School of Accounting

Auditor attributes and its association with financial distress: An Australian context

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DECLARATION

To the best of my knowledge and belief this thesis contains no materials previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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ABSTRACT

This study investigates the effect of four pivotal auditor attributes underpinning auditor quality (that is, auditor brand, provision of non-audit services, audit tenure, and audit fee) on the likelihood of Australian firm's financial distress risks across a longitudinal timeframe. This investigation is important given continuing questions, uncertainty and lack of empirical evidence of the precise nature of the auditor quality/financial distress association, and the need to validate if recent corporate governance reforms designed to improve auditor quality has any impact on firms' financial distress risks. The hypotheses are developed within an agency theory framework and tested using data collected from a sample of a total of 4,876 firm-year observations spanning the period January 1 2008 to December 31 2014. Findings of this study indicate that all four auditor attributes are significantly negatively associated with the respective firm-year financial distress risk. The main results of the study are largely supported by a range of robustness and sensitivity tests. Results from this study have clear implications for regulators, capital market participants, firms/management, the auditing profession/auditors, and scholars.

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DEDICATION

To my sons, Adam and Umar, who are no less to me than my dearest to my heart, the apples of my eyes. This thesis would be meaningless if not to make a better life for you.

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ABBREVIATIONS

AGAAP	Australian Generally Accepted Accounting Principles
AICPA	American Institute of Certified Public Accountants
AIFRS	Australian Equivalent of International Financial Reporting Standards
APESB	Accounting Professional and Ethical Standards Board
ASIC	Australian Securities and Investments Commission
ASX	Australian Securities Exchange
ASX CGC	Australian Securities Exchange Corporate Governance Council
AUASB	Auditing and Assurance Standards Board
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIA	Certified Internal Auditor
CLERP 9	Corporate Law Economic Reform Program (Audit Reform and Corporate Disclosure) Act 2004 (Australia)
DTT	Deloitte Touche Tohmatsu
EC	European Commission
EU	European Union
EY	Ernst & Young
FASB	Financial Accounting Standards Board
FCCG	Financial Committee on Corporate Governance
FRC	Financial Reporting Council
GAAP	Generally Accepted Accounting Principles
GFC	Global Financial Crisis
GICS	Global Industry Classification Standard
IAASB	International Auditing and Assurance Standards Board
IAF	Internal Audit Function
IASB	International Accounting Standards Board
ICAA	Institute of Chartered Accountants in Australia
IFRS	International Financial Reporting Standards
IIA	Institute of Internal Auditors
IPA	Institute of Public Accountants
IPO	Initial Public Offering
ISAs	International Standards on Auditing
NYSE	New York Stock Exchange
PCAOB	Public Company Accounting Oversight Board
POB	Public Oversight Board
PwC	PricewaterhouseCoopers
SEC	Securities and Exchange Commission
SOX	Sarbanes-Oxley Act 2002
S&P	Standard & Poor’s
UK	United Kingdom
US	United States of America

CHAPTER ONE:

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

Studies have been carried out since the 1960s with an aim to establish the business and economic factors that are likely to mitigate the effect of financial distress on firms. The recent economic turmoil (the global financial crisis as well as the European sovereign debt crisis) has significantly increased interest in the determinants of financial distress with the aim of decreasing corporate collapses. A study on financial distress is important, especially because of the costs it imposes on firms and on the economy. Such costs can be divided in two distinctive categories: direct and indirect costs (Wruck 1990). Direct costs include outlays for debt restructuring and indirect costs range from the depletion of the company's share value as a result of a reduction in stakeholders' trusts, to bankruptcy (Liou and Smith 2007). A distressed financial position may result in insolvency and subsequently, in bankruptcy (Baxter 2006), but this may however be avoided if the distressed risks are detected and managed effectively and efficiently (Opler and Titman 1994). Such firms which are successful at effectively managing and over-coming a financially distressed position may gain increased confidence from various stakeholders which may consequently lead to an improvement in market capitalisation (Wruck 1990).

Similarly, as a result of the trend in corporate bankruptcies since the 1960s, interests in both financial distress and corporate governance related determinants have increased. Wruck (1990) states that as part of ethical corporate governance practices, managing financial distress plays an upmost role since financial distress may be a result of weak corporate governance structure. Porter (2009) finds an increase in societal demand for responsible corporate governance as a result of continued corporate failures. Porter (2009) further concludes that an effective corporate governance made up of a robust and autonomous component of the "tripartite audit function" (the external audit function, the internal audit function and the audit committee) is required to ensure corporate accountability. Extant literature commonly finds an effective corporate governance to be an element that firms may utilize to mitigate or avoid financial distress. Specifically such an association was pointed out between (1) board of directors and financial distress (Bredart 2014; Salloum, Azoury, and Azzi 2013; Manzaneque, Priego, and Merino 2016; Iskandar, Noor and Omar 2012); (2) internal audit function and financial distress (Wallace 2004; Bailey, Gramling, and Ramamoorti 2003; Cohen, Krishnamoorthy, and Wright 2004); and (3) audit committee and financial distress (Noor and Wan 2009; Salloum, Azzi, and Gebrayel 2014; Chien, Mayer, and Sennetti 2010; Rahmat, Mohd Iskandar, and Mohd Saleh 2009).

Within the corporate governance mosaic, audit quality has also been a topic of growing emphasis since the beginning of the new millennium. There have been a considerable number of studies conducted on different dimensions of audit quality and its measurement proxies in order to understand factors affecting audit quality. A high-quality audit provides substantial benefits to most key stakeholders. Specifically, companies with higher audit quality are deemed to be less risky and consequently, have more access to capital markets as well as lower cost of equity and capital. However, low audit quality could demonstrate an uncertain financial position and may lead potential shareholders and debt holders to deem the company to be riskier. The end-result would then be a reduced access to capital markets and an increase in the cost of financing.

Similar to other studies on different corporate governance elements and financial distress, some scholars have researched the final key element of an effective corporate governance (in addition to board of directors, audit committee and internal audit function), that is, the external audit function, with financial distress. Lu and Ma (2016) proxy audit quality with the engagement of a Big 4 auditor and finds a negative correlation with financial distress, which is proxied for using the Altman's (1983) Z-Score. Jin, Kanagaretnam, and Lobo (2011) investigate the effect of audit quality on financial distress in the banking sector by proxying audit quality with Big 4 auditor and auditor specialization and financial distress with banking specific factors such as non-performing loans, loan loss provisions, and proportion of securitized loans. However, Francis (2004) funds audit quality to be hard to measure, and Blasam, Krishnan, and Yang 2003 (2003) conclude that due to audit quality being unobservable and multidimensional, different auditor characteristics (as opposed to only one auditor characteristic) is required to proxy for it (that is, audit quality). Whilst the study conducted by Jin, Kanagaretnam and Lobo (2011) use two different auditor attributes to proxy for audit quality (namely, Big 4 auditor and auditor specialization), they. however, proxy financial distress with banking specific variables which renders the findings non-generalisable to other industries (other than the banking industry). Lu and Ma (2016) solve this issue by proxying financial distress with the Altman's Z-Score. However, the Altman Z-Score (as opposed to the Altman Z2-Score) does not consider non-manufacturing industries. In addition, by only proxying audit quality with Big 4 auditor, the multidimensional nature of audit quality as specified by Blasam, Krishnan, and Yang 2003 (2003) is ignored.

The absence of empirical studies (to the best of the author's knowledge) and evidence on the association between audit quality (considering its multidimensional nature) and financial distress warrants investigation. This gap in extent literature therefore drives the motivation behind this study to use a set of auditor attributes to measure audit quality and its impact on financial distress. In so doing, an equally important motivation is the possibility of improving the external audit function and consequently, corporate governance.

1.2 RESEARCH QUESTIONS AND OBJECTIVES

The association between financial distress and auditor attributes warrants investigating as a comprehensive understanding of such a linkage can support regulators to formulate legislation and strategies in an attempt to improve credibility in the capital markets and the financial reporting process. In addition, corporate governance is continually under reform and by studying the relationship between a range of auditor attributes and financial distress, deviations to regulations governing certain auditor attributes such as audit partner tenure and auditor independence will be able to be enacted if deemed necessary, therefore improving overall corporate governance practices. Corporate governance has attracted intense interest in Australia as a result of prominent corporate collapses (such as One-Tel, HIH, and Harris Scarfe). Consequently, governance improvements in the form of CLERP 9 and ASX CGC 2003 have been introduced in an effort to restore investors' confidence in the Australian capital market. Both investors and regulators have recognized the significant role of the external audit function as a key corporate governance mechanism (Lai et al. 2013; CLERP 9). CLERP 9 reform was introduced with the intent of expressively improving the financial reporting and auditing processes in Australia.

In addition to the two motivations mentioned in Section 1.1 above, this study, being conducted in the post-CLERP 9 period, has the potential to shed some new light and understanding on the debate surrounding the effectiveness and true impact of the

CLERP 9 legislation. Though legislations contained in CLERP 9 does not ban auditors from providing non-audit services to auditees, it imposes extensive disclosure requirements in regards to the provision of non-audit services by the incumbent auditor[1]. The effectiveness of the implementation of such regulations as part of CLERP 9, especially in key capital market determinants such as earnings management, has been well researched in extant literature[2]. However, an examination of the impact of CLERP 9 (especially the disclosure requirements imposed on the provision of non-audit services) on firms' distressed risk is lacking. This study has the potential of shedding some light on such requirements of CLERP 9 and its effects on firms' risk of financial distress and the capital markets.

On a similar note, another requirement of CLERP 9 is the mandatory audit partner rotation, whereby audit partners of an Australian listed firm must rotate after five successive years and can only return after a two-year gap. Extant literature agrees this strategy is successful for Big 4 auditors to achieve a better-quality audit, however, finds this detrimental to non-Big 4 auditors suggesting that the learning experience obtained through longer audit partner tenure to be crucial for smaller sized auditors. This has led to scholars questioning the 'one size fits all' requirements for audit partner rotation (Hamilton et al 2005). However, a question that remains unanswered is the effect of this CLERP 9 requirements of firm's financial position, especially, its financial distress risks. This study has the potential of shedding some light on such requirements of CLERP 9 and its effects on firms' financial distress risks and the capital markets.

Based on the above, the primary objective of this study is to provide a comprehensive investigation of the connotation between four pivotal auditor attributes (that is, big 4 auditor, provision of non-audit services, audit tenure and audit fees) and the likelihood of financial distress in Australian publicly listed companies. Though studies on audit quality/auditor attributes and financial distress are not unique (as stated in Section 1.1 above), prior empirical research has not taken the

[1] For reporting periods commencing from the 1st July 2004, CLERP 9 requires the inclusion of details of fees paid to the incumbent auditor in the directors' report. Such details need to include itemize amount paid to the auditor for each of the non-audit services provided during the year. In addition, also required is a statement by the audit committee (or board in its absence) that the non-audit services provided during the year were aligned with the general standard of independence of auditors imposed by the Corporations Act 2001 and that the non-audit services provided have not compromised auditor independence (Behan Legal 2004).

[2] Extant literature include studies finding a statistically significant positive association between the provision of non-audit services and earnings management in the pre-CLERP 9 period (Hussain 2013; Coulton, Ruddock, and Taylor 2007; Chai and Jubb 2000) however the same association is found to be statistically insignificant in the post-CLERP 9 era (Hussain 2013).

multidimensional nature of audit quality into account and / or has not used a generalisable proxy for financial distress. The originality of this work is that this study considers the impact of key auditor attributes in unison, thereby capturing its multidimensional nature, and its linkage, if any, with financial distress.

Consistent with the primary objective, this study's main research question is identified as follows:

> *RQ: Are auditor attributes associated with Australian publicly listed firms' likelihood of financial distress?*

A number of other significant research objectives will also be investigated in addition to answering this study's main research question. Since this study uses different profession driven and governance guideline driven auditor attributes (big 4 auditor (that is, auditor brand name), provision of non-audit services and audit tenure), findings of this study can provide guidance on the type of auditor attributes of more significant importance in mitigating financial distress in firms. In addition, since this study uses alternative measures of auditor attributes (such as auditor specialization and different metrics for audit tenure and the provision of non-audit services), valued understandings into the use of different attributes to reflect key auditor characteristics can be provided.

1.3 SIGNIFICANCE OF THE STUDY

This Australian study provides an examination of the auditor attributes and financial distress association linkage by using a comprehensive range of fundamental auditor attributes along with two different proxies for financial distress. Results obtained as part of this study will provide various important contributions. First, this study is the first (to the best of the researcher's knowledge) to examine such an association with the use of these pivotal auditor attributes. Given the exploratory nature of this study, the benefits derived are two-fold. In the first instance, this study will assist in the provision of a deeper understanding of business and economic factors that are likely to exacerbate or mitigate financial distress, of which costs and determinants are becoming increasingly important given the recent economic turmoil and the growing number of corporate collapses. On a similar note, this study will further help in the provision of a deeper comprehension of the external audit function as a monitoring mechanism (based on the Agency Theory concept) and the degree to which it benefits to the auditee (by helping firms mitigate its financial distressed risks) as well as other stakeholders (by improving the credibility of financial reporting by listed firms). In so doing, this study will assist in providing a critical analysis of an effective corporate governance contribution by the external audit function by investigating whether key external auditor attributes impact on the likelihood of financial distress, thereby aiming to contribute to the limited Australian empirical evidence on this association (that is, the association between pivotal auditor attributes and financial distress). These results, therefore, have important significance for the effective and efficient process of capital markets, scholars, auditors and firm's actions.

Second, results of this study from the four pivotal auditor attributes adopted in this study (namely, Big4 auditor, provision for non-audit services, audit tenure and audit fee) will assist to determine which of these four auditor attributes (if any) are found to effectively reduce the likelihood of financial distress. Based on this information, regulators, auditors and scholars can utilize the results from this study to further investigate and possibly regulate key corporate governance instruments (especially the external audit function) in an attempt to increase the quality and efficiency of the external audit process so as to improve the integrity of firms' financial reporting processes and subsequently attempt to provide capital market players with a tool to mitigate firms' risks of financial distress. Henceforth, results of this study will have real economic consequences for auditees, auditors, regulators and scholars alike.

Third, given that all CLERP 9 changes (as will be detailed in Section 4.2.3) are reflected in the observation window used in this study (from 1 January 2008 to 31 December 2014), the results from this study may also be used to determine the extant to which CLERP 9 regulations have been successful in achieving the objectives of using the statutory external auditing process such as the audit partner rotation requirements, and the disclosure for the provision of non-audit services requirements. This further strengthens the contributions and benefits provided by the results of this study to regulators and the audit profession.

Fourth, if results of this study show a promising association between auditor attributes and financial distress, scholars can extend similar studies to investigate other key corporate governance mechanisms that may also be effective in improving the integrity of the financial reporting process and subsequently mitigate the likelihood of financial distress. This further strengthen the contributions and benefits provided by the results of this study to auditees, auditors, regulators and scholars.

In summary, results of this study will benefit a number of key capital market players. Policy makers and regulators will be able to determine the effectiveness and true impact of legislation impacting on the auditor attributes (as well as on corporate governance) in an attempt to improve firms' quality of financial reporting. This will also benefit capital market partakers by having a flow on effect of minimizing poor corporate reporting practices and, possibly, subsequent financially distressed firms and in turn corporate failure. In addition, external auditors will be able to use the findings of this study to assist them in determining which of the four attributes adopted in this study significantly influence auditees' (or potential clients) performance and hence financial distress. The auditors will also be able to apply information on which client features are most significantly associated with financial distress to their advantage so as to enhance audit effectiveness. Finally, evidence from this study will also help scholars to identify which specific auditor attributes to investigate in future research.

1.4 LIMITATIONS OF THE STUDY

Whilst this study has a number of strengths, it is not without limitations. First, even though there are a significant number of studies in the extant literature using accounting-based models such as Zmijewski and Altman to determine financial distress (or to predict firms' bankruptcy risks) (Wu, Graunt, and Gray 2010; Tanthanongsakkun, Pitt, and Treepongkaruna 2009) there also exists a significant literature reporting models such as the Merton BSM (Black-Scholes-Merton 2010) and the Shumway (2001) to outperform accounting-based models in the prediction of bankruptcy (Wu, Graunt, and Gray 2010; Tanthanongsakkun, Pitt, and Treepongkaruna 2009; Vassalou and Xing 2004). Whilst acknowledging these negative performance reporting, there has been a significant number of studies dedicated to finding the best model to predict corporate failure but in vain (Balcaen and Ooghe 2006). In fact, let alone the empirical identification of the best model to predict corporate failure, even the definition of corporate failure lacks undivided consensus. In addition, the use of accounting-based models in the prediction of financial distress (not bankruptcy) is still prominent in extant literature.

Second, given the multi-dimensional nature of audit quality (Blasam, Krishnan, and Yang 2003), prior studies have used a varied number of auditor attributes to measure audit quality. This study uses four specific auditor attributes. Even though these four selected attributes are the most commonly cited in prior studies as being key auditor attributes (Francis 2011; Carcello and Nagy 2004; Blasam, Krishnan, and Yang

2003; Balsam, Krishnan, and Yang 2003; Kim et al. 2003; Ashbaugh et al. 2003; Carcello et al. 1992) there may be other auditor attributes that could be significantly associated with financial distress.

Third, in order to test the hypotheses, data for all the variables (dependent, independent and control) adopted in this study were collected from the respective companies' annual reports. This approach to data collection can potentially posit as a further limitation due to the amount and type of data that can be collected. Such an example can be the proxies used to measure for the auditor attributes adopted in this study. Whilst there can be other alternative proxies, these are excluded due to their firm-specific nature.

Fourth, even though this study includes a large number of control variables (in addition to the independent variables) in the tests performed so as to control for additional possible influencers of the likelihood of financial distress, it is without doubt that there are additional factors that may impact financial distress. For example, corporate culture, economic, and management style and integrity may impact the risk of financial distress but were omitted from this study due to their lack of effective measurements.

Fifth, for data collection purposes, sample firms selected was done by matching distressed firms (measured by the Zmijewski ZFC-Score) with the closest comparable healthy firms (based on year, size, and industry). Admittedly, the use of matching based solely on the Zmijewski ZFC-Score rather than using both the Zmijewski ZFC-Score and the Altman Z2-Score has limitations. However, these two models show an agreeance (whereby both models agree on either a firm-year observation being healthy or distressed) of 79%. Furthermore, this study adopts the use of the Zmijewski ZFC-Score model as the main proxy for financial distress. The Altman Z2-Score is only used to provide robustness to the main findings. Therefore, the consequence of this issue may not be significant in affecting the findings of this study.

Sixth, data of this study is collected from only Australia. Therefore, to countries with different institutional settings; the results of this study may not be generalized.

While the limitations are acknowledged, these do not offset this study's findings, strengths or contributions highlighted.

1.5 THESIS OUTLINE

The The remainder of the chapters in this thesis is organized as follows. Chapter Two provides an in-depth literature review on capital markets, financial distress, and audit quality. This chapter also provides a comprehensive background to the relationship between the auditor and the Australian regulatory parties. The implication of this study are also relevant to key regulators such as the Australian Securities and Investments Commission (ASIC) ; the Financial Reporting Council (FRC) and to key legislation such as CLERP 9 and the ASX Listing Rules.

Chapter Three discusses the theoretical framework of this study and the empirical literature linking to the research questions testing the different hypotheses. The theories underpinning the concept of corporate governance, specifically the external audit component of the corporate governance mosaic, are discussed and contrasted. A discussion on the empirical literature relating to each of the four key auditor attributes selected for the purpose of this study is provided together with justification for the expected association of each auditor attributes with financial distress.

Chapter Four provides details of the research methods employed to test the hypotheses of this study. Justification of the source documentation, sample selected and the time period is provided in the first part of the chapter. This is then followed by details on the measurement of financial distress (the dependent variable of this study). Measures to operationalize the auditor attributes analysed in this study are then provided (that is, measures for Big 4 auditor, non-audit fees, audit tenure and audit fees). Then, the sensitivity tests to be undertaken are identified and outlined after the statistical tests and regression models utilized to test the hypothesis.

Chapter Five provides a review of the descriptive statistics for the different variables used for the purpose of this study by first outlining the steps undertaken in the final sample selection. Descriptive statistics for the dependent variables (namely the Zmijewski ZFC-Score and the Altman Z2-Score), the independent variables (namely Big 4 auditor, Auditor tenure, the provision of non-audit services [auditor independence] and audit fees), and control variables are provided.

Chapter Six examines the main empirical results of this study. The examination of key auditor attributes is divided into three parts. The first part examines the association of key auditor attributes with the financial distress model. The second part examines the lagged effect of key auditor attributes with the Zmijewski ZFC-Score. The third part examines the association of key auditor attributes in unison (composite score) with the financial distress model. In so doing, the lag effect of the composite auditor attributes with the Zmijewski ZFC-Score will also be examined.

Chapter Seven then discusses the robustness and sensitivity of the main results found in Chapter Six. In so doing, alternative measures for the four key auditor attributes are used and regressed against alternative proxy for financial distress. Logistic regressions are also performed to analyse the lagged effect of key auditor attributes using the alternative measures with two different models proxying for financial distress. Composite score calculated using the alternative measures of financial distress are also regressed against both models proxying for financial distress.

Chapter Eight reviews the major conclusions and implications of this study. Determination of acceptance or rejection of the hypotheses based on empirical results is made, henceforth leading to the key findings of this study. This is then followed by a discussion on the implications and contributions with limitations and future research opportunities also emphasized. Last, an overarching summary of this study is provided.

CHAPTER TWO:

LITERATURE REVIEW

2.1 OVERVIEW OF THE CHAPTER

Chapter Two begins by presenting a discussion on the theoretical framework underpinning the capital market. An analysis of the various theories that are used by firms in their capital structure determinants is provided within this section, along with the risks associated with incorrect capital structure decisions. This is followed by a comprehensive examination and discussion on the key financial distress literature which includes both accounting and non-accounting-based prediction models. The link between capital market, financial distress and external auditor attributes is then discussed by examining the four major components of corporate governance namely, the audit committee, the board of directors, the internal audit function and the external auditor. A comprehensive overview of the four pivotal audit quality attributes adopted by this study namely, big 4 auditor, the provision of non-audit services, audit tenure and audit fee are provided based on key prior literature. Last, a summary of the chapter is provided.

2.2 CAPITAL MARKETS

This section of the chapter provides a comprehensive overview of capital markets, its structure, determinants and risks.

2.2.1 Background and Introduction

Financial markets exist to facilitate the sale and purchase of financial instruments and it involves two major markets, the capital market and the money market. The difference between the capital market and the money market is that the capital market mostly deals with medium to long-term investments (with maturity of more than one year) while the money market deals with only short-term investments (with maturity of up to one year). The capital market provides an avenue for issuers to raise capital from investors. The capital market can be categorised into two segments: primary and secondary market. Primary market is largely used for the first-time issue of a category of capital by making initial public offers (IPOs) and the secondary market provides liquidity to these instruments, through trading and settlement on the stock exchanges. Capital market is therefore, important for raising funds and forms a very vital link for economic progress of the economy (Titman and Wessels 1988).

Amidst extant literature, the efficient market hypothesis constitute the benchmark for evaluating capital market efficiency and subsequently, the economic health. Fama (1965) introduces, and makes significant contributions to the refinement and empirical testing of the efficient markets hypothesis and states that "in an efficient market, competition will cause the full effects of new information on intrinsic values to be reflected instantaneously in actual prices" Fama (1965, p. 4). Relying upon the market efficiency hypothesis, researchers have shown growing interest within capital markets research in accounting. Ball and Brown (1968, p. 160) assert that capital market efficiency provides "justification for selecting the behaviour of security prices as an operational test of usefulness" of information in financial statements. Similar argument on capital market is also postulated by Beaver (1968).

Capital markets are generally operated by independent bodies. In the United States, the primary equity markets are the New York Stock Exchange Euronext (NYSE) and the NASDAQ Stock Market. The NYSE as at the 02nd September 2014 consist of 1,867 listed companies with 19% of these companies being foreign and 50 of the largest 100 NYSE-listed companies being non-US entities. The NYSE, as the world's largest stock exchange, has a total market capitalization of its listed companies as of September 2014 of over US$16.613 trillion with an average daily trading value of approximately US$150 billion (New York Stock Exchange Euronext (Nyse) 2014). The NASDAQ Stock Market operates the Global Market and the Capital Market and is considered the largest single cash equities securities market in the world in terms of share value traded (Nasdaq 2014). The securities market in the US is regulated by the Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA). The SEC is an independent US government agency with the purpose of regulating public companies' disclosure of financial and non-financial information to the public, and overseeing securities exchanges, securities brokers and dealers, investment advisers, and mutual funds (Securities and Exchange Commission 2013). The FINRA is dedicated to the protection of investor and the market integrity through effective and efficient regulation (Financial Industry Regulatory Authority 2013).

Australia, commonly referred to as a market-oriented economy, ranks as the 13th largest economy in the world (measured by GDP) and the 3rd largest in the Asia Pacific region. The capital market operates via the Australian Stock Exchange (ASX) with a total market capitalization of $1.4 trillion and 2,184 listed companies as of the

31st July 2014 (Australian Stock Exchange Group 2014). Similar to the US, the capital market in Australia is also regulated by independent bodies: The Australian Securities and Investment Commission (ASIC) and the Reserve Bank of Australia (RBA) (Australian Stock Exchange Group 2014). The prevalent roles of the ASX Compliance section are as follows: (1) to monitor compliance with the ASX operating regulations; (2) to promote efficient standards of corporate governance among Australia's public listed companies; and (3) to ensure the assurance of transparent markets to investors by providing clear and efficient regulation procedures (Australian Stock Exchange Group 2013).

2.2.2 Determinants of Capital Structure

2.2.2.1 The Modigliani and Miller theory

Myers (1984, p. 575) defines capital structure as the way a company finances its operations and assets through a combination of equity, debt or hybrid instruments such as bonds and convertible debentures. The development of theoretical capital structure literature started with the influential work of Modigliani and Miller (M&M) (1958) in which the authors state that under a set of strict assumptions, the capital structure of a firm is irrelevant. Subsequently, they (Modigliani and Miller 1963) lessen their above argument to state that when taxes are introduced into the capital structure model, a firm will start benefiting from using more debt after accounting for the tax deduction associated with the interest payments, thereby increasing its value. However, the authors warn that firms will not necessarily maximize their values by using 100 percent debt due to the cost of bankruptcy. This implies that each firm has an optimal level of capital structure[3] (proportion of debt to proportion of equity) and the value of the firm will fall should the amount of debt go beyond the optimal level.

2.2.2.2 The trade-off theory

Since the studies by Modigliani and Miller, there have been a significant number of capital structure researches undertaken in an aim to better understand the optimal capital structure predicament, among which are the influential work by Jensen and Meckling (1976) who introduce the concept of agency costs and its association with an optimal capital structure. Jensen and Meckling (1976) argue that every publicly traded firm faces conflict between the shareholders and the managers. They further

[3] Modigliani and Miller (1963) state that an optimal level of capital structure is attained when the firm's marginal benefits of debt equal the firm's marginal costs of debt.

explain that the conflict between the shareholders and managers arise when managers, being a characteristically separate entity from the shareholders, have the incentive to consume perquisites at the expense of the shareholders. This concept has since been commonly referred to as the agency theory. Jensen and Meckling (1976) suggest that by increasing the level of debt and maintaining the level of manager's equity constant, firms can effectively mitigate the agency problem since the managers now own a larger proportion of the firm. Jensen and Meckling (1976) view is that the benefit of using debt does not arise from the tax shield as suggested by Modigliani and Miller (1963) but comes from the lower likelihood that managers will pursue activities that do not maximize the value of the firm due to their ownership in the firm. Thus, Jensen and Meckling (1976) argue that even if there are no taxes, which is in opposition to the M&M Theory, an optimal capital structure can still be obtained by trading off the agency costs of debt and the benefits of debt.

2.2.2.3 **The signalling theory**

Ross (1977) states that managers, who know better about the firm's expected cash flows than the investors due to information asymmetry, can use the capital structure of a firm to send out signals to investors about the future performance of the firm. Based on Ross (1977) arguments, by using a greater level of debt, managers can send out a positive signal to the investors that the future performance of the firm is optimistic. Relying on the seminal work of Ross (1977), Krishnan and Schauer (2000) defines information asymmetry as the difference in the types and levels of information made available to managers and other stakeholders. They further state that information asymmetry renders instability in the capital market due to an increase in uncertainty and riskiness by restricting access to equity funding or increasing cost of capital.

2.2.2.4 **The pecking order theory**

Myers (1984) states that issuing equity may not be optimal for a firm. Myers (1984) explains that when managers are better informed than investors, managers may decide to venture in a project if such venture requires the firm to issue equity at a lower price (due to the information asymmetry that may be in existence, investors may not know the real condition of the firm thereby placing a lower valuation). Thus, Myers (1984) argues that a firm prefers internal capital to external capital when the firm needs resources and he also provides an explanation as to why firms do not use as much debt as suggested by the trade-off theory. He argues that by accumulating cash and marketable securities, the firm should never have to issue equity at a lower price just to undertake a positive net present value (NPV) project. Relying upon these arguments, the pecking order theory states that the order in which investments and financing decisions are to be made is first the use of retained earnings (due to the absence of any cost of equity or cost of debt), second the use of borrowings (due to the interest tax shield as suggested by the M&M and trade-off theories) and last the new issue of equity. The pecking order theory is attractive because it explains why there is a negative relationship between leverage and profitability. The pecking order model also implies that firms do not have a target leverage ratio when they make capital structure decisions.

There are many empirical studies testing the pecking order theory among which are the studies of Titman and Wessels (1988) and Helwege and Liang (1996) who find that more profitable firms use less leverage and firms with surplus internal funds avoid going public. These findings are consistent with the pecking order theory.

2.2.3 Risk of capital structure

Ball and Brown (1968) state that the deeper the market economic system is, the more dependence there will be on firm's capital structure. They further state that the main functions of capital markets are to offer varying kinds of arrangements for exchanging securities, converting deposits into investments and overall, pulling the development of integral economy by the openness of investment activities. These are achieved by the implementation of diversifying investment portfolio and subsequently, the investment risk. Firms are often responsible for the corresponding operation risks when pursuing business ventures, whereby the more future benefits a venture is expected to gain, the more risks it holds, thereby the higher risk higher return analogy within the financial market sphere.

However, companies, investors and potential investors are able to manipulate and diversify the level of risks by applying a diversification investment strategy. By doing so, these entities are effectively decreasing the non-systematic risks (also commonly referred to as the firm specific risks). Capital structure offer varying kinds of securities and debts with different properties, deadlines, and risks for firms to choose. In order to make an informed decision on which securities or debt obligations to issue (or invest in), firms (or potential investors) need to research into the varying options with different anticipated costs or returns and investment risks. The risk –

return analogy again comes in play when deciding on the type of security in which to invest, regardless of their risk tolerance. Consequently, it is primordial to correctly assess the riskiness of a security in order to determine whether the return associated with the desired security is adequate. Beaver (1968) states that incorrect risk assessment may possibly lead to investment in incorrect securities which in turn may lead to an inefficient diversification process. Consequently, incorrect risk assessment may result in investors incurring significant financial losses and subsequently may lead to market collapse.

2.3 FINANCIAL REPORTING QUALITY

Titman and Wessels (1988) argue that due to the high risk involved in the incorrect determination of capital structure, it is important for investors and potential investors to accurately research the market before making investment decisions. They (Titman and Wessels 1988) further state that the most common way of researching the market is to analyse firm specific accounting information namely, the audited financial reports. This denotes the importance of having true and fair financial reports that comply with current legislations. This is decidedly dependent on the quality of the audit performed.

A higher audit quality will ensure the disclosure of crucial events to investors to enable them to make justified investment decisions. Conversely, a poor-quality audit may lead to investors making the wrong investment decisions. Similarly, inaccurate capital structure decisions may lead to firms facing a financially distressed situation, which could lead to insolvency if such a financial position persists over an extended period of time. Given the upmost importance of the understanding and assessment of securities' risks in making investment decisions, researchers have been looking into various financial tools of risks assessments. However, most of the financial tools used in the risks assessments of securities rely on accounting information provided in the financial statements.

Lintner (1965) states that the valid capital market is prominently characterized by the validity of information, meaning that price related information are promptly and fully reflected in the capital market. Should invalid or misleading information be reported in their financial reports, firms face the risk of reduced access to capital market as well as incorrect capital structure decisions, which could potentially mean the incorrect rejection of highly viable and profitable projects. Concurrently, the poor reporting quality along with the inability to invest in viable projects may harm shareholders' confidence. The combined and amplified effect of these factors may potentially lead to the firm facing financial distress, and if such financial conditions persist over an extended period of time, lead to bankruptcy.

2.4 FINANCIAL DISTRESS

The following section of the chapter provides a comprehensive overview of financial distress. Different prediction models are examined and compared.

