings and foreign exchange differences have significant (at 5% level), but negative coefficients (table 8). This result indicates that as the magnitude of the variable increases, so the odds of it indicating an EM1 firm decreases. In other words, a negative coefficient would suggest that EM1 firms have greater losses than EM0 firms. This is not congruent with upward earnings management. If equity accounted profits or foreign exchange differences were being manipulated to avoid a loss, the coefficient would be positive, as there should be greater profits in EM1 firms than EM0 firms. The results for these categories are therefore inconclusive and do not warrant any further discussion.

In summary, the analyses of both the deferred tax components as well as the cash flow reconciliation items revealed that revenue related accruals (and changes in accounts receivable) are associated with EM to avoid a loss in South African listed companies. The underlying assumption that companies prefer to manage earnings upwards without affecting taxable income (Phillips et al., 2003) limits the use of the DTE as a tool for identifying all potential accruals used to manage earnings upwards. The use of the cash flow reconciliation in the identification of EM accruals, however, poses no such limitation as all accruals are considered (regardless of whether they affect current or deferred tax). Two additional accruals were identified as being associated with EM when using the cash flow reconciliation note disclosure, these being "changes in inventory" and "depreciation".

Tests on the DTE components also revealed that loss firms recognise significantly more deferred tax savings on tax losses than profit firms. This recognition of deferred tax on tax losses is not a result of earnings management but is instead a distinctive financial characteristic of loss firms. This finding created uncertainty about whether the total DTE was indeed useful at detecting EM to avoid a loss or whether this outcome was driven by the "recognised tax loss component" of DTE. This uncertainty was addressed in the supplementary tests (chapter 5).

Table 6: Descriptive statistics for cash flow components (scaled by number of ordinary shares in issue at year end)

Variable	EM	N	Means	Std Dev	Min	Max	Medians	25th Pctl	75th Pctl	z(skew)	z(kurt)
Changes in Accounts payables	0	219	-0.034	0.232	-1.237	0.554	-0.003	-0.048	0.016	-15.47	39.59
Changes in Accounts payables	1	481	-0.056	0.221	-1.237	0.554	-0.009	-0.059	0.015	-24.89	54.8
Changes in Accounts receivable	0	213	-0.002	0.176	-0.602	0.885	-0.001	-0.031	0.026	7.26	31.08
Changes in Accounts receivable	1	480	0.046	0.18	-0.602	0.885	0.013	-0.007	0.071	12.45	33.35
Changes in Inventory	0	182	-0.029	0.267	-1.351	0.774	0	-0.018	0.007	-13.59	38.68
Changes in Inventory	1	402	0.015	0.168	-1.351	0.774	0.003	-0.002	0.034	-24.49	127.78
Depreciation	0	202	-0.178	0.331	-1.698	0	-0.036	-0.196	-0.009	-17.88	29.37
Depreciation	1	471	-0.081	0.2	-1.698	0	-0.029	-0.069	-0.011	-54.51	189.7
Employee costs	0	114	-0.008	0.03	-0.148	0.075	-0.001	-0.01	0	-9.15	20.26
Employee costs	1	272	-0.007	0.023	-0.148	0.075	-0.002	-0.008	0	-18.29	56.84
Equity accounted profits	0	54	0.566	1.756	-0.195	6.641	0.003	-0.001	0.031	9.13	11.69
Equity accounted profits	1	104	0.027	0.105	-0.195	0.742	0.002	0	0.012	18.8	51.56
Fair value (P/L)	0	27	0.006	0.014	-0.027	0.05	0.001	0	0.011	2.04	3.42
Fair value (P/L)	1	91	-0.009	0.106	-0.635	0.216	0	-0.001	0.006	-17.49	50.89
Foreign exchange differences	0	57	0.001	0.162	-0.788	0.576	0	-0.004	0.006	-2	22.6
Foreign exchange differences	1	92	-0.005	0.1	-0.788	0.408	0	-0.001	0.006	-19.11	88.94
Profit on disposal	0	172	0.006	0.05	-0.122	0.244	0	-0.001	0.004	10.76	26.76
Profit on disposal	1	379	0.009	0.037	-0.067	0.244	0	0	0.003	36.89	91.89
Provisions	0	90	-0.009	0.109	-0.738	0.231	0	-0.009	0.005	-14.19	45.99
Provisions	1	189	-0.043	0.197	-1.134	0.231	0	-0.007	0.003	-24.9	55.69

Table 7: Results of null hypothesis of no significant difference between means and medians of cash flow components (scaled by number of ordinary shares in issue at year end) in EM1 firms vs EM0 firms

Variable	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
Changes in Accounts payable	0.39	0.65
Changes in Accounts receivable	0.0042	<0.0001
Changes in Inventory	0.027	0.000
Depreciation	0.0004	0.0025
Employee costs	0.65	0.37
Equity accounted profits	0.28	0.23
Fair value (P/L)	0.19	0.075
Foreign exchange differences	0.75	0.86
Profit on disposal	0.39	0.041
Provisions	0.42	0.66

Table 8: Outcome on logistic regressions performed on cash flow components (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years

Variable	N	Coefficient (β)	Standard Error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio	
Changes in Accounts payables	699	-0.5413	0.5027	1.1594	0.2816	0.582	0.217	1.560
Changes in Accounts receivable	689	2.4898	0.7287	11.675	0.0006	12.048	2.890	50.0
Changes in Inventory	583	1.1813	0.5865	4.0562	0.044	3.257	1.032	10.309
Depreciation	660	10.2709	1.9725	27.1136	<0.0001	>999.999	500.0	>999.999
Employee costs	382	1.5552	5.4441	0.0816	0.7751	4.739	<0.001	>999.999
Equity accounted profits	156	-0.6295	0.2499	6.3432	0.0118	0.533	0.326	0.870
Fair value (P/L)	116	-1.6663	1.7219	0.9366	0.3332	0.189	0.006	5.525
Foreign exchange differences	144	-4.4374	1.5274	8.4402	0.0037	0.012	<0.001	0.236
Profit on disposal	550	2.18	2.8081	0.6027	0.4376	8.850	0.036	>999.999
Provisions	277	-1.5089	1.3859	1.1855	0.2762	0.221	0.015	3.344

5. SUPPLEMENTARY TESTS

The purpose of the supplementary tests was two-fold. Firstly, an additional hypothesis was tested to ascertain whether the presence of the DTE component relating to recognised tax losses affected the primary result, in which total DTE was found to be useful in detecting EM to avoid a loss. Thereafter, the validity and robustness of the DTE and the cash flow components found to be associated with upward EM to avoid a loss (as per the primary results shown in chapter 4) was assessed by controlling for growth (for DTE component only) and for distinctive financial characteristics in profit vs loss firms (for cash flow components only) in the logistic regressions performed.

These tests and control measures are discussed in detail below.