2.4.1 Bankruptcy v/s Insolvency v/s Financial Distress

Extant literature has provided varying definitions for bankruptcy, among which Altman (1968, p.1) defines bankruptcy as "a situation in which a company cannot pay lenders, preferred stock, shareholders, suppliers, or a bill is overdrawn, or the company is bankrupt according to the law". Altman (2000) further states that a firm is bankrupt when its liabilities exceed the value of its assets. Overall, bankruptcy is commonly defined as a condition where a business is unable to continue its operations due to its inability to meet its debt obligations. However, under Australian Law, the term bankruptcy can only apply to individuals. In Australia, the term insolvency is commonly used as a proxy for companies facing financial difficulties which includes liquidity and performance inefficiency (Altman and Hotchkiss 2006). Consequently, insolvency is commonly defined as a firm with a negative economic net worth or a firm with a negative net present value (Keating et al. 2005; Altman, 1983). Firms facing an insolvent financial situation can seek voluntary administration, or creditors can place the company into receivership or liquidation. Liquidation is the term commonly referred to when firms need to sell their assets as a result of insolvency in order to redistribute the proceeds to claimants (Wruck 1990). Among all these terms and definitions, a common ground stands among extant literature that firm facing each of the stated financial uncertainty would first encounter financial distress.

However, scholars provide a significant number of varying definitions of financial distress, and to date, there is not (to the author's knowledge) unanimously accepted definition. Zmijewski (1984 p.63) defines financial distress as the "act of filing a petition for bankruptcy". Grice, Stephen, and Ingram (2001) define distressed firms as those satisfying one of these conditions: (1) Chapter 7 liquidation; (2) Chapter 11 bankruptcy; (3) low stock ratings; or (4) risky bonds. Similarly, Kane, Richardson, and Graybeal (1996 p.638) define distress as "Failure as event as the date of occurrence of the Chapter 7 or Chapter 11 bankruptcy petition filing, or the date of initiation of an involuntary liquidation proceeding as provided by the Wall Street Journal Index". Platt and Platt (2004) define distressed firms as firms with negative EBIT, low interest coverage ratio, or negative net income before special items. Platt and Platt (2002) postulate a distress position as a result of a number of consecutive negative net operating income, or deferment of dividend payment, or layoffs.

Nonetheless, extant literature commonly agree that a distressed situation can be reversed, identified as the "turnaround process" by Smith and Graves (2005), if management make the proper decision to improve internal control, efficiency and stakeholders' (suppliers, creditors, shareholders and customers) support. On the contrary, a prolonged distressed financial position may eventually lead to liquidation (Wruck 1990; Gilson 1989).

2.4.2 Background and introduction to financial distress

The search for the knowledge of financial distress can be dated back to the 1960s with the work of Altman (1968) and Beaver (1966). Since then, there have been several studies on the determinants, the measurements, and the factors that may exacerbate or mitigate the effects of financial distress. Recently, the global financial crisis and the European sovereign debt crisis plus the large corporate collapses in the early 2000s have further accentuated the necessity to comprehend financial crisis.

One of the most accepted definitions of financial distress in extent literature is "a situation where cash flow is insufficient to cover current obligations such as unpaid debts to suppliers and employees, or actual or potential damages from litigation" Wruck (1990, 421). Gilson (1989, p.243) similarly defined financial distress as an "inability to meet fixed payment obligation on debt". According to Wruck (1990), firms experiencing financial distress face the likelihood of an increase in expenditures due to the direct and indirect cost of financial distress. This may potentially lead to a reduction in the firm's liquidity and profitability; ultimately to an increase in the firm's likelihood of liquidation (Janes 2005). Furthermore, firms facing financial distress need to divert corporate resources from sustainable projects to debt restructuring processes (Gilson 1989). These acts may result in a fall in shareholders', creditors' and investors' trust which sequentially leads to the erosion of the company's wealth by the depletion of the company's share value, and net worth (Liou and Smith 2007).

Moreover, firm's encountering a financially distressed situation may choose to reduce its workforce in a desperate attempt to try to avoid bankruptcy, which as the result creates unemployment. Hence, financial distress can potentially negatively affect not only shareholders, investors and creditors but also the capital market as well as the economy as a whole. On the other hand, mitigating financial distress can indirectly lead to an enhancement of market capitalization, attributable to a rise in stakeholders' confidence (Wruck 1990).

2.4.3 Implications of financial distress

Previous studies on the implications of financial distress merely focus on the costs of financial distress while neglecting its potential benefit. One such crucial example is the research conducted by Brealey and Myers (1988) who present the following formula for the value of a levered firm:

Value of Levered Firm = Value of firm + Value of Equity Financing + PV of Tax Shield – PV of Cost of Financial Distress (Brealey and Myers 1988, p. 421).

Accordingly, this formula relies on the belief that firms make borrowing decisions by balancing the tax benefits of taking debts against the costs of an increase in the likelihood as well as intensity of financial distress. Wruck (1990, p. 430) however states that "this analysis is incomplete because it ignores both the non-tax benefits of leverage and the benefits of financial distress. Therefore, it understates the amount a firm should borrow".

2.4.3.1 Benefits of financial distress

While financial distress is known to have significant downsides to the subsistence of firms, some studies have argued that financial distress could potentially carry some benefits. Some of the most commonly argued benefits are management turnover and changes in organizational strategy and structure as a direct consequence of financial distress (Gilson 1989; Wruck 1990). Gilson (1989) finds that distressed firms experience a 52% annual turnover of top management. Wruck (1990, p. 433) states that "poor stock price performance is not enough to remove incumbent managers, but financial distress provides a mechanism to initiate top management changes".

Gilson (1989) also finds that director turnover is also high (that is, over 53%) in the event of financial distress. Wruck (1990) argues that firms undergoing financial distress often undergo significant organizational strategy and structure changes in an attempt to regain financial stability. Such restructuring can often add value to the firm by increasing shareholder's confidence. Wruck (1990, p. 434) further states that "financial distress can force managers to undertake value increasing organizational changes they would not have otherwise undertaken". However, with the impulse provided by the distress situation, and the increase in likelihood for management and governance turnover, executives consequently have the incentives to take on riskier ventures as well as restructuring in order to minimize the distressed effects (Khurana and Lippincott 2000).

2.4.3.2 Costs of financial distress

Extant literature on financial distress has traditionally differentiated two types of financial distress costs, direct and indirect costs (Kim 1978). Wruck (1990) states that the direct costs (which is also commonly referred to as the out-of-pocket costs) are the easiest to measure. These costs usually include legal, advisory and administrative fees paid by the company as a result of the distressed situation. Prior studies on the direct costs of financial distress are all in agreement that such costs are usually quite small. Wruck (1990) finds that these costs usually average between 3% to 4.5% of the market value of the firm. Other similar studies find very similar averages for the direct cost of financial distress: Altman (1984) finds the cost to be 4.3% of the firm's market value one year before bankruptcy; Weiss (1990) finds the average to be 3.1% of the market value at the end of the financial year before bankrupty; and Ang, Chua, and McConnell (1982) conclude that the mean direct costs to be 7.5% of the liquidated value of firms at the end of the bankruptcy process.

Wruck (1990, p. 437) defines the indirect costs of financial distress as the "opportunity costs imposed on the firm because financial distress affects its ability to conduct business as usual". The indirect costs of financial distress are commonly considered to be threefold. First, distressed firms have limited rights and ability to make certain decisions without legal approval. This limits the investment and financing decisions that management can make in order to amend the distressed situation. Due to its unobservable nature, this costs is commonly referred in extant literature as an opportunity cost (Warner 1977).

Second, distressed firms may be inflected with reduce demand for the firm's products as well as increase in production costs. Gilson, John, and Lang (1990) explain that demand falls if the value of the product to customers depends on the firm's future performance and financial distress threatens the firm's ability to survive. Weiss (1990) indicates that increased production costs are a result of the firm's inability to negotiate prices and credit terms. Weiss (1990) further explains that suppliers often charge a risk premium through higher prices, or constricted credit terms due to the distress firm's potential inability to repay the debt.

Third, prior studies have considered the time that management spends in resolving financial distress as an opportunity cost (Gilson, John, and Lang 1990; Weiss 1990). However, Wruck (1990, p. 438) argues that "when management is engaged in productive restructuring and in implementing strategic change, it is using its time to increase the firm's value. Unless the time could have been spent more productively elsewhere, its value should not be considered an indirect cost".

2.4.4 Financial distress / bankruptcy prediction models

The measurement of financial distress has been a topic of significant emphasis during the recent decades. Researchers have instigated this question by developing various approaches for forecasting and predicting financial distress and bankruptcy from the economic, financial, accounting and statistical point of view. Jostarndt and Sautner (2008) state that most of these studies can be chronologically stratified into two distinct categories: pre-1990's and post-1990's. Before the 1990's, most of the financial distress assessments relied upon single-period models by trying to find key characteristics that distinguish distressed firms from non-distressed ones. Altman (1984), Jones (1987), Foster (1986) and Zavgren (1983) provide extensive reviews of these single-period classification models. With the post-1990's era, researchers realize that no single characteristic or variable can be used to predict financial distress and bankruptcy; instead, dynamic models incorporating different characteristics and variables were developed in order to determine firms' distress risk at varying point in time. Mosmann et al. (1998), Altman and Hotchkiss (2005)[4], Cybinsky (2003) and Weckbach (2004) provide an extensive review comparing the post 1990's techniques with previous pre-1990's discriminant models. Cybinski (2003, p. 131) states that "within the recent decades no new methodology has been introduced. Most extensions of the already existent models occur when either a new statistical technique or a new

[4] Altman and Hotchkiss (2005) provide a chronological classification of existing forecasting models. These models are grouped as: (1) Qualitative analysis (subjective models); (2) Univariate Analysis the use of accounting based ratios for the prediction of financial distress as used by Beaver (1966); (3) Multivariate Analysis (which include Discriminant, Logit, Probit, and Neural Networks analysis); (4) Artificial Intelligence System (Expert Systems, Neural Networks Credit Model) and (5) Contingent Claim Models (KMV Credit Monitor Model).

database becomes available. In the absence of theory, extensions to the available techniques concentrate on the analysis of accuracy of forecasts and the manner of its improvement".

As opposed to the chronological classification suggested by Altman and Hotchkiss (2005) a more preferred classication is suggested by Wruck (1990). She (Wruck, 1990) classified all relevant models which are widely used in empirical studies into two groups depending on the type of data applied. These are (i) models relying on accounting information which are commonly referred as accounting based models and (ii) market based models relying upon capital market information. This form of classification is preferred since this study aims at determining and utilizing the most reliable measure for the prediction of financial distress. Extant literature has argued that the term market-based model can either be the use of stock market data using a statistical model of bankruptcy prediction such as the logit model or bankruptcy prediction based on option pricing model which is based on the Merton's Option Pricing Model (Merton 1974). In comparison between the traditional statistical approach and the structure approach, extant literature commonly use the term accounting (ratio) based model for the former and market based model for the latter.

2.4.4.1 Market-based (non-accounting based) models

Hillegeist et al. (2004) propose that market based models endeavor to estimate the firms bankruptcy risk by assessing a combination of the firm's liability structure and its assets market prices. They (Hillegeist et al. 2004) further offer that the fundamental supposition of market based models is that the probability of default can be determined by the market values which contain all information relevant to creditors and investors.

2.4.4.1.1 The Merton's (1974) option to default model

Merton (1974) is commonly viewed as the pioneer of the market based model for the prediction of bankruptcy. He (Melton 1974) uses the option pricing methodology established by Black and Scholes (1973) to the valuation of a leveraged firm and relates the default risk to the capital structure of the company. According to this model, he (Melton 1974, p. 176) suggests that "the firm's equity can be seen as a European call option on the firm's assets with a strike price equal to the book value of the firm's liabilities". In addition, Merton (1974) also proposes that the "option-like" property of the firm's equity is derived from the unconditional rule to which shareholders are viewed as residual claimants with limited liability. Based on this limited liability rule, shareholders are thus given the option, but not the obligation to pay off creditors and can be entitled to the remaining assets of the company. Counting on the assumption that all liabilities are due at the maturity of the option, if the market value of the firm's assets is greater than the book value of liabilities at maturity, the shareholders would therefore exercise their options on the assets. As the result, the shareholders pay off the debt-holders and the firm continues to exist. If the market value of the firm's assets is lower than the book value of liabilities, the shareholders will let the option lapse therefore the equity value is deemed to be zero and the firm defaults. In this case the firm value is transferred to the debtholders.

Though the Merton's model is considered to be a relatively robust and simple technique, which buils a general framework for the valuation of contingent claims conditional on the firm’s current asset value, leverage, market risk free interest rate, and debt structure, the different assumptions on which it relies may not hold in reality[5]. These limitations have led to the development of a number of variations to the Merton’s model. One of the most successful methods based on the Merton model was developed by Kealhofer and Vasicek (1995) which is a proprietary model of the KMV Model (1995).

2.4.4.1.2 The KMV (1995) Model

The The KMV model is commonly considered as a generalization of the Merton’s model but it allow more flexibility for different classes and different maturities of liabilities (Kealhofer and Vasicek 1995). In contrast to the application of Merton model, when using the KMV Model- the firm is treated as a perpetual entity that is continuously borrowing and repaying debt. Furthermore, the model takes into account all classes of liabilities and equity when calculating fixed cash payouts such as coupon and dividend payments. The KMV Model also suggests that default can occur both at and before the maturity date[6]. Kealhofer (2003) emphasizes that while the Merton model is aimed at the estimation of the company's debt value based on its asset value and volatility, the KMV model centers on the relationship between the

[5] Black and Cox (1976) finds that the assumptions on which Merton (1974) relies does not hold in reality: (1) Merton (1974) assumes that all debt will have the same maturity date whereas in practice, the capital structure of firms will incorporate many classes of debt with different maturity; (2) In the Merton’s model, the bond is seen as a zero coupon bond whereas in practice, many corporate bonds have coupon payments attached; (3) In the Merton’s model, default can only happen at the time of maturity of the debt, but in reality, default can happen at any time during the life of the bond; (4) Merton assumes a constant asset volatility and risk free rate which is not the case in reality.

[6] The KMV Model relies on the assumption that company defaults on its obligations if the market value of equity falls below a certain value called a default point.

firm's equity and asset characteristics which works out for a robust measure of the company's default risk.

Even though the commercial version of Kealhofer and Vasicek (1995) KMV model is widely used among financial practitioners as well as often applied to empirical research, it is not without limitation. Two of the limitations of the KMV model are its complexity and expensiveness (Shumway, 2001).

(Shumway, 2001).

2.4.4.1.3 The Shumway's (2001) simple hazard model

A main difference between the Simple Hazard Model by Shumway (2001) and the previous discussed market based approach (that is, the Merton and KMV Models) is that while the latter are static models (not accounting for time) the Simple Hazard Model controls each firm for a number of periods at distress risk. Shumway (2001) finds that some companies will default after many years of being financially distressed whereas other firms may default in their first year of financial distress. Shumway (2001) states that the hazard rate models stipulate the probability per unit of time for a firm that has survived to the beginning of the respective period will fall in this time period. The other previous structure models originate the probability of liquidation from the capital structure; however, hazard models links probability of default to the intensity of default.

Altman (1968) and Zmijewski (1984) discover that the explicit accounting for time allows researchers to capture the changes in the default risk through time and to adjust varying intensity of default automatically. Three market driven variables are used in the Shumway model to compute the accuracy of the market data to the results of a hazard model. He concludes that a substantial number of the accounting variables used in the Merton's and KMV's models are poor predictors of default. In contrary, market driven variables such as market size, volatility and past stock returns are strongly related to the probability of default and allow analyzing the probability of default for periods the company spent in financial distress prior to default.

2.4.4.1.4 The neural networks model

Odom and Sharda (1990) introduce the Neural Networks technique to assist with corporate bankruptcy prediction in 1990. Recent studies in Neural Networks (NNs) show that they are appropriate for many tasks in pattern recognition and pattern classification (Rudorfer, 1995). NNs have non linear, non parametric adaptive learning properties in modelling and forecasting (Zhang, Hu, Patuwo and Indro, 1999). There are other studies using the NNs technique such as Altman et al. (1997), Altman et al. (1994), Wilson and Sharda (1994), Coats and Fant (1992), Tam and Kiang (1992), Cadden (1991). Most neural network methods to bankruptcy prediction use a multi layer perceptron (MLP). Zhang et al. (1999) describe that in MLP, all nodes and layers are mananged in a feed forward manner. The feed forward layered network covers three kinds of layers. The first layer is called the input layer where external information is received. The last layer is called the output layer where the network produces the final solution. In between, there are one or more internal or hidden layers. As the number of hidden layers increases, the network becomes more complex (Zhang et al. 1999). Odom and Sharda (1990) used Altman's financial ratios as inputs to the NNs, with most of the data used for the bankrupt firms gathered the last financial statement before declaring bankdruptcy. Odom and Sharda (1990) apply the three layer feed forward MLP in their research. They find that NNs provides a more precise and robust prediction ability than other market based models[7].

Though the NNs technique appears to do well in insolvency forecast, it also has some serious limitations. The most significant problem related to the use of NNs technique is the "black box problem" which criticised that NNs do not reveal the significance and role of each of the variable being analyzed. (Cybinski, 2001; Coats and Fant, 1993; Hawley et al. 1990).

2.4.4.1.5 The survival analysis model

The use of survival analysis to financial distress modelling started in the 1980s and grew in use through the 1990s (Helwege, 1996; George, Spiceland and George, 1996; Crapp and Stevenson, 1987; Lane, Looney and Wansley, 1986). Survival analysis is deeded to be the best choice for insolvency forecast since it allows the estimation of the probability that a firm will survive or will go into bankruptcy at each point in time over the period being forecasted (Cole and Wu, 2009; Campbell, Hilscher, and Szilagyi, 2008; Parker, Peters and Tmetsky, 2002; Partington, Russel, Stevenson and Torbey, 2001; Shumway, 2001). While other statistical models inspect

[7] Many researchers put emphasis on the superiority of the NNs technique over classical techniques for various reasons. First, NNs can recognize complex patterns with better accuracy, and they are able to learn from training samples without any prior knowledge about the underlying problems (Back et al., 1996). Second, Coats and Fant (1993) found that non numeric data can be easily included in an NN because the input data do not need to conform to some linearity assumption. Third, an NN is perfectly suited for pattern recognition and classification in unstructured environments with incomplete or inconsistent data (Hawley, Johnson and Raina, 1990).

an event's probability using variables based on data at one point in time, survival analysis is run on data collected across time. Moreover, survival analysis not only estimates the probability of the event but also investigates the fluctuations in variables over time and their impact before the event occurs.

Hillegeist et al. (2004) advised disassembling the dependent variables into lagged levels and changes, in order to extract additional information from historical data so as to improve the predictive accuracy of a model. Likewise, Jones and Hensher (2004) used lagged changes of a variable in an attempt to combine the accumulating effect of changing financial characteristics over time.

To summarize, the main limitation of market based models is that the market may not correctly reflect all the information disclosed in financial statements in reality (Jones and Hensher 2004). In addition to this, the efficient market hypothesis underlying the theory of market based models; which uses strong assumption and thus it can lead to potential biases in estimated probabilities of default (Gharghori, Chan and Faff 2007). One more weakness is that market-based models require stocks to be listed on the stock exchange, which is not applicable for private firms (Hillegeist et al. 2004). However, Hillegeist et al. (2004) argue that in comparison to the accounting based models, market based models are still more flexible and provide superior information to researchers interested in the bankruptcy prediction[8] study.

In Australia, Gharghori et al. (2007) compared the effectiveness of the accounting based and market based models and concluded that market based models outperform the accounting based models in predicting bankruptcy. Tanthanongsakkun et al. (2009) have a similar conclusion as Gharghori et al. (2007). They (Tanthanongsakkun et al. 2009), however suggested that while the market based models performed better, the performance of the accounting based models (that is, the Zmijewski, Altman and the Ohlson models) were still suitable and preferred for the determination of financial distress rather than for predicting bankruptcy. This view is also shared by Grice et al. (2001, p. 53) who state that accounting based models like

[8] Hillegeist et al. (2004) find accounting based models to have the following limitations. First, they state that accounting-ratio analysis is backward-looking, while bankruptcy prediction is ideally conducted in a forward-looking manner. Second, due to the conservatism principle, book values of firm assets are often understated compared to their market values, which may lead to overstatement of accounting-based leverage figures which may limit the performance of any accounting based measure of bankruptcy likelihood. Third, although the volatility of the firm's assets is considered one of the key variables in predicting bankruptcy probability, it is not reported in financial statements Forth, Hillegeist et al. (2004) state the data used in accounting based models are often incomplete especially for distressed firms due to the interruption of regular financial reporting when firms face a financially distressed situation.

the ZFC and O Scores are still the most relevant methods for predicting financial distress conditions other than bankruptcy.

On an international perspective, a large number of studies still prefer the use of accounting based models for the determination of default risk (Fargher and Kalotay, 2009; Agarwal and Taffler, 2008; Bharath and Shumway, 2008; Campbell, Hilscher, and Szilagyi, 2008; Agarwal and Taffler 2008; Reisz and Perlich, 2007; Brockman and Tmile, 2003; Taffler 1984). Similar research within an Australian setting for the prediction of bankruptcy are conducted by Hensher et al. (2007) and Jones and Hensher (2004).

While this study acknowledges the findings of Hillegeist et al. (2004) and the limitations associated with accounting based models, the latter are still preferred as this study aims predominantly at determining financial distress rather than the prediction of bankruptcy. This study will, however, still take the findings of Hillegeist et al. (2004), Shumway (2001) and the Survival Analysis Model and use both lagged data as well as data collected across time (over time).

2.4.4.2 Accounting based models

2.4.4.2.1 The Beaver's (1966) univariate analysis of financial ratios

Beaver (1966), is considered one of the pioneers in the determination of financial distress using accounting based methods. He introduces a univariate approach which classify companies into two groups by using financial ratios: financially sound and financially distressed. Beaver (1966) performs comparison of the means of failed firms with sound (non distressed) companies and finds that failed firms have lower financial ratios. Beaver (1966) also finds that the financial ratios of the failed firms are substantially lower that the ratios of sound firms as early as five years prior to bankruptcy. Furthermore, Beaver (1966) also finds that the ratios keep deteriorating as default approaches. Based on his findings, Beaver performs a dichotomous classification test of the predictive ability of the chosen accounting measures and identifies the six most powerful ratios: (1) cash flow to total debt, (2) net income to total assets, (3) total debt to total assets, (4) working capital to total assets, (5) current ratio, and (6) no credit interval. After further analysis, Beaver (1966) concludes that the cash flow to total debt ratio was the single most important factor in the prediction of financial distress. However, Beaver's univariate analysis is often criticized of lacking practicality and being too simple. Dimitras et al. (1996) argue that there are several factors which can portray the financial position of a company. Thus they (Dimitras et al. 1996) assert that no single ratio is good enough to provide sufficient information to thoroughly estimate the probability of financial distress. Taking into account the weaknesses of Beaver's (1966) univariate analysis, Altman (1968) developed the Altman's Z-Score which is based on multiple discriminant analysis.

2.4.4.2.2 The Ohlson's (1980) O-Score

Ohlson (1980) criticizes the restrictive assumptions of multiple discriminant analysis and the output of this technique. He argues that the single dichotomous score obtained does not provide a probability of default; it merely provides an indication on whether the firm is facing financial distress while failing to provide any indication on the intensity of the distressed situation (if any). To mitigate these problems, he introduces an altemative econometric technique based on the logistic transformations (logit model). Comparable to the discriminant analysis, this technique weights the independent variables and assigns a score. Yet, unlike discriminant analysis, this method estimates the probabilities of default for each company in a sample. Using the Ohlson's O-Score, the higher the 0-Score, the higher the bankruptcy risk. Based on his findings, Ohlson states that the size of the company is the most significant predictor of financial distress (Ohlson 1980). The Ohlson's O-Score is defined as:

$$O-Score = -1.32 - 0.407\ log\ \frac{Total\ Assest}{GNP\ price-level\ index} + 6.03\ \frac{Total\ Liabilities}{\text{Total Assets}} - 1.43\ \frac{\text{Working Capital}}{\text{Total Assets}} + 0.076\frac{Current\ Liabilities}{Current\ Assets} - 1{,}72\ (1\ if\ total\ liabilities > total\ assets, otherwise\ 0) - 2.37\frac{Net\ Income}{Total\ Assets} - 1.83\ \frac{Funds\ from\ Operations}{Total\ Liabilities} + 0.285\ (1\ if\ a\ net\ loss\ for\ the\ past\ two\ years, otherwise\ zero) - 0.521\ \frac{Net\ Income\ (t)-Net\ Income\ (t-1)}{Net\ Income\ (t) + Net\ Income\ (t-1)}$$

However, Keasey and Watson (1991, p. 92) postulate that, "logit analysis offers as much as any other technique to the user". Keasey and Watson (1991) compare the predictive accuracy of the logit model with multivariate discriminant analysis. They (Keasey and Watson 1991) use the same set of variables with the same sample and conclude that the improvement in reliability or level of information provided by the O-Score as compared to other models is insignificant.

2.4.4.2.3 The Altman's (1968) Z-Score

Altman (1968) first used Multiple Discriminant Analysis (MDA) in the Z-score model as the fitting statistical technique for the purpose of detecting bankruptcy. Altman (1968) selected a sample of 33 bankrupt and 33 non-bankrupt companies from

1946 to 1965, and constructed a five-variable model to separate bankrupted and non bankrupted companies into two groups. The following variables are used in Altman's Z- score model and these financial ratios have been widely used as inputs for many other models (Hillegeist, Keating, Cram and Lundstedt 2004; Altman, 2000; Atiya, 2001; Grice and Ingram, 2001; Shumway, 2001; Dimitras, Zanakis and Zopounidis, 1996; and Odom and Sharda, 1990)

$$Z = 1.2\,\frac{Working\ Capital}{Total\ Assets} + 1.4\,\frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3\,\frac{\text{EBIT}}{\text{Total Assets}} + 0.6\,\frac{Equity}{Total\ Liabilities} + 0.999\,\frac{Sales}{Total\ Assets}$$

Altman (1968) finds that a Z-Score of 2.99 or over indicates that the firm's financial position is healthy, while a score below 1.81 indicates an unhealthy financial position which equates to a higher likelihood of going bankrupt. A Z-score of 2.675 is the critical point separating bankrupt and non-bankrupt companies. However, the Altman's model fails to predict the Z-Score of some firms that fall within a "gray area" (i.e. firms with a Z-Score between 1.81 and 2.99). This is the cause why Altman (1968, p. 596) suggests that "it is desirable to establish a guideline for classifying firms in the gray area". In addition, the Altman's Z-Score merely provides a view on how healthy (or unhealthy) a firm is, and its reliability should be questioned (Dimitras et al. 1996; Atiya, 2001; Grice and Ingram 200l). Whilst the Altman Z-Score is better suited for manufacturing industry firms, the Altman Z2-Score model is a modified version of the previous model to include non-manufacturing industry firms (Altman et al. 2017). The Altman Z2-Score is therefore not specific to any industry (Grice, Stephen and Ingram 2001). For these reasons, the Altman's Z-Score model is not the desired measure for this research.

2.4.4.2.4 The Zmijewski's (1984) financial (ZFC) Score

Zmijewski and Dietrich (1984) Zmijewski and Dietrich (1984) suggest the use of a different method for the determination of financial distress. This method is commonly referred to as the Zmijewski's Financial Condition score. Since Zmijewski came up with the ZFC in 1984, the model has been far and wide used, and is still considered as reliable as newer prediction models (Wertheim and Robinson 2011). The ZFC score is calculated as follows (Walker and Hay 2009):

$$ZFC = -4.336 - 4.513\,\frac{Net\ Income}{Total\ Asset}\,(ROA) + 5.679\,\frac{Total\ Liabilities}{Total\ Assets}\,(Fin\ Leverage) + 0.004\,\frac{Current\ Assets}{Current\ Liabilies}\,(Liquidity)$$

There are numerous studies that use the ZFC Score for the purpose of measuring the likelihood of financial distress: Geiger and Rama (2003); Geiger, Raghunandan, and Rama

(2006); Carey, Kortum, and Moroney (2011); Francis, Reichelt, and Wang (2005). Using the ZFC method, a higher (lower) value will indicate a higher (lower) likelihood of financial distress. The findings reached is therefore easy to understand and to analyse for comparison purposes. In opposition to the Altman's Z-Score, the ZFC Score provides a probability of facing financial difficulty whereas the Z-Score only provides a guideline on the firm's financial healthiness. When compared with the Ohlson's Logistic Regression model, the ZFC Score still manages to provide equally reliable information as the former while also being easier to use and to comprehend (Keasey and Watson 1991). In addition, all the data required to calculate the ZFC score can be obtained from databases or the audited financial statements of the sampled companies. The Zmijewski ZFC score is therefore the preferred method for this research as it provides a reliable probability score.

2.4.5 Financial distress – A meta-analysis

A considerable number of papers has been published both nationally and internationally underpinning the effect of certain factors on financial distress. For the purpose of this research, these factors will be clustered under firm characteristics, earnings quality, and corporate governance.

2.4.5.1 Financial distress and firm's characteristics

The degree of financial distress is admitted in extant literature to be in direct association with certain firm characteristics such as the firm's maturity, size, industry, and complexity (Chancharat et al. 2010; Jostarndt and Sautner 2008; Hou and Chuang 2007; Dimitras, Zanakis, and Zopounidis 1996). Jostarndt and Sautner (2008) discover that mature firms are less likely to suffer from financial distress. The reason behind that is established firms generally have greater access to capital market, with a more dependable clientele base, and more tolerant suppliers. Firm complexity is connected with the number of subsidiaries. Chancharat et al. (2010) find that the more subsidiaries a company has, the lower the chance of it suffering financial distress. Chancharat et al. (2010) explain that firms with a large number of subsidiaries often operate in different market and industry groups. Thereby, should one subsidiary within one industry not perform at par, the parent company can rely on other subsidiaries operating in other industry to compensate for the loss. Janes (2005) finds the firm's riskiness (measured by the degree of financial leverage) and profitability have a direct correlation with the intensity of the distressed condition. He (Janes 2005) explains that firms with a high degree of financial leverage and/or a poor profitability have a reduced access to capital market, consequently render the harder turnaround process from financial difficulty situations.

2.4.5.2 Financial distress and earnings quality

The extant literature provides ample quantity of papers analysing the effect of some earnings quality measures on financial distress. The main measures commonly used are earnings management and abnormal accrual. Sweeney (1994) analyses the relationship between financial distress and earnings management and discovers that earnings management does not in itself give rise to financial distress. However, Sweeney concludes that financial distress provides an incentive for corporate governance body to manipulate earnings so as to satisfy debt covenants, to meet market expectations, to understate losses or declines in earnings. Sweeney's conclusions are in accordance with several other literature (e.g., Janes 2005; Jaggi and Lee 2002; DeAngelo, DeAngelo, and Skinner 1994; DeFond and Jiambalvo 1994) .

2.4.5.3 Financial distress and corporate governance

Porter (2009) postulates that an effective corporate governance made up of a robust and autonomous component of the "tripartite audit function" (the external audit function, the internal audit function and the audit committee) is required to ensure corporate accountability. There are currently considerable literature examining the effect between financial distress and corporate governance factors like audit committee, management turnover and internal control structure. Lapointe (1997) looks into the correlation between financial distress and the entity's internal control structure and concluded that financial distress results in poor internal control structure which mainly due to the firms' lack of financial ability to improve or maintain its internal control structure. Noted that his research could not demonstrate that poor internal control structure leads to financial distress directly. Jerry, June, and Joon (2006) examine the association between financial distress and audit committee. They (Jerry, June, and Joon 2006) use size, financial expertise of the committee independence, meeting frequency and attendance as proxies to measure the efficiency of the audit committee. They conclude that audit committee does not directly affect financial distress. However, these authors mention that the efficiency of the audit committee is related with the quality of financial reporting which in turn may affect financial distress (Jerry, June, and Joon 2006). Jerry, June, and Joon (2006) conclude that the higher (lower) the quality of the financial reporting, the lower (higher) the likelihood of financial distress. These findings are consistent with another study conducted by Noor and Wan (2009). In addition, Jostarndt and Sautner (2008) tested whether management turnover reduces the likelihood of financial distress but find the results to be inconclusive. They (Jostarndt and Sautner 2008) find that in many situations, management turnover follows as a result of financial instability but they fail to find any evidence to show that a restructuring in the board of management can prevent (or even reduce the effects of) financial distress. Jostarndt and Sautner (2008) findings are coherent with other literature: Liou and Smith (2007), Smith and Graves (2005),Gilson (1989).

Similar to other studies on different corporate governance elements and financial distress, some scholars have researched the final key element of an effective corporate governance (in addition to board of directors, audit committee and internal audit function), that is, the external audit function, with financial distress.

Existing literature have analysed the link between financial distress and the type of auditor's opinion issued such the issuance of going-concern reports, or the likelihood of receiving a modified auditor's opinion (Chi and Chin 2011; Stanley 2011; Carey and Simnett 2006; Liu and Wang 2005; Choi, Doogar, and Ganguly 2004; Carcello and Neal 2000). Balsam, Krishnan, and Yang (2003, p. 86) postulate that "because audit quality is multidimensional and inherently unobservable, no single auditor characteristic can be used to proxy for it". Accordingly, Balsam (2003, p. 86) describes that in order to obtain a reliable measure for audit quality, several proxies need to be jointly employed due to the unavailability of any specific measure for audit quality.