5.1. BACKGROUND

5.1.1. Effect of recognised tax losses on usefulness of total DTE to detect EM

This study has shown (in chapter 4 above) that the total DTE is equally useful to the MJ discretionary accrual measure at detecting EM to avoid a loss. In other words, as DTE increases (consequent to increases in income-related accruals or decreases in expense related accruals), so the likelihood of a firm being an EM1 firms increases. Consequently, in line with the findings of Phillips et al. (2003), one can argue that DTE could be used as a proxy for discretionary accruals in South Africa.

When analysing the components of the DTE however, the primary results of this study show that EM0 firms recognise significantly more tax losses than EM1 firms and that this is a consequence of comparing loss firms (EM0) to profit-making firms (located in the EM1 band). In other words, the recognition of tax losses is a distinguishing factor between profit and loss companies and not of EM0 and suspected EM firms. The DTE of loss firms (i.e. EM0 firms) that recognise tax losses is therefore lower than the DTE of the firms in the EM1 location because of this distinction and not necessarily because of earnings management.

These findings lead to an uncertainty as to whether the recognition of tax losses in EM0 firms is driving the “apparent” association of the total DTE with EM to avoid a loss.

In light of this uncertainty, the following hypothesis was tested:

H4: The residual deferred tax expense[51] is incrementally useful to discretionary accruals, computed using the Modified Jones model, in detecting upward earnings management to avoid reporting a loss..

5.1.2. Deferred tax expense component – Revenue accrual

The primary results (chapter 4) indicate that "revenue-related accruals" are associated with EM to avoid reporting a loss. The association of this accrual to EM, in the presence of a control variable for growth, was re-tested using logistic regression.

Phillips et al. (2003) suggested that the comparison of high growth companies to companies with lower growth rates could distort the significance of the results when comparing EM0 and EM1. In other words, an increase in DTE could be merely a consequence of year-on-year growth in a company's assets and not the result of EM. This robustness test followed the supplementary tests performed by Phillips et al. (2003) who validated their own primary findings (of usefulness of DTE to detect earnings management) by augmenting their probit regression with a growth control variable (using firstly average[52] growth in assets and then average growth in revenue as the control variable).

5.1.3. Cash flow components

Robustness tests were performed on cash flow accruals that were found to be associated with EM (per primary results) to test whether the association was a result of EM or the consequence of a distinctive financial characteristic in profit vs loss firms.

Profit and loss companies often possess distinct financial characteristics. As an example, loss companies recognise more tax losses than do profit firms and thereby normally report tax

[51] The residual total deferred tax expense (residual DTE) is calculated by deducting the deferred tax on recognised tax losses from total deferred tax expense.

[52] The main purpose of averaging the growth control variables is that the impact of irregularities that could possibly occur in an exceptional year is reduced. A potential weakness of using either growth in assets or growth in revenue as a growth control variable is that both revenue and assets could be manipulated upwards and may not be entirely independent of other variables in the regression. However, by using the ***average*** of the growth variable, the effects of any potential earnings management on these variables should be mitigated, particularly where discretionary accruals are reversed in one of the years.

savings whereas profit companies normally report tax expenses. Furthermore, Beaver et al. (2007) reported that the tax expense of a profit company does not necessarily mirror the tax saving of a loss company (i.e. asymmetry in the recognition of taxes exists in profit vs loss companies) as loss companies are only able to recognise their tax losses to the extent of future taxable income (IAS 12: *Income taxes* para 24). Jordan and Clark (2011) found evidence of large impairments of goodwill in loss-making firms as opposed to profit firms. Ferrando and Mulier (2013) found that companies with increased profitability measures have reduced financing constraints. In other words, loss making-firms would normally have greater debt-financing constraints compared to profit-making firms.

The primary results in this study (chapter 4) suggest that the following three CF components are associated with upward EM to avoid a loss.

1. Changes in accounts receivable
2. Changes in inventory and,
3. Depreciation

In order to confirm that the above-mentioned accruals are associated with upward EM to avoid a loss (as observed and discussed in chapter 4) and the association found is not a consequence of distinctive financial characteristics of profit vs loss companies, a supplementary test was performed where logistic regressions were performed on significant CF components[53] deflated by their "drivers"[54] (refer to equation 5 below). By deflating the CF components by their specific drivers, the additional logistic regressions performed were controlled for the effect of distinctive financial characteristics in profit vs loss firms. In the context of this study, a driver represents a financial element that 1) has dissimilar financial characteristics in profit vs loss companies and; 2) drives or affects a change on the independent variable being tested.

The deflator (driver) used for changes in accounts receivable and changes in inventory is based on the widely held notion underlying DuPont analysis that "sales is a fundamental driver of a firm's investment and income, and that net operating assets on the balance sheet

[53] Significant components: This is referring only to those variables found to have positive and statistically significant coefficients when performing equation 2 of the primary analysis. In other words, these variables initially appeared to be associated with upward EM to avoid a loss.

[54] A driver is simply a factor that influences or drives the outcome of an activity. It can broadly be defined as "an aspect of business that effects a change on another aspect of business" (http://m.investorwords,com/1586/driver.html (16 Dec 2014).

and net operating income on the income statement should vary directly with sales" (Jansen et al., 2012). In other words, as sales increase, so the accounts receivable balance should increase (due to an increase in credit sales). In a similar manner, an increase in sales effects a need for increased inventory levels (i.e. would normally cause an increase in inventory purchased).

By scaling the "changes in accounts receivable" and "changes in inventory" by turnover (sales) and using these as independent variables in separate logistic regressions, this study tests whether the significance of the coefficient on these variables is likely to be the result of upward EM to avoid a loss or rather a consequence of different levels of turnover in profit vs loss companies[55].

The deflator (driver) used for depreciation[56] is lagged property, plant and equipment (including intangible assets and goodwill) as depreciation is derived from the levels of property, plant and equipment (PPE) in a firm.

This section is followed by the methodology used (section 5.2) for the supplementary tests and concludes by discussing the results (section 5.3) in the context of the primary analysis as documented under chapter 4.

5.2. METHODOLOGY

5.2.1. Descriptive tests

Descriptive tests, (as described under chapter 3, section 3.4.1 above) were performed on the residual DTE and on the cash flow components (changes in accounts receivable, changes in inventory and depreciation) scaled by their drivers.

[55] The descriptive statistics (financial characteristics) of sales and property, plant and equipment (including and excluding goodwill) were observed in South African listed companies (as per tables 17 and 18 in Appendix C). The means and medians of these variables were all found to be significantly different across profit and loss companies.

[56] The cash flow component labelled "depreciation" includes depreciation on property, plant and equipment (PPE), amortisation of intangible assets and impairments of PPE, intangible assets and goodwill.