Lu and Ma (2016) proxy audit quality with the engagement of a Big 4 auditor and finds a negative correlation with financial distress, which is proxied for using the Altman's (1983) Z-Score. Jin, Kanagaretnam, and Lobo (2011) investigate the effect of audit quality on financial distress in the banking sector by proxying audit quality with Big 4 auditor and auditor specialization and financial distress with banking specific factors such as non-performing loans, loan loss provisions, and proportion of securitized loans. However, Francis (2004) funds audit quality to be hard to measure, and Blasam, Krishnan, and Yang 2003 (2003) conclude that due to audit quality being unobservable and multidimensional, different auditor characteristics (as opposed to only one auditor characteristic) is required to proxy for it (that is, audit quality).

Whilst the study conducted by Jin, Kanagaretnam and Lobo (2011) use two different auditor attributes to proxy for audit quality (namely, Big 4 auditor and auditor specialization), they proxy financial distress with banking specific variables which renders the findings non-generalisable to other industries (other than the banking industry). Lu and Ma (2016) solve this issue by proxying financial distress with the Altman's Z-Score. However, the Altman Z-Score (as opposed to the Altman Z2-Score) does not consider non-manufacturing industries. In addition, by only proxying audit quality with Big 4 auditor, the multidimensional nature of audit quality as specified by Blasam, Krishnan, and Yang 2003 (2003) is ignored.

2.5 AUDIT QUALITY

Berle and Means (1932) raised concerns about issues associated with separation of ownership and management, namely information asymmetry and agency costs. A significant number of scholars studying agency theory have emphasised the necessity of audit function in monitoring the alignment of the interest between shareholders (the principal) and management (the agent) (Clinch, Stokes and Zhu 2012; Arrunada 2000; Benston 1985; Chow 1982; Watts and Zimmerman 1980; Watts 1977; Jensen and Meckling 1976). Subsequently, firms need to ensure that the quality of the audit performed is reliable for its stakeholders. Audit quality is a broad term for various factors affecting the quality of the audit performed such as recruitment of firm auditors, accounting and auditing standards, code of ethics subjected to professional accountancy bodies, professional attributes of auditors, audit regulators involved in the audit review process, the corporate culture of the audit firm and audit methodology used by the audit firm (Simunic 1980).

2.5.1 Concept and definition

A definition of audit quality is proposed by DeAngelo in 1981 and is widely recognised as the ability of the auditor to detect and report any material misstatements and breaches in accounting standard that impact the contract between company management and shareholders. According to DeAngelo (1981b), auditor quality is perceived as a composition of auditor's competence and auditor's independence which respectively refer to the auditor's ability to detect and report any material misstatements and breaches in accounting standard.

DeAngelo (1981b) further points out the quality of an audit does not reflect the degree of information available to the public and is not directly noticeable. Palmrose (1988) agrees to the fact that external financial statement users do not generally recognise the level of the quality of an audit. Various scholars have identified the primary determinants of audit quality to be the number and extant of audit procedures applied (Hribar, Kravet and Wilson 2014; Chaney, Jeter, and Shivakumar 2004; Turpin 1995; Chan, Ezzamel, and Gwilliam 1993; Chung and Lindsay 1988; Taffler and Ramalingam 1982; Simunic 1980). Since these audit procedures cannot be observed explicitly in audit working papers, it is essential to have alternative measures to proxy for these audit procedures (Dechow, Ge, and Schrand 2010). Audit quality proxies used in prior literature regarding auditor differentiation include fraud frequencies (Beneish 1999b; Farber 2005), analyst forecast accuracy (Lawrence, Minutti-Meza, and Zhang 2011; Behn, Choi, and Kang 2008), discretionary accruals (Lawrence, Minutti-Meza, and Zhang 2011; Francis, Maydew and Sparks 1999), ex-ante cost of equity capital (Lawrence, Minutti-Meza, and Zhang 2011; Khurana and Raman 2004), and litigation (Feroz, Park, and Pastena 1991; Palmrose 1988).

2.5.2 Impact of auditor quality

External auditor is of paramount importance for ensuring high alignment of interests between principal and agent by verifying the reliability of the company's financial statement (Clinch, Stokes and Zhu 2012; Ferguson, Francis and Stokes 2003; Leftwich 1980). Hence, auditor quality is one of the critical components affecting auditing profession (Vanstraelen 2000). The external audit function acts as a key corporate governance mechanism in the information market place (Gay and Simnett 2012). Chang, Dasgupta and Hilary (2009) postulate that the quality of the auditor will affect the firm's debt-equity appetite. For instance, firms with a higher quality auditor tend to rely more on equity financing and have lower debt ratios (Chang, Dasgupta and Hilary 2009). In this case, equity market participants and debt providers highly value quality auditors and client firms often enjoy benefits associated with high quality auditors, namely- lower contracting costs and increase in market value of equity (Chang, Desgupta, and Hilary 2009; Hope et al. 2009; Ahmed, Rasmussen, and Tse 2008; Khurana and Raman 2004; Mansi, Maxwell, and Miller 2004; Pittman and Fortin 2004; Vanstraelen 2000; Crawford, and Johnson 1998; Moreland 1995; Franz).

High quality auditors are perceived to possess better monitoring skills in ensuring the credibility of the financial report of the firm (Dunn, Hillier, and Marshall 1999; Klock 1994; Eichenseher, Hagigi, and Shields 1989; Nichols and Smith 1983; Fried and Schiff 1981). High quality auditors are often characterised by the ability to assess audit risks accurately and to detect errors and misstatements, improve earnings quality and render credibility to financial statements (Caramanis and Lennox 2008;

Balsam, Krishnan, and Yang 2003; Krishnan 2003; Francis, Maydew, and Sparks 1999; Becker et al. 1998; Beatty 1989; Jensen 1986). In addition, high quality auditors are also less likely to be allied with managerial unscrupulous behaviours (Sun and Liu 2013; Krishnan 2003; Francis, Maydew, and Sparks 1999). Often, firms with high quality auditors avoid poor disclosure quality (Chu, Mathieu, and Mbagwu 2013; Dunn and Mayhew 2004;) and financial fraud (Lennox and Pittman 2010; Farber 2005; Carcello and Nagy2004). In addition, to improve the quality of the audit performed, auditors also provide additional value-added services to promote the reliability of the firm's internal control as well as the credibility of financial report. These non-audit services include identifying business risks, reporting on internal control weaknesses, and providing non-audit services such as tax advisory and risk management assessments (Gay and Simnett 2012; Hamilton Li, and Stokes 2008; Zhang 2007).

2.5.3 Determinants of auditor quality

Auditor quality is a complex and innately unobservable concept (Balsam, Krishnan and Yang 2003). It is often difficult to create proxies for auditor effort/effectiveness due to limited information (Dechow, Ge and Schrand 2010). The auditor quality proxies mushroomed to a series of auditor attributes in extant literature, namely audit fees (Gul, Jaggi and Krishnan 2007; Francis and Ke 2006; Larcker and Richardson 2004; Ashbaugh, LaFond, and Maayhew 2003; Frankel, Johnson, and Nelson 2002), auditor brand name (Lai et al. 2013; Behn, Choi and Kang 2008; Dye 1993; Palmrose 1988; DeAngelo 1981b), auditor independence (Salehi 2009; Chaney and Philipich 2002; Craswell 1999), auditor tenure (Chen, Lin and Lin 2008; Ghosh and Moon 2005; Johnson, Khurana, and Reynolds 2002), auditor specialisation (Balsam, Krishnan, and Yang 2003; Krishnan 2003; Zhou and Elder 2002), auditor size (Kim, Chung, and Firth 2003; Francis, Maydew, and Sparks 1999; Becker et al. 1998;), auditor gender (Gold, Hunton, and Gomaa 2009; Bernardi and Arnold 1997), time spent on the audit (Caramanis and Lennox 2008; Ettredge, Li, and Sun 2006), delay of auditor report (Schwartz and Soo 1996; Bamber, Bamber, and Schoderbek 1993; Ashton, Graul, and Newton 1989; Newton and Ashton 1989), and auditor workload compression (Lopez and Peters 2011). Out of these, there are four critical components that have drawn considerable attention in extend literature and are widely accepted as adequate proxies of audit quality. These four pivotal auditor attributes, therefore pertinent to this study, are (a) Big 4 auditors; (b) the provision of non-audit services; (c) audit tenure; and (d) audit fee.

2.5.3.1 Big 4 auditor / auditor brand name

There have been extensive studies conducted on using auditor brand name as a proxy for audit quality globally. Speaking of brand name, it directly signifies the four largest audit firms that completely dominate the industry – KPMG, Price Waterhouse-Coopers, Ernst & Young and Deloitte Touche Ross, which collectively known as the Big Four worldwide. Within a non-Australian context, Reynolds and Francis (2001) stated that whilst there exist incentives for big 4 auditors to pursue a higher quality audit, incentives for firms to contract such auditors also subsists. The thought behind their statements (Reynolds and Francis 2001) revolves around the reputation capital perceived for such auditors. It is commonly believed that financial statements audited by big 4 auditors "should" be more reliable and consequently reflect a more truthful portrait of the financial situation of such auditees. Due to this perceived reputation capital, many firms prefer to contract with "branded" auditors so as to provide greater perceived assurance that their financial statements provide a true and fair view of their financial condition (Ali Abedalqader et al. 2011; Choi et al. 2010; Reynolds and Francis 2001; Colbert and Murray 1998).

According to Lennox (1999, p 217) "the reputation argument suggests that large auditors suffer a greater loss as a result of inaccurate reporting". Lennox (1999) further explains that bigger firms have a greater proportion of reputation capital at risk than smaller companies, thereby they should have greater emphasis on providing higher quality audits. This view is also shared by Dye (1993) and DeAngelo (1981). Likewise, Dye (1993) states that larger audit firms have a bigger motivation to deliver higher quality audit so as to reduce litigation risk. The reasoning behind Dye's (1993) argument is that stakeholders are more likely to target bigger audit firms in the event of litigation due to the shared belief that such firms have 'deeper pockets' than smaller firms and will as a result have more resources to make compensation on any legal indemnities (Lennox 1999).

Big 4 auditors are known to have national training programs, standardized audit programs, and firm-wide knowledge sharing practices which are supported by updated information technology (Francis and Yu 2009). Large firms also employ more employees; therefore, auditors working in such firms have more in-house support and more colleagues to consult with (Vera-Munoz et al. 2006). Danos et al. (1989, p.102) reported that "auditors are most likely to consult their peers within the same office when problems arise rather than broader consultation with colleagues in competing firms". Furthermore, Francis and Yu (2009) proclaim that big 4 auditors are commonly, highly specialized within the specific industry assigned to them.

Existing literature also includes some research on the subject matter within an Australian context. Coram et al. (2008) studied the relationship between big 4 auditors and the audit quality and claimned that big 4 auditors generally yield higher quality audit due to the specialized nature of such auditors. Studies using Australian data to analyse the relationship between auditor size and audit quality include those by Stringer and Adamidis (2010); Coram et al. (2008); Boon et al. (2008); Coram et al. (2003); Green and Simnett (1993).

However, there are contrasting voices from empirical studies claiming that both brand name and non-brand name auditors exert about the same amount of effort in the production of an audit and it is the characteristics of client firm that influence the distinctions in the quality of an audit between brand name and non-brand name auditors (Lawrence, Minutti-Meza, and Zhang 2011; Blokdijk et al. 2006).

2.5.3.2 Provision of non-audit services

The provision of non-audit services by incumbent auditors result in diverging views in extent literature. On one side, scholars favour the "economic bonding" hypothesis as impairing the independence of the auditor. Lennox (2005, p.219) defines auditor independence as the auditor being free from any financial interest in the auditee. When defining auditor independence, it is essential to first differentiate between independence in fact and independence in appearance (DeAngelo 1981). Should the auditors' independence appear to have been compromised, the result may be a decrease in credibility of the audited reports which may sequentially impose an increase in the auditee's cost of capital (Jackson et al. 2008; Schneider et al. 2006; DeAngelo 1981). However, should a breach in the auditor's independence be factual (that is, proven), the consequences will be considerably costlier both for the auditee and the auditor. However, in a study conducted by Olazabal and Almer (2001), the authors claim that an impairment in the auditor's independence in appearance can potentially be as detrimental to both the auditor and the auditee as a breach in independence in fact. Scholars who support the 'economic bonding' hypothesis proposed that a violation of auditor independence is accused when there is economic bond between the auditor and its client (DeAngelo 1981b; Chaney and Philipich 2002; Salehi 2009). Though legislations contained in CLERP 9 does not ban auditors from providing non-audit services to auditees, it however imposes extensive disclosure requirements in regards to the provision of non-audit services by the incumbent auditor thereby effectively favouring the "economic bonding" hypothesis.

On the contrary, other scholars favour the provision of non-audit services by incumbent auditors because of the "knowledge spilled-over" hypothesis whereby the knowledge acquired through the provision of non-audit services to an audit client may "spill over" to the production of the audit, subsequently increasing the auditor independence, audit quality and reduce audit costs (Stanley 2011; Griffin and Lont 2010; Callaghan et al. 2009; Gul et al. 2007; Schneider et al. 2006; Lennox 2005; Larcker and Richardson 2004; Menon and Williams 2004; Geiger and Rama 2003; Barkess et al. 2002; Franker et al. 2002; Beaver 1966). These scholars also justify the positivity of the provision of non-audit services by incumbent auditors as the risks associated with an impairment of independence (such as reputation loss and litigation) (Knechel, Sharme, and Sharma 2012; Dopuch, King and Schwartz 2003; Arrunada 1999; Wallman 1996; Simunic 1984).

2.5.3.3 Audit tenure

Johnson et al. (2002) define auditor tenure as the length of time that the auditor held office. Current literature provides diverging views on the effect of audit tenure on audit quality. Theoretical models defined in the present literature usually embody either a 'learning hypothesis' (also commonly referred as the Knowledge Spillover Hypothesis) or a 'bonding hypothesis' perspective towards audit tenure (Brooks 2011). The 'learning hypothesis' perspective implies that the longer an auditor holds office, the more client-specific knowledge he/she will possess, and the more efficient he/she will be at detecting material misstatements. Ali Abedalqader et al. (2011) describe the learning effect as a spill-over of information that the auditors possess on the auditee after delivering auditing service for the company for a few successive years. The familiarity between the auditor and the company renders it easier for the former to analyse the financial statements and operations of the company, and consequently, increases the likelihood of finding misstatements. The outcome is a higher audit quality. Likewise, Simunic (1980) argues that the knowledge and understanding the auditor has of the firm's industry, operations and accounting system will grow deeper as the relationship between auditor and the firm continues and as a result improving the audit quality. There currently exist a large number of literature that support this view (Brooks 2011; Myers et al. 2003; Geiger and Rama 2003; Johnson et al. 2002;

Solomon et al. 1999; Beck et al. 1998; Knapp 1991).

In the contrary, other literature strongly support the ‘bonding hypothesis’. The supporters of this hypothesis argue that the longer an auditor remains in office, the higher the likelihood of their independence being compromised (Bedard and Johnstone 2010; Brooks 2011; Johnson et al. 2002; Raghunandan et al. 1994; DeAngelo 1981). The enthusiasts of this hypothesis assert that the longer the relationship between the auditor and the auditee, the higher the familiarity threat which may result in the auditor not being meticulous with his audit procedures. They also argue that the longer the relationship, the more financially dependent the auditor is on the client (Johnson et al. 2002; Raghunandan et al. 1994; DeAngelo 1981). Due to this reason, the auditor may be reluctant to give an unfavourable audit opinion due to the perceiverisk of losing a high fee-paying client. A policy of mandatory auditor partner rotation through CLERP 9 has been introduced and exercised as a means of improving audit quality by promoting auditor independence in terms of reducing the risk associated with familiarity threat and auditors’ conflicts of interest (Jenkins and Vermeer 2013). Extant literature agrees this strategy to be successful for Big 4 auditors to achieve a better-quality audit, however, finds this detrimental to non-Big 4 auditors suggesting that the learning experience obtained through longer audit partner tenure to be crucial for smaller sized auditors. This has resulted in scholars questioning the ‘one size fits all’ requirements for audit partner rotation (Hamilton et al 2005). Carey and Simnett (2006) state that a long duration of auditor tenure can lead to reduced auditor independence and objectivity, and consequently, result in reduced audit quality. Additionally, some researchers also claimed that time may deteriorate the auditor’s ability to detect critical error (Mansi, Maxwell, and Miller 2004). However, the results from Carey and Simnett (2006) show no evidence of the negative association between auditor tenure and audit quality.

2.5.3.4 Audit fee

Financial report users and clients expect that a higher audit fee indicates a higher quality audit will be performed. It is always a dilemma common to both the auditor and the client when it comes to determining an audit fee which is mutually acceptable by both parties. For auditors, they deserve to be compensated fairly for services provided, whereas from the client point of view, they should be provided with audit work align with the audit fees paid (Maher, Tiessen, Colson, and Broman 1992). Several scholars have stated that the primary determinants of audit fees should be the number and extant of audit procedures (Hay et al. 2006; Chung and Lindsay 1988; Turpin 1995; Chan et al. 1993; Taffler and Ramalingan 1982; Simunic 1980). Essentially, alternative measures should be in place to proxy for the audit procedures due to audit procedures being not directly observable in the audit working papers. Empirical studies on audit fee commonly find a positive association between audit fee and the quality of the audit.

Prior researchers have identified audit fee variation through investigation of numerous firms and auditor attributes based on the seminal work by Simunic (1980), that includes firm size, complexity, risk, auditor size and specialisation. These attributes have been recognized to be consistent with the identification across a wide array of studies, sample sizes and regions (Hay et al. 2006). For instance, larger audit firms provide better quality audits than smaller audit firms, hence they are paid at a higher compensation. Consistent with the auditor expertise hypothesis, audit quality increases with specialisation in industry as they acquire in-depth knowledge over time within that specific industry and achieve a competitive advantage in identifying the high-risk area for aggressive accounting, and as a result, detect any material misstatement (Gul, Fung, and Jaggi 2009; Geiger and Raghunandan 2002; Solomon, Shields, and Whittington 1999; Knapp 1991; Beck, Frecka, and Solomon 1988; Hoyle 1978).

Another similar study is Wuchun (2011) who finds a positive association between audit fee and audit quality and further explains the higher fees to be as a consequence of more time spent on the audit, the hiring of more experienced auditors, and the higher level of training and support provided to the audit team. These findings are also consistent with other extant literature looking into the impact of variations of audit fees on the quality of the audit (Reichelt and Wang 2010; Romanus et al. 2008; David et al. 2006; Reynolds et al. 2004; Frankel et al. 2002; Craswell et al. 2002; DeFond et al. 2002; Becker et al. 1998; Craswell et al. 1995; Teoh and Wong 1993). The increase in audit fee as a result of the increased in time spent on the audit process, the increased level of training, and the assignment of more experienced auditors on the audit team thereby leads to an increased in the quality of the audit.

2.6 SUMMARY OF THE CHAPTER

Chapter Two began by providing a definition, overview and determinants of the capital markets. Risks of capital structure were discussed along with the importance of financial reporting quality. These then funnel down to financial distress, whereby various definitions were discussed and compared, its implications and finally its measurement. A general discussion followed on the concept of audit quality and the important role an auditor plays in the financial reporting system. Finally, proxies for audit quality were discussed.

CHAPTER THREE:

THEORETICAL PERSPECTIVE AND HYPOTHESES DEVELOPMENT

3.1 OVERVIEW OF THE CHAPTER

Chapter Three discusses the theoretical framework of this study and the empirical literature relating to the research questions testing the different hypotheses. The theories underpinning the concept of corporate governance, specifically the external audit component of the corporate governance mosaic, are discussed and contrasted. These theories are agency theory; institutional theory; stewardship theory; resource dependency theory; and stakeholder theory are discussed and compared. A discussion on the empirical literature relating to each of the four key auditor attributes selected for the purpose of this study is provided together with justification for the expected association of each auditor attributes with financial distress. Finally, a conceptual schema is provided to outline the relationships examined in this study.

3.2 THEORETICAL PERSPECTIVE – CORPORATE GOVERNANCE

Extant literature commonly provides for five main theories used to underpin the concept of corporate governance. These are agency theory, institutional theory, stewardship theory, resource dependency theory, and stakeholder theory. Whilst this study uses the agency theory as the tenet of corporate governance, the following sub-sections nonetheless provide a discussion of each of these theories together with their association with firms' corporate governance structures and validate the use of the agency theory.

3.2.1 Agency theory

Agency theory as introduced by Berle and Means (1932), explains the relationship between any entity delegating work (the principal) and any entity to whom work is being delegated (the agent). As a consequence of this delegation of power and authority, the likelihood of conflicts between the principal and agent is quite high (that is, there is a high risk of the agent making decisions for their own personal benefit and at the expense of the principal) (Hendry 2002; Eisenhardt and Bourgeois 1988). This under-fulfilment of the principals' interests is commonly referred to as the agency loss[9]

[9] Jensen and Meckling 1976 define agency loss as the difference between the returns to the shareholders as a consequence of delegation and the returns from the best possible consequence that would have resulted if the owners exercised direct control over the corporation.

(Jensen and Meckling 1976). The agency loss situation can be worsened when information asymmetry occurs (that is, when the principals do not gain access to all relevant information by the relevant time) and thereby are incapable of determining whether the agents' actions are in the firms' (or principals') best interests (Scapens 1985). For firms, the directors and managers (being the agents) are hired by the owners or shareholders (the principals) to assume a stewardship function in making decisions relating to the company's operations in the best interests of the latter. This situation may lead to conflicts given the information asymmetry that may prevail (whereby the directors or managers hold on to more information) and the costs and difficulties involved for the owners or shareholders to ascertain whether the decisions made by managers are in the firm's best interests or in their (that is, the directors or managers) personal interests (such as employment opportunities or financial rewards). These potential conflicts between the principal and agent may lead to uncertainties on the reliability of information which are produced by the agents (Shleifer and Vishny 1986; Jensen and Meckling 1976). Given the diverging objectives between both parties, agency theory drives on the alignment of the owners' and managers' interests (that is, goal congruence) thereby operationalizing mechanisms to reduce agency loss (Fama and Jensen 1983; Fama 1980; Jensen and Meckling 1976).

Corporate governance structures such as the external audit function, the internal audit function, the board of directors, other committees (such as the audit committees or the remuneration committee) are widely acknowledge to be important mechanisms to monitor and control the agent's (that is, managers and directors) behaviour and overcome agency conflicts (Stiles and Taylor 2001; Adams 1994; Williamson 1984; Fama and Jensen 1983).

3.2.2 A critical analysis of agency theory with other theoretical approaches

Following the discussion of the literature pertaining to the five theoretical perspectives, this study now proceeds with a critical analysis and comparison of these theories. Agency theory, being the dominant theoretical perspective within the corporate governance domain, provides the benchmark against which the other theories are compared and evaluated.

3.2.2.1 Agency theory and institutional theory

Whilst both the agency and institutional theories look at the diverging interests of the principal (shareholders) and agent (management), agency theory is driven by financial motivations (Donaldson and Davis 1991) whereas institutional theory is driven by non-economic motivations (such as the desire for legitimacy) (Eisenhardt and Bourgeois 1988). As such, agency theorists commonly view entities as self-interested rationalists whereas institutional theorists view individuals as legitimacy-seeking entities (Eisenhardt and Bourgeois 1988; Meyer and Rowan 1977; Berle and Means 1932). Eisenhardt and Bourgeois (1988) find the principle notion within agency theory is that much managerial action is resulted from efficient information and risk-bearing costs while they (Eisenhardt and Bourgeois 1988) find the key idea behind institutional theory is that much managerial action is resulted from imitative forces and corporate customs that over time have gain legitimacy within the organization.

3.2.2.2 Agency theory and stakeholder theory

Whilst agency theory considers the relationship between the agent and the principal, stakeholder theory broadens this view to incorporate other stakeholders. For this reason, scholars view stakeholder theory as an extension of agency theory (Donaldson and Preston 1995; Evan and Freeman 1993; Hill and Jones 1992). Under agency theory, monitoring controls are required to achieve goal congruence (that is, to align the goals of management with those of the principal). Stakeholder theorists, however, argue that rather than only considering the goals of the principal, goals of all other stakeholders must also be considered. Such stakeholders include the creditors, employees, customers and the community (Freeman 1984). Hill and Jones (1992) state that rather than being only shareholders' agents, managers are considered stakeholders' agents, thereby asserting that management decisions should aim at protecting the interest of each stakeholder group.

Though both the agency and stakeholder theories share some common group, they have different underlying perspectives. Agency theory focuses on the extrinsic motivations viewing management as utility maximizers and motivated by monetary benefits (Hillman and Dalziel 2003; Donaldson and Davis 1991). Stakeholder theory, in contrast, focuses on a more social oriented perspective while accentuating firms' social responsibilities (Blair 1995).

3.2.2.3 Agency theory and resource dependency theory

The resource role of board of directors, being a well acknowledged mechanism of corporate control, is the focus of agency theory. Resource dependency theory focuses on the role played by the board of directors in securing resources through external sources. Whilst, both of these theories focus on the behavioural aspect of the board of directors with emphasis on having external outside members, they both differ in the justification underlying this recommendation.

Dalton et al. (2007) find that in efficient markets, agency theory assumes rational actors contract for profits and views outside board members as mechanisms of corporate control, thereby focusing on how external players to the firm can control managerial opportunism. In contrast, resource dependency theory views outside board members to be important boundary spanners who provide timely information and convey critical resources to a firm through linkages with the external environment thereby focusing on how the management team can control external players to the firm for gaining access to critical resources (Pfeffer 1972; Zald 1967). The inclusion of different stakeholders (that is, external players) is therefore acknowledged by the resource dependency theory but generally ignored by the agency theory. This therefore justifies some scholars finding resource dependency theory to provide a broader understanding of corporate governance mechanisms (Usaysankar 2008; Zahra and Pearce 1989).

3.2.2.4 Agency theory and stewardship theory

Both agency and stewardship theories focus on the relationship between the principal (shareholders) and the agents (managers) and view the board of directors as a corporate governance mechanism to create shareholder wealth (Donaldson and Davis 1991). However, whilst agency theory views the agents as self-serving individuals being motivated by extrinsic factors, stewardship theory postulate managers' behaviour as collectivistic and pro-organization and motivated by a desire to perform, achieve and gain satisfaction (Donaldson and Davis 1991).

While acknowledging the complexity of organizational behaviour, stewardship theorists suggest a number of psychological and cultural factors that lead management to either be an agent or a steward (Davis et al. 1997; Donaldson and Davis 1991). Davis et al. (1997) find such a factor to be the perceived risk of the principal and the managers and the degree of trust towards the other party. They (Davis et al. 1997) further state that agency costs are minimized when principals and managers chose an agent-principle relationship and utility maximization is achieved when parties chose a steward-principal relationship. Therefore, a steward-principal relationship is appropriate if both parties (principals and managers) are collectivists and an agent-principal relationship is appropriate if both parties are individualists.

3.2.3 Theory selection

Whist no one particular theory will fully provide a complete description about the behaviour of players in the corporate governance mosaic, this study favours the agency theory as the most complete one. As per Jensen and Meckling (1976), agency problems occur because of (1) diverging motivations between the agent and the principal; and (2) information asymmetries that exist between the information available to the managers and made available to the principals. These can lead to uncertainties about the reliability of information provided by the agents and subsequently compromise the corporate financial reporting process. The principal benefit from the external audit function is the ability of external auditor to provide an independent assurance on the quality and reliability of the financial information prepared by the agent (Lennox 2005; Jensen and Meckling 1976).

Therefore, the presence of an external audit function along with all the underlying regulation is premised on agency theory in an attempt to achieve goal congruence between the principal and the agent. While there are five main theories underpinning corporate governance mechanisms, specifically the external audit determinant, agency theory is used for this study, given the close association of external audit quality and financial distress to agency conflicts and contractual arrangements.

3.3 KEY AUDITOR ATTRIBUTES AND IMPACT ON FINANCIAL DISTRESS

This study examines the influence of four pivotal auditor attributes on the auditee's likelihood of facing financial distress. The four attributes of interest are: (1) Big 4 auditor; (2) provision of non-audit services; (3) auditor (firm) tenure; and (4) audit fees. The four attributes are selected as they are frequently cited in empirical audit quality literature as having a significant influence on audit quality (Knechel et al. 2013; Behn, Choi, and Kang 2008; Chen, Lin, and Lin 2008; Balsam, Krishnan, and Yang 2003; Krishnan 2003; Becker et al. 1998; DeAngelo 1981). Hypotheses related to the four auditor attributes are individually developed in the following sub-sections.

3.3.1 Big Firm auditor/auditor brand name: Big4

Lower likelihood of financial distress is expected when an external audit function is deemed to be of superior quality. A large body of empirical studies on audit quality documents a positive association between auditor reputation (that is, Big 4 auditor) and audit quality. Extant literature explain this positive association as a consequence of greater expertise, higher resources, and market based incentives (that is, protecting their reputational capital, and mitigating the litigation risk) (Khurana and Raman 2004; Lennox 1999; Becker et al. 1998; Craswell et al. 1995; DeAngelo 1981). Jin, Kanagaretnam, and Lobo (2011) investigate the effect of audit quality and the likelihood of financial distress in the banking sector only and find auditees hiring Big 4 auditors to have a lower risk of financial distress. They however, only use Big 4 auditor and Auditor specialization to proxy for audit quality, thereby not fully capturing the multinational nature of audit quality. This association can be explained as Big 4 auditors, given their reputation to preserve, their expertise and resource available can be more selective in their client selection, better understand business risks that could be an insight into possible financial distress, and provide more intelligence to firms to mitigate investment and risks thereby effectively assisting in maintaining profitability.

Although empirical studies on audit quality and financial distress is very limited, thereby a gap in the literature (as discussed in section 2.4.5 above), the following hypothesis, based on agency theory, is proposed to test the association between a Big 4 auditor and financial distress:

> *H_1: Client firms engaging a Big4 auditor will be less likely to suffer financial distress than client firms engaging a non-Big4 auditor.*

3.3.2 The provision of non-audit services

For decades, regulatory bodies have continuously aimed to address concerns over the provision of non-audit services by the incumbent auditor (CLERP 9 Act 2004; US Securities and Exchange Commission (SEC) 1977; 1978; 1979; 1980; 1981; 1982; 2000; 2003). Extant literature on the impact of the provision of non-audit services on audit quality provide diverging views. First, extant literature favouring the economic bonding hypothesis have shown concerns that if an auditor earns a high level of non-audit fees from the auditee, then the auditor's independence may be impacted so as to exploit the prospect to retain clients due to the greater incremental economic bonding and the possible loss of revenues earned from the provision of non-audit services (Reynolds, Deis, and Francis 2004; Wallman 1996; DeAngelo 1981). This may compromise the reliability and quality of financial reporting, leading to a reduction in the quality of the audit and consequently, an increase in the firm's financial distress risks. In contrast to the economic bonding theorists, other researchers postulate that incumbent auditors also providing non-audit services can in fact improve the audit process through enhanced economies of scale. This view is commonly referred to as the knowledge spill-over hypothesis which states that the provision of non-audit services by the incumbent auditor increase the auditor's knowledge about the auditee and consequently an improvement in the efficiency in detecting misstatements (Stanley 2011; Griffin and Lont 2010; Callaghan et al. 2009; Gul et al. 2007; Schneider et al. 2006; Lennox 2005; Larcker and Richardson 2004; Menon and Williams 2004; Geiger and Rama 2003; Barkess et al. 2002; Franker et al. 2002; Beaver 1966). The knowledge spill-over and enrichment in economies of scale may improve the reliability and quality of financial reporting, leading to an enhancement in the quality of the audit and consequently, a decrease in the firm's financial distress risks.

Given the strict regulations in place in Australia aiming towards the preservation of auditors' independence, this study favours the knowledge spilled over hypothesis which provides for a positive association between the provision of non-audit services and the quality and efficiency of the audit. Although empirical studies on the provision of non-audit services and financial distress is non-existent (based on the author's knowledge), thereby a gap in the literature (as discussed in section 2.4.5 above), the following hypothesis, based on the agency theory, is proposed to test the association between the provision of non-audit services and financial distress:

H_2: Client firms paying higher non-audit service fees to the incumbent auditor will be less likely to suffer financial distress than client firms paying lower non-audit service fees to the incumbent auditor.

3.3.3 Auditor tenure

Regulators and extant literature have commonly investigated auditor tenure at two levels; namely at the firm level (that is, audit firm tenure) and at the partner level (that is, audit partner tenure). The auditing profession and most extant literature have commonly opposed auditor rotation, thereby asserting the costly implications of auditor rotation (that is, the steep learning curve involved) and favouring lengthier audit tenure to assist in improving client specific knowledge (Fargher, Lee, and Mande 2008; Carey and Simnett 2006; Carcello and Nagy 2004; PricewaterhouseCoopers (PWC) 2002; American Institute of Certified Public Accountants (AICPA) 1992;

DeAngelo 1981; Simunic and Stein 1987). This improvement in client specific knowledge may lead to an increase in the efficiency of the quality of the audit and consequently, a reduction in the auditee's financial distress risks. However, some scholars find longer tenure leads to the auditor to become complacent due to excessive familiarity with the auditee; thereby leading to the deterioration in the quality of the audit (Chi, Lisic, and Pevzner 2011; Gul, Jaggi, and Krishnan 2007; Chi et al. 2005).