5.2.2. Estimation of logistic regressions

i. Effect of recognised tax losses

In order to test whether the DTE remains useful in detecting EM after deducting deferred tax relating to recognised tax losses, the following logistic regression was estimated:

EQUATION 3: $\text{Logit}(p) = \beta_0 + \beta_1 \text{ResDTE}_{it} + \beta_2 \text{CFO}_{it} + \beta_3 \text{DAMJ}_{it} + \beta_4 \text{ industry} + \mu_{it}$

Where:

logit (p)	is the odds ratio; i.e. logit (p) = p / (1-p)
P	is the probability of $EM_{it}=1$ given an independent variable (IV) i.e. $p = P(EM_{it}=1 \mid IV)$
$EM_{it} = 1$	Where firm i has been identified as an EM firm using KDE distribution. $EM_{it}=0$ has been chosen as the reference and the equation is modelling EM1 firms.
ResDTE_{it}	the "residual DTE" after deducting the deferred tax on recognised tax losses from the total DTE, scaled by number of shares in issue at the end of the reporting period.
CFO_{it}	this represents firm i's total cash flow from operations.
DAMJ_{it}	Discretionary accruals computed using the MJ model (Dechow et al., 1995) as total accruals *(Tacc)* less non-discretionary accruals. Non-discretionary accruals are estimated as $Tacc_{it} = \alpha + \beta_1 (\Delta REV_{it} - \Delta REC_{it}) + \beta_2 PPE_{it} + \xi_{it}$ where ΔREV_{it} is change in firm *i*'s sales from period *t-1* to *t*; ΔREC_{it} is changes in firm *i's* receivables from year *t-1* to *t*, PPE_{it} is gross property, plant and equipment for firm *i* in period *t*. All variables are scaled by lagged total assets.
Industry	this categorical variable controls for the industry for a particular observation. The industries controlled for are: Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunications and Utilities

ii. DTE "revenue related accruals" component: Inclusion of additional variable that controls for growth

In order to assess whether the primary results obtained (per chapter 4 above) relating to the significant DTE components are valid, i.e. are not the result of comparing high growth companies to companies with low or negative growth, additional logistic regressions, that control for growth, were performed on the DTE component relating to revenue accruals, as follows:

EQUATION 4: $\text{Logit}(p) = \beta_0 + \beta_1 DTE_{it} + \beta_2 CFO_{it} + \beta_3 \text{growth}_{it} + \beta_4 \text{industry} + \mu_{it}$

Where:

logit (p)	is the odds ratio; i.e. logit (p) = p / (1-p)
P	is the probability of EM_{it}=1 given an independent variable (IV) i.e. p = P(EM_{it}=1 | IV)
EM_{it} = 1	Where firm i has been identified as an EM firm using KDE distribution. EM_{it}=0 has been chosen as the reference and the equation is modelling EM1 firms.
DTE_t	this represents the total deferred tax expense
CFO_{it}	this represents firm i's total cash flow from operations.
growth_{it}	this represents one of the two growth variables (average growth in revenue or average growth in total assets[57]) scaled over number of shares at the end of the period.
Industry	this categorical variable controls for the industry for a particular observation. The industries controlled for are: Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunications and Utilities

[57] In the sensitivity analysis conducted by Phillips et al. (2003), the growth control variables were averaged over a prior period of three years. In this study however, using three years would significantly reduce the sample size and thereby render the results unreliable. As such, the control variables were averaged over a prior period of two years.

The control variables included, were calculated as follows:

Growth control variable	Calculation
Average growth in revenue	$[((\text{turnover}_t - \text{turnover}_{t-1})/\text{turnover}_{t-1}) + ((\text{turnover}_{t-1} - \text{turnover}_{t-2})/\text{turnover}_{t-2})]/2$
Average growth in total assets	$[((\text{total assets}_t - \text{total assets}_{t-1})/\text{total assets}_{t-1}) + ((\text{total assets}_{t-1} - \text{total assets}_{t-2})/\text{total assets}_{t-2})]/2$

iii. Cash flow components

In order to assess whether the primary results obtained (per chapter 4 section 4.2.2 above) relating to the significant cash flow components are valid, i.e. are not the result of merely comparing profit and loss companies with distinctive financial characteristics, additional logistic regressions, that control for inequalities between profit and loss firms, were performed. Distinguishing financial characteristics between profit and loss firms were controlled for by deflating the significant cash flow components by their drivers.

The additional logistic regression performed is represented as follows:

EQUATION 5: $\text{Logit}(p) = \beta_0 + \beta_1 \text{CF component}_{it} + \beta_2 \text{CFO}_{it} + \beta_3 \text{ industry} + \mu_{it}$

Where:

logit (p)	is the odds ratio; i.e. logit (p) = p / (1-p)
P	is the probability of $EM_{it}=1$ given an independent variable (IV) i.e. $p = P(EM_{it}=1 \mid IV)$
$EM_{it} = 1$	Where firm i has been identified as an EM firm using KDE distribution. $EM_{it}=0$ has been chosen as the reference and the equation is modelling EM1 firms.
CF component_{it}	this represents the individual cash flow components scaled by their specific drivers.
CFO_{it}	this represents firm i's total cash flow from operations.
Industry	this categorical variable controls for the industry for a particular observation. The industries controlled for are: Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunications and Utilities

Each independent variable, with the exception of the cash flow component, was scaled by number of ordinary shares in issue at the end of the reporting period.

Logistic regressions were performed for the following cash flow components:

	Component	**Deflator**
1	Change in accounts receivable	Turnover
2	Change in Inventory	Turnover
3	Depreciation	PPE_{t-1}
4	Depreciation (excluding goodwill impairments)	PPE_{t-1} (excluding goodwill)

This regression was therefore only performed on those cash flow variables found to have significant, positive coefficients when estimating equation 2 as well as on depreciation excluding goodwill impairments.
The additional logistic regression was performed to test whether the levels of goodwill impairment included under the "depreciation" cash flow component, could have had an effect on the significance of this coefficient (per equation 2).

5.3. RESULTS AND DISCUSSION

5.3.1. Residual DTE

The primary results suggested that the DTE component relating to recognised tax losses is not associated with EM but is instead a distinctive characteristic of loss vs profit firms. Loss firms have lower DTE because of the recognition of tax losses when compared to profit making firms. Consequent to this finding, the question was raised as to whether the deferred tax arising on the recognised tax loss component could affect the apparent association of the total DTE with EM to avoid a loss.

When removing the recognised tax loss component from total DTE, the means and the medians of the residual DTE were no longer significantly different between EM0 and EM1 firms (p=0.92 for means and p=0.67 for medians)[58&59]. In addition, when performing the

[58] Descriptive statistics for total and residual DTE (scaled by number of ordinary shares in issue at year end)

logistic regression per equation 3, the estimated coefficient on the abnormal accruals remained positive and highly significant, but the coefficient on the residual DTE was positive and ***insignificant*** (β=0.968; p=0.822)[60]. Hypothesis 4 is therefore rejected as this result indicates that the residual DTE is not useful at detecting EM to avoid a loss.

Phillips et al. (2003) and Phillips et al. (2004) found that DTE could be used as a proxy for discretionary accruals. More specifically, Phillips et al. (2003) and Phillips et al. (2004) found that DTE was incrementally useful to discretionary accrual measures at detecting EM to avoid a loss and to avoid an earnings decline. In this study, total DTE and the MJ discretionary accrual measure appeared to be equally useful at detecting EM to avoid a loss in South African companies (p<0.0001 for discretionary accruals and p<0.0001 for total DTE). The results of the supplementary tests show that the principle reason that the total DTE was

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Variable	EM	N	Mean	Std Dev	Min	Max	Median	25th Pctl	75th Pctl	z(skew)	z(kurt)
Total DTE	0	225	-0.015	0.04	-0.164	0.08	0	-0.016	0	-12.68	16.37
Total DTE	1	496	0	0.027	-0.164	0.08	0	-0.005	0.006	-15.55	56.80
Residual DTE	0	115	0.003	0.064	-0.218	0.2	0	-0.006	0.01	0.19	11.63
Residual DTE	1	251	0.002	0.032	-0.218	0.2	0	-0.006	0.007	3.38	62.96

[59] Results of null hypothesis of no significant difference between means and medians of total and residual DTE (scaled by number of ordinary shares in issue at year end) in EM1 firms vs EM0 firms

Variable	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
Total DTE	<0.0001	<0.0001
Residual DTE	0.92	0.67

[60]Outcome on logistic regression performed on total and residual DTE (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years and using Modified Jones abnormal accruals as an additional control variable.

	N	Coefficient (β)	Std error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio		Coefficient (β) Abnormal Accruals	Pr > Chi-Square Abnormal Accruals
Total DTE	618	18.385	3.9117	22.0903	<.0001	>999.99	>999.99	>999.99	8.0959	<.0001
Residual DTE	319	0.968	4.307	0.051	0.822	2.632	<0.001	>999.99	7.222	<.0001

originally found to be equally as useful as the MJ discretionary accruals at detecting EM (β=18.385; p<0.0001) was due to the distinctive financial characteristic of recognised tax losses in loss vs profit companies, and not because of EM.

Consequently this research provides evidence that DTE, as a whole, is not useful at detecting EM to avoid a loss and cannot be used as a proxy for discretionary accruals in South African firms.

5.3.2. Deferred tax expense component – Revenue accrual

The introduction of the additional variables that control for growth did not alter the direction or significance of the coefficient for the "revenue accrual" DTE component (β= 56.27 and p=0.009 for average growth in assets; β=46.85 and p=0.0149 for average growth in revenue) when performing the logistic regression. These results[61] suggest that the significance of the coefficient is not a consequence of EM1 firms being higher growth firms than EM0 firms. Rather, the significance of this component appears to be due to upward EM occurring through the use of revenue accruals. This outcome is therefore consistent with the primary result that the "revenue accruals" DTE component is associated with upward EM to avoid a loss.

5.3.3. Cash flow components

i. Changes in Accounts Receivable

The means and medians of changes in accounts receivable (scaled by sales) remained significantly different between EM0 and EM1 firms (means of -0.028:0.025 for EM0:EM1 with p=0.0023; and medians of -0.004:0.016 for EM0:EM1 with p<0.0001). Furthermore, the coefficient for this component remained positive and significant (β = 1.7; p= 0.044). This result confirms the primary result that "changes in accounts receivable" is associated with EM to avoid a loss. Furthermore, it corresponds with the finding that the DTE component

[61] Outcome on logistic regression performed on DTE: revenue accruals variable (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years and additional control variable for growth as depicted in equation 4.

Variable	Additional control Variable	N	Coefficient (β)	Standard Error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio	
Revenue accruals	Average growth: Revenue	130	46.854	19.2459	5.9267	0.0149	>999.99	>999.99	>999.99
Revenue accruals	Average growth: Assets	130	56.2658	21.5366	6.8255	0.009	>999.99	>999.99	>999.99

relating to revenue accruals is also associated with upward EM to avoid a loss (refer to chapter 5 section 5.3.2 above).

ii. Changes in inventory

The means and medians of changes in inventory (scaled by sales) remained significantly different between EM0 and EM1 firms (means of -0.006:0.011 for EM0:EM1 with p=0.0054; and medians of 0:0.003 for EM0:EM1 with p<0.0001). Furthermore, the coefficient for this component remained positive and significant (β = 7.26; p=0.017). This outcome confirms the primary result that "changes in inventory" is associated with EM to avoid a loss which is in line with prior research that has also identified this working capital accrual as being associated with EM (Beneish, 1999; Dechow et al., 2011).

iii. Depreciation

The result of the logistic regression performed on depreciation (scaled by PPE_{t-1}) remained positive and significant (β =0.9129; p=0.0085) inferring that depreciation could in fact have been used for earnings manipulation and is not merely a function of the level of PPE in profit vs loss firms.

A second logistic regression was performed for depreciation (excluding goodwill impairments and write-downs) scaled by PPE (excluding goodwill) at the beginning of the year.

Although the coefficient for depreciation (excluding goodwill impairments) deflated by PPE (excluding goodwill) remained significant, it was no longer positive (β=-0.7782; p=0.0030). In other words, after excluding the effects of goodwill, the depreciation/amortisation and impairment of fixed assets and intangibles was lower in EM0 firms than in EM1 firms (means of -0.185 in EM0 firms and -0.272 in EM1 firms; p=0.02). This finding suggests that the reason that the coefficient of depreciation was initially found to be positive and significant was because of the relatively large and significant goodwill write-offs in EM0 firms (means of -0.43:-0.16 for EM0:EM1 with p=0.0035; and medians of -0.13:0 for EM0:EM1 with p<0.0001). In other words, by excluding the goodwill impairments, the resultant depreciation component is in fact greater for EM1 companies than for EM0 companies and can therefore not be associated with EM, i.e. association with upward EM would be counter-intuitive as a larger depreciation expense in EM1 firms would reduce earnings.

This finding is consistent with the primary DTE component results (as shown in table 5) in which the deferred tax "capital allowances component" – which in essence is the temporary differences arising on items of depreciation and impairments, was not found to be associated with EM.

Dechow et al. (2011) argued that the management of earnings through depreciation would be conspicuous and unlikely due to the fact that preparers of financial statements are required to disclose the effects of changes in depreciation policies. The main reason that depreciation initially appeared to be associated with EM was a function of how this component was originally defined in this study (i.e. depreciation, amortisation and impairments of tangible and intangible assets and goodwill) and the resultant consequence of large goodwill impairments in EM0 firms, compared to EM1 firms.

In terms of IAS 36: *Impairment of assets*, companies are required to perform an annual impairment test for goodwill. Intuitively, one expects to find that the recoverability of goodwill is less probable in loss-making firms, making this asset more prone to impairment. This could explain the large goodwill write-downs in EM0 firms. An alternate reason for the large goodwill impairments in loss-making firms could be a result of the "big bath effect". "The big bath theory holds that companies with unusually low earnings in the current year will take large write downs to lower earnings even further. As observed by Jordan and Clark (2011:68), "there seems to be little additional penalty for missing the earnings mark by a lot rather than by a little". Jordan and Clark (2011) found evidence of large impairments of goodwill in loss-making firms. Although there is no clear evidence in this study that points to the big bath effect, this could be an area for future investigation.