Whilst empirical studies on auditor tenure and financial distress is non-existent (based on the author's knowledge), empirical literature on the impact of audit tenure on the quality of the audit is mixed, the general findings that the longer tenure, leading to the learning effect hypothesis which provides for an improvement in client specific knowledge is favoured. This knowledge spill over consequently leads to an increased in the quality of the audit and by association, may assist in reducing the firm's financial distress risks. Relying upon the agency theory, the following hypothesis is proposed to test the association between auditor tenure and financial distress:

H_3: Client firms with longer audit firm tenure will be less likely to suffer financial distress than client firms with shorter audit firm tenure.

3.3.4 Audit fee

Empirical studies on audit fee commonly find a positive association between audit fee and the quality of the audit. One such study is Wuchun (2011) who finds such a positive association and further explains the higher fees to be as a consequence of more time spent on the audit, the hiring of more experienced auditors, and the higher level of training and support provided to the audit team. These findings are also consistent with other extant literature looking into the impact of variations of audit fees on the quality of the audit (Reichelt and Wang 2010; Romanus et al. 2008; David et al. 2006; Reynolds et al. 2004; Frankel et al. 2002; Craswell et al. 2002; DeFond et al. 2002; Becker et al. 1998; Craswell et al. 1995; Teoh and Wong 1993). The increase in audit fee as a result of the increased in time spent on the audit process, the increased level of training, and the assignment of more experienced auditors on the audit team thereby leads to an increased in the quality of the audit and by association, consequently may assist in reducing the firm's financial distress risks.

Although empirical studies on audit fee and the likelihood of financial distress is non-existent (based on the author's knowledge), thereby a gap in the literature (as discussed in section 2.4.5 above), the following hypothesis, based on the agency theory, is proposed to test the association between audit fee and financial distress:

H_4: Client firms paying higher audit fees to the incumbent auditor will be less likely to suffer financial distress than client firms paying lower audit fees.

3.3.5 Lagged auditor attributes

As it can be argued that the quality of the audit will only impact the likelihood of a firm's financial distress after some time, the above hypotheses (H_1 to H_4) are reformulated to analyse the pre-one, two, and three years effect of each auditor attributes (that is, t_{-1}, t_{-2}, *and* t_{-3}) on the likelihood of financial distress at t_0. The following hypotheses are therefore proposed:

For hypothesis H_5 on Big4 auditor:

H_{5a}: Client firms engaging a Big4 auditor in one will be less likely to suffer financial distress one year later.

H_{5b}: Client firms engaging a Big4 auditor in one year will be less likely to suffer financial distress two years later.

H_{5c}: Client firms engaging a Big4 auditor in one year will be less likely to suffer financial distress three years later.

For hypothesis H_6 on non-audit services:

H_{6a}: Client firms paying higher non-audit service fees to the incumbent auditor in one year will be less likely to suffer financial distress one year later.

H_{6b}: Client firms paying higher non-audit service fees to the incumbent auditor in one year will be less likely to suffer financial distress two years later.

H_{6c}: Client firms paying higher non-audit service fees to the incumbent auditor in one year will be less likely to suffer financial distress three years later.

For hypothesis H_7 on audit firm tenure:

H_{7a}: Client firms with longer audit firm tenure in one year will less be likely to suffer financial distress one year later.

H_{7b}: Client firms with longer audit firm tenure in one year will be less likely to suffer financial distress two years later.

H_{7c}: Client firms with longer audit firm tenure in one year will be less likely to

suffer financial distress three years later.

For hypothesis H_8 on audit fees:

H_{8a}: Client firms paying higher audit fees to the incumbent auditor in one year will be less likely to suffer financial distress one year later.

H_{8b}: Client firms paying higher audit fees to the incumbent auditor in one year will be less likely to suffer financial distress two years later.

H_{8c}: Client firms paying higher audit fees to the incumbent auditor in one year will be less likely to suffer financial distress three years later.

3.3.6 Composite auditor attributes and lagged composite auditor attributes

So as to capture the multidimensional nature of audit quality (as suggested by Balsam 2003 and discussed in section 2.4.5.3), extent literature have commonly used a composite score based on different proxies of audit quality. For the purpose of this study, to determine the combined influence of the four pivotal auditor attributes on the likelihood of financial distress, a composite score based on the four proxy measures for auditor quality (namely, big 4 auditor, provision of non- audit services, length of audit firm tenure and audit fee) is developed. Therefore, the following hypothesis is therefore proposed to test the association between the composite auditor attributes and financial distress:

H_9: Client firms engaging an auditor composed of a higher set of quality attributes will be less likely to suffer financial distress than client firms engaging an auditor composed of a lower set of quality attributes.

Last, as it can be argued that the quality of the audit will only impact the likelihood of a firm's financial distress after some time, the above hypothesis is reformulated to analyse the pre-one, two, and three years effect of the composite auditor attributes (that is, t_{-1}, t_{-2}, *and* t_{-3}) on the likelihood of financial distress at t_0. From the above, the following hypotheses are therefore proposed:

H_{10a}: Client firms engaging an auditor composed of a higher set of quality attributes in one year will be less likely to suffer financial distress one year later.

H_{10b}: Client firms engaging an auditor composed of a higher set of quality attributes in one year will be less likely to suffer financial two years later.

H_{10c}: Client firms engaging an auditor composed of a higher set of quality attributes in one year will be less likely to suffer financial distress three years later.

3.4 CONCEPTUAL SCHEMA

The conceptual schema shown in Figures 3.1, 3.2, 3.3, and 3.4 graphically illustrates a set of testable hypotheses that were formed with reference to the prior literature.

Figure 3.1: Conceptual Schema for individual auditor attributes

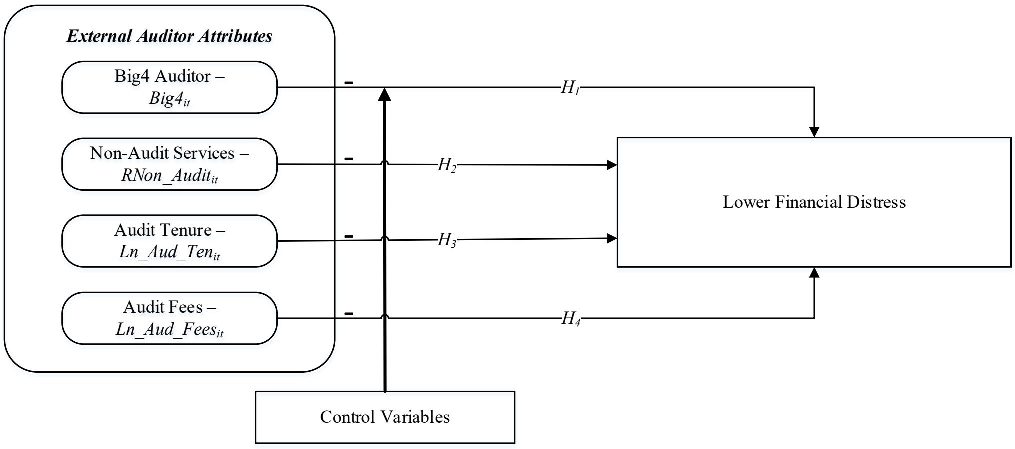


Figure 3.2: Conceptual Schema for individual lagged auditor attributes

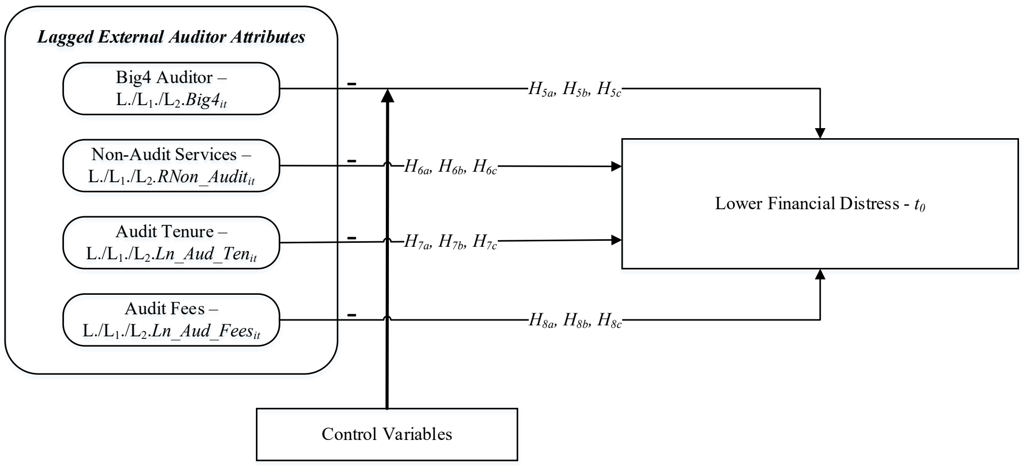


Figure 3.3: Conceptual Schema for composite auditor attributes

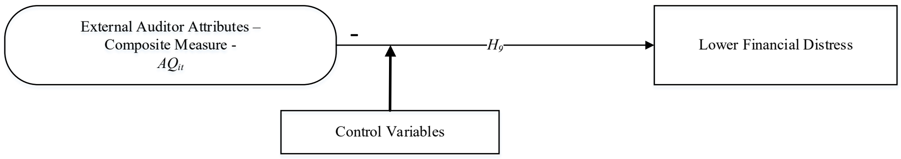
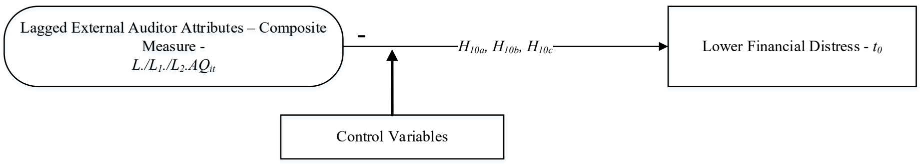


Figure 3.4: Conceptual Schema for composite lagged auditor attributes



3.5 SUMMARY OF THE CHAPTER

Chapter Three discussed five main underlying theoretical perspectives underpinning corporate governance before adopting agency theory as the most appropriate for this thesis. The empirical literature relating to each of the four pivotal auditor attributes examined in this study was discussed and the justification for each auditor attributes' expected relationship to financial distress detailed resulting in the formulation of a set of testable hypotheses. Finally, conceptual schemas illustrating each of these hypotheses were provided.

CHAPTER FOUR:

RESEARCH METHOD

4.1 OVERVIEW OF THE CHAPTER

Chapter Four provides details of the research method used to assess the hypotheses of this study. Reasoning of the sample selected, the source documentation, and the time period is provided in the first part of the chapter. This is then followed by details on the measurement of financial distress (the dependent variable of this study). Measures to operationalize the auditor attributes analysed in this study are then provided. The sensitivity tests to be undertaken are subsequently identified after the statistical tests and regression models utilized to test the hypothesis are outlined. Finally, a summary of chapter Four is provided.

4.2 SAMPLE, DOCUMENTATION AND TIME PERIOD

The following sub-sections provide a justification of the sample firms selected, source documentation chosen, and time period analysed.

4.2.1 Selection justification

The sample that is used for testing purposes of this study consists of a total of 2,438 firm-year deemed to be distressed and the same number of firms deemed to be healthy (as determined by the Zmijewski ZFC-Score), yielding a total of 4,876 firm-years observations (spanning over a period of 7 years, that is, from 2008 to 2014 inclusive). This sample was selected after taking various exclusions into account; as detailed below.

The sample consists of ASX listed firms for the period 2008 to 2014. Initially, all of the listed firms (on the ASX) in accordance with the DatAnalysis database are obtained for the period 2008 to 2014. The ASX listed firms are chosen because listed organizations provide readily accessible information in a suitable operational form. Consistent with prior empirical study, banks, financial institutions, stock brokerages, insurance and trusts entities are excluded as the financial statements of such entities are subject to special accounting regulations (Ferguson; Krishnan, Su, and Zhang 2011; Fargher, Lee, and Mande 2008; Givoly, Hayn, and Natarajan 2007; Ruddock, Taylor, and Taylor 2006; Carey and Simnett 2006; Wu 2004; Givoly and Hayn 2000). Furthermore, consistent with Clifford and Evans (1997), unit trusts are excluded since such firms' financial statements may not be prepared in accordance with the normal disclosure requirements as for other firms listed on the ASX. For the firms remaining, data required to calculate the Zmijewski ZFC-Score is gathered (downloaded and/or hand calculated) and the ZFC-Score[10] (as will be outlined in Section 4.3 below) is calculated for each of these firms.

We find a total of 2,438 firm-year observations as distressed firms for the period 2008 to 2014. The year wise breakdown shows a total of 496 firms to be distressed in 2008, 437 firms in 2009, 326 firms in 2010, 306 firms in 2011, 268 firms in 2012, 316 firms in 2013 and 289 distressed firms in 2014. In the second stage, the firm-years deemed to be healthy (per the ZFC-Score) are then matched to the closest comparable 2,438 distressed firm, based on year, size (proxied by total assets) and industry[11]. The resulting sample provides 4,876 firm-year observations for subsequent testing.

4.2.2 Source documentation justification

Data for this study are obtained from archival data[12] from a number of resources namely, Annual Reports Collection (Connect 4 Pty Ltd), Morningstar's DatAnalysis Premium, Osiris, Sirca Corporate Governance Database and Capital IQ. Since some of these databases provide similar data (such as financial amounts, which can be obtained from DatAnalysis, Osiris, Capital IQ as well as annual reports collection (manual collection), steps to verify the accuracy of the information provided from these databases are taken. First, sample data for 50 firm-year observations are downloaded from each of the three databases (namely, DatAnalysis, Osiris and Capital IQ). The same data are then hand-collected and these are then compared to find the most accurate database for a given variable[13]. For some of the variables, since the data provided by these databases differs significantly from the data available from financial reports, hand-collection of the data is done so as to ensure accuracy of the data used for testing in this study. Similar procedures are employed for gathering data for the

[10] *ZFC_Scoreit* = For firm *i* for time period *t*, a value of "1" will be assigned if the calculated results using the Zmijewski model is equal to or greater than 0.5, otherwise a value "0" will be assigned

[11] Admittedly, the use of matching based solely on the Zmijewski ZFC-Score rather than using both the Zmijewski ZFC-Score and the Altman Z2-Score has limitations. However, as will be explained in Chapter Five, these two models show an agreeance (whereby both models agree on either a firm-year observation being healthy or distressed) of 79%. Furthermore, this study adopts the use of the Zmijewski ZFC-Score model as the main proxy for financial distress. The Altman Z2-Score is only used to provide robustness to the main findings.

[12] Archival data was selected due to: (1) the inherent limitations of survey research (Baxter and Pragasam 1999); (2) the availability of annual reports from a variety of electronic databases (that is, the use of data does not suffer from non-response bias); and (3) the objective measures for all the variables of interest can be obtained from data in annual reports.

[13] Though not part of this study, it is important to note that whilst completing these steps to select the most appropriate database for each respective variable, significant variations between these databases for the same variable(s) are noted.

dependent, independent and control variables (both for the main and sensitivity analyses)[14,15]. Once these are completed, a data verification check is undertaken by randomly selecting a sample of 20 firms per calendar year under observation (from 2008 to 2014) and data further verified to the respective financial reports.

4.2.3 Time period selection

This study includes a collective analysis spanning over the 2008 to 2014 calendar years (inclusive). This time-frame is selected as this period orbits around key phases in the corporate governance and financial accounting landscape in Australia as well as key global economic events[16]. Such events include the revisions to the ASX CGCs corporate governance guidelines, the execution of CLERP 9 recommendations, and the adoption of IFRS as outlined below.

The first edition of the corporate governance guidelines, Principles of Good Corporate Governance and Best Practice Recommendations, was introduced by ASX CGC on the 1st January 2003 so as to improve compliance with corporate governance practices. The second edition of the Principles of Good Corporate Governance and Best Practice Recommendations was released in August 2007 and further amendments made on the 30th June 2010 with implementation from the 1st January 2011[17]. Given that the period of interest for this study spans from 2008 to 2014 (inclusive), all revisions issues by the ASX CGC will be captured.

Significant changes were made to the Australian auditing and financial reporting landscape with the enactment of CLERP 9 in July 2004. This enactment became fully effective from the July 2006 financial year (Fargher, Lee, and Mande 2008). One such example is the necessity of mandatory audit partner rotation every five years or less followed by a two-year cooling off period has been effective from 1 July 2006. The observation window that is used for subsequent testing in this study (2008 to 2014) therefore covers these CLERP 9 changes.

From balance date 30th June 2006, the Australian equivalent of the IFRS became applicable to all Australian listed companies meaning the change from Australian Generally Accepted Accounting Principles to the Australian equivalent

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[14] As part of the data collection process, among all databases available, DatAnalysis Premium is found to be most reliable database (data closest to the financial report) for statement amounts, and Sirca for corporate governance information.

[15] Consistent with other empirical studies, this study winsorizes all continuous variables at the 1 and 99 percent levels (Pizzini, Lin, and Ziegenfuss 2015; Lin et al. 2011; Feng, Li, and McVay 2009).

[16] Market volatility arose from the global financial crisis (GFC) in July 2007 with the sub-prime crisis and the collapse of the US housing bubble, resulting in a severe global economic recession in 2008 and 2009 (Roxburgh et al. 2009).

[17] These revisions to the corporate governance guidelines are made so as to improve general business practices and financial reporting quality (Australian Securities Exchange Corporate Governance Council (ASX CGC) 2007, 2010).

International Financial Reporting Standards. So as to consider the time lag consequence with this post-harmonization stage, the year 2008 is selected as the first year. This study does not use earlier data as this was under the previous regulations outlined above and are therefore of less relevance to the time of interest. In addition, this study does not consider any data post 2014 with that year being the most recent data available when data collection occurred.

The findings from this study, for the period selected (2008 to 2014 calendar years), will therefore, provide significant implication to regulators by examining the impact (if any) of the recommendations related to the auditing discipline in the corporate governance reforms in Australia (such as the implementation of CLERP 9 recommendations) on the auditor attributes/financial distress association.

The subsequent sections outline the measurement of the dependent variable (the Zmijewski ZFC-Score) and independent variables (auditor attributes).

4.3 MEASUREMENT OF THE DEPENDENT VARIABLE

Extant empirical literature on financial distress commonly finds the Zmijewski ZFC-Score model to be the most reliable among other accounting ratios model in the prediction of financial distress (Carey, Kortum, and Moroney 2011; Wu, Gaunt and Gray 2010; Geiger, Raghunandan, and Rama 2006). Wu, Gaunt and Gray (2010) find the Zmijewski's probit model to be the preferred one in the prediction of financial distress (not bankruptcy) in comparison with the Altman Z-Score MDA model (Multivariate Discriminant Analysis based on accounting ratios) and the Ohlson's logit model (with the use of accounting ratios) because it (the Zmijewski's model) outperforms the Altman's and Ohlson's models. Grice, Stephen and Ingram (2001) find the Altman Z-Score model to be a useful predictor of financial distress. Dugan and Zaygren (1988) find that though the Altman Z-Score only uses manufacturing industry firms as in-data, the model is commonly adopted by external auditors to assess auditees' abilities to continue as going concern. Whilst the Altman Z-Score is better suited for manufacturing industry firms, the Altman Z2-Score model is a modified version of the previous model to include non-manufacturing industry firms (Altman et al. 2017). The Altman Z2-Score is therefore not specific to any industry (Grice, Stephen and Ingram 2001). Both the Zmijewski's and Altman's models are listed by Wallace (2004) as tools for predicting financial distress. As a result, both the Zmijewski ZFC-Score (1984) and the Altman Z2-Score (1983) are preferred models for predicting financial distress for this study. Between these two, this study favours the use of the Zmijewski ZFC-Score model due to the grey area that exists in the Altman Z2-Score model which is a score between 1.1 and 2.6 (Altman et al. 2016; Danescu and Marginean 2015; Onyiri 2014)[18]. As such, for the main analysis of this study, the Zmijewski ZFC-Score will be used as proxy for financial distress. The Altman Z2-Score will be used as an alternate proxy for financial distress for sensitivity and robustness testings.

For the Zmijewski ZFC-Score, firms obtaining scores (probability scores) greater or equal to 0.5 are interpreted as distressed whereas firms with probabilities less than 0.5 are classified as healthy (Zmijewski 1984). For the Altman Z2-Score, firms obtaining a score of less or equal to 2.6 are interpreted as distressed[19] (Onyiri 2014). The dichotomous variables proxying for financial distress, the Zmijewski ZFC-Score and the Altman Z2-Score models are specified as follows:

The Zmijewski ZFC-Score is calculated as:

$$ZFC\text{-}Score_{it} = \frac{1}{1+Exp\,(\beta_0 + \beta_1 ROA_{it} + \beta_2 Fin\_Lev_{it} + \beta_3 Liquidity_{it})};$$

ZFC-Score$_{it}$ is the calculated Zmijewski ZFC-Score (1984) for firm *i* at the period *t* year. Using this model, a calculated score of greater or equal to 0.5 is interpreted as a distressed firm. Therefore, a value of one (1) is assigned to firms with a calculated score of greater or equal (>=) to 0.5, otherwise, a value of zero (0) is assigned.

Where:

$\beta 0$ = -4.336; $\beta 1$ = -4.513; $\beta 2 = 5.679$; $\beta 3 = 0.004$;

ROA_{it} = Net Income / Total Asset for firm *i* in the period *t*;

Fin_Lev_{it} = Total Liabilities / Total Assets for firm *i* in the period *t*;

$Liquidity_{it}$ = Current Assets / Current Liabilities for firm *i* in the period *t*.

[18] Due to the existence of the grey area (between 1.1 and 2.6) extend literature commonly assume a Z2-Score between this grey area to most likely experience financial distress if appropriate financial planning is not implemented.

[19] Given the grey area for the Altman's model, a score < 1.1 is considered distressed, and a score <2.6 (but above 1.1) is interpreted as most likely to experience financial distress if no appropriate financial planning is implemented. Extent literature therefore use a score <2.6 to be interpreted as distressed (Danescu and Marginean 2015; Onyiri 2014).

The Altman Z2-Score is calculated as:

$Z2\text{-}Score_{it} = \beta0 + 6.56X1_{it} + 3.26X2_{it} + 6.72X3_{it} + 1.05X4_{it};$

$Z2\text{-}Score_{it}$ is the calculated Altman Z2-Score (1983) for firm *i* at the period *t* year. Using this model, a calculated score of less than 2.6 is interpreted as a distressed firm. Therefore, a value of one (1) is assigned to firms with a calculated score less than 2.6 otherwise, a value of zero (0) is assigned. $\boldsymbol{\beta_0}$ (which equals 3.25) is not applicable since Australia is not considered an emerging market economy.

Where:

$X1_{it}$ = Working Capital/Total Assets for firm *i* in the period *t*;

$X2_{it}$ = Retained Earnings/Total Assets for firm *i* in the period *t*;

$X3_{it}$ = EBIT/ Total Assets for firm *i* in the period *t*;

$X4_{it}$ = Equity/Total Liabilities for firm *i* in the period *t*.

4.4 MEASUREMENT OF THE INDEPENDENT VARIABLES

The independent variables considered for this study are a number of carefully chosen pivotal auditor attributes. Data for the independent variables is collected from the financial reports of 4,876 Australian publicly listed firms (as at their respective reporting dates) for the calendar years spanning from 2008 to 2014. Measurement proxies for the independent variables (used in both the main and sensitivity analyses) are detailed in the subsections 4.4.1 to 4.4.4.

4.4.1 Big firm auditor/auditor reputation ($BIG4_{it}/Aud\_Spec\_30_{it}$)

Extant literature postulate that non-Big 4 auditors may be correlated with lower quality audits due to the use of greater "accounting flexibility" (Becker et al. 1998). In contrast, Big 4 auditors may be linked with higher quality audits due to the higher risk of litigation exposure and loss of reputation (Krishnan 2003; Francis and Schipper 1999; Becker et al. 1998). For the purpose of this study and as a proxy for Big 4 auditors, the dichotomous variable $BIG4_{it}$ is used whereby an auditee *i* is scored a one (1) if in the time period *t* the incumbent auditor is a Big 4 auditor; otherwise a score zero (0) is awarded.

Regarding the dichotomous variable $BIG4_{it}$ for sensitivity purpose of this study, extant literature does not provide any other measure to operationalize this variable. However, similar to Big 4 auditors, auditor specialization is also commonly associated with auditor reputation in prior empirical studies on audit quality (DeBoskey and Jiang 2012; Balsam, Krishnan, and Yang 2003; Krishnan 2003). Auditors with industry specialization possess higher industry knowledge as opposed to non-industry specialist auditors. This is a consequence of specialized staff training, extensive auditing experience, and widespread investments in information technology, physical amenities, and organizational control systems. This in turn leads to specialized auditors earning a better reputation (Gramling, Johnson, and Khurana 1999; Dopuch and Simunic 1980).

Given the unobservable nature of industry specialization, prior studies have used several different proxies to measure this attribute. Such proxies include the market leadership, dominance, and market shares approaches (Balsam, Krishnan, and Yang 2003; DeFond, Raghunandan, and Subramanyam 2002; Hogan and Jeter 1999; Craswell, Francis, and Taylor 1995). Relying on the hypothesis that industry expertise is built on reiteration in similar settings, market share is the most frequently used proxy to measure auditor industry specialization (Knechel, Naiker, and Pacheco 2007; Krishnan 2003; Balsam, Krishnan, and Yang 2003; Carcello and Nagy 2004). From the market share approach, an industry specialist is defined as an audit firm that distinguishes itself from other audit firms based on its market share within a specific industry (Krishnan 2003). A specialist auditor (based on the above definition) can yield a higher quality audit and consequently a higher reputation due to the reflection of higher sophisticated industry specific audit technology (Mayhew and Wilkins 2003).

This study will therefore adopt the market share approach to proxy for auditor specialization. Consistent with previous scholars (Knechel and Vanstraelen 2007; Jenkins, Kane, and Velury 2006; Ferguson and Stokes 2002) auditor specialization is calculated using the sum of sales of all clients of an audit firm in a specific industry over the sales of all clients (whether audited by a Big 4 or non-Big 4 auditor) in that respective industry. Using a conservatism approach, an auditor with a 30% market share is then defined as a specialist auditor. Therefore, for $Aud\_Spec\_30_{it}$, a client firm i in industry k is scored one (1) if in time period t an auditor defined as an industry specialist in industry k is engaged; otherwise client firm i is scored zero (0).

4.4.2 Non-audit services (*RNon-Audit*$_{it}$, *and CNon-Audit*$_{it}$)

Extant literature provides two diverging views when it comes to the provision of non-audit services. The first is against incumbent auditors providing non-audit services due to the risk of impacting on the auditors' independence. This can be as a result of financial dependence (especially if the auditors earn more from the provision of non-audit services) whereby auditors may harm their independence over potential reputation loss or litigation (DeAngelo 1981; Reynolds, Deis, and Francis 2004). The other view is knowledge spilled-over hypothesis which states that if incumbent auditors are to also provide the auditee with non-audit services, this will result in an increase in the auditor knowledge about the auditee and consequently an improvement in the efficiency in detecting misstatements (Stanley 2011; Griffin and Lont 2010; Callaghan et al. 2009; Geiger and Rama 2003; Gul et al. 2007; Schneider et al. 2006; Lennox 2005; Larcker and Richardson 2004; Menon and Williams 2004; Barkess et al. 2002; Franker et al. 2002; Beaver 1966). Given the strict regulations in place in Australia aiming towards the preservation of auditors' independence, this study favours the knowledge spilled over hypothesis which provides for a positive association between the provision of non-audit services and the quality and efficiency of the audit.

Empirical research on the provision of non-audit services commonly uses one continuous measure of non- audit fees (*RNon-Audit*$_{it}$), namely, the ratio of non-audit fees to total fees and one dichotomous measure (CNon-Audit$_{it}$) whereby a firm *i* in time period *t* is scored 1 if the ratio of non-audit fees to total fees (*RNon-Audit*$_{it}$) is less than or equal to 25% (Huang, Mishra, and Raghunandan 2007; Reynolds, Deis, and Francis 2004; Ashbaugh, LaFond, and Mayhew 2003; Frankel, Johnson, and Nelson 2002). So as to capture the broad extant of economic bonding between the auditor and the auditee, this study will use both of these proxies for the provision of non-audit services. The continuous measure, *RNon-Audit*$_{it}$ will be used for the main testings of the hypotheses and the dichotomous measure, *CNon-Audit*$_{it}$ will be used in the sensitivity tests.

4.4.3 Audit tenure (*Ln_Aud_Ten*$_{it}$ and *Ln_Aud_Part_Ten*$_{it}$)

The audit tenure variable is operationalized by the length of time (in years) during which the incumbent audit firm has been acting as the incumbent auditor for the client firm. Empirical studies on audit tenure have commonly used either audit firm tenure or audit partner tenure as proxy for audit tenure (Fargher, Lee, and Mande 2008; Carey and Simnett 2006; Carcello and Nagy 2004; Simunic and Stein 1987; DeAngelo 1981). As with the provision of non-audit services, in order to comprehensively capture the influence of the audit engagement tenure, this study will use both proxies of audit tenure. Consistent with extant literature, logarithmic transformation of the audit tenure variable is necessary so as to ensure a better linear fit. The continuous measure representing audit firm tenure, *$Ln\_Aud\_Ten_{it}$* will be used for the main testings of the hypotheses and the continuous measure representing audit partner tenure, *$Ln\_Aud\_Part\_Ten_{it}$* will be used in the sensitivity tests.

4.4.4 Audit fee (*$Ln\_Aud\_Fee_{it}$* and *$Prop\_Aud\_Fee_{it}$*)

Empirical studies on audit fee commonly conclude a positive association between audit fee and the quality of the audit. One such study is Wuchun (2011) which finds such a positive association and further explains the higher fees to be as a consequence of more time spent on the audit, the hiring of more experienced auditors, and the higher level of training and support provided to the audit team. These findings are also consistent with other extant literature looking into the impact of variations of audit fees on the quality of the audit (Reichelt and Wang 2010; David et al. 2006; Romanus et al. 2008; Reynolds et al. 2004; Frankel et al. 2002; Craswell et al. 2002; DeFond et al. 2002; Becker et al. 1998; Craswell et al. 1995; Teoh and Wong 1993).

As is common in the prior studies looking into audit fee, data for audit fees usually requires transformation due to issues with linearity (Simunic 1980; Hair et al. 1995). Extant literature typically adopts two different approaches to achieve this. First, a logarithm transformation is performed so as to ensure a better linear fit in order to undertake subsequent regression testing. The second approach to ensure linearity is to deflate audit fees by the auditee size (such as total assets held by the auditee) so that any variation in audit fees is unlikely to be due to the size of the auditee. In order to comprehensively capture the influence of audit fee, this study will use both approaches to capture audit fee. The continuous measure representing the natural log of audit fee, *$Ln\_Aud\_Fee_{it}$* will be used for the main testings of the hypotheses and the continuous measure representing proportion of audit fee to total assets held by the auditee, *$Prop\_Aud\_Fee_{it}$* will be used in the sensitivity tests.

4.4.5 Composite auditor attributes for audit quality (*AQ_{it}*)

To determine the combined influence of the four pivotal auditor attributes on the likelihood of financial distress, a composite score based on the four proxy measures for auditor quality (namely, big 4 auditor, provision of non- audit services, length of audit firm tenure and audit fee) is used. Where the variables are continuous, they will be transformed to a dichotomous variable by assigning a value of one (1) if the value is above the mean of the respective variable; otherwise a value of zero (0) is assigned (Prawitt, Smith and Wood 2009). This composite score is denoted as AQ_{it}. Thus, the AQ score for auditee *i* in time period *t* is equal to $Big4_{it} + RNon\text{-}Audit_{it} + Ln\_Aud\_Ten_{it} + Ln\_Aud\_Fee_{it}$ (whereby all variables are transformed to dichotomous variables).

4.5 MEASUREMENT OF THE CONTROL VARIABLES

4.5.1 Justification for inclusion of control variables

4.5.1.1 Firm characteristics

There are numerous diverse features of firm characteristics which may have an influence on the firm's financial distress. The following sub-sections explain these.

4.5.1.1.1 Firm's size

Firm size is commonly found to influence financial distress in extant literature (Baxter 2006) and is also associated with successful turnaround of firms' distressed position (Smith and Grave 2005). Usually, firm size is measured by market capitalization, total assets, total sales and number of employees (Gul, Jaggi, and Krishnan 2007; Rosner 2003; Altman 1968). For the purpose of analysis, this study proxies size of firm *i* at time period *t* with (a) the natural log of total assets $Ln\_Total\_Assets_{it}$ and (b) the square root of number of employees Sq_Emp_{it} for the main analyses and (c) natural log of market capitalization $Ln\_Market\_Cap_{it}$ and (d) natural log of sales Ln_Sales_{it} for the sensitivity analyses.