In summary, the primary results (as per chapter 4) showed that the total DTE was found to be equally useful to discretionary accruals (calculated using the MJ model) at detecting EM to avoid a loss. However, when the DTE component related to the recognised tax losses was removed from the total DTE, then the residual DTE was no longer associated with EM to avoid a loss. This finding suggests that the usefulness of total DTE to detect EM is caused by loss companies (EM0 firms) recognising more deferred tax assets (due to the recognition of

tax losses) than profit firms (included in EM1 bandwidth) and is not the result of earnings management, as previously argued by Phillips et al. (2003) and Phillips et al. (2004).

When analysing the DTE and the cash flow components, both the primary analysis as well as the supplementary tests revealed that revenue related accruals (and changes in accounts receivable) as well as changes in inventory are associated with EM to avoid a loss in South African listed companies; i.e. in accordance with hypothesis 2 and 3 these components were found to be useful at detecting EM to avoid a loss. The cash flow component relating to depreciation was found not to be associated with EM to avoid a loss after performing the supplementary tests on the primary results. Instead, the initial association with EM (in the primary results) was driven by the inclusion of large goodwill write-downs in loss firms (EM0 firms) compared to profit firms (included in the EM1 bandwidth).

This finding again highlights a key limitation of using earnings distributions to obtain a sample of suspected EM firms, in that the EM1 interval includes legitimate profit-making firms which have distinctive financial characteristics to the non-EM firms (loss-making and control entities).

Table 9: Descriptive statistics for statistically significant cash flow components (scaled by drivers)

Variable	EM	N	Mean	Std Dev	Min	Max	Median	25th Pctl	75th Pctl	z(skew)	z(kurt)
ΔAccounts Receivable/Turnover	0	200	-0.028	0.226	-1.087	0.809	-0.004	-0.058	0.029	-6.75	30.8
ΔAccounts Receivable/Turnover	1	469	0.025	0.168	-1.087	0.809	0.016	-0.009	0.055	-10.95	97.98
ΔInventory/Turnover	0	178	-0.006	0.069	-0.204	0.245	0	-0.028	0.012	1.48	11.27
ΔInventory/Turnover	1	398	0.011	0.045	-0.204	0.245	0.003	-0.002	0.018	13.89	43.57
Depreciation/PPE[1](t-1)	0	197	-0.281	0.29	-1.7	0	-0.198	-0.345	-0.098	-13.855	22.536
Depreciation/PPE(t-1)	1	418	-0.232	0.265	-1.7	0	-0.151	-0.264	-0.077	-26.167	52.137
Depreciation ex GWI[2]/PPE ex GW[3](t-1)	0	197	-0.185	0.329	-1.213	1.38	-0.175	-0.294	-0.083	13.443	33.75
Depreciation ex GWI/PPE ex GW(t-1)	1	418	-0.272	0.332	-1.474	1.38	-0.199	-0.372	-0.099	-3.681	30.712
Goodwill impairment/Goodwill(t-1)	0	66	-0.43	0.6	-3.55	0.25	-0.13	-0.73	0	-8.56	17.26
Goodwill impairment/Goodwill(t-1)	1	192	-0.16	0.5	-3.55	0.25	0	-0.1	0	-29.27	84.43

[1]PPE refers to property, plant and equipment and includes both intangible assets and goodwill.
[2]Depreciation ex GWI refers to depreciation, amortisation and impairments excluding any impairments or write-offs of goodwill.
[3]PPE ex GW refers to property, plant and equipment and includes intangible assets but excludes goodwill.

Table 10: Results of null hypothesis of no significant difference between means and medians of cash flow components (scaled by drivers) in EM1 firms vs EM0 firms

Variable	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
ΔAccounts Receivable/Turnover	0.0023	<0.0001
ΔInventory/Turnover	0.0054	<0.0001
Depreciation/PPE(t-1)	0.061	0.0013
Depreciation ex GWI/PPE ex GW(t-1)	0.0020	0.42
Goodwill impairment/Goodwill(t-1)	0.0035	<0.0001

Table 11: Outcome on logistic regressions performed on significant cash flow components (scaled by drivers) comparing EM1 to EM0 firm years

Variable	N	Coefficient (β)	Standard Error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio	
ΔAccounts Receivable/Sales	675	1.6976	0.8449	4.0372	0.044	5.46448	1.04275	28.5714
ΔInventory/Sales	581	7.2577	3.0066	5.8268	0.017	>999.999	3.92157	>999.999
Depreciation/PPE(t-1)	615	0.9129	0.347	6.9221	0.0085	2.49377	1.26263	4.92611
Depreciation ex GWI/PPE ex $GW_{(t-1)}$	615	-0.7782	0.2623	8.8003	0.003	0.45914	0.27465	0.76805

6. CONCLUSION

The purpose of this study was firstly to establish whether the total DTE could be used as a surrogate for discretionary accruals in the South African context. Secondly, this study identified the types of accruals used by South African listed companies to manage earnings upwards to avoid reporting a loss.

On initial examination, this research found that the total DTE was equally useful to the modified Jones (MJ) discretionary accrual measure at detecting EM to avoid a loss, initially showing that DTE could be used as a proxy for discretionary accruals in the South African environment.
Thereafter, in the analysis of the DTE components, the DTE variable relating to recognised tax losses was not found to be associated with EM, but was instead observed to be significantly greater in EM0 firms (i.e. causing a significant decrease in the DTE in these companies) than in EM1 firms. This finding would be anticipated if comparing loss firms to profit firms as the recognition of tax losses would be expected to be distinctly greater in loss firms than profit firms. Consequent to this finding, the study found that after deducting this DTE component from the total DTE, the residual DTE (total DTE less recognised tax losses) was not useful, in the presence of the MJ discretionary accrual measure, at detecting EM to avoid a loss.
This result makes two important contributions to accrual-based EM research. Firstly, it shows that total DTE cannot be used as a surrogate for EM in South African listed companies. This is based on the fact that it is the underlying DTE component relating to recognised tax losses that is driving the apparent "usefulness" of total DTE to detect EM to avoid a loss. Secondly, it unveils a limitation of using empirical distributions for the identification of EM firms in that the EM1 interval identified as being the location of suspected EM firms (loss firms that managed earnings upwards) is also the location of other legitimate profit-making firms. If not controlled for, the distinctive financial characteristics of these profit-making firms compared to the loss firms (non-EM firms) could obstruct attempts to identify financial characteristics of EM0 vs suspected EM firms.
An important avenue for future research would be to consider the effect of the recognised tax loss component of DTE on the usefulness of DTE to detect EM in international financial markets. Furthermore, it would be interesting and very useful, for future researchers to develop a means of specifically identifying the "true" EM firms (loss making firms that have managed earnings upwards to avoid the loss) located in the EM1 interval of an empirical distribution. If

this problem were resolved, then empirical distributions would become very valuable in the identification of EM firms, particularly in emerging markets where other sources of EM information (e.g. databases of restated company earnings) are limited.