4.5.1.1.2 Firm's risk

There are a number of different aspects to firms' risks which can impact on financial distress. Extant literature commonly agrees that firms with reported consecutive losses are deemed riskier and as such more prone to facing financial distress (Wu, Gaunt, and Gray 2010; Beaver, McNichols, and Rhie 2005). Similarly, firms with reported higher level of leverage are deemed riskier and lead to an increase in the distressed level. Consistent with prior literature, leverage is measured as the ratio of total debt to total assets (Gul, Jaggi, and Krishnan 2007; Balsam, Krishnan, and Yang 2003). Last, extant literature also finds return of assets (ROA) to impact on financial distress. Previous studies find the lower the return (on assets), the poorer the firm's financial performance and consequently, the higher the likelihood of financial distress. Consistent with prior literature, this study measures return on assets (ROA) as the earnings before interest and tax over the total assets at year-end. For the purpose of the main analyses, this study proxies risk of firm *i* at time period *t* with (a) a dichotomous variable representing loss $Loss_{it}$, (b) the leverage $Leverage_{it}$ and (c) the return of assets ROA_{it} [20].

4.5.1.1.3 Firm's complexity

There are a number of different aspects to firm complexity which may impact on financial distress. Studies have been conducted using the number of business (geographic) segments as a measure of firm complexity (Wu, Gaunt, and Gay 2010; Choi et al. 2004; Francis and Simon 1987; Francis 1984). It is anticipated that firms with a higher number of business segments face a lower likelihood of financial distress. The rationale for this is that firms with different business segments are not influenced as much by adverse effects affecting one specific segment and as such, are able to hedge their risks (Wu, Gaunt, and Gay 2010). Similarly, segment (offshore) sales are expected to reduce the likelihood of financial distress since firms making offshore sales have access to a greater market base (therefore well diversified) and as such are able to hedge their risk of market fluctuations in their base country (Wu, Gaunt, and Gay 2010; Taylor 1997). Consistent with prior literature, this study measures firm's complexity with proportion of segment sales $Prop\_Segment\_Sales_{it}$ for the main analysis and number of geographic segments $No\_Geographic\_Segements_{it}$ for sensitivity testings.

4.5.1.1.4 Firm's maturity

Firm's maturity is also found to be a common factor in extant literature which may impact on financial distress. Older, larger and well diversified firms are found to be more able to trade through difficult times (such as economic downturns) and as such, less likely to face financial distress or more likely to reverse a previously distressed position (Wu, Gaunt, and Gray 2010; Beaver, McNichols, and Rhie 2005; Denis, Denis, and Sarin 1997). As such, consistent with prior literature, this study measures firm's maturity with the natural log of age Ln_Age_{it}.

4.5.1.2 Accounting discretion and other auditor attribute

Regarding accounting discretion and other auditor attributes (not included as an independent variable for the purpose of this study, such as auditor opinion) extant

[20] Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued since these variables are also used in the Zmijewski ZFC-Score model, analyses will be re-run and the control variables $Leverage_{it}$ and ROA_{it} will then be omitted.

literature shows the possibility of the following impacting financial distress.

4.5.1.2.1 Earnings quality

Warfield, Wild, and Wild (1995) suggest that the use of abnormal accruals to reduce the perception of risk by firms deemed riskier can be common practice. With the use of abnormal accruals, such firms may be able to show a positive performance and hence a lower risk of being distressed in the shorter term only before such a (hidden) distressed position results in insolvency. The valuation of normal and abnormal accruals was first introduced by Jones (1991) and subsequently adopted or modified by other scholars to test year and industry performance-matched discretionary accruals. Such scholars include Dechow, Sloan, and Sweeney (1995); Kothari, Leone, and Wasley (2005); Louis (2004); Bowen, Rajgopal, and Venkatachalam (2008) and Klein (2002). The Jones (1991) model, as follows, will be used in this study as a proxy of discretionary-accruals.

$$TAC_{it}/TA_{it-1} = \beta 1(1/TA_{it-1}) + \beta 2((\Delta Rev_{it}/TA_{it-1} - \Delta AR_{it}/TA_{it-1}) + \beta 3PPE_{it}/TA_{it-1} + \varepsilon_{it}$$

Where:

$\beta 1,2,3$	= Estimated coefficients;
TAC_{it}	= Total accruals in time period t for firm i;
ΔREV_{it}	=Revenue in time period t less revenue in time period t_{-1} for firm i;
ΔAR_{it}	=Account receivables in time period t less account receivable in time period t_{-1} for firm i;
PPE_{it}	= Gross property, plant, and equipment in time period t for firm i;
TA_{it-1}	= Total assets in time period t_{-1} for firm i;
ε_{it}	= Error term representing discretionary accruals in period t for firm i.

$|Earnings\_Quality\_EQ|_{it}$, a continuous variable, will be the absolute value of the ε_{it} for firm i at time period t, after the ordinary least squares (OLS) regression model is run. The cash-flow statement approach by Collins and Hribar (2002) is used to determine the level of discretionary accruals:

$$TAC_{it} = NI_{it} – CFO_{it}$$

Where:

TAC_{it}	= Total accruals in time period t for firm i;
NI_{it}	= Earnings before extraordinary items & discontinued operations in time period t for firm i;
CFO_{it}	= Net cash flow from operating activities (taken directly from the statement of cash flows) in time period t for firm i.

4.5.1.2.2 Auditor opinion

Butler, Leone, and Willenborg (2004) finds firms issued with going-concern auditor's report are likely undergoing severe financial distress. Other similar prior studies have examined the association between financial distress and the type of auditor's opinion issued such the issuance of going-concern reports, and the likelihood of receiving a modified auditor's opinion (Chi and Chin 2011; Liu and Wang 2005; Stanley 2011; Carey and Simnett 2006; Choi et al. 2004; Carcello and Neal 2000) and find a significant positive association. As such, consistent with prior literature, this study controls for the auditor's opinion with the use of the dichotomous variable *Aud_Opinion*$_{it}$[21].

4.5.1.3 Firm corporate governance characteristics

There are numerous diverse features of firm corporate governance characteristics which may have an influence on the firm's financial distress. The following sub-sections explain these.

4.5.1.3.1 Board of directors

Prior studies find the board of directors play an important role in ensuring the effectiveness and efficiency of the financial reporting process. Board of directors of firms have a fiduciary duty to ensure the integrity of the firm's process of financial reporting. Extant literature commonly use the following proxies for an effective and efficient board of directors: (1) Board independence (Defond, Hann, and Hu 2005; Lee, Mande, and Ortman 2004; Denis, Denis, and Sarin 1997); (2) Board tenure (Carcello et al. 2002; Denis, Denis, and Sarin 1997; Karamanou and Vafeas 2005); (3) CEO duality (Lee, Mande, and Ortman 2004; Anderson, Mansi, and Reeb 2004) and (4) Board financial expertise (Singh 2010; Carcello et al. 2002).

For this study, for firm *i* in the period *t*, the measurements for the above variables are as follow: (1) Board independence, *Prop_BoD_Ind*$_{it}$, will be assigned the percentage of independent directors to total number of directors on the board; (2) Board tenure, *BoD_Tenure*$_{it}$, will be assigned the average number of years the member have served on the board; (3) CEO duality, *CEO_Duality*$_{it}$, will be assigned a dummy variable, whereby a value of one (1) is awarded if the CEO and Chair of the board are the same person; and (4) Board financial expertise, *BoD_Financial_Expertise*$_{it}$, will be assigned a dummy variable, whereby a value of one (1) if the board consists of at least

[21] This study does not include audit opinion as an independent variable for the analysis because (1) audit opinion is not one of the pivotal proxy for audit quality in extant literature and (2) there also exist studies looking at the association between financial distress and auditor's opinion in extant literature (Chi and Chin 2011; Stanley 2011; Carey and Simnett 2006; Liu and Wang 2005; Choi et al. 2004; Carcello and Neal 2000).

50% financial expert during the year[22].

4.5.1.3.2 Audit committee

Prior studies find a firm's audit committee plays an important role in ensuring the effectiveness and efficiency of the financial reporting process. The quality and existence of the audit committee is commonly proxied with: (1) the existence of an audit committee (Carcello et al. 2011; Krishnan 2005); (2) the number of members on the audit committee board (Krishnan 2005); (3) the audit committee independence (Carcello et al. 2011; Chen and Zhou 2007; Xie, Davidson, and Dadalt 2003; Abbott et al. 2003; Klein 2002); (4) the number of audit committee meetings (Stewart and Munro 2007; Abbott, Parker, and Peters 2004; Abbott et al. 2003); and (5) financial expertise (Krishnan and Visvanathan 2007; Dhaliwal et al. 2006; Defond et al. 2005).

For this study, for firm *i* in the period *t*, the measurements of the above variables are as follow: (1) the existence of an audit committee, Aud_Com_{it}, will be assigned a dichotomous variable whereby a value of one (1) is awarded if the firm has an audit committee during the year; (2) the number of members on the audit committee board, AC_Size_{it}, will be assigned the number of members on the audit committee board; (3) the audit committee independence which is calculated as the proportion of independent members in the audit committee board, $Prop\_Aud\_Com\_Ind_{it}$; (4) the number of audit committee meetings; $Aud\_Com\_Meet_{it}$, will be assigned the number of audit committee meetings held during the year; and (5) the audit committee financial expertise, $Aud\_Com\_Financial\_Expertise_{it}$, will be assigned a dummy variable, whereby a value of one (1) if the board consists of at least 50% financial expert during the year[23].

4.5.1.4 Industry effects

For the purposes of this study, impact of specific industry ($Industry_{it}$) is controlled due to the likelihood of sample firms to concentrate on a small number of industries. Consequently, the variable $Industry_{it}$ controls variances in the likelihood of financial distress between sectors. For empirical testing of this study, the variable $Industry_{it}$ is assigned a value of one (1) if the client firm *i* in the time period *t* is from

[22] Following Agrawal and Knoeber (1996); and Klein (1998), a value of 1 is awarded if 50% of more of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification (CA, or CPA); and (2) Over 5 years' experience as a member of a board.

[23] Following Klein (1998) and Krishnan and Visvanathan (2007), a value of 1 is awarded if 50% of more of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification (CA, or CPA); and (2) Over 5 years' experience as a member of a board.

one respective GICS industry; otherwise a value of zero (0) is assigned. This study uses nine industry classifications namely, Materials, Energy, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Information Technology, Telecommunication Services, and Utilities.

4.5.1.5 Year effects

Since the magnitude of financial distress can vary by year, year dummies, $Year_{it}$, are also used in this study to control for fixed year effects. The variable $Year_{it}$ represent series indicator variables controlling for time temporal variances of reporting periods for each firm-year observations whereby a score of one (1) is awarded to firm i if the data corresponds to time period t; otherwise a value of zero (0) is assigned. Analyses of this study will be performed over the calendar years spanning from 2008 to 2014 (that is, a seven-year observation window).

4.6 STATISTICAL REGRESSION MODEL

This study uses linear regression models to test the hypotheses formulated from the association between financial distress and pivotal external auditor attributes. In so doing, a range of factors likely to influence financial distress will be controlled for. In addition to examining the impact of each individual auditor attributes in isolation, this study will also investigate the unison effect of all four pivotal auditor attributes on financial distress. Last, for each of the analyses stated above, the lagged effect of the four pivotal auditor attributes (both in isolation and in unison) will be examined.

The linear regression analyses used to examine the predicted relationships of the auditor attributes are as follows:

$$ZFC_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}; \tag{1}$$

$$ZFC_{it} = \beta 0+\beta_1 RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}; \tag{2}$$

$$ZFC_{it} = \beta 0+\beta_1 Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}; \tag{3}$$

$$ZFC_{it} = \beta 0+\beta_1 Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}; \tag{4}$$

$$ZFC_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 RNon\_Audit_{it}+\beta_3 Aud\_Ten_{it}+\beta_4 Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financia \tag{5}$$

$$\mathit{l\_Expertise}_{it}+\beta_7\mathit{AC\_Size}_{it}+\beta_8\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_9\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_{10}\mathit{Prop\_Segment\_Sales}_{it}+\beta_{11}\mathit{Ln\_Total\_Assets}_{it}+\beta_{12}\mathit{Sq\_Emp}_{it}+\beta_{13}\mathit{Ln\_Age}_{it}+\beta_{14}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{15}\mathit{Loss}_{it}+\beta_{16}\mathit{Leverage}_{it}+\beta_{17}\mathit{ROA}_{it}+\beta_{18}\mathit{Aud\_Opinion}_{it}+\beta_{19}\mathit{Industry}_{it}+\beta_{20}\mathit{Year}_{it}+\varepsilon_{it}.$$

The linear regression analyses used to examine the predicted relationships of the lagged auditor attributes are as follows:

For a one-year lag:

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L.Big4}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [6]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L.}\mathit{RNon\_Audit}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [7]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L.}\mathit{Aud\_Ten}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [8]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L.}\mathit{Aud\_Fee}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [9]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L.}\mathit{Big4}_{it}+\beta_2\mathrm{L.}\mathit{RNon\_Audit}_{it}+\beta_3\mathrm{L.}\mathit{Aud\_Ten}_{it}+\beta_4\mathrm{L.}\mathit{Aud\_Fee}_{it}+\beta_5\mathit{Prop\_BoD\_Ind}_{it}+\beta_6\mathit{BoD\_Financial\_Expertise}_{it}+\beta_7\mathit{AC\_Size}_{it}+\beta_8\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_9\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_{10}\mathit{Prop\_Segment\_Sales}_{it}+\beta_{11}\mathit{Ln\_Total\_Assets}_{it}+\beta_{12}\mathit{Sq\_Emp}_{it}+\beta_{13}\mathit{Ln\_Age}_{it}+\beta_{14}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{15}\mathit{Loss}_{it}+\beta_{16}\mathit{Leverage}_{it}+\beta_{17}\mathit{ROA}_{it}+\beta_{18}\mathit{Aud\_Opinion}_{it}+\beta_{19}\mathit{Industry}_{it}+\beta_{20}\mathit{Year}_{it}+\varepsilon_{it}; \quad [10]$$

For a two-years lag:

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L2.Big4}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [11]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L2.}\mathit{RNon\_Audit}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [12]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L2.}\mathit{Aud\_Ten}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [13]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L2.}\mathit{Aud\_Fee}_{it}+\beta_2\mathit{Prop\_BoD\_Ind}_{it}+\beta_3\mathit{BoD\_Financial\_Expertise}_{it}+\beta_4\mathit{AC\_Size}_{it}+\beta_5\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_6\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_7\mathit{Prop\_Segment\_Sales}_{it}+\beta_8\mathit{Ln\_Total\_Assets}_{it}+\beta_9\mathit{Sq\_Emp}_{it}+\beta_{10}\mathit{Ln\_Age}_{it}+\beta_{11}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{12}\mathit{Loss}_{it}+\beta_{13}\mathit{Leverage}_{it}+\beta_{14}\mathit{ROA}_{it}+\beta_{15}\mathit{Aud\_Opinion}_{it}+\beta_{16}\mathit{Industry}_{it}+\beta_{17}\mathit{Year}_{it}+\varepsilon_{it}; \quad [14]$$

$$ZFC_{it} = \beta 0+\beta_1\mathrm{L2.}\mathit{Big4}_{it}+\beta_2\mathrm{L2.}\mathit{RNon\_Audit}_{it}+\beta_3\mathrm{L2.}\mathit{Aud\_Ten}_{it}+\beta_4\mathrm{L2.}\mathit{Aud\_Fee}_{it}+\beta_5\mathit{Prop\_BoD\_Ind}_{it}+\beta_6\mathit{BoD\_Financial\_Expertise}_{it}+\beta_7\mathit{AC\_Size}_{it}+\beta_8\mathit{Prop\_Aud\_Com\_Ind}_{it}+\beta_9\mathit{Aud\_Com\_Financial\_Expertise}_{it}+\beta_{10}\mathit{Prop\_Segment\_Sales}_{it}+\beta_{11}\mathit{Ln\_Total\_Assets}_{it}+\beta_{12}\mathit{Sq\_Emp}_{it}+\beta_{13}\mathit{Ln\_Age}_{it}+\beta_{14}\mathit{Earnings\_Quality\_EQ}_{it}+\beta_{15}\mathit{Loss}_{it}+\beta_{16}\mathit{Leverage}_{it}+\beta_{17}\mathit{ROA}_{it}+\beta_{18}\mathit{Aud\_Opinion}_{it}+\beta_{19}\mathit{Industry}_{it}+\beta_{20}\mathit{Year}_{it}+\varepsilon_{it}; \quad [15]$$

For a three-years lag:

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.Big4it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}; \tag{16}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}; \tag{17}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}; \tag{18}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}; \tag{19}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Big4_{it}+\beta_2 \mathrm{L3.}RNon\_Audit_{it}+\beta_3 \mathrm{L3.}Aud\_Ten_{it}+\beta_4 \mathrm{L3.}Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\beta_{19} Industry_{it}+\beta_{20} Year_{it}+ \varepsilon_{it}. \tag{20}$$

The linear regression analysis used to examine the predicted relationships of the auditor attributes in unison is as follows:

$$ZFC_{it} = \beta 0+\beta_1 AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it},. \tag{21}$$

Finally, the linear regression analyses used to examine the predicted relationships of the lagged auditor attributes in unison are as follows:

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L.}AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}; \tag{22}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2.}AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}; \tag{23}$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2.}AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+ \varepsilon_{it}. \tag{24}$$

Where (for [1] to [24]):

$\beta 0$ to *$\beta 20$*	= coefficients;
ZFC_{it}	= For firm *i* for time period *t*, a value of "1" will be assigned if the calculated results using the Zmijewski model is equal to or greater than 0.5, otherwise a value "0" will be assigned;
$Big4_{it}$	= A dichotomous indicator variable representing Big N auditors; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* is from a big 4 accounting firm (i.e. KPMG, PriceWaterhouseCoopers, Deloitte and Touche and Ernst and Young); otherwise a score of zero (0) will be awarded;
L. / L2. / L3.*$Big4_{it}$*	= A dichotomous indicator variable representing lagged Big N auditors; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3})[24] is from a big 4 accounting firm (i.e. KPMG, PriceWaterhouseCoopers, Deloitte and Touche and Ernst and Young); otherwise a score of zero (0) will be awarded;
$RNon\text{-}Audit_{it}$	= A continuous measure denoting the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor *j* by auditee *i* during time period *t*. Following Palmrose (1986) non-audit services is calculated as the fee charged for accounting related management advisory services + the fee charged for non-accounting related management services + the fee charged for taxation services;
L. / L2. / L3.*$RNon\text{-}Audit_{it}$*	= A continuous measure denoting the lagged ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor *j* by auditee *i* during time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3}). Following Palmrose (1986) non-audit services is calculated as the fee charged for accounting related management advisory services + the fee charged for non-accounting related management services + the fee charged for taxation services;
Aud_Ten_{it}	= Natural log of continuous measure denoting the actual number of years the auditor (audit firm) held office will be used;
L. / L2. / L3.*Aud_Ten_{it}*	= Natural log of continuous measure denoting lagged the actual number of years the auditor (audit firm) held office will be used during time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3});
Aud_Fee_{it}	= Natural log of audit fee paid by firm *i* at the end of time period *t*;
L. / L2. / L3.*Aud_Fee_{it}*	= Natural log of audit fee paid by firm *i* at the end of time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3});
AQ_{it}	= Sum of the individual component scores underpinning auditor quality (i.e. Big4 *($Big4_{it}$)*; Non-audit services *($RNon\text{-}Audit_{it}$)*; audit tenure *(Aud_Ten_{it})*; and audit fee *(Aud_Fee_{it})* for firm *i* at the end of time period *t*;
L. / L2. / L3.*AQ_{it}*	= Sum of the lagged individual component scores underpinning auditor quality (i.e. Big4 *($Big4_{it}$)*; Non-audit services *($RNon\text{-}Audit_{it}$)*; audit tenure *(Aud_Ten_{it})*; and audit fee *(Aud_Fee_{it})* for firm *i* at the end of time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3}).

Please refer to Appendix-1 for definitions of all other variables used as part of this study (including the control variables.

[24] Whereby L. represents T_{-1} as a lag of one year, L2. Represents T_{-2} as a lag of two years, and L3. Represents T_{-3} as a lag of three years.

The set of regressions to test the hypotheses H_1, to H_{10} of this study are performed in Chapter Six by regressing independent and control variables in *Equations [1]* to *[24]* above against the financial distress proxy ZFC_{it}, which is the Zmijewski ZFC-Score. Considering that the dependent variable (financial distress) is a dichotomous variable, a logistic regression analysis is considered to be a powerful technique (Hutcheson and Sofroniou 1999). Therefore, this study focuses on logistic regression.

4.7 CLEANING OF THE DATA

Verification such as accuracy of data, ascertaining missing values, and normality tests are performed prior to commencing data analysis. As outlined in Chapter Four, data readily available from databases was downloaded as well as hand-collected from the respective financial reports. The database (for each respective variable) providing the most accurate data was used. If none of the database available provided accurate data, these were hand-collected. Once these are completed, a data authentication check is further undertaken by randomly selecting a sample of 20 firms per calendar year under observation (from 2008 to 2014) and data verified to the respective financial reports.

Consistent with empirical audit quality literature, continuous variables such as audit fee are transformed using both natural logarithm and winsorisation in order to provide a better linear fit with the dependent variable and increase confidence in subsequent regression tests to be undertaken (Wan-Hussin and Bamahros 2013; Lin et al. 2011; Hoitash, Hoitash, and Bedard 2009). Extent studies on audit quality find the process of winsorising continuous variables to improve robustness of the results (Pizzini, Lin, and Ziegenfuss 2015; Lin et al. 2011; Feng, Li, and McVay 2009). Consistent with prior literature, this study winsorises all continuous variables at the 1 and 99 percent levels. Undefined values obtained as a result of natural logarithm are replaced to the lowest values. These are performed to remove the effect of influential eccentric observations.

Normality test involves examining each continuous variables skewness and Kolmogorov-Smirnov p-value. Though not all variables result in normal distributions, these are still included in this study as justified by prior empirical research (Gopalan and Jayaraman 2012; Chi, Lisic, and Pevzner 2011; Carcello and Nagy 2004; Balsam, Krishnan, and Yang 2003).

4.8 SENSITIVITY ANALYSIS

Sensitivity tests will be undertaken to validate the robustness of the findings. For the purposes of main analysis, this study proxies financial distress with the use of the Zmijewski ZFC-Score. For the purpose of sensitivity analysis, the Altman Z2-Score will be use. Similarly, alternate measures of the independent variables will be used and the regressions mentioned above re-run. As per section 4.4 above, the regression models utilized amend $Big4_{it}$ with $Aud\_Spec\_30_{it}$; $RNon\text{-}Audit_{it}$ with $Cnon\_Audit_{it}$; $Ln\_Aud\_Ten_{it}$ with $Ln\_Aud\_Part\_Ten_{it}$; and $Ln\_Aud\_Fee_{it}$ with $Prop\_Aud\_Fee_{it}$ simultaneously. These alternative measures of auditor attributes are derived so as to help determine whether the main regressions results are influenced by the measures used to proxy for these auditor attributes.

4.9 SUMMARY OF THE CHAPTER

Chapter Four detailed the research method used to test the hypotheses of this study. Initially, reasoning of the sample selected, source documentation chosen and time period analysed was provided. Subsequently, measures for the dependent (financial distress) and independent variables (external auditor attributes) used in this study were outlined before the main empirical tests to be performed in this study identified.

Table 4.1: Details of Control Variables

Explanatory Variable (proxy measure)	**Definition of proxy measure**	**Expected direction of relationship**
Auditee Size		
Ln_Market_Cap$_{it}$	Natural Log of Market capitalisation for firm *i* at the end of time period *t*.	-
Ln_Total_Assets$_{it}$	Natural log of total assets for firm *i* at the end of time period *t*.	-
Ln_Sales$_{it}$	Natural log of sales / revenue during the year for firm *i* at the end of time period *t*.	-
Sq_Emp$_{it}$	Square root of the number of employees for firm *i* at the end of time period *t*.	?
Auditee Risk		
Loss$_{it}$	A dichotomous indicator variable where firm *i* is given a score of one (1) if the firm reported a loss in year *t*; otherwise, firm i is scored zero (0).	+
Leverage$_{it}$	Total debt to total assets of firm *i* at the end of time period *t*.	+
ROA$_{it}$	The return on assets of firm *i* at the end of time period *t*.	-
Aud_Opinion$_{it}$	A dichotomous indicator variable whereby firm *i* is given a score of one (1) if during time period *t* the firm received a qualified audit opinion; otherwise, firm *i* is scored zero (0).	+
Auditee Complexity		
Prop_Segment_Sales$_{it}$	Proportion of offshore sales for firm *i* at the end of time period *t*.	-
No_Geographic_Segments$_{it}$	Number of segments outside Australia for firm *i* at the end of time period *t*.	-
Auditee Maturity		
Ln_Age$_{it}$	Natural Log of age of firm i in the period *t*.	-
Corporate Governance Factors		
Board of Directors		
Prop_BoD_Ind$_{it}$	The proportion of independent directors to total number of directors on the board of the firm *i* at the end of time period *t*.	-
BoD_Tenure$_{it}$	The average number of years for which the members on the board of a firm *i* have served on the board at the end of time period *t*.	?
CEO_Duality$_{it}$	A dichotomous indicator variable representing CEO Duality whereby 1 is awarded is the CEO and Chair of the Board are the same person; otherwise 0 is awarded.	-

BoD_Financial_Expertise$_{it}$	A dichotomous indicator variable representing Board of Directors Financial Expertise. Following Agrawal and Knoeber 1996; and Klein 1998, a value of 1 is awarded if 50% of more of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification (CA, or CPA); and (2) Over 5 years' experience as a member of a board.	-
Audit Committee		
Aud_Com$_{it}$	A dichotomous indicator variable representing the existence of an audit committee for firm *i* at the end of time period *t*.	-
AC_Size$_{it}$	The number of member on the Audit Committee board for firm *i* in period t.	?
Prop_Aud_Com_Ind$_{it}$	The proportion of independent directors to total number of directors on the audit committee of the firm *i* at the end of time period *t*.	-
Aud_Com_Meet$_{it}$	The number of audit committee meetings per year of firm *i* at the end of time period *t*.	-
Aud_Com_Financial_Expertise$_{it}$	A dichotomous indicator variable representing Audit Committee Financial Expertise. Following Klein 1998, a value of 1 is awarded if over 50% of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification; and (2) Over 5 years' experience as in a finance related role.	-
Auditee Industry		
ConsumerDisc$_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the consumer discretionary sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
ConsumerStap$_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the consumer staples sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
Energy$_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the energy sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?

$HealthCare_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the health care sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
$Industrials_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the industrial sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
IT_{it}	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the information technology sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
$Materials_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the materials sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
Tel_Serv_{it}	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the telecommunication services sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
$Utilities_{it}$	A dichotomous indicator variable where a firm *i* is given a score one (1) if during the time period *t* the firm belonged to the utilities sector as per the GICS standardized classification system; otherwise, firm *i* is scored zero (0).	?
Other Characteristics		
$Earnings\_Quality\_EQ_{it}$	The modified traditional discretionary accrual measures Jones (1995) model. $TAit = \beta0(1/ASSETS\mathit{it}_{-1}) + \beta1(\Delta SALES\mathit{it} - \Delta Receivable\mathit{it}) + \beta3PPE\mathit{it} + \varepsilon\mathit{it}$ (Kothari, Leone and Wasley 2005).	-
Industry_Dummy	Dummy variable for industry of firm *i* at the end of time period *t*.	?
Year_Dummy	Series indicator variables controlling time temporal differences of reporting periods for firm-year observations with firm i scored one (1) if financial data corresponds to time period t; otherwise scored zero (0).	?

CHAPTER FIVE:

DESCRIPTIVE STATISTICS AND UNIVARIATE ANALYSIS

5.1 OVERVIEW OF THE CHAPTER

Chapter Five provides a review of the descriptive statistics for the different variables used for the purpose of this study by first outlining the steps undertaken in the final sample selection. The subsequent sections of this chapter outline the descriptive statistics for the dependent variables (namely the Zmijewski ZFC-Score and the Altman Z2-Score), the independent variables (namely Big 4 auditor, Auditor tenure, the provision of non-audit services [auditor independence] and audit fees), and control variables. The association between the two alternative dependent variables is then examined prior to a summary to end Chapter Five.

5.2 BASIC SAMPLE DESCRIPTIVE STATISTICS

5.2.1 Sample selection process and industry breakdown

The final usable sample for this study consists of 4,876 firm-year observations (between 2008 to 2014). Table 5.1 provides a total of 496 distressed firms in 2008, 437 firms in 2009, 326 firms in 2010, 306 firms in 2011, 268 firms in 2012, 316 firms in 2013 and 289 distressed firms in 2014. From this initial sample, firm-years deemed to be distressed (per the ZFC-Score) are then matched to the closest comparable healthy firm, based on year, size (proxied by total assets) and industry.

Table 5.1: Sample Breakdown for Distressed / Healthy Firms for the Period 2008 to 2014

	Overall	%	2008	%	2009	%	2010	%	2011	%	2012	%	2013	%	2014	%
Distressed firm:	2438	50.00	496	50.00	437	50.00	326	50.00	306	50.00	268	50.00	316	50.00	289	50.00
Healthy firm:	2438	50.00	496	50.00	437	50.00	326	50.00	306	50.00	268	50.00	316	50.00	289	50.00
Sub-Total:	4876		992		874		652		612		536		632		578	
Consumer Discretionary	335	6.85	71	7.16	40	4.58	28	4.29	29	4.74	36	6.72	62	9.81	68	11.76
Consumer Staples	168	3.45	36	3.63	24	2.75	24	3.68	18	2.94	20	3.73	22	3.48	24	4.15
Energy	764	15.67	134	13.51	145	16.59	116	17.79	108	17.65	88	16.42	94	14.87	74	12.80
Health Care	452	9.27	102	10.28	92	10.53	66	10.12	44	7.19	40	7.46	66	10.44	42	7.27
Industrials	593	12.16	94	9.48	83	9.50	86	13.19	80	13.07	52	9.70	82	12.97	116	20.07
Information Technology	353	7.24	77	7.76	74	8.47	50	7.67	54	8.82	28	5.22	24	3.80	46	7.96
Materials	2007	41.16	434	43.75	376	43.02	252	38.65	255	41.67	246	45.90	262	41.46	182	31.49
Teleommunication Services	94	1.93	20	2.02	14	1.60	8	1.23	14	2.29	12	2.24	10	1.58	16	2.77
Utilities	116	2.38	24	2.42	26	2.97	22	3.37	10	1.63	14	2.61	10	1.58	10	1.73
Total firm-years	4876		992		874		652		612		536		632		578	

Table 5.1 shows final sample size to be 992 firms in 2008, 874 firms in 2009, 652 firms in 2010, 612 firms in 2011, 536 firms in 2012, 632 firms in 2013 and 578 firms in 2014 (each consisting of 50% healthy and 50% distressed firms (as scored by the ZFC-Score).

Table 5.1 above also presents the industry breakdown of the sample firms. Overall, the table reveals that the Materials industry (41.16%) is the most prominent sector in the sample, followed by Energy (15.67%). This suggests that over 50% of firms sampled (4,876 firm-year observations) for this study is collectively represented by the Materials and Energy industry sector (56.83%). On the other hand, the Utilities (2.38%) and Telecommunication Services (1.93%) are the least represented sectors in the final sample. The representation of firms within each industry contains enough observations in the final sample used in this study to control for the industry effects in subsequent analysis.

5.2.2 Descriptive statistics

Table 5.2 shows that the mean of the Zmijewski ZFC-Score (firms facing financial distress computed using this model) ZFC_Score_{it} is 0.50 (due to the fact that this model was use to match distressed firms to healthy firms on a 50:50 ratio) and the Altman Z2-Score (firms facing financial distress computed using the Altman model) $Z2\_Score_{it}$ has a mean of 0.32. The implication of this is that 50% and 32% of firms in the sample are deemed to be facing financial distress calculated using the Zmijewski ZFC-Score and the Altman Z2-Score models.

Table 5.2 also shows descriptive statistics for the independent variables in the sample. The mean of the presence of a Big 4[25] auditor $Big4_{it}$ is 0.28 which implies that 28% of the sampled firms hire a big 4 auditor. Other independent variables in the sample, namely the provision of non-audit services $RNon\text{-}Audit_{it}$, auditor tenure Aud_Ten_{it}, and audit fee Aud_Fee_{it} have a mean (median) of 0.25 (0.19), 6.91 (3.00) and 180,000 (69,000) respectively. That is, sampled firms on average have 25% of their total fees charged by the auditor as a fee for the provision of non-audit services, the average auditor tenure for the sampled firms is 6.91 years and the average audit fee charged to the sampled firms is $180,000.

[25]The Big-4/brand name audit firms comprise the four largest international accounting/auditing practices, namely, PricewaterhouseCoopers (PwC), KPMG, Ernst & Young (EY), and Deloitte Touche Tohmatsu (DTT) (Leung et al. 2011).

Table 5.3 also shows descriptive statistics for continuous independent variables in relation to ranges of percentiles from 25th percentile to 75th percentile. The $RNon\text{-}Audit_{it}$ ranges from 0.01 (25th percentile) to 0.42 (75th percentile). The Aud_Ten_{it} ranges from 2.00 (25th percentile) to 10.00 (75th percentile). The Aud_Fee_{it} ranges from 408,000 (25th percentile) to 144,000 (75th percentile).