Further examination of the DTE components revealed that revenue-related accruals are associated with EM to avoid a loss. This was confirmed through an assessment of the cash flow reconciliation note, where "changes in accounts receivable" was also found to be associated with EM to avoid a loss. In addition to this, the cash flow reconciliation note revealed that "changes in inventory" is associated with upward EM. This additional discretionary component was detected due to the fact that the accruals identified off the cash flow reconciliation represent the total "operating" accruals of the firm and not just those that affect deferred tax. Furthermore, the reconciling items in the cash flow reconciliation note are easier to interpret than the components of the deferred tax note as they represent the actual accruals of an entity as opposed to the tax effect of a temporary difference. As such, the cash flow reconciliation note is a more informative and possibly superior tool to the deferred tax note for detecting discretionary accruals.

These analyses should provide useful insights to analysts, auditors, investors, and other financial statement users regarding the usefulness of both the deferred tax note and the cash flow reconciliation note (particularly when analysed together) for detecting areas of earnings management. Furthermore, this study should provide such users with a better understanding of the accounts that are being used by South African listed companies to manage earnings upwards to avoid reporting losses.

As the SA environment provides a unique opportunity to test information from the cash flow reconciliation this research has provided insight into detecting evidence of EM that has not previously been considered. Consequently, a final contribution of this research would be to recommend to international standard-setting bodies that the cash flow reconciliation note become compulsory disclosure for all entities that are required to report in terms of international accounting standards, regardless of whether the entity chooses the direct or the indirect method of presenting the statement of cash flows.

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8. APPENDIX A

This Appendix sets out the methodology and results used in this study for identifying the sample of EM firms using an empirical distribution of earnings as described by (Lahr, 2014) and (Rabin and Negash, 2012).

8.1. Detection of suspected EM firms through earnings distribution

Suspected EM firms were identified through the comparison of an empirical distribution of net income after tax scaled by number of ordinary shares in issue (at year end) and a reference distribution constructed using KDE from the empirical distribution as proposed by Lahr (2014). This section will begin with a brief description of the population of firms used to derive the earnings distribution curves. This will then be followed by a discussion of the deflated earnings figure utilised and an explanation of the KDE method used to identify the location of suspected EM firms on the distribution curve.

8.1.1. Population used in earnings distribution

All firms listed on the Johannesburg Securities Exchange (JSE) for the years 2000-2010, with the exception regulated industries, such as financial institutions ("financials") and the mining sector ("basic materials"), were included in the earnings distribution. The number of firm year observations totalled 1 862 and number of individual companies totalled 212.

Information on earnings (net income after tax - line 02020100) and number of ordinary shares in issue at year end (line 02060201) were extracted off the "as published financials" from the INET BFA database.

8.1.2. Deflated earnings figure

"Net income after tax deflated by the outstanding number of ordinary shares in issue at year end" was chosen as the earnings figure to be analysed for a discontinuity in the distribution curve. Each component of this figure (numerator and denominator) is discussed in more detail below.

i. Numerator: Net income after tax

The earnings figure chosen as the numerator for the underlying empirical distribution was "net income after tax". The reason this figure was chosen is because it includes the tax effects that

could potentially also be manipulated (Dhaliwal et al., 2004; Cook et al., 2008; Ettredge et al., 2008). As the "recognised tax losses" were one of the DTE accrual components analysed in this research, it was essential to test earnings after tax.

In addition, the reason that the "earnings" figure used in earnings per share was not used is that this earnings figure represents only the earnings attributable to the equity holders of the parent and is calculated after deducting preference dividends (IAS 33: *Earnings per share,* para 12). Both the proportion of non-controlling interests sharing in profits/losses, as well as the effect of preference shares on earnings, would reduce the comparability of the earnings figure across the firms being investigated.

ii. Denominator: Number of ordinary shares in issue

In response to the concerns of Durtschi and Easton (2005) and others (Degeorge et al., 1999; Dechow, Richardson and Tuna, 2003) who suggested that if a deflator is different between a profit and loss firms the deflator itself will affect the underlying earnings distribution, particularly at zero, this research investigated some of the characteristics of two different deflators in the South African environment. A comparison between the means and the medians of two potential deflators *viz.* total assets and number of ordinary shares outstanding was made across profit and loss companies. The results of this investigation are summarised in tables 13 and 14 in Appendix C.

The comparison of the two alternate scalers indicates that the means and medians of the number of ordinary shares in issue are not significantly different across profit and loss companies (per tables 13 and 14: means of 274 266: 254 480 for loss: profit firms with $p=0.53$ and medians of 144 805: 161 615 for loss: profit firms with $p=0.70$). Further, the results indicate that the means and medians of total assets are indeed significantly different across profit and loss firms (per tables 13 and 14: means of 1 426 987: 4 848 602 for loss: profit firms with $p<0.0001$ and medians of 178 652: 844 553 for loss: profit firms with $p=0.0009$). As the means and medians of total assets in profit firms are significantly greater than those of loss firms, scaling by total assets could lead to a spurious build-up of firms immediately to the right of zero (i.e. profit firms would be pulled towards zero) and fewer firms immediately to the left of zero. Thus deflating by total assets could, in itself, forge a discontinuity in the distribution at zero with no reference to earnings management (Durtschi and Easton, 2005).

Based on these findings, this study chose to scale NIAT by the number of ordinary shares in issue at year end for the earnings distribution, as an unbiased scaler. Further, dividing the NIAT numerator by number of shares intuitively makes sense as earnings are often manipulated because

of their impact on the earnings per share calculation (Graham et al., 2005). Finally, "total assets" could itself be distorted through the accrual process and this could bias the outcome of the results. The number of ordinary shares in issue at year end is not subject to accrual based manipulation and although a change thereof could be used to manage earnings per share, this would be costly and highly visible (Durtschi and Easton, 2005).

8.1.3. EM firms identified using the discontinuity in earnings distributions

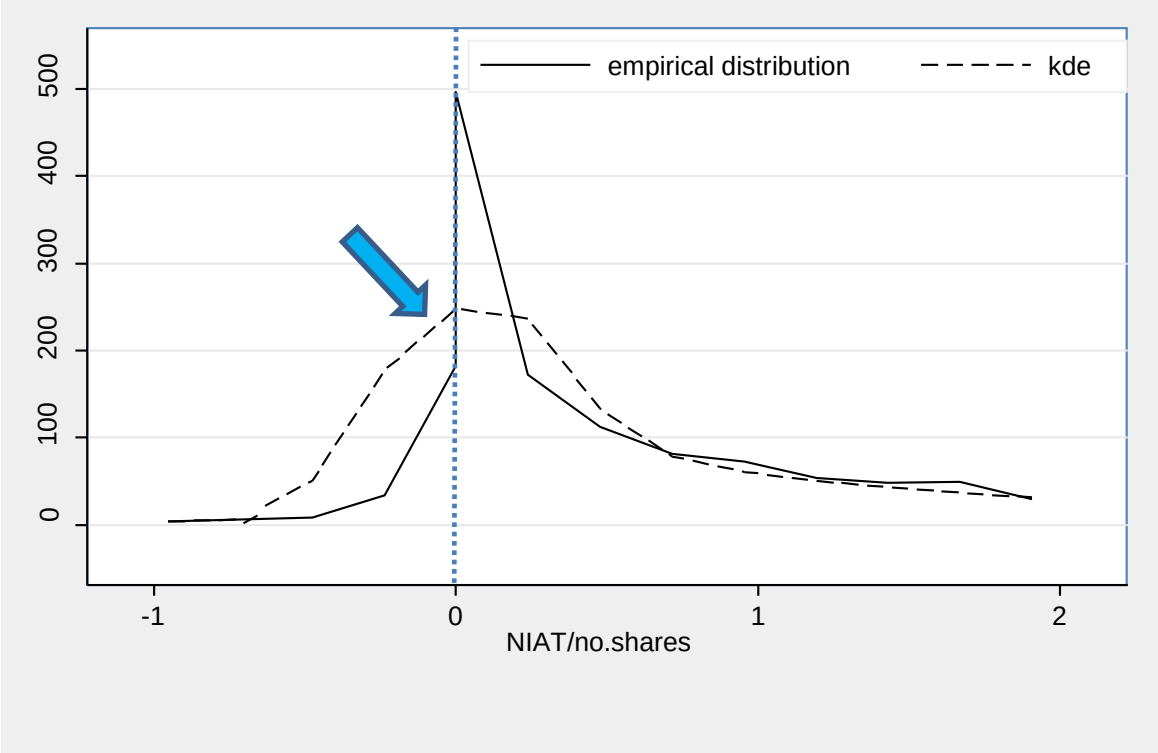
The empirical distribution of net income after tax scaled by number of ordinary shares in issue (at year end) was constructed and compared to a reference distribution obtained by using an Epanechnikov KDE of the empirical cumulative distribution function (ECDF), as proposed by Lahr (2014).

The test procedure adopted for the identification of the location of suspected EM firms (based on the work of Lahr (2014) and Rabin and Negash (2012) was as follows:

1. An estimated bandwidth based on Silverman's (1986) rule of thumb was calculated from the empirical data. This first estimate for the kernel bandwidth h was used as the starting point for the iteration.
2. An Epanechnikov kernel density estimate (based on bandwidth h) was constructed from the empirical function. The point of maximum difference between the reference distribution and the ECDF was calculated (denoted as d_{max}).
3. Bootstrap samples with replacement were drawn from the underlying data in order to construct a confidence interval for the empirical distribution at point d_{max} .
4. Where the kernel density at d_{max} was found to be located outside (or inside) this confidence interval, bandwidth h was reduced (or increased) and the procedure from (2) was re-performed until the ECDF exactly meets the confidence band i.e. the kernel could not be distinguished from the underlying global empirical distribution. An optimal bandwidth of 0.24 was identified in this study.
5. In order to determine the statistical significance of the maximum difference between the kernel and the empirical data, the expected number of observations within the intervals ($d_{max} - h$, d_{max}) and (d_{max} , $d_{max} + h$) were tested simultaneously against the observed number using a z-test.

Points of maximum difference between the curves indicated the location of suspected EM firms. These suspected EM firms then formed the basis of the sample used in this research. The results from the above-mentioned test procedure are documented below.

Figure 1: Diagrammatic representation of distribution curves used to identify the location of suspected EM firms (arrow points to the significant discontinuity observed in the empirical distribution.)



The following table depicts the identified location of suspected EM and non-EM firms for South African companies for the period 2000 to 2010:

Table 12: Significant discontinuities identified in distribution of net income after tax scaled by number of ordinary shares in issue compared to reference distribution (KDE).

BANDWIDTH		Actual	Theoretical	Difference	EM
FROM	**TO**	**Observations**	**Observations**		**Firms**
	-1.67	1	1	0	
-1.67	-1.43	1	1	-0	
-1.43	-1.19	3	2	1	
-1.19	-0.95	4	4	0	
-0.95	-0.71	6	7	-1	
-0.71	-0.48	9	51	-42	0
-0.48	-0.24	34	177	-143	0
-0.24	0.00	182	248	-66	0
0.00	**0.24**	**496**	**248**	**248**	**1**
0.24	0.48	172	237	-65	0
0.48	0.71	113	133	-20	
0.71	0.95	82	79	3	
0.95	1.19	73	61	12	
1.19	1.43	54	51	3	
1.43	1.67	48	43	5	
1.67	1.91	50	37	13	
1.91	2.14	30	32	-2	
2.14	2.38	32	27	5	

The range of net income after tax (NIAT) scaled by number of shares in issue at year end for the entire population of South African listed companies used was -1.67 through to 17.16, analysed in intervals of 0.24 (optimal bandwidth as determined through KDE distribution). A statistically significant discontinuity (points of maximum difference) was observed in the three bandwidths to the left of zero and one bandwidth to the right of zero (over a range of NIAT/number of shares of -0.71 through to 0.48). The remainder of the curve from location of 2.38 through to 17.16 shows no discontinuities and therefore has been excluded from table 12 above.

The three intervals immediately to the left of zero (ranging from -0.71 to 0) revealed the actual number of observations (225 observations) as being significantly less than the expected number of observations (476 expected observations). The interval immediately to the right of zero (0 to 0.24) revealed actual number of observations (496 observations) as being significantly more than the expected number of observations (248 expected observations). This discontinuity in the curve around zero can be interpreted as evidence of earnings management to avoid a loss (Burgstahler and Dichev, 1997; Degeorge et al., 1999; Rabin and Negash, 2012; Donelson et al., 2013; Lahr, 2014).

The second interval to the right of zero (0.24 to 0.48) also reveal the actual number of observations (172 observations) are significantly less than the expected number of observations (237 expected observations). This could be indicative of downward EM, where firms that have exceeded their targets, reduce earnings in order to "reserve" future profits. If this is the case, then a second reason for the inflation in number of actual observations within the EM1 band is due to profit firms manipulating earnings downwards. Research on this finding is outside of the scope of this study but could potentially be considered for future investigation.

Companies located within the three intervals to the left of zero (-0.71 to 0) are referred to as non-EM / EM0 firms and represent the "control group of no earnings management" used in this study. The interval immediately to the right of zero (0 to 0.24) is the location of suspected EM firms (EM1 firms) tested in this study.

9. APPENDIX B

This appendix describes the assumptions underlying logistic regressions and how each of these was addressed and tested in the context of this study.