Pertaining to the dichotomous control variables used in the main analysis of this study, the mean for the board of director's financial expertise $BoD\_Financial\_Expertise_{it}$[26] being 0.43 signifies that 43% of the sampled firm has at least 50% of board members possess a financial related qualification (such as a CA or CPA qualification). Similarly, the mean for the audit committee's financial expertise $Aud\_Com\_Financial\_Expertise_{it}$[27] being 0.25 signifies that 25% of the sampled firm has at least 50% of the audit committee members with possess a financial related qualification and over five years' experience in a finance related role. The third dichotomous control variable, $Aud\_Opinion_{it}$ has a mean of 0.23 which means that 23% of the firm year observations were issued with a qualified opinion during that year. The final dichotomous control variable, $Loss_{it}$ has a mean of 0.48 which means that 48% of the firm year observations encountered a loss during that year. This value is higher than reported in extent literature since half of the sample is distressed.

In relation to the continuous control variables used in this study, board of director independence BoD_Ind_{it} has a mean, median and standard deviation of 1.27, 1.19 and 0.26. The audit committee size AC_Size_{it} has a mean, median and standard deviation of 3.45, 2.12 and 1.22. The audit committee independence $Aud\_Com\_Ind_{it}$[28] has a mean, median and standard deviation of 0.18, 0.00 and 0.32. The proportion of offshore sales $Prop\_Segment\_Sales_{it}$ has a mean, median and standard deviation of 1.19, 1.00 and 0.44. The total assets $Total\_Assets_{it}$ (000's) has a mean, median and standard deviation of 238,000, 14,100 and 95,400. The age of the sampled firm Age_{it} has a mean, median and standard deviation of 19.76, 15.00 and 15.28. The modified traditional discretionary accrual $Earnings\_Quality\_EQ_{it}$ has a mean, median and standard deviation of 0.15, 0.06 and 0.24. The total liabilities over total assets

[26] A dichotomous indicator variable representing Board of Directors Financial Expertise. Following Agrawal and Knoeber 1996; and Klein 1998, a value of 1 is awarded if 50% of more of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as possessing Financial Related Qualification (such as CA, or CPA).

[27] A dichotomous indicator variable representing Audit Committee Financial Expertise. Following Klein 1998, a value of 1 is awarded if over 50% of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification; and (2) Over 5 years' experience as in a finance related role.

[28] The proportion of independent directors to total number of directors on the audit committee of the firm *i* at the end of time period *t*.

$Leverage_{it}$ has a mean, median and standard deviation of 0.48, 0.45 and 0.42. The return on assets *ROA_{it}* has a mean, median and standard deviation of -0.45, -0.17 and 0.87.

Last, Table 5.3 further shows descriptive statistics for continuous control variables in relation to ranges of percentiles from 25th percentile to 75th percentile. Board of director independence *BoD_Ind_{it}* ranges from 1.19 (25th percentile) to 1.46 (75th percentile). The audit committee size *AC_Size_{it}* ranges from 1.20 (25th percentile) to 4.00 (75th percentile). The audit committee independence *$Aud\_Com\_Ind_{it}$* ranges from 0.00 (25th percentile) to 0.26 (75th percentile). The proportion of offshore sales *$Prop\_Segment\_Sales_{it}$* ranges from 1.00 (25th percentile) to 1.00 (75th percentile). The total assets *$Total\_Assets_{it}$* (000's) ranges from 5,163 (25th percentile) to 51,700 (75th percentile). The age of the sampled firm *Age_{it}* ranges from 10.00 (25th percentile) to 26.00 (75th percentile). The modified traditional discretionary accrual *$Earnings\_Quality\_EQ_{it}$* ranges from 0.10 (25th percentile) to 0.93 (75th percentile). The total liabilities over total assets *$Leverage_{it}$* ranges from 0.12 (25th percentile) to 0.57 (75th percentile). Finally, the return on assets *ROA_{it}* ranges from -0.58 (25th percentile) to 0.03 (75th percentile). The average return on assets being negative suggests that firms are losing value, rather than gaining value as measured by the net income earned by the firm over the total assets held by the firm. The data is consistent with the fact that 48% of all the sampled firms reported a loss.

Table 5.2: Descriptive Statistics

Variable	Mean	Median	Std Dev	P25	P75
ZFC_Score $_{it}$	0.50				
Z2_Score$_{it}$	0.32				
Big4 $_{it}$	0.28				
RNon-Audit $_{it}$	0.25	0.19	0.25	0.01	0.42
Aud_Ten $_{it}$	6.91	3.00	7.98	2.00	10.00
Aud_Fee $_{it}$ (000's)	180	69	408	36	144
BoD_Ind $_{it}$	1.27	1.19	0.26	1.19	1.46
BoD_Financial_Expertise $_{it}$	0.43				
AC_Size $_{it}$	3.45	2.12	1.22	1.20	4.00
Aud_Com_Ind $_{it}$	0.18	0.00	0.32	0.00	0.26
Aud_Com_Financial_Expertise $_{it}$	0.25				
Prop_Segment_Sales $_{it}$	1.19	1.00	0.44	1.00	1.00
Total_Assets $_{it}$ (000's)	238,000	14,100	95,400	5,163	51,700
Age $_{it}$	19.76	15.00	15.28	10.00	26.00
Earnings_Quality_EQ $_{it}$	0.15	0.06	0.24	0.10	0.93
Loss $_{it}$	0.48				
Leverage $_{it}$	0.48	0.45	0.42	0.12	0.57
ROA $_{it}$	-0.45	-0.17	0.87	-0.58	0.03
Aud_Opinion $_{it}$	0.23				

Pease refer to Appendix-1 for variables definition.

5.3 CORRELATION ANALYSIS

Table 5.3 presents a correlation matrix reporting Pearson listwise correlation coefficients for both the continuous and dichotomous variables used in the main analysis of this study. The abovementioned table includes the financial distress proxy, calculated using both the Zmijewski ZFC-Score (ZFC_Score_{it}) (which will be used for the main analyses) and the Altman Z2-Score ($Z2\_Score_{it}$) (which will be used for the sensitivity analyses). An examination of the correlation coefficients of Table 5.3 reveals that both of these variables are significantly correlated with all four key auditor attributes instigated as part of this study (that is, the existence of a Big 4 auditor ($Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor ($RNon\text{-}Audit_{it}$), the actual number of years the auditor (audit firm) held office (Aud_Ten_{it}), and the total audit fee paid to the auditor (Aud_Fee_{it}). All the four independent variables show a negative correlation with both proxies for financial distress. For the Zmijewski ZFC-Score, Table 5.3 shows the correlation between all four independent variables to be significant at the 0.01 level. In addition, Table 5.3 also displays that for the Altman Z2-Score, the correlation between the independent variables is also significant at the 0.01 level for three of the independent variables (namely, $Big4_{it}$, $RNon\text{-}Audit_{it}$, and Aud_Ten_{it}). However, the correlation between the $Z2\_Score_{it}$ and the Aud_Fee_{it} is only significant at the 0.05 level (though still negatively correlated).

Further review of the correlation coefficients in Table 5.3 highlights a number of significant correlations between the proxies for financial distress and a number of control variables. First, there is a significant correlation between the proxies of financial distress and the proxy that measures firm size (in this case, the total assets of the firm $Total\_Assets_{it}$, showing smaller firms are more prone to being distressed). Second, Table 5.3 also shows a significant correlation between the proxies for financial distress and the proxies for firm risk (in this case, $Loss_{it}$, $Leverage_{it}$, ROA_{it} and $Aud\_Opinion_{it}$). This is expected since two of those proxies (namely, $Leverage_{it}$ and ROA_{it}) are included in the dependent variable calculation. Firm complexity (proxied by $Prop\_Segment\_Sales_{it}$) also shows a significant correlation with both the ZFC_Score_{it} and the $Z2\_Score_{it}$. Last, key number of proxies for corporate governance show strong correlation with both the ZFC_Score_{it} and the $Z2\_Score_{it}$ (namely, BoD_Ind_{it}, $BoD\_Financial\_Expertise_{it}$, AC_Size_{it}, and $Aud\_Com\_Ind_{it}$). These significant correlations between the dependent variables and the control variables are as expected as firm's size, firm's risk, firm's complexity and firm's corporate governance structure are expected to affect firm's likelihood of financial distress.

Last, Table 5.3 shows no major multicollinearity issues are found since all coefficients are within the critical multicollinearity limit of 0.8 (Hair et al. 2010).

Table 5.3: Pearson Correlation Matrix

Variables	ZFC_Score$_{it}$	Z2_Scorei$_{it}$	Big4$_{it}$	RNon-Audit$_{it}$	Aud_Ten$_{it}$	Aud_Fee$_{it}$ (000's)	BoD_Ind$_{it}$	BoD_Financial_Expertise$_{it}$	AC_Size$_{it}$	Aud_Com_Ind$_{it}$	Aud_Com_Financial_Expertise$_{it}$	Prop_Segment_Sales$_{it}$	Total_Assets$_{it}$ (000's)	Age$_{it}$	Earnings_Quality_EQ$_{it}$	Loss$_{it}$	Leverage$_{it}$	ROA$_{it}$	Aud_Opinion$_{it}$
ZFC_Score$_{it}$																			
Z2_Scorei$_{it}$	0.42***																		
Big4$_{it}$	-0.30***	-0.31***																	
RNon-Audit$_{it}$	-0.40***	-0.26***	0.36***																
Aud_Ten$_{it}$	-0.33***	-0.31***	0.15***	0.12***															
Aud_Fee$_{it}$ (000's)	-0.08***	-0.04**	0.15***	-0.02	-0.13***														
BoD_Ind$_{it}$	0.06***	0.05***	-0.00	-0.06***	-0.25***	0.33***													
BoD_Financial_Expertise$_{it}$	-0.15***	-0.17***	0.20***	0.07***	0.42***	-0.17***	-0.12***												
AC_Size$_{it}$	0.04***	0.03**	0.09***	0.01	-0.12***	0.23***	0.18***	-0.08***											
Aud_Com_Ind$_{it}$	0.07***	0.07***	0.11***	-0.01	-0.16***	0.31***	0.55***	-0.14***	0.61***										
Aud_Com_Financial_Expertise$_{it}$	0.02	0.03**	0.03*	-0.01	-0.05***	0.08***	0.04***	0.02*	0.29***	0.23***									
Prop_Segment_Sales$_{it}$	-0.12***	-0.08***	0.17***	0.07***	-0.00	-0.01	0.04***	0.06***	0.03*	0.05***	0.00								
Total_Assets$_{it}$ (000's)	-0.07***	-0.04***	0.13***	0.01	-0.14***	0.69***	0.34***	-0.15***	0.18***	0.26***	0.06***	-0.02							
Age$_{it}$	0.02	0.02*	0.09***	-0.00	-0.08***	0.37***	0.00	-0.09***	0.18***	0.10***	0.05***	-0.03**	0.33***						
Earnings_Quality_EQ$_{it}$	-0.03**	-0.02	0.08***	0.01	-0.03*	0.11***	0.05***	-0.07***	0.03*	0.06***	-0.03*	0.15***	0.15***	0.05***					
Loss$_{it}$	-0.23***	-0.41***	0.01	-0.15***	0.18***	-0.14***	-0.05***	0.04**	-0.05***	-0.08***	-0.03**	-0.03**	-0.14***	-0.08***	-0.10***				
Leverage$_{it}$	0.25***	0.18***	-0.10***	0.04***	-0.42***	0.11***	0.13***	-0.31***	0.05***	0.08***	0.00	-0.08***	0.11***	0.08***	-0.03*	0.01			
ROA$_{it}$	-0.35***	-0.26***	0.11***	-0.15***	-0.06***	0.16***	0.05***	0.01	0.04***	0.06***	0.02	0.01	0.14***	0.10***	0.03*	-0.23***	0.11***		
Aud_Opinion$_{it}$	0.44***	0.74***	-0.24***	-0.18***	-0.23***	0.03*	0.05***	-0.11***	0.01	0.04***	0.01	-0.05***	0.04***	0.04***	0.00	-0.53***	0.14***	0.22***	

Pease refer to Appendix-1 for variables definition.

5.4 ANALYSIS OF THE ZMIJEWSKI ZFC-SCORE AND THE ALTMAN Z2-SCORE

5.4.1 Two-way table between the Zmijewski ZFC-Score and the Altman Z2-Score

Table 5.4 presents a four-way table analysing the results obtained from the determination of the Zmijewski ZFC-Score and the Altman Z2-Score. From the table, it can be seen that the Zmijewski ZFC-Score returns a total of 2,438 healthy firms and 2,438 distressed firms (as also detailed in section 5.3.1). In contrast, the Altman Z2-Score, for the same firm-year observations, returns a total of 3,315 healthy firms (68%) and 1,561 distressed firms (32%).

Further review of Table 5.4 shows that between the two models, there is an agreeance (whereby both models agree on either a firm-year observation being healthy or distressed) of 79%. From the disagreement of 21%, there is a total of 958 firm-year observations that the Zmijewski's model qualify as distressed which is however qualified as healthy by the Altman's model and a total of 81 firm-year observations that the Zmijewski's model qualify as healthy which the Altman's model does not. This disagreement of 21% can be due to these two proxies measuring different aspect of what is deemed to be distressed though they both aim at measuring the same event (that is a distressed situation) and the oversampling of distressed firms when using the ZFC-Score.

Table 5.4: Two-way table between Zmijewski ZFC-Score and Altman Z2-Score

ZFC_Score	**Z2_Score**				
	0	**%**	**1**	**%**	***Total***
0	2357	48.34	81	1.66	2438
1	958	19.65	1480	30.35	2438
Total	3315	67.99	1561	32.01	4876

5.4.2 Scatter plot between the Zmijewski ZFC-Score and the Altman Z2-Score

Figure 5.1 presents a scatter plot between the two proxies of financial distress namely, the Zmijewski ZFC-Score (ZFC_Score_{it}) and the Altman Z2-Score ($Z2\_Score_{it}$). In order to do so, the continuous value for these variables are used (prior to dichotomising). An examination of the scatter plot reveals a declining line of good-fit between the two variables (which implies that as the value for the ZFC-Score increases, the value for the Z2-Score decreases).

So as to understand the correlation between these two variables, it is first imperative to understand how the raw (continuous values) of these two variables are calculated.

The Zmijewski ZFC-Score is calculated using:

$$ZFC\text{-}Score_{it} = \frac{1}{1+Exp\,(\beta_0 + \beta_1 ROA_{it} + \beta_2 Fin\_Lev_{it} + \beta_3 Liquidity_{it})};$$

ZFC-Score$_{it}$ is the calculated Zmijewski ZFC-Score (1984) for firm *i* at the period *t* year. Using this model, a calculated score of greater or equal to 0.5 is interpreted as a distressed firm. Therefore, a value of one (1) is assigned to firms with a calculated score of greater or equal (>=) to 0.5, otherwise, a value of zero (0) is assigned.

Where:

$\beta 0$ = -4.336; $\beta 1$ = -4.513; $\beta 2$ = 5.679; $\beta 3$ = 0.004;

ROA_{it} = Net Income / Total Asset for firm *i* in the period *t*;

Fin_Lev_{it} = Total Liabilities / Total Assets for firm *i* in the period *t*;

$Liquidity_{it}$ = Current Assets / Current Liabilities for firm *i* in the period *t*.

The Altman Z2-Score is calculated as:

$$Z2\text{-}Score_{it} = \beta 0 + 6.56X1_{it} + 3.26X2_{it} + 6.72X3_{it} + 1.05X4_{it};$$

Z2-Score$_{it}$ is the calculated Altman Z2-Score (1983) for firm *i* at the period *t* year. Using this model, a calculated score of less than 2.6 (cut-off) is interpreted as a distressed firm. Therefore, a value of one (1) is assigned to firms with a calculated score less than 2.6 otherwise, a value of zero (0) is assigned. $\boldsymbol{\beta_0}$ (which equals 3.25) is not applicable since Australia is not considered an emerging market economy.

Where:

$X1_{it}$ = Working Capital/Total Assets for firm *i* in the period *t*;

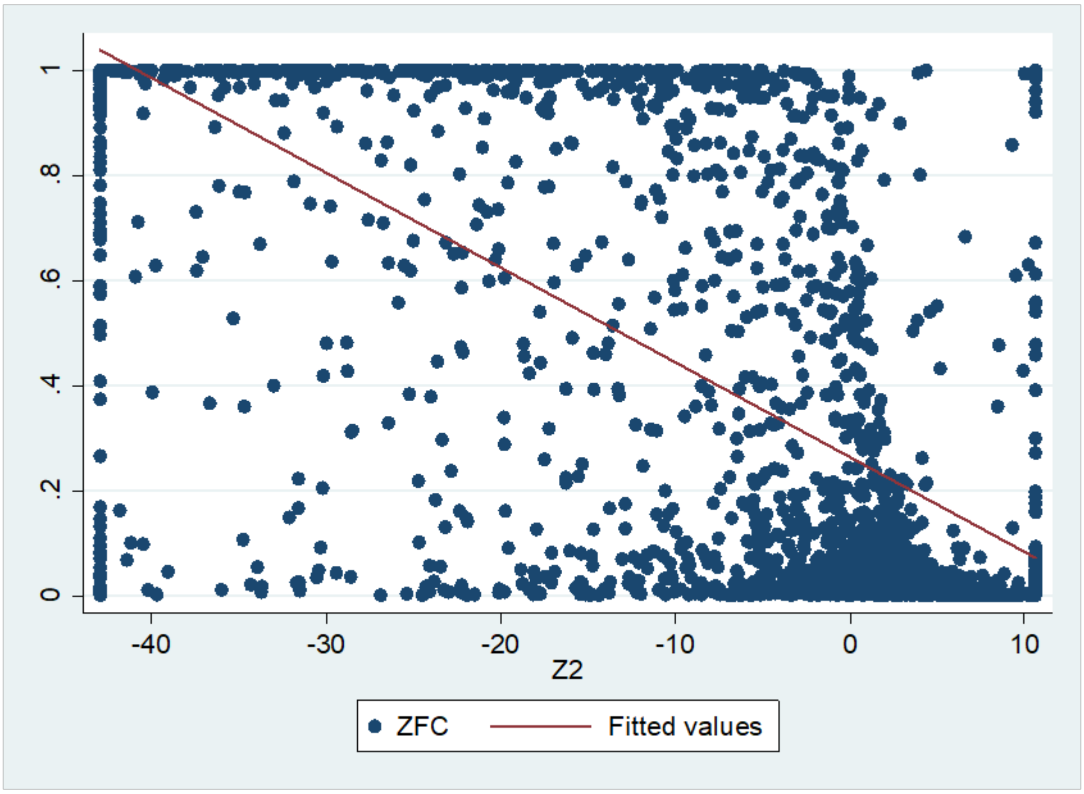
$X2_{it}$ = Retained Earnings/Total Assets for firm *i* in the period *t*;

$X3_{it}$ = EBIT/ Total Assets for firm *i* in the period *t*;

$X4_{it}$ = Equity/Total Liabilities for firm *i* in the period *t*.

From the above calculations, it can be noted that the Altman Z2-Score merely provide a cut-off figure, whereby if the figure obtained is below that cut-off point, a value of 1 is awarded, otherwise a value of 0 is awarded. In comparison, when calculating the Zmijewski ZFC-Score, a probability score is obtained (rather than a cut-off point). This, therefore show that these two models (prior to dichotomising) are providing two different benchmarks to determining distress.

Figure 5.1: Scatter Plot between ZFC-Score and Z2-Score



5.5 SUMMARY OF THE CHAPTER

Chapter Five provides the descriptive statistics for the data examined in this study. Details of the sample selection is provided. An industry breakdown of the final usable sample is provided before a comprehensive review undertaken of the descriptive statistics of variables. Subsequently, results from correlations were reported and discussed. Finally, a scatter-plot and two-way table is provided so as to enhance understanding of the two proxies for financial distressed used in this study, namely the Zmijewski ZFC-Score and the Altman Z2-Score showing that these two proxies for financial distress may be measuring different aspects of financial distress.

CHAPTER SIX:

MULTIVARIATE ANALYSIS – MULTIPLE REGRESSIONS

6.1 OVERVIEW OF THE CHAPTER

Chapter Six examines the main empirical results of this study that aim to answer the research hypotheses. The examination of key auditor attributes is divided into three parts. The first part examines the association of key auditor attributes with the Zmijewski ZFC-Score financial distress model. The second part look into the lagged effect of key auditor attributes (T_{-1}, T_{-2} and T_{-3}) with the Zmijewski ZFC-Score. The third part examines the association of key auditor attributes in unison (composite score) with the Zmijewski ZFC-Score financial distress model. In so doing, the lag effect of the composite auditor attributes (T_{-1}, T_{-2} and T_{-3}) with the Zmijewski ZFC-Score will also be examined. All three analyses are completed for a pooled sample of firm-year observations. Finally, a summary of Chapter Six is presented.

6.2 REGRESSION RESULTS

The subsections in this chapter include the presentation and discussion on the outcomes of the multivariate analyses on key auditor attributes on financial distress proxied by the likelihood of financial distress (a dichotomous variable) calculated using the Zmijewski ZFC-Score model for a pooled sample of firm-year observations (sample size n=4,876) over a period from year 2008 to 2014. As stated in Chapter Four, logistic regression is used since the dependent variable (financial distress) is a dichotomous variable.

6.2.1 Existence of a key auditor attribute impact on financial distress: The Zmijewski Base Model

Table 6.1 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a Big 4 auditor ($Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor ($RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office ($Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor ($Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score (ZFC_{it}) model with no control variables.

6.2.1.1 Independent variables

As shown in column 1 of Table 6.1, the coefficient of the independent variable Big 4 auditor (*Big4$_{it}$*) is reported to be negative and statistically significant (β = -20.096, z-statistics (Wald) = -1.423, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, the use of a Big 4 auditor decreases the likelihood of financial distress with a goodness-of-fit of 6.63% (that is, Pseudo R^2 of 0.0663).

Column 2 of Table 6.1 below shows the coefficient of the independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (*RNon-Audit$_{it}$*) is reported to be negative and statistically significant (β = -24.103, z-statistics (Wald) = -3.801, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, audit firm tenure decreases the likelihood of financial distress with a goodness-of-fit of 12.4% (that is, Pseudo R^2 of 0.124).

Column 3 of Table 6.1 below shows the coefficient of the independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (*Ln_Aud_Ten$_{it}$*) is reported to be negative and statistically significant (β = -23.053, z-statistics (Wald) = -0.703, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, audit firm tenure decreases the likelihood of financial distress with a goodness-of-fit of 8.86% (that is, Pseudo R^2 of 0.0886).

Column 4 of Table 6.1 below shows the coefficient of the independent variable proxying the natural log of the total audit fee paid to the auditor (*Ln_Aud_Fee$_{it}$*) is reported to be positive and statistically significant (β = 5.683, z-statistics (Wald) = 0.174, and $p < 0.01$) though a negative coefficient is expected. This result implies that with the use of no control variable the higher the fee paid to the auditor the higher likelihood of financial distress with a goodness-of-fit of 6.12% (that is, Pseudo R^2 of 0.00612).

Last column 5 of Table 6.1 shows that when all four independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (*Big4$_{it}$* - β = -8.717, z-statistics (Wald) = -0.784, and $p < 0.01$, *RNon-Audit$_{it}$* - β = -17.560, z-statistics (Wald) = -3.607, and $p < 0.01$, *Ln_Aud_Ten$_{it}$* - β = -19.700, z-statistics (Wald) = -0.684 and $p < 0.01$,

$Ln\_Aud\_Fee_{it}$ - β = 4.485, z-statistics (Wald) = 0.163, and $p < 0.01$) and an overall goodness-of-fit of 22.50% (that is, Pseudo R^2 of 0.225) which implies that that unison effect of all four independent variables affect the Zmijewski ZFC-Score by 22.50%. In this case (when all four independent variables are simultaneously regressed) the coefficient and statistical significance are comparable to when each variable is independently regressed.

Table 6.1: Logistic Regression Results - Key Auditor Attributes and Zmijewski ZFC Score – Base Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
$Big4_{it}$	-1.423***				-0.784***
	(-20.096)				(-8.717)
$RNon\text{-}Audit_{it}$		-3.801***			-3.607***
		(-24.103)			(-17.560)
$Ln\_Aud\_Ten_{it}$			-0.703***		-0.684***
			(-23.053)		(-19.700)
$Ln\_Aud\_Fee_{it}$				0.174***	0.163***
				(5.683)	(4.485)
Constant	0.376***	0.926***	0.942***	-2.028***	0.109
	(10.963)	(20.212)	(18.253)	(-5.829)	(0.259)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-3160	-2965	-3084	-2673	-2084
Pseudo_R2	0.0663	0.124	0.0886	0.00612	0.225

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [1]*, Column 2 based on *Equation [2]*, Column 3 based on *Equation [3]*, Column 4 based on *Equation [4]* and Column 5 based on *Equation [5]*.

$$ZFC_{it} = \beta_0 + \beta_1 Big4_{it} + \varepsilon_{it} \quad [1]$$
$$ZFC_{it} = \beta_0 + \beta_1 RNon\text{-}Audit_{it} + \varepsilon_{it} \quad [2]$$
$$ZFC_{it} = \beta_0 + \beta_1 Ln\_Aud\_Ten_{it} + \varepsilon_{it} \quad [3]$$
$$ZFC_{it} = \beta_0 + \beta_1 Ln\_Aud\_Fee_{it} + \varepsilon_{it} \quad [4]$$
$$ZFC_{it} = \beta_0 + \beta_1 Big4_{it} + \beta_2 RNon\text{-}Audit_{it} + \beta_3 Ln\_Aud\_Ten_{it} + \beta_4 Ln\_Aud\_Fee_{it} + \varepsilon_{it} \quad [5]$$

6.2.1.2 Summary

As shown in Table 6.1 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0663, 0.124, 0.0886, 0.00612 and 0.225 respectively. This implies that the independent variables in the regression models explain 6.63%, 12.4%, 8.86%, 6.12% and 22.5% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply three out of the four auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 6.1 using the Zmijewski ZFC-Score model provide support for the hypotheses H_1, H_2, and H_3, showing that big 4 auditor ($Big4_{it}$), provision for non-audit services ($RNon\text{-}Audit_{it}$) and auditor tenure ($Ln\_Aud\_Ten_{it}$) have a statistically significant association with financial distress with all coefficients being negative. However, Table 6.1 using the Zmijewski ZFC-Score model rejects the hypothesis H_4 showing that audit fee ($Ln\_Aud\_Fee_{it}$) has a statistically significant association with financial distress but with a positive coefficient.

6.2.2 Existence of a key auditor attribute impact on financial distress: The Zmijewski Full Model

Table 6.2 below presents the results of binary logistic regressions where the four key auditor attributes used in this study are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables. The discussion of the results from this analysis is split into consideration of the audit quality independent variables and the control variables in the following two subsections.

6.2.2.1 Independent variables

As shown in column 1 of Table 6.2, the coefficient of the independent variable Big 4 auditor ($Big4_{it}$) is reported to be negative and statistically significant (β = -17.040, z-statistics (Wald) = -1.617, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor decreases the likelihood of financial distress with a goodness-of-fit of 34.9% (that is, Pseudo R^2 of 0.349).

Column 2 of Table 6.2 below shows the coefficient of the independent variable proxying for the provision for non-audit services calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor ($RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant (β = -20.261, z-statistics (Wald) = -4.015, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 38.1% (that is, Pseudo R^2 of 0.381).

Column 3 of Table 6.2 below shows the coefficient of the independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office ($Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -

10.679, z-statistics (Wald) = -0.488, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, audit firm tenure decreases the likelihood of financial distress with a goodness-of-fit of 31.7% (that is, Pseudo R^2 of 0.317).

Column 4 of Table 6.2 below shows the coefficient of the independent variable proxying the natural log of the total audit fee paid to the auditor ($Ln\_Aud\_Fee_{it}$) is reported to be negative and statistically significant ($\beta = -4.737$, z-statistics (Wald) = -0.300, and $p < 0.01$). As column 4 of Table 6.2 shows, while the coefficient obtained was a positive one with no control variables (from Table 6.1), with added control variables, the coefficient obtained is now a negative one. This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor decreases the likelihood of financial distress with a goodness-of-fit of 29.4% (that is, Pseudo R^2 of 0.294).

Last column 5 of Table 6.2 shows that when all four independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained ($Big4_{it}$ - $\beta = -7.031$, z-statistics (Wald) = -0.794, and $p < 0.01$, $RNon\text{-}Audit_{it}$ - $\beta = -14.374$, z-statistics (Wald) = -4.039, and $p < 0.01$, $Ln\_Aud\_Ten_{it}$ - $\beta = -7.318$, z-statistics (Wald) = -0.392 and $p < 0.01$, $Ln\_Aud\_Fee_{it}$ - $\beta = -6.223$, z-statistics (Wald) = -0.477, and $p < 0.01$) and an overall goodness-of-fit of 40.3% (that is, Pseudo R^2 of 0.403) which implies that that unison effect of all four independent variables affect the Zmijewski ZFC-Score by 40.3%.

6.2.2.2 Control variables

As shown in column 1 of Table 6.2 below, where the independent variable $Big4_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -3.853$, z-statistics (Wald) = -0.722, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 2.442$, z-statistics (Wald) = 0.459, and $p < 0.05$), $Prop\_Segment\_Sales_{it}$ ($\beta = -4.128$, z-statistics (Wald) = -0.377, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ ($\beta = -8.225$, z-statistics (Wald) = -0.219, and $p < 0.01$), Ln_Age_{it} ($\beta = -6.318$, z-statistics (Wald) = -0.380, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -3.889$, z-statistics (Wald) = -0.159, and $p < 0.01$), $Loss_{it}$ ($\beta = 4.447$, z-statistics (Wald) = 0.389, and $p < 0.01$), $Leverage_{it}$ ($\beta = 8.073$, z-statistics (Wald) = 0.096, and $p < 0.01$), ROA_{it} ($\beta = -10.269$, z-statistics (Wald) = -1.733, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β

= 17.601, z-statistics (Wald) = 2.095, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 6.2) return no statistically significant results when regressed with the independent variable *Big4*$_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 6.2 below, where the independent variable *RNon-Audit*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -4.385, z-statistics (Wald) = -0.865, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 1.726, z-statistics (Wald) = 0.334, and $p < 0.1$), *Prop_Segment_Sales*$_{it}$ (β = -4.907, z-statistics (Wald) = -0.477, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -5.170, z-statistics (Wald) = -0.135, and $p < 0.01$), *Sq_Emp*$_{it}$ (β = 1.868, z-statistics (Wald) = 0.006, and $p < 0.1$), *Ln_Age*$_{it}$ (β = -7.504, z-statistics (Wald) = -0.488, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -3.916, z-statistics (Wald) = -0.179, and $p < 0.01$), *Loss*$_{it}$ (β = -2.810, z-statistics (Wald) = -0.293, and $p < 0.01$), *Leverage*$_{it}$ (β = 10.550, z-statistics (Wald) = 0.109, and $p < 0.01$), *ROA*$_{it}$ (β = -8.108, z-statistics (Wald) = -1.212, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 15.292, z-statistics (Wald) = 2.072, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 6.2) return no statistically significant results when regressed with the independent variable *RNon-Audit*$_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 6.2 below, where the independent variable *Ln_Aud_Ten*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -5.226, z-statistics (Wald) = -0.990, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 1.781, z-statistics (Wald) = 0.322, and $p < 0.1$), *Prop_Segment_Sales*$_{it}$ (β = -6.750, z-statistics (Wald) = -0.567, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -4.778, z-statistics (Wald) = -0.122, and $p < 0.01$), *Sq_Emp*$_{it}$ (β = 1.827, z-statistics (Wald) = 0.006, and $p < 0.1$), *Ln_Age*$_{it}$ (β = -6.682, z-statistics (Wald) = -0.398, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -4.171, z-statistics (Wald) = -0.170, and $p < 0.01$), *Loss*$_{it}$ (β = 5.863, z-statistics (Wald) = 0.502, and $p < 0.01$), *Leverage*$_{it}$ (β = 5.914, z-statistics (Wald) = 0.056, and $p < 0.01$), *ROA*$_{it}$ (β = -10.048, z-statistics (Wald) = -1.517, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 20.727, z-statistics (Wald) = 2.383, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 6.2) return no statistically significant results when regressed with the independent variable *Ln_Aud_Ten*$_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 6.2 below, where the independent variable *Ln_Aud_Fee*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_Segment_Sales*$_{it}$ (β = -5.580, z-statistics (Wald) = -0.537, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -7.795, z-statistics (Wald) = -0.294, and $p < 0.01$), *Sq_Emp*$_{it}$ (β = 1.920, z-statistics (Wald) = 0.006, and $p < 0.1$), *Ln_Age*$_{it}$ (β = -6.955, z-statistics (Wald) = -0.471, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -3.569, z-statistics (Wald) = -0.160, and $p < 0.01$), *Loss*$_{it}$ (β = 4.327, z-statistics (Wald) = 0.406, and $p < 0.01$), *Leverage*$_{it}$ (β = 8.121, z-statistics (Wald) = 0.098, and $p < 0.01$), *ROA*$_{it}$ (β = -7.270, z-statistics (Wald) = -1.233, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 19.090, z-statistics (Wald) = 2.400, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 6.2) return no statistically significant results when regressed with the independent variable *Ln_Aud_Fee*$_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 6.2 below, where the four independent variables *Big4*$_{it}$, *RNon-Audit*$_{it}$, *Ln_Aud_Ten*$_{it}$ and *Ln_Aud_Fee*$_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -5.058, z-statistics (Wald) = -1.093, and $p < 0.01$), *BoD_Financial_Expertise*$_{it}$ (β = 3.752, z-statistics (Wald) = 0.404, and $p < 0.1$), *Prop_Aud_Com_Ind*$_{it}$ (β = 2.794, z-statistics (Wald) = 0.626, and $p < 0.1$), *Prop_Segment_Sales*$_{it}$ (β = -3.498, z-statistics (Wald) = -0.369, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -8.838, z-statistics (Wald) = -0.403, and $p < 0.01$), *Sq_Emp*$_{it}$ (β = 3.294, z-statistics (Wald) = 0.012, and $p < 0.1$), *Ln_Age*$_{it}$ (β = -3.991, z-statistics (Wald) = -0.299, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -3.390, z-statistics (Wald) = -0.170, and $p < 0.01$), *Loss*$_{it}$ (β = -2.655, z-statistics (Wald) = -0.360, and $p < 0.01$), *Leverage*$_{it}$ (β = 6.597, z-statistics (Wald) = 0.078, and $p < 0.01$), *ROA*$_{it}$ (β = -4.955, z-statistics (Wald) = -0.816, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 10.159, z-statistics (Wald) = 1.579, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 6.2) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued given that these variables are also used in the Zmijewski ZFC-Score model, the above regressions were re-run and the control variables $Leverage_{it}$ and ROA_{it} were omitted. The results obtained did not significantly defer to those explained in Table 6.2.