Key assumptions of logistic regression

Risk of misspecification

Misspecification occurs when key explanatory/independent variables are missing from the model. In using logistic regression, the intention of the researcher is to assess the association of an explanatory variable to the response (dependent) variable and thereby establish its usefulness in detecting EM.

A risk of misspecification arises in this study, as a multivariate logistic regression could not be estimated due to the constraints of sample size (discussed above). This risk could cause an estimate (coefficient) bias towards the null hypothesis of no association between the dependent and independent variables (Begg and Lagakos, 1990). In other words, this study runs the risk of not identifying all the accruals that are associated with EM when such an association does in fact exist. However, the estimates that are found to be significant would continue to be significant in the absence of misspecification risk. The researcher is therefore cognisant of the fact that her results could be incomplete, i.e. not able to identify all accounts used in EM.

Goodness-of- fit tests and multi-collinearity

Because the researcher is not creating a multivariate logistic model, the underlying assumption of goodness-of-fit is not strictly necessary.

Multi-collinearity occurs when two or more independent variables in a model are approximately determined by a linear combination of other independent variables in the model. In other words the combination of explanatory variables is redundant. Correlation tests between the independent variables were performed prior to running the logistic regression. Any correlation among the independent variables is an indicator of collinearity. Variables exhibiting a correlation of 0.75 or more would have been rejected. No such variables were detected.

Influential points and outliers

Influential outliers can pull modelled regression relationships away from their true best fit, biasing regression coefficients. Most outliers were removed through winsorising at the 1% and 99%

level. However, additional influential observations and outliers, that were observed using Pearson residual and deviance residual plots, leverage and dfbeta calculations, were removed when their effect on the regression estimate (coefficient) was significant.

Heteroskedasity

Heteroskedasity occurs when there is an inconsistent variance across the residuals for each independent variable. Such variances can be observed visually through residual plots such as Pearson and deviance residual plots. No heteroskedasity was observed for any of the regressions performed.

10. APPENDIX C

Table 13: Descriptive statistics of two potential deflators (number of ordinary shares in issue and total assets) for use as denominator for earnings distribution

Comparison by Profit	N	Deflator	Mean	Std Dev	Min	Max	Median	25th Pctl	75th Pctl	z(skew)	z(kurt)
Loss firms	262	Number of ordinary shares in issue	274 266	345 112	7 124	1 854 515	144 805	84 557	312 238	18.11	27.44
		Total assets	1 426 987	5 115 418	4 497	61 800 000	178 652	33 777	692 001	54.76	280.32
Profit firms	1478	Number of ordinary shares in issue	254 480	308 150	7 124	1 854 515	161 615	71 896	314 377	44.24	75.48
		Total assets	4 848 602	10 868 132	4 497	61 800 000	844 553	237 217	4 056 600	58.06	110.61

Table 14: Results of null hypothesis of no significant difference between means and medians of two potential deflators in profit/loss and EM1/EM0 firms

Deflator	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
Comparison by profit		
Number of ordinary shares in issue	0.53	0.70
Total assets	<0.0001	0.0009

Significant differences at the 5% level are shaded in grey.

Table 15: Comparison of components used in the study by Phillips et al. (2004) and DTE and cash flow components used in this study.

Phillips, Pincus, Rego and Wan (2004)	Deferred tax expense-related accruals	Cash flow reconciling items (total accruals)
REVENUE AND EXPENSE ACCRUALS		
Revenue and expense accruals and reserves	Expense Accruals (including provisions)	Changes in accounts payable
	Revenue accruals (including allowance for credit losses and deferred revenue)	Provisions
	Prepayments	Changes in accounts receivable
ASSET MEARSUREMENT ACCRUALS		
Depreciation of tangible assets	Capital Allowances (including amortisation and impairments of tangible and intangible assets)	Depreciation (including amortisation and impairments of tangible and intangible assets and goodwill)
Other asset valuations (expenses related to intangible assets, inventory, and leases)		Profits or losses on disposal of assets
		Changes in inventory
Unrealized gains and losses on securities	Fair value adjustments (in particular of financial instruments and investment property)	Fair value adjustments recognised through profit and loss (financial instruments and investment property)
REMUNERATION-RELATED ACCRUALS		
Compensation	Employee Compensation	Employee costs
TAX-RELATED ACCRUALS		
Income tax carry forwards	Recognised tax losses	
Deferred tax asset valuation allowance		
OTHER		
Miscellaneous items		Equity accounted profits
		Foreign exchange gains and losses

Table 16: Outcome on logistic regressions performed on deferred tax variables (scaled by number of ordinary shares in issue at year end) comparing EM1 to EM0 firm years

Variable	N	Coefficient (β)	Standard Error	Wald Chi-Square	Pr > Chi-Square	Odds Ratio	95% confidence interval for odds ratio	
Capital Allowances	390	-1.5521	3.6331	0.1825	0.6692	0.212	<0.001	262.071
Compensation	101	22.4579	42.528	0.2789	0.5974	>999.999	<0.001	>999.999
Expense Accruals	290	10.563	6.7783	2.4285	0.1191	>999.999	0.066	>999.999
Fair value adjustments	53	-179.6	69.1582	6.7462	0.0094	<0.001	<0.001	<0.001
Prepayments	169	23.8885	37.6928	0.4017	0.5263	>999.999	<0.001	>999.999
Revenue accruals	165	53.1938	19.2198	7.6599	0.0056	>999.999	>999.999	>999.999
Tax Loss	358	23.1923	5.7523	16.2555	<0.0001	>999.999	>999.999	>999.999
Total DTE	717	14.6794	3.5086	17.5047	<0.0001	>999.999	>999.999	>999.999

Significant differences at the 5% level are shaded in grey.

Table 17: Descriptive statistics for drivers of significant for variables tested in profit vs loss firms

Profit Vs Loss	Number of observations	Variable	Mean	Std Dev	Min	Max	Median	25th Pctl	75th Pctl	z(skew)	z(kurt)
0	**262**	Sales (Turnover)	1 733 706	6 498 494	0	66 214 000	139 370	22 399	825 042	47.59	196.67
		PPE	599 978	2 962 277	0	43 100 000	46 459	6 091	182 790	78.24	543.00
		PPE (excluding goodwill)	543 673	2 797 668	0	41 300 000	40 104	5 672	168 442	81.31	576.89
1	**1478**	Sales (Turnover)	6 048 169	12 178 354	0	66 214 000	1 201 193	298 618	5 139 552	49.93	81.75
		PPE	2 178 515	6 681 594	0	43 100 000	248 739	56 180	1 106 000	77.41	195.73
		PPE (excluding goodwill)	1 854 806	5 958 366	0	41 300 000	195 329	36 906	969 700	84.24	236.19

Table 18: Results of null hypothesis of no significant difference between means and medians of various drivers in profit vs loss firms

	p-value for H0: no significant difference between means	p-value for H0: no significant difference between medians
Sales (Turnover)	<0.0001	0.0012
PPE	0.0005	0.0008
PPE (excluding goodwill)	0.002	0.0090