Table 6.2: Logistic Regression Results - Key Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
$Big4_{it}$	-1.617***				-0.794***
	(-17.040)				(-7.031)
$RNon\text{-}Audit_{it}$		-4.015***			-4.039***
		(-20.261)			(-14.374)
$Ln\_Aud\_Ten_{it}$			-0.488***		-0.392***
			(-10.679)		(-7.318)
$Ln\_Aud\_Fee_{it}$				-0.300***	-0.477***
				(-4.737)	(-6.223)
$Prop\_BoD\_Ind_{it}$	-0.722***	-0.865***	-0.990***	-0.292	-1.093***
	(-3.853)	(-4.385)	(-5.226)	(-1.444)	(-5.058)
$BoD\_Financial\_Expertise_{it}$	0.081	-0.094	0.142	-0.071	0.404***
	(0.991)	(-1.127)	(1.632)	(-0.817)	(3.752)
AC_Size_{it}	0.013	0.008	-0.012	0.024	0.011
	(0.597)	(0.351)	(-0.576)	(1.021)	(0.404)
$Prop\_Aud\_Com\_Ind_{it}$	0.459**	0.334*	0.322*	0.171	0.626***
	(2.442)	(1.726)	(1.781)	(0.865)	(2.794)
$Aud\_Com\_Financial\_Expertise_{it}$	-0.075	-0.126	-0.067	-0.008	-0.117
	(-0.856)	(-1.381)	(-0.777)	(-0.089)	(-1.085)
$Prop\_Segment\_Sales_{it}$	-0.377***	-0.477***	-0.567***	-0.537***	-0.369***
	(-4.128)	(-4.907)	(-6.750)	(-5.580)	(-3.498)
$Ln\_Total\_Assets_{it}$	-0.219***	-0.135***	-0.122***	-0.294***	-0.403***
	(-8.225)	(-5.170)	(-4.778)	(-7.795)	(-8.838)
Sq_Emp_{it}	0.004	0.006*	0.006*	0.006*	0.012***
	(1.400)	(1.868)	(1.827)	(1.920)	(3.294)
Ln_Age_{it}	-0.380***	-0.488***	-0.398***	-0.471***	-0.299***
	(-6.318)	(-7.504)	(-6.682)	(-6.955)	(-3.991)
$Earnings\_Quality\_EQ_{it}$	-0.159***	-0.179***	-0.170***	-0.160***	-0.170***
	(-3.889)	(-3.916)	(-4.171)	(-3.569)	(-3.390)
$Loss_{it}$	0.386***	-0.293***	0.502***	0.406***	-0.360***
	(4.447)	(-2.810)	(5.863)	(4.327)	(-2.655)
$Leverage_{it}$	0.096***	0.109***	0.056***	0.098***	0.078***
	(8.073)	(10.550)	(5.914)	(8.121)	(6.597)
ROA_{it}	-1.733***	-1.212***	-1.517***	-1.233***	-0.816***
	(-10.269)	(-8.108)	(-10.048)	(-7.270)	(-4.955)
$Aud\_Opinion_{it}$	2.095***	2.072***	2.383***	2.400***	1.579***
	(17.601)	(15.292)	(20.727)	(19.090)	(10.159)
Constant	-0.920*	1.935***	1.365***	0.382	2.768***
	(-1.825)	(3.715)	(2.895)	(0.691)	(4.355)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-2196	-2089	-2305	-1897	-1603
Pseudo_R2	0.349	0.381	0.317	0.294	0.403

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [6]*, Column 2 based on *Equation [7]*, Column 3 based on *Equation [8]*, Column 4 based on *Equation [9]* and Column 5 based on *Equation [10]*.

$$ZFC_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\varepsilon i_t \quad [6]$$

$$ZFC_{it} = \beta 0+\beta_1 RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\varepsilon i_t \quad [7]$$

$$ZFC_{it} = \beta 0+\beta_1 Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\varepsilon i_t \quad [8]$$

$$ZFC_{it} = \beta 0+\beta_1 Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\varepsilon i_t \quad [9]$$

$$ZFC_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 RNon\_Audit_{it}+\beta_3 Ln\_Aud\_Ten_{it}+\beta_4 Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\varepsilon i_t \quad [10]$$

6.2.2.3 Summary

As shown in Table 6.2 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.349, 0.381, 0.317, 0.294 and 0.403 respectively. This implies that the independent variables and control variables in the regression models explain 34.9%, 38.1%, 31.7%, 29.4% and 40.3% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress and the results are robust to the inclusion of control variables.

In summary, the results from Table 6.2 using the Zmijewski ZFC-Score model provide support for the hypotheses H_1, H_2, H_3, and H_4 showing that big 4 auditor ($Big4_{it}$), the provision for non-audit services ($RNon\text{-}Audit_{it}$), auditor tenure ($Ln\_Aud\_Ten_{it}$) and audit fee ($Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

6.2.3 Existence of a lagged one-year key auditor attribute impact on financial distress in year zero: The Zmijewski Full Model

Table 6.3 below presents the results of binary logistic regressions where the lagged one year (T_{-1}) four key auditor attributes used in this study (are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

6.2.3.1 Independent variables

As shown in column 1 of Table 6.3 below, the coefficient of the lagged one year (T–1) independent variable Big 4 auditor (L.$Big4_{it}$) is reported to be negative and statistically significant (β = -7.064, z-statistics (Wald) = -1.048, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 36.1% (that is, Pseudo R^2 of 0.361).

Column 2 of Table 6.3 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L.$RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant (β = -9.334, z-statistics (Wald) = -2.378, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 37.6% (that is, Pseudo R^2 of 0.376).

Column 3 of Table 6.3 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L.$Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -4.801, z-statistics (Wald) = -0.356, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 35.1% (that is, Pseudo R^2 of 0.351).

Column 4 of Table 6.3 below shows the coefficient of the lagged one year (T–1) independent variable proxying the natural log of the total audit fee paid to the auditor (L.$Ln\_Aud\_Fee_{it}$) is reported to be negative and statistically significant (β = -4.559, z-statistics (Wald) = -0.442, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 33.1% (that is, Pseudo R^2 of 0.331).

Last column 5 of Table 6.3 shows that when all four lagged one year (T–1) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (L.$Big4_{it}$ - $\beta = -3.109$, z-statistics (Wald) = -0.507, and $p < 0.01$, L.$RNon\text{-}Audit_{it}$ - $\beta = -7.642$, z-statistics (Wald) = -2.280, and $p < 0.01$, L.$Ln\_Aud\_Ten_{it}$ - $\beta = -3.876$, z-statistics (Wald) = -0.311 and $p < 0.01$, L.$Ln\_Aud\_Fee_{it}$ - $\beta = -4.761$, z-statistics (Wald) = -0.498, and $p < 0.01$) and an overall goodness-of-fit of 37.8% (that is, Pseudo R^2 of 0.378) which implies that that unison effect of all four independent variables in the year T_{-1} affect the Zmijewski ZFC-Score in the year T_0 by 37.8%.

6.2.3.2 Control variables

As shown in column 1 of Table 6.3 below, where the independent variable L.$Big4_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -2.872$, z-statistics (Wald) = -0.835, and $p < 0.01$), $BoD\_Financial\_Expertise_{it}$ ($\beta = -1.952$, z-statistics (Wald) = -0.257, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 2.061$, z-statistics (Wald) = 0.637, and $p < 0.05$), $Prop\_Segment\_Sales_{it}$ ($\beta = -3.587$, z-statistics (Wald) = -0.534, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ ($\beta = -2.265$, z-statistics (Wald) = -0.103, and $p < 0.05$), Ln_Age_{it} ($\beta = -3.217$, z-statistics (Wald) = -0.307, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -3.712$, z-statistics (Wald) = -0.222, and $p < 0.01$), $Loss_{it}$ ($\beta = 3.219$, z-statistics (Wald) = 0.477, and $p < 0.01$), ROA_{it} ($\beta = -5.919$, z-statistics (Wald) = -2.260, and $p < 0.01$), and $Aud\_Opinion_{it}$ ($\beta = 12.878$, z-statistics (Wald) = 2.771, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 6.3) return no statistically significant results when regressed with the independent variable L.$Big4_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 6.3 below, where the independent variable L.$RNon\text{-}Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -3.077$, z-statistics (Wald) = -0.848, and $p < 0.01$), $BoD\_Financial\_Expertise_{it}$ ($\beta = -2.295$, z-statistics (Wald) = -0.298, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 2.032$, z-statistics (Wald) = 0.622, and $p < 0.05$),

$Prop\_Segment\_Sales_{it}$ (β = -4.267, z-statistics (Wald) = -0.616, and $p < 0.01$), Sq_Emp_{it} (β = 1.757, z-statistics (Wald) = 0.008, and $p < 0.1$), Ln_Age_{it} (β = -3.802, z-statistics (Wald) = -0.365, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -3.575, z-statistics (Wald) = -0.209, and $p < 0.01$), $Loss_{it}$ (β = 2.945, z-statistics (Wald) = 0.431, and $p < 0.01$), ROA_{it} (β = -6.133, z-statistics (Wald) = -2.303, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 13.249, z-statistics (Wald) = 2.892, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 6.3) return no statistically significant results when regressed with the independent variable L.$RNon\text{-}Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 6.3 below, where the independent variable L.$Ln\_Aud\_Ten_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -3.316, z-statistics (Wald) = -0.894, and $p < 0.01$), $BoD\_Financial\_Expertise_{it}$ (β = -1.933, z-statistics (Wald) = -0.250, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 2.061, z-statistics (Wald) = 0.605, and $p < 0.05$), $Prop\_Segment\_Sales_{it}$ (β = -3.936, z-statistics (Wald) = -0.575, and $p < 0.01$), Ln_Age_{it} (β = -3.908, z-statistics (Wald) = -0.365, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -3.604, z-statistics (Wald) = -0.216, and $p < 0.01$), $Loss_{it}$ (β = 3.716, z-statistics (Wald) = 0.546, and $p < 0.01$), ROA_{it} (β = -6.149, z-statistics (Wald) = -2.342, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 13.574, z-statistics (Wald) = 2.971, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 6.3) return no statistically significant results when regressed with the independent variable L.$Ln\_Aud\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 6.3 below, where the independent variable L.$Ln\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -1.906, z-statistics (Wald) = -0.560, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 1.759, z-statistics (Wald) = 0.574, and $p < 0.1$), $Prop\_Segment\_Sales_{it}$ (β = -3.729, z-statistics (Wald) = -0.585, and $p < 0.1$), $Ln\_Total\_Assets_{it}$ (β = -4.054, z-statistics (Wald) = -0.229, and $p < 0.01$), Ln_Age_{it} (β = -2.789, z-statistics (Wald) = -0.271, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -3.469, z-statistics (Wald) = -0.220, and $p < 0.01$), $Loss_{it}$ (β = 2.322, z-statistics (Wald) = 0.365, and $p < 0.05$), ROA_{it} (β = -4.715, z-statistics (Wald) = -1.928, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 12.022, z-statistics (Wald) = 2.670, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 6.3) return no statistically significant results when regressed with the independent variable L.$Ln\_Aud\_Fee_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 6.3 below, where the four independent variables L.$Big4_{it}$, L.$RNon\text{-}Audit_{it}$, L.$Ln\_Aud\_Ten_{it}$ and L.$Ln\_Aud\_Fee_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -2.084, z-statistics (Wald) = -0.624, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 1.761, z-statistics (Wald) = 0.617, and $p < 0.1$), $Prop\_Segment\_Sales_{it}$ (β = -3.446, z-statistics (Wald) = -0.560, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ (β = -4.708, z-statistics (Wald) = -0.286, and $p < 0.01$), Ln_Age_{it} (β = -1.979, z-statistics (Wald) = -0.204, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ (β = -3.395, z-statistics (Wald) = -0.215, and $p < 0.01$), $Loss_{it}$ (β = 2.201, z-statistics (Wald) = -0.367, and $p < 0.05$), ROA_{it} (β = -4.500, z-statistics (Wald) = -1.870, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 11.189, z-statistics (Wald) = 2.575, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 6.3) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued given that these variables are also used in the Zmijewski ZFC-Score model, the above regressions were re-run and the control variables $Leverage_{it}$ and ROA_{it} were omitted. The results obtained did not significantly defer to those explained in Table 6.3.

Table 6.3: Logistic Regression Results – Lagged Key (one year) Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L.*Big4$_{it}$*	-1.048***				-0.507***
	(-7.064)				(-3.109)
L.*RNon-Audit$_{it}$*		-2.378***			-2.280***
		(-9.334)			(-7.642)
L.*Ln_Aud_Ten$_{it}$*			-0.356***		-0.311***
			(-4.801)		(-3.876)
L.*Ln_Aud_Fee$_{it}$*				-0.442***	-0.498***
				(-4.559)	(-4.761)
Prop_BoD_Ind$_{it}$	-0.835***	-0.848***	-0.894***	-0.560*	-0.624**
	(-2.872)	(-3.077)	(-3.316)	(-1.906)	(-2.084)
BoD_Financial_Expertise$_{it}$	-0.257*	-0.298**	-0.250*	-0.176	-0.004
	(-1.952)	(-2.295)	(-1.933)	(-1.278)	(-0.029)
AC_Size$_{it}$	-0.007	-0.021	-0.029	-0.010	0.007
	(-0.202)	(-0.593)	(-0.817)	(-0.255)	(0.168)
Prop_Aud_Com_Ind$_{it}$	0.637**	0.622**	0.605**	0.574*	0.617*
	(2.061)	(2.032)	(2.061)	(1.759)	(1.761)
Aud_Com_Financial_Expertise$_{it}$	-0.041	-0.060	-0.030	0.012	-0.008
	(-0.312)	(-0.454)	(-0.236)	(0.090)	(-0.055)
Prop_Segment_Sales$_{it}$	-0.534***	-0.616***	-0.575***	-0.585***	-0.560***
	(-3.587)	(-4.267)	(-3.936)	(-3.729)	(-3.446)
Ln_Total_Assets$_{it}$	-0.103**	-0.025	-0.000	-0.229***	-0.286***
	(-2.265)	(-0.590)	(-0.005)	(-4.054)	(-4.708)
Sq_Emp$_{it}$	0.007	0.008*	0.007	0.007	0.008
	(1.522)	(1.757)	(1.505)	(1.495)	(1.548)
Ln_Age$_{it}$	-0.307***	-0.365***	-0.365***	-0.271***	-0.204**
	(-3.217)	(-3.802)	(-3.908)	(-2.789)	(-1.979)
Earnings_Quality_EQ$_{it}$	-0.222***	-0.209***	-0.216***	-0.220***	-0.215***
	(-3.712)	(-3.575)	(-3.604)	(-3.469)	(-3.395)
Loss$_{it}$	0.477***	0.431***	0.546***	0.365**	0.367**
	(3.219)	(2.945)	(3.717)	(2.322)	(2.201)
Leverage$_{it}$	0.017	0.013	0.011	0.008	0.002
	(1.165)	(1.032)	(0.803)	(0.603)	(0.116)
ROA$_{it}$	-2.260***	-2.303***	-2.342***	-1.928***	-1.870***
	(-5.919)	(-6.133)	(-6.149)	(-4.715)	(-4.500)
Aud_Opinion$_{it}$	2.771***	2.892***	2.971***	2.670***	2.575***
	(12.878)	(13.249)	(13.574)	(12.022)	(11.189)
Constant	1.463	3.438***	3.523***	3.561***	4.000***
	(1.613)	(4.021)	(4.123)	(3.733)	(3.742)
Observations	2,082	2,082	2,082	2,082	2,082
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-895.1	-874.6	-909.8	-781.6	-725.8
Pseudo_R2	0.361	0.376	0.351	0.331	0.378

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [11]*, Column 2 based on *Equation [12]*, Column 3 based on *Equation [13]*, Column 4 based on *Equation [14]* and Column 5 based on *Equation [15]*.

$$ZFC_{it} = \beta0+\beta_1 L.Big4it+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [11]$$

$$ZFC_{it} = \beta0+\beta_1 L.RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [12]$$

$$ZFC_{it} = \beta0+\beta_1 L.Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [13]$$

$$ZFC_{it} = \beta0+\beta_1 L.Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [14]$$

$$ZFC_{it} = \beta0+\beta_1 L.Big4_{it}+\beta_2 L.RNon\_Audit_{it}+\beta_3 L.Ln\_Aud\_Ten_{it}+\beta_4 L.Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+ \beta_{18} Aud\_Opinion_{it}+ \beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [15]$$

6.2.3.3 Summary

As shown in Table 6.3 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.361, 0.379, 0.351, 0.331 and 0.378 respectively. This implies that the lagged independent variables in the regression models explain 36.1%, 37.9%, 35.1%, 33.1% and 37.8% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -1) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 6.3 using the Zmijewski ZFC-Score model provide support for the hypotheses H_{5a}, H_{6a}, H_{7a}, and H_{8a} showing that lagged (T –1) big 4 auditor (L.$Big4_{it}$), lagged (T –1) the provision for non-audit services (L.$RNon\text{-}Audit_{it}$), lagged (T –1) auditor tenure (L.$Ln\_Aud\_Ten_{it}$) and lagged (T –1) audit fee (L.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

6.2.4 Existence of a lagged two-years key auditor attribute impact on financial distress in year zero: The Zmijewski Full Model

Table 6.4 below presents the results of binary logistic regressions where the lagged two-years (T_{-2}) four key auditor attributes used in this study (the existence of a Big 4 auditor (L2.$Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L2.$RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office (L2.$Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor (L2.$Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

6.2.4.1 Independent variables

As shown in column 1 of Table 6.4 below, the coefficient of the lagged two years (T–2) independent variable Big 4 auditor (L2.$Big4_{it}$) is reported to be negative and statistically significant (β = -5.092, z-statistics (Wald) = -1.002, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 40.9% (that is, Pseudo R^2 of 0.409).

Column 2 of Table 6.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L2.$RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant (β = -6.426, z-statistics (Wald) = -2.315, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 42.3% (that is, Pseudo R^2 of 0.423).

Column 3 of Table 6.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L2.$Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -2.421, z-statistics (Wald) = -0.240, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 39.7% (that is, Pseudo R^2 of 0.397).

Column 4 of Table 6.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying the natural log of the total audit fee paid to the auditor (L2.*Ln_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -3.922, z-statistics (Wald) = -0.502, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 39.0% (that is, Pseudo R^2 of 0.390).

Last column 5 of Table 6.4 shows that when all four lagged two years (T–2) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (L2.*Big4*$_{it}$ - β = -2.796, z-statistics (Wald) = -0.5614, and $p < 0.01$, L2.*RNon-Audit*$_{it}$ - β = -6.613, z-statistics (Wald) = -2.632, and $p < 0.01$, L2.*Ln_Aud_Fee*$_{it}$ - β = -3.963, z-statistics (Wald) = -0.564, and $p < 0.01$) and an overall goodness-of-fit of 43.6% (that is, Pseudo R^2 of 0.436) which implies that that unison effect of three of the four independent variables (namely L2.*Big4*$_{it}$, L2.*RNon-Audit*$_{it}$ and L2.*Ln_Aud_Fee*$_{it}$ in the year T_{-2} affect the Zmijewski ZFC-Score in the year T_0 by 43.6%. Column 5 of Table 6.4 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L2.*Ln_Aud_Ten*$_{it}$ - β = -0.448, z-statistics (Wald) = -0.050 and $p > 0.1$).

6.2.4.2 Control variables

As shown in column 1 of Table 6.4 below, where the independent variable L2.*Big4*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -1.932, z-statistics (Wald) = -0.775, and $p < 0.1$), *Prop_Segment_Sales*$_{it}$ (β = -3.069, z-statistics (Wald) = -0.568, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -3.082, z-statistics (Wald) = -0.424, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -3.612, z-statistics (Wald) = -0.279, and $p < 0.01$), *Loss*$_{it}$ (β = 4.521, z-statistics (Wald) = 1.006, and $p < 0.01$), *Leverage*$_{it}$ (β = 2.793, z-statistics (Wald) = 0.043, and $p < 0.01$), *ROA*$_{it}$ (β = -5.611, z-statistics (Wald) = -2.813, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 10.353, z-statistics (Wald) = 3.459, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 6.4) return no statistically significant results when regressed with the independent variable L2.*Big4*$_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 6.4 below, where the independent variable L2.$RNon\text{-}Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_Segment\_Sales_{it}$ (β = -3.183, z-statistics (Wald) = -0.596, and $p < 0.01$), Ln_Age_{it} (β = -3.160, z-statistics (Wald) = -0.447, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -3.513, z-statistics (Wald) = -0.279, and $p < 0.01$), $Loss_{it}$ (β = 4.109, z-statistics (Wald) = 0.922, and $p < 0.01$), $Leverage_{it}$ (β = 2.704, z-statistics (Wald) = 0.039, and $p < 0.01$), ROA_{it} (β = -5.614, z-statistics (Wald) = -2.823, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 10.691, z-statistics (Wald) = 3.573, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 6.4) return no statistically significant results when regressed with the independent variable L2.$RNon\text{-}Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 6.4 below, where the independent variable L2.$Ln\_Aud\_Ten_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -1.809, z-statistics (Wald) = -0.688, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 1.736, z-statistics (Wald) = 0.709, and $p < 0.1$), $Prop\_Segment\_Sales_{it}$ (β = -3.063, z-statistics (Wald) = -0.569, and $p < 0.01$), Ln_Age_{it} (β = -23.330, z-statistics (Wald) = -0.447 and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -3.575, z-statistics (Wald) = -0.287, and $p < 0.01$), $Loss_{it}$ (β = 4.715, z-statistics (Wald) = 1.027, and $p < 0.01$), $Leverage_{it}$ (β = 2.414, z-statistics (Wald) = 0.039, and $p < 0.05$), ROA_{it} (β = -5.768, z-statistics (Wald) = -2.876, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 10.767, z-statistics (Wald) = 23.697, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 6.4) return no statistically significant results when regressed with the independent variable L2.$Ln\_Aud\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 6.4 below, where the independent variable L2.$Ln\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables AC_Size_{it} (β = -1.649, z-statistics (Wald) = -0.088, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 2.114, z-statistics (Wald) = 0.890, and $p < 0.05$), $Prop\_Segment\_Sales_{it}$ (β = -2.228, z-statistics (Wald) = -0.435, and $p < 0.05$), $Ln\_Total\_Assets_{it}$ (β = -1.827, z-statistics (Wald) = -0.119, and $p < 0.1$), Ln_Age_{it} (β =

-2.227, z-statistics (Wald) = -0.316, and $p < 0.05$), *Earnings_Quality_EQ*$_{it}$ (β = -3.771, z-statistics (Wald) = -0.311, and $p < 0.01$), *Loss*$_{it}$ (β = 3.788, z-statistics (Wald) = 0.893, and $p < 0.01$), *Leverage*$_{it}$ (β = 2.663, z-statistics (Wald) = 0.042, and $p < 0.01$), *ROA*$_{it}$ (β = -5.018, z-statistics (Wald) = -2.730, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 9.468, z-statistics (Wald) = 3.309, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 6.4) return no statistically significant results when regressed with the independent variable L2.*Ln_Aud_Fee*$_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 6.4 below, where the four independent variables L2.*Big4*$_{it}$, L2.*RNon-Audit*$_{it}$, L2.*Ln_Aud_Ten*$_{it}$ and L2.*Ln_Aud_Fee*$_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_Segment_Sales*$_{it}$ (β = -2.407, z-statistics (Wald) = -0.493, and $p < 0.05$), *Ln_Total_Assets*$_{it}$ (β = -2.670, z-statistics (Wald) = -0.190, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -3.659, z-statistics (Wald) = -0.300, and $p < 0.01$), *Loss*$_{it}$ (β = 3.075, z-statistics (Wald) = -0.785, and $p < 0.01$), *Leverage*$_{it}$ (β = 2.700, z-statistics (Wald) = 0.039, and $p < 0.01$), *ROA*$_{it}$ (β = -4.708, z-statistics (Wald) = -2.615, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 8.611, z-statistics (Wald) = 3.097, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 6.4) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Since the inclusions of variables representing financial leverage *Leverage*$_{it}$ and return on assets *ROA*$_{it}$ can be argued given that these variables are also used in the Zmijewski ZFC-Score model, the above regressions were re-run and the control variables *Leverage*$_{it}$ and *ROA*$_{it}$ were omitted. The results obtained did not significantly defer to those explained in Table 6.4.

Table 6.4: Logistic Regression Results – Lagged (two years) Key Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L2.*$Big4_{it}$*	-1.002***				-0.614***
	(-5.092)				(-2.796)
L2.*$RNon\text{-}Audit_{it}$*		-2.315***			-2.632***
		(-6.426)			(-6.613)
L2.*$Ln\_Aud\_Ten_{it}$*			-0.240**		-0.050
			(-2.421)		(-0.448)
L2.*$Ln\_Aud\_Fee_{it}$*				-0.502***	-0.564***
				(-3.922)	(-3.963)
$Prop\_BoD\_Ind_{it}$	-0.775*	-0.620	-0.688*	-0.408	-0.392
	(-1.932)	(-1.520)	(-1.809)	(-1.018)	(-0.924)
$BoD\_Financial\_Expertise_{it}$	-0.139	-0.159	-0.166	-0.155	-0.044
	(-0.816)	(-0.923)	(-0.986)	(-0.877)	(-0.234)
AC_Size_{it}	-0.047	-0.063	-0.067	-0.088*	-0.078
	(-0.967)	(-1.286)	(-1.409)	(-1.649)	(-1.334)
$Prop\_Aud\_Com\_Ind_{it}$	0.682	0.708	0.709*	0.890**	0.783
	(1.579)	(1.588)	(1.736)	(2.114)	(1.595)
$Aud\_Com\_Financial\_Expertise_{it}$	-0.069	0.020	-0.006	0.066	0.104
	(-0.378)	(0.107)	(-0.034)	(0.348)	(0.495)
$Prop\_Segment\_Sales_{it}$	-0.568***	-0.596***	-0.569***	-0.435**	-0.493**
	(-3.069)	(-3.183)	(-3.063)	(-2.228)	(-2.407)
$Ln\_Total\_Assets_{it}$	-0.007	-0.061	-0.061	-0.119*	-0.190***
	(-0.131)	(-1.121)	(-1.150)	(-1.827)	(-2.670)
Sq_Emp_{it}	-0.000	0.006	0.001	0.002	0.008
	(-0.034)	(0.721)	(0.095)	(0.316)	(0.949)
Ln_Age_{it}	-0.424***	-0.447***	-0.447***	-0.316**	-0.203
	(-3.082)	(-3.160)	(-3.330)	(-2.227)	(-1.333)
$Earnings\_Quality\_EQ_{it}$	-0.279***	-0.279***	-0.287***	-0.311***	-0.300***
	(-3.612)	(-3.513)	(-3.575)	(-3.771)	(-3.659)
$Loss_{it}$	1.006***	0.922***	1.027***	0.893***	0.785***
	(4.521)	(4.109)	(4.715)	(3.788)	(3.075)
$Leverage_{it}$	0.043***	0.039***	0.039**	0.042***	0.039***
	(2.793)	(2.704)	(2.414)	(2.663)	(2.700)
ROA_{it}	-2.813***	-2.823***	-2.876***	-2.730***	-2.615***
	(-5.611)	(-5.614)	(-5.768)	(-5.018)	(-4.708)
$Aud\_Opinion_{it}$	3.459***	3.573***	3.697***	3.309***	3.097***
	(10.353)	(10.691)	(10.767)	(9.468)	(8.611)
Constant	3.047***	4.388***	4.133***	5.662***	5.688***
	(2.621)	(3.769)	(3.708)	(4.157)	(3.925)
Observations	1,172	1,172	1,172	1,172	1,172
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-478.9	-467.7	-488.4	-439.5	-406.2
Pseudo_R2	0.409	0.423	0.397	0.390	0.436

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [16]*, Column 2 based on *Equation [17]*, Column 3 based on *Equation [18]*, Column 4 based on *Equation [19]* and Column 5 based on *Equation [20]*.

$$ZFC_{it} = \beta 0+\beta_1 L2.Big4_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [16]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [17]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [18]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [19]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Big4_{it}+\beta_2 L2.RNon\_Audit_{it}+\beta_3 L2.Ln\_Aud\_Ten_{it}+\beta_4 L2.Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+ \beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [20]$$

6.2.4.3 Summary

As shown in Table 6.4 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.409, 0.423, 0.397, 0.390 and 0.436 respectively. This implies that the lagged independent variables in the regression models explain 40.9%, 42.3%, 39.7%, 39.0% and 43.6% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -2) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 6.4 using the Zmijewski ZFC-Score model provide support for the hypotheses H_{5b}, H_{6b}, H_{7b}, and H_{8b} showing that lagged (T – 2) big 4 auditor (L2.$Big4_{it}$), lagged (T – 2) the provision for non-audit services (L2.$RNon\text{-}Audit_{it}$), lagged (T – 2) auditor tenure (L2.$Ln\_Aud\_Ten_{it}$) and lagged (T – 2) audit fee (L2.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

6.2.5 Existence of a lagged three-years key auditor attribute impact on financial distress in year zero: The Zmijewski Full Model

Table 6.5 below presents the results of binary logistic regressions where the lagged three-years (T_{-3}) four key auditor attributes used in this study (the existence of a Big 4 auditor (L3.$Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L3.$RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office (L3.$Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor (L3.$Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

6.2.5.1 Independent variables

As shown in column 1 of Table 6.5 below, the coefficient of the lagged three years (T–3) independent variable Big 4 auditor (L3.$Big4_{it}$) is reported to be negative and statistically significant ($\beta = -3.892$, z-statistics (Wald) = -0.829, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 35.3% (that is, Pseudo R^2 of 0.353).

Column 2 of Table 6.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L3.$RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant ($\beta = -4.769$, z-statistics (Wald) = -1.694, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 36.0% (that is, Pseudo R^2 of 0.360).

Column 3 of Table 6.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L3.$Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant ($\beta = -1.763$, z-statistics (Wald) = -0.179, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 34.4% (that is, Pseudo R^2 of 0.344).

Column 4 of Table 6.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying the natural log of the total audit fee paid to the auditor (L3.*Ln_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -3.471, z-statistics (Wald) = -0.453, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 33.4% (that is, Pseudo R^2 of 0.334).

Last column 5 of Table 6.5 shows that when all four lagged three years (T–3) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (L3.*Big4*$_{it}$ - β = -1.851, z-statistics (Wald) = -0.431, and $p < 0.1$, L3.*RNon-Audit*$_{it}$ - β = -4.395, z-statistics (Wald) = -1.733, and $p < 0.01$, L3.*Ln_Aud_Fee*$_{it}$ - β = -3.302, z-statistics (Wald) = -0.446, and $p < 0.01$) and an overall goodness-of-fit of 36.0% (that is, Pseudo R^2 of 0.360) which implies that that unison effect of three of the four independent variables (namely L3.*Big4*$_{it}$, L3.*RNon-Audit*$_{it}$ and L3.*Ln_Aud_Fee*$_{it}$ in the year T_{-3} affect the Zmijewski ZFC-Score in the year T_0 by 36.0%. Column 5 of Table 6.5 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L3.*Ln_Aud_Ten*$_{it}$ - β = -0.639, z-statistics (Wald) = -0.070 and $p > 0.1$). This is consistent with Table 6.4 when a lag of two-years was used.

6.2.5.2 Control variables

As shown in column 1 of Table 6.5 below, where the independent variable L3.*Big4*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -3.416, z-statistics (Wald) = -1.400, and $p < 0.01$), *Bod_Financial_Expertise*$_{it}$ (β = -1.859, z-statistics (Wald) = -0.356, and $p < 0.1$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.555, z-statistics (Wald) = 1.555, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -1.962, z-statistics (Wald) = -0.299, and $p < 0.05$), *Earnings_Quality_EQ*$_{it}$ (β = -2.666, z-statistics (Wald) = -0.217, and $p < 0.01$), *Loss*$_{it}$ (β = 2.940, z-statistics (Wald) = 0.670, and $p < 0.01$), *Leverage*$_{it}$ (β = 3.329, z-statistics (Wald) = 0.063, and $p < 0.01$), *ROA*$_{it}$ (β = -3.950, z-statistics (Wald) = -2.274, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 9.160, z-statistics (Wald) = 3.002, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 6.5) return no

statistically significant results when regressed with the independent variable L3.$Big4_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 6.5 below, where the independent variable L3.$RNon\text{-}Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -3.354, z-statistics (Wald) = -1.349, and $p < 0.01$), $Bod\_Financial\_Expertise_{it}$ (β = -1.884, z-statistics (Wald) = -0.367, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 3.576, z-statistics (Wald) = 1.609, and $p < 0.01$), Ln_Age_{it} (β = -2.198, z-statistics (Wald) = -0.342, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ (β = -2.461, z-statistics (Wald) = -0.214, and $p < 0.05$), $Loss_{it}$ (β = 2.593, z-statistics (Wald) = 0.597, and $p < 0.01$), $Leverage_{it}$ (β = 3.659, z-statistics (Wald) = 0.063, and $p < 0.01$), ROA_{it} (β = -4.001, z-statistics (Wald) = -2.289, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 9.191, z-statistics (Wald) = 2.996, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 6.5) return no statistically significant results when regressed with the independent variable L3.$RNon\text{-}Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 6.5 below, where the independent variable L3.$Ln\_Aud\_Ten_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -3.262, z-statistics (Wald) = -1.303, and $p < 0.01$), $Bod\_Financial\_Expertise_{it}$ (β = -1.944, z-statistics (Wald) = -0.372, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 3.537, z-statistics (Wald) = 1.498, and $p < 0.01$), Ln_Age_{it} (β = -2.219, z-statistics (Wald) = -0.335, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ (β = -2.686, z-statistics (Wald) = -0.224, and $p < 0.01$), $Loss_{it}$ (β = 2.922, z-statistics (Wald) = 0.652, and $p < 0.01$), $Leverage_{it}$ (β = 3.046, z-statistics (Wald) = 0.057, and $p < 0.01$), ROA_{it} (β = -4.045, z-statistics (Wald) = -2.317, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 9.405, z-statistics (Wald) = 3.117, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 6.5) return no statistically significant results when regressed with the independent variable L3.$Ln\_Aud\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 6.5 below, where the independent variable L3.$Ln\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.574, z-statistics (Wald) = -1.083, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.371, z-statistics (Wald) = 1.488, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.674, z-statistics (Wald) = -0.219, and $p < 0.01$), *Loss*$_{it}$ (β = 2.286, z-statistics (Wald) = 0.549, and $p < 0.05$), *Leverage*$_{it}$ (β = 2.972, z-statistics (Wald) = 0.058, and $p < 0.01$), *ROA*$_{it}$ (β = -3.560, z-statistics (Wald) = -2.178, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 8.325, z-statistics (Wald) = 2.762, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 6.5) return no statistically significant results when regressed with the independent variable L3.*Ln_Aud_Fee*$_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 6.5 below, where the four independent variables L3.*Big4*$_{it}$, L3.*RNon-Audit*$_{it}$, L3.*Ln_Aud_Ten*$_{it}$ and L3.*Ln_Aud_Fee*$_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.924, z-statistics (Wald) = -1.267, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.338, z-statistics (Wald) = 1.582, and $p < 0.01$), *Aud_Com_Financial_Expertise* (β = -1.870, z-statistics (Wald) = -0.397, and $p < 0.1$), *Earnings_Quality_EQ*$_{it}$ (β = -2.396, z-statistics (Wald) = -0.208, and $p < 0.05$), *Loss*$_{it}$ (β = 2.035, z-statistics (Wald) = 0.514, and $p < 0.05$), *Leverage*$_{it}$ (β = 3.200, z-statistics (Wald) = 0.058, and $p < 0.01$), *ROA*$_{it}$ (β = -3.428, z-statistics (Wald) = -2.097, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 7.717, z-statistics (Wald) = 2.608, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 6.5) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Since the inclusions of variables representing financial leverage *Leverage*$_{it}$ and return on assets *ROA*$_{it}$ can be argued given these variables are also used in the Zmijewski ZFC-Score model, the above regressions were re-run and the control variables *Leverage*$_{it}$ and *ROA*$_{it}$ were omitted. The results obtained did not significantly defer to those explained in Table 6.5.

Table 6.5: Logistic Regression Results – Lagged (three years) Key Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L3.*Big4*$_{it}$	-0.829***				-0.431*
	(-3.892)				(-1.851)
L3.*RNon-Audit*$_{it}$		-1.694***			-1.733***
		(-4.769)			(-4.395)
L3.*Ln_Aud_Ten*$_{it}$			-0.179*		-0.070
			(-1.763)		(-0.639)
L3.*Ln_Aud_Fee*$_{it}$				-0.453***	-0.446***
				(-3.471)	(-3.302)
Prop_BoD_Ind$_{it}$	-1.400***	-1.349***	-1.303***	-1.083**	-1.267***
	(-3.416)	(-3.354)	(-3.262)	(-2.574)	(-2.924)
BoD_Financial_Expertise$_{it}$	-0.356*	-0.367*	-0.372*	-0.249	-0.170
	(-1.859)	(-1.884)	(-1.944)	(-1.287)	(-0.838)
AC_Size$_{it}$	-0.055	-0.066	-0.066	-0.040	-0.037
	(-1.180)	(-1.377)	(-1.419)	(-0.812)	(-0.743)
Prop_Aud_Com_Ind$_{it}$	1.555***	1.609***	1.498***	1.488***	1.582***
	(3.555)	(3.576)	(3.537)	(3.371)	(3.338)
Aud_Com_Financial_Expertise$_{it}$	-0.299	-0.272	-0.275	-0.324	-0.397*
	(-1.555)	(-1.394)	(-1.451)	(-1.599)	(-1.870)
Prop_Segment_Sales$_{it}$	-0.077	-0.130	-0.123	-0.106	-0.117
	(-0.382)	(-0.637)	(-0.601)	(-0.515)	(-0.548)
Ln_Total_Assets$_{it}$	-0.050	-0.100	-0.096	-0.052	-0.076
	(-0.803)	(-1.618)	(-1.591)	(-0.743)	(-1.049)
Sq_Emp$_{it}$	-0.011	-0.010	-0.010	-0.010	-0.009
	(-1.429)	(-1.288)	(-1.302)	(-1.223)	(-1.103)
Ln_Age$_{it}$	-0.299**	-0.342**	-0.335**	-0.219	-0.166
	(-1.962)	(-2.198)	(-2.219)	(-1.395)	(-0.995)
Earnings_Quality_EQ$_{it}$	-0.217***	-0.214**	-0.224***	-0.219***	-0.208**
	(-2.666)	(-2.461)	(-2.686)	(-2.674)	(-2.396)
Loss$_{it}$	0.670***	0.597***	0.652***	0.549**	0.514**
	(2.940)	(2.593)	(2.922)	(2.286)	(2.035)
Leverage$_{it}$	0.063***	0.063***	0.057***	0.058***	0.058***
	(3.329)	(3.659)	(3.046)	(2.972)	(3.200)
ROA$_{it}$	-2.274***	-2.289***	-2.317***	-2.178***	-2.097***
	(-3.950)	(-4.001)	(-4.045)	(-3.560)	(-3.428)
Aud_Opinion$_{it}$	3.002***	2.996***	3.117***	2.762***	2.608***
	(9.160)	(9.191)	(9.405)	(8.325)	(7.717)
Constant	4.260***	5.519***	5.056***	6.804***	6.999***
	(3.293)	(4.303)	(4.015)	(4.504)	(4.410)
Observations	948	948	948	948	948
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-422.7	-417.8	-428.4	-392.2	-377.2
Pseudo_R2	0.353	0.360	0.344	0.334	0.360

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [21]*, Column 2 based on *Equation [22]*, Column 3 based on *Equation [23]*, Column 4 based on *Equation [24]* and Column 5 based on *Equation [25]*.

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.Big4it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [21]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [22]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [23]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [24]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L3.}Big4_{it}+\beta_2 \mathrm{L3.}RNon\_Audit_{it}+\beta_3 \mathrm{L3.}Ln\_Aud\_Ten_{it}+\beta_4 \mathrm{L3.}Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [25]$$

6.2.5.3 Summary

As shown in Table 6.5 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.353, 0.360, 0.344, 0.334 and 0.360 respectively. This implies that the lagged independent variables in the regression models explain 35.3%, 36.0%, 34.4%, 33.4% and 36.0% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -3) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 6.5 using the Zmijewski ZFC-Score model provide support for the hypotheses H_{5c}, H_{6c}, H_{7c}, and H_{8c} showing that lagged (T – 3) big 4 auditor (L3.$Big4_{it}$), lagged (T – 3) the provision for non-audit services (L3.$RNon\text{-}Audit_{it}$), lagged (T – 3) auditor tenure (L3.$Ln\_Aud\_Ten_{it}$) and lagged (T – 3) audit fee (L3.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

6.2.6 Existence of a composite key auditor attribute and lagged (one, two and three years) composite key auditor attribute impact on financial distress in year zero: The Zmijewski Full Model

Table 6.6 below presents the results of binary logistic regressions where the composite score (AQ_{it}) and lagged (one, two, and three years) composite score (L.AQ_{it}, L2.AQ_{it}, and L3.AQ_{it} respectively) of the four key auditor attributes used in this study calculated as $\sum$ ($Big4_{it}$, $RNon\text{-}Audit_{it}$, $Ln\_Aud\_Ten_{it}$ and $Ln\_Aud\_Fee_{it}$) is (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

6.2.6.1 Independent variables

As shown in column 1 of Table 6.6 below, the coefficient of the independent variable composite auditor attributes (AQ_{it}) is reported to be negative and statistically significant (β = -21.348, z-statistics (Wald) = -1.409, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a composite auditor attributes decreases the likelihood of financial distress with a goodness-of-fit of 49.7% (that is, Pseudo R^2 of 0.497).

Column 2 of Table 6.6 below shows the coefficient of the independent variable lagged one-year (T_{-1}) composite auditor attributes (L.AQ_{it}) is reported to be negative and statistically significant (β = -12.697, z-statistics (Wald) = -0.831, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 40.9% (that is, Pseudo R^2 of 0.409).

Column 3 of Table 6.6 below shows the coefficient of the independent variable lagged two-years (T_{-2}) composite auditor attributes (L2.AQ_{it}) is reported to be negative and statistically significant (β = -8.463, z-statistics (Wald) = -0.711, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 44.3% (that is, Pseudo R^2 of 0.443).

Last, column 4 of Table 6.6 below shows the coefficient of the independent variable lagged three-years (T_{-3}) composite auditor attributes (L3.AQ_{it}) is reported to be negative and statistically significant (β = -6.247, z-statistics (Wald) = -0.522, and

$p < 0.01$). This result is as expected and implies that with the use of added control variables, with added control variables, an increase in the in the composite auditor attributes in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 37.2% (that is, Pseudo R^2 of 0.372).

6.2.6.2 Control variables

As shown in column 1 of Table 6.6 below, where the independent variable AQ_{it} is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -5.391$, z-statistics (Wald) = -1.270, and $p < 0.01$), $Bod\_Financial\_Expertise_{it}$ ($\beta = 2.185$, z-statistics (Wald) = 0.258, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 3.111$, z-statistics (Wald) = 0.767, and $p < 0.01$), $Aud\_Com\_Financial\_Expertise_{it}$ ($\beta = -1.955$, z-statistics (Wald) = -0.227, and $p < 0.1$), $Prop\_Segment\_Sales_{it}$ ($\beta = -4.125$, z-statistics (Wald) = -0.496, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ ($\beta = -7.580$, z-statistics (Wald) = -0.305, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -3.469$, z-statistics (Wald) = -0.162, and $p < 0.01$), $Loss_{it}$ ($\beta = 2.307$, z-statistics (Wald) = 0.301, and $p < 0.05$), ROA_{it} ($\beta = -8.053$, z-statistics (Wald) = -2.552, and $p < 0.01$), and $Aud\_Opinion_{it}$ ($\beta = 15.173$, z-statistics (Wald) = 2.698, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 6.6) return no statistically significant results when regressed with the independent variable AQ_{it} against the Zmijewski ZFC-Score.

From column 2 of Table 6.6 below, where the independent variable L.AQ_{it} is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -2.918$, z-statistics (Wald) = -0.830, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 2.322$, z-statistics (Wald) = 0.717, and $p < 0.05$), $Prop\_Segment\_Sales_{it}$ ($\beta = -4.054$, z-statistics (Wald) = -0.612, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ ($\beta = -4.217$, z-statistics (Wald) = -0.187, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -3.354$, z-statistics (Wald) = -0.196, and $p < 0.01$), $Loss_{it}$ ($\beta = 3.269$, z-statistics (Wald) = 0.505, and $p < 0.01$), ROA_{it} ($\beta = -5.810$, z-statistics (Wald) = -2.325, and $p < 0.01$), and $Aud\_Opinion_{it}$ ($\beta = 12.990$, z-statistics (Wald) = 2.840, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 6.6) return no statistically significant results when regressed with the independent variable L.AQ_{it} against the Zmijewski ZFC-Score.

As shown in column 3 of Table 6.6 below, where the independent variable L2.AQ_{it} is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -1.814$, z-statistics (Wald) = -0.727, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 1.844$, z-statistics (Wald) = 0.817, and $p < 0.1$), $Prop\_Segment\_Sales_{it}$ ($\beta = -3.668$, z-statistics (Wald) = -0.706, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -3.678$, z-statistics (Wald) = -0.272, and $p < 0.01$), $Loss_{it}$ ($\beta = 4.488$, z-statistics (Wald) = 1.024, and $p < 0.01$), $Leverage_{it}$ ($\beta = 1.870$, z-statistics (Wald) = 0.032, and $p < 0.1$), ROA_{it} ($\beta = -5.437$, z-statistics (Wald) = -2.915, and $p < 0.01$), and $Aud\_Opinion_{it}$ ($\beta = 10.386$, z-statistics (Wald) = 3.504, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 6.6) return no statistically significant results when regressed with the independent variable L2.AQ_{it} against the Zmijewski ZFC-Score.

From column 4 of Table 6.6 below, where the independent variable L3.AQ_{it} is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -3.423$, z-statistics (Wald) = -1.362, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 3.605$, z-statistics (Wald) = 1.572, and $p < 0.01$), $Aud\_Com\_Financial\_Expertise_{it}$ ($\beta = -1.814$, z-statistics (Wald) = -0.356, and $p < 0.1$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -2.645$, z-statistics (Wald) = -0.216, and $p < 0.01$), $Loss_{it}$ ($\beta = 2.912$, z-statistics (Wald) = 0.679, and $p < 0.01$), $Leverage_{it}$ ($\beta = 3.129$, z-statistics (Wald) = 0.059, and $p < 0.01$), ROA_{it} ($\beta = -3.844$, z-statistics (Wald) = -2.269, and $p < 0.01$), and $Aud\_Opinion_{it}$ ($\beta = 9.170$, z-statistics (Wald) = 2.982, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 6.6) return no statistically significant results when regressed with the independent variable L3.AQ_{it} against the Zmijewski ZFC-Score.

Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued given these variables are also used in the Zmijewski ZFC-Score model, the above regressions were re-run and the control variables $Leverage_{it}$ and ROA_{it} were omitted. The results obtained did not significantly defer to those explained in Table 6.6.

Table 6.6: Logistic Regression Results – Composite Auditor Attributes (AQ) and lagged (one, two and three years) AQ with Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)
AQ_{it}	-1.409***			
	(-21.348)			
L. *AQ_{it}*		-0.831***		
		(-12.697)		
L2. *AQ_{it}*			-0.711***	
			(-8.463)	
L3. *AQ_{it}*				-0.522***
				(-6.247)
$Prop\_BoD\_Ind_{it}$	-1.270***	-0.830***	-0.727*	-1.362***
	(-5.391)	(-2.918)	(-1.814)	(-3.423)
$BoD\_Financial\_Expertise_{it}$	0.258**	-0.189	-0.155	-0.321
	(2.185)	(-1.382)	(-0.883)	(-1.637)
AC_Size_{it}	0.023	-0.003	-0.050	-0.057
	(0.804)	(-0.069)	(-1.021)	(-1.201)
$Prop\_Aud\_Com\_Ind_{it}$	0.767***	0.717**	0.817*	1.572***
	(3.111)	(2.322)	(1.844)	(3.605)
$Aud\_Com\_Financial\_Expertise_{it}$	-0.227*	-0.088	-0.053	-0.356*
	(-1.955)	(-0.651)	(-0.281)	(-1.814)
$Prop\_Segment\_Sales_{it}$	-0.496***	-0.612***	-0.706***	-0.173
	(-4.125)	(-4.054)	(-3.668)	(-0.851)
$Ln\_Total\_Assets_{it}$	-0.305***	-0.187***	-0.076	-0.013
	(-7.580)	(-4.217)	(-1.330)	(-0.208)
Sq_Emp_{it}	0.004	0.008	0.003	-0.010
	(1.016)	(1.534)	(0.372)	(-1.246)
Ln_Age_{it}	-0.092	-0.114	-0.197	-0.130
	(-1.202)	(-1.161)	(-1.377)	(-0.826)
$Earnings\_Quality\_EQ_{it}$	-0.162***	-0.196***	-0.272***	-0.216***
	(-3.469)	(-3.354)	(-3.678)	(-2.645)
$Loss_{it}$	0.301**	0.505***	1.024***	0.679***
	(2.307)	(3.269)	(4.488)	(2.912)
$Leverage_{it}$	-0.016	0.008	0.032*	0.059***
	(-0.810)	(0.526)	(1.870)	(3.129)
ROA_{it}	-2.552***	-2.325***	-2.915***	-2.269***
	(-8.053)	(-5.810)	(-5.437)	(-3.844)
$Aud\_Opinion_{it}$	2.698***	2.840***	3.504***	2.982***
	(15.173)	(12.990)	(10.386)	(9.170)
Constant	-0.116	0.414	2.074*	3.315***
	(-0.151)	(0.456)	(1.756)	(2.602)
Observations	4,876	2,082	1,172	948
Year_Dummy	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included
Log_Pseudolikelihood	-1186	-828.4	-451.5	-410.1
Pseudo_R2	0.497	0.409	0.443	0.372

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [26]*, Column 2 based on *Equation [27]*, Column 3 based on *Equation [28]* and Column 4 based on *Equation [29]*.

$$ZFC_{it} = \beta 0+\beta_1 AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [26]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [27]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [28]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [29]$$

6.2.6.3 Summary

As shown in Table 6.6 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, and 4 as 0.497, 0.409, 0.443 and 0.372 respectively. This implies that the independent variables in the regression models explain 49.7%, 40.9%, 44.3%, and 37.2% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that the composite score of all of the four key auditor attributes along with the lagged composite auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 6.6 (column 1) using the Zmijewski ZFC-Score model provide support for the hypothesis H_9 showing that composite auditor attributes (AQ_{it}) has a statistically significant association with financial distress with all coefficients being negative. In addition, results from Table 6.6 (columns 2, 3, and 4) using the Zmijewski ZFC-Score model provide support for the hypotheses H_{10a}, H_{10b}, and H_{10c} showing the lagged one, two, and three-years (T_{-1}, T_{-2}, and T_{-3}) auditor attributes (L.AQ_{it}, L2.AQ_{it}, and L3.AQ_{it} respectively) have a statistically significant association with financial distress in the year T_0 with all coefficients being negative.

6.3 RESULTS

This section discusses the results shown in Tables 6.1 to 6.6. Results reported in Tables 6.1 and 6.2 suggest that firms meeting the criteria used in this study to proxy for key auditor attributes are less likely to suffer financial distress. Tables 6.3 to 6.5 suggest a negative correlation between the lagged key auditor attributes and the likelihood of financial distress. These tables show a statistically significant (P-Value < 0.01) negative correlation between all the four key auditor attributes used in this study with the likelihood of financial distressed using the Zmijewski ZFC-Score. Results from Table 6.6 show a statistically significant (P-Value < 0.01) negative association when the composite auditor attributes[29] score is logistically regressed against the dependent variable. Last, Table 6.6 also show that the impact of the composite auditor attributes score on the likelihood of financial distress is also negatively affected by time, yielding a statistically significant (P-Value < 0.01) negative association when a lagged of one, two, and three years are used.

Results from Tables 6.1 to 6.6 shows that a number of control variables in used as part of this study remain statistically significant. These variables measure the proportion of board of director independence $Prop\_BoD\_Ind_{it}$, proportion segment sales $Prop\_Segment\_Sales_{it}$, total assets $Ln\_Total\_Assets_{it}$, and audit opinion $Aud\_Opinion_{it}$.

Furthermore, the directionality of the coefficients and the P-Values obtained clearly suggest a strong negative correlation with the hiring of big 4 auditors, who are independent, with longer tenure and are paid a higher audit fee premium and the likelihood of financial distress. These results may suggest that further research is required to provide readers with a comprehensive meaning in order to generalise the results. It is also suggested to broaden the number of key auditor attributes used so as to encompass enough attributes to measure audit quality in order to attain a conclusion on the relation between audit quality and financial distress.

[29] Though the use of a composite auditor attributes score has been used as part of this study (so as to be consistent with extent literature on audit quality which commonly group the different attributes as a composite measure), this can be argued to be against the multi-dimensional nature of audit quality as suggested by Blasam, Krishnan, and Yang 2003 (2003) whereby different attributes (in isolation) are required to proxy for audit quality rather than a composite score.

6.4 SUMMARY OF THE CHAPTER

Chapter Six presents and discusses the empirical results of this study. The first set of regression results examine the association between the four key auditor attributes and financial distress using the Zmijewski ZFC-Score for a pooled sample of firm-year observations between 2008 and 2014. The second set of regression results look into the lagged effect of the auditor attributes on financial distress using the Zmijewski ZFC-Score. The third set of regression results examine the association between a composite auditor attributes score and financial distress using the Zmijewski ZFC-Score. In doing so, the lagged effects of the composite auditor attributes in the year T_{-1}, T_{-2}, and T_{-3} on financial distress using the Zmijewski ZFC-Score in the year T_0 are also examined.

CHAPTER SEVEN:

ROBUSTNESS AND SENSITIVITY ANALYSIS

7.1 OVERVIEW OF THE CHAPTER

Chapter Seven discusses the robustness and sensitivity of the main results in Chapter Six. In so doing, the main analysis of this study is repeated firstly with alternative measure of financial distress and secondly with alternative proxy measure of audit quality. Logistic regressions are also performed to analyse the lagged effect (one, two and three years) of key auditor attributes using the alternative measures with two different models proxying for financial distress. Composite score calculated using the alternative measures of financial distress are also regressed against both models proxying for financial distress. Finally, a summary of Chapter Seven is provided.

Below is an outline of the analysis performed in this chapter:

7.2.1	*Audit Quality (AQ_1) and Altman Z Score (DV_2) – No Control Variable*
7.2.2	*Audit Quality (AQ_1) and Altman Z Score (DV_2) – With Control Variables*
7.2.3 to 7.2.5	*Lagged (one, two, and three years) Audit Quality (AQ_1) and Altman Z Score (DV_2) – With Control Variables*
7.2.6	*Alternative Measure of Audit Quality (AQ_2) and Zmijewski ZFC Score (DV_1)– No Control Variable*
7.2.7	*Alternative Measure of Audit Quality (AQ_2) and Zmijewski ZFC Score (DV_1)– With Control Variable*
7.2.8 to 7.2.10	*Lagged (one, two, and three years) alternative Measure of Audit Quality (AQ_2) and Zmijewski ZFC Score (DV_1)– With Control Variable*
7.2.11	*Alternative Measure of Audit Quality (AQ_2) and Altman Z Score (DV_2)– No Control Variable*
7.2.12	*Alternative Measure of Audit Quality (AQ_2) and Altman Z Score (DV_2)– With Control Variable*
7.2.13 to 7.2.15	*Lagged (one, two, and three years) alternative Measure of Audit Quality (AQ_2) and Altman Z Score (DV_2)– With Control Variable*
7.2.16	*Composite Audit Quality score (AQ_1) and Altman Z Score (DV_2) (including lagged anaylysis)*
7.2.17	*Composite alternative measure of Audit Quality score (AQ_2) and Zmijewski ZFC Score (DV_1) (including lagged anaylysis)*
7.2.18	*Composite alternative measure of Audit Quality score (AQ_2) and Altman Z Score (DV_2) (including lagged anaylysis)*

Overall, the sensitivity tests support the main findings of this study (from Chapter Six) by consistently showing the four key auditor attributes adopted by this study to have a statistically significant negative association with the likelihood of financial distress (using both the Altman Z2-Score and the Altman Z2-Score models).

7.2 ALTERNATIVE MEASURES OF FINANCIAL DISTRESS AND KEY AUDITOR ATTRIBUTES

The subsections that follows show the regression results when alternative measure of financial distress (that is, alternative measure for ZFC_{it}) and alternative measures of auditor attributes (that is alternative measures for auditor attributes $Big4_{it}$, $RNon\text{-}Audit_{it}$, $Ln\_Aud\_Ten_{it}$, and $Ln\_Aud\_Fee_{it}$) are applied and the binary logistic regression results of Chapter Six re-run. Specifically, the regression models utilized amend ZFC_{it} with $Z2_{it}$[30], $Big4_{it}$ with $Aud\_Spec\_30_{it}$[31], $RNon\text{-}Audit_{it}$ with $Cnon\_Audit_{it}$[32], $Ln\_Aud\_Ten_{it}$ with $Ln\_Aud\_Part\_Ten_{it}$[33], and $Ln\_Aud\_Fee_{it}$ with $Prop\_Aud\_Fee_{it}$[34]. These alternative measures of financial distress and auditor attributes are derived so as to help determine whether the main regressions results of Chapter Six are influenced by the measures used to proxy for these variables.

The subsections in this chapter include the presentation and discussion of the outcomes of the multivariate analyses on key auditor attributes using alternative measures on financial distress proxied by the likelihood of financial distress (a dichotomous variable) calculated using both the Zmijewski ZFC-Score and Altman Z2- Score models for a pooled sample of firm-year observations (sample size n=4,876) over a period from year 2008 to 2014.

7.2.1 Existence of a key auditor attribute impact on financial distress: The Altman Base Model

Table 7.1 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a Big 4 auditor ($Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor ($RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office ($Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor ($Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with no control variables.

7.2.1.1 Independent variables

As shown in column 1 of Table 7.1 below, the coefficient of the independent variable Big 4 auditor ($Big4_{it}$) is reported to be negative and statistically significant (β = -19.560, z-statistics (Wald) = -2.035, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, the use of a Big 4 auditor decreases the likelihood of financial distress with a goodness-of-fit of 9.24% (that is, Pseudo R^2 of 0.06924).

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[30] $Z2_{it}$ = The modified Altman Z2-Score calculated as per Chapter Four, section 4.3.

[31] $Aud\_Spec\_30_{it}$ = A dichotomous indicator variable representing Auditor Specialization, following the industry market share approach suggested by Krishnan (2003b); where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* is considered an industry specialist for auditing purpose in the industry sector to which form *i* is categorized by the GICS codes (30% market share within the specific industry); otherwise a score of zero (0) will be awarded;

[32] $Cnon\_Audit_{it}$ = A dichotomous indicator variable representing the provision for non-audit services; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* has a proportion of non-audit fees to total fees < or = to 25%;

[33] $Ln\_Aud\_Part\_Ten_{it}$ = Natural log of continuous measure denoting the actual number of years the audit partner held office will be used;

[34] $Prop\_Aud\_Fee_{it}$ = Proportion of audit fee paid / total assets held by firm *i* at the end of time period *t*.

Column 2 of Table 7.1 below shows the coefficient of the independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (*$RNon\text{-}Audit_{it}$*) is reported to be negative and statistically significant (β = -16.526, z-statistics (Wald) = -2.708, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 6.06% (that is, Pseudo R^2 of 0.0606).

Column 3 of Table 7.1 below shows the coefficient of the independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office ($Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -24.145, z-statistics (Wald) = -0.780, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, audit firm tenure decreases the likelihood of financial distress with a goodness-of-fit of 9.53% (that is, Pseudo R^2 of 0.0953).

Column 4 of Table 7.1 below shows the coefficient of the independent variable proxying the natural log of the total audit fee paid to the auditor ($Ln\_Aud\_Fee_{it}$) is reported to be positive and statistically insignificant (β = 0.675, z-statistics (Wald) = 0.023, and $p > 0.1$) though a negative coefficient is expected. This result implies that with the use of no control variable the higher the fee paid to the auditor the higher likelihood of financial distress with a goodness-of-fit of 0.0103% (that is, Pseudo R^2 of 0.000103) – hence statistically insignificant. It is important to note that similar results were obtained for variable $Ln\_Aud\_Fee_{it}$ when using the Zmijewski's model (as per Table 6.1).

Last column 5 of Table 7.1 shows that when all four independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained ($Big4_{it}$ - β = -14.503, z-statistics (Wald) = -0.1700, and $p < 0.01$, $RNon\text{-}Audit_{it}$ - β = -10.607, z-statistics (Wald) = -2.188, and $p < 0.01$, $Ln\_Aud\_Ten_{it}$ - β = -19.348, z-statistics (Wald) = -0.719 and $p < 0.01$, $Ln\_Aud\_Fee_{it}$ - β = 3.120, z-statistics (Wald) = 0.115, and $p < 0.01$) and an overall goodness-of-fit of 21% (that is, Pseudo R^2 of 0.210) which implies that that all four independent variables explain 21% of the variation in the Altman Z2-Score.

Table 7.1: Logistic Regression Results - Key Auditor Attributes and Altman Z2 Score – Base Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
$Big4_{it}$	-2.035***				-1.700***
	(-19.560)				(-14.503)
$RNon\text{-}Audit_{it}$		-2.708***			-2.188***
		(-16.526)			(-10.607)
$Ln\_Aud\_Ten_{it}$			-0.780***		-0.719***
			(-24.145)		(-19.348)
$Ln\_Aud\_Fee_{it}$				0.023	0.115***
				(0.675)	(3.120)
Constant	-0.362***	-0.152***	0.175***	-1.056***	-0.428
	(-10.566)	(-3.474)	(3.569)	(-2.753)	(-1.018)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-2777	-2874	-2768	-2404	-1900
Pseudo_R2	0.0924	0.0606	0.0953	0.000103	0.210

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [1]*, Column 2 based on *Equation [2]*, Column 3 based on *Equation [3]*, Column 4 based on *Equation [4]* and Column 5 based on *Equation [5]*.

$Z2_{it} = \beta0 + \beta1\ Big4_{it} + \varepsilon_{it}$ [1]

$Z2_{it} = \beta0 + \beta1\ RNon\text{-}Audit_{it} + \varepsilon_{it}$ [2]

$Z2_{it} = \beta0 + \beta1\ Ln\_Aud\_Ten_{it} + \varepsilon_{it}$ [3]

$Z2_{it} = \beta0 + \beta1\ Ln\_Aud\_Fee_{it} + \varepsilon_{it}$ [4]

$Z2_{it} = \beta0 + \beta1\ Big4_{it} + \beta2\ RNon\text{-}Audit_{it} + \beta3\ Ln\_Aud\_Ten_{it} + \beta4\ Ln\_Aud\_Fee_{it} + \varepsilon_{it}$ [5]

7.2.1.2 Summary

As shown in Table 7.1 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0924, 0.0606, 0.0953, 0.000103 and 0.210 respectively. This implies that the independent variables in the regression models explain 9.24%, 6.06%, 9.53%, 0.0103% and 21% of the variation in the dependent variable (the Altman Z2-Score). These results may imply three out of the four auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.1 using the Altman Z2-Score model provide support for the hypotheses H_1, H_2, and H_3, showing that big 4 auditor ($Big4_{it}$), the provision for non-audit services ($RNon\text{-}Audit_{it}$) and auditor tenure ($Ln\_Aud\_Ten_{it}$) have a statistically significant association with financial distress with all coefficients being negative. However, Table 7.1 using the Altman Z2-Score model rejects the hypothesis H_4 showing that audit fee ($Ln\_Aud\_Fee_{it}$) has a statistical insignificant positive association with financial distress.

7.2.2 Existence of a key auditor attribute impact on financial distress: The Altman Full Model (with control variables)

Table 7.2 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a Big 4 auditor (*Big4$_{it}$*), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (*RNon-Audit$_{it}$*), the natural log of the actual number of years the auditor (audit firm) held office (*Ln_Aud_Ten$_{it}$*), and the natural log of the total audit fee paid to the auditor (*Ln_Aud_Fee$_{it}$*)), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.2.1 Independent variables

As shown in column 1 of Table 7.2 below, the coefficient of the independent variable Big 4 auditor (*Big4$_{it}$*) is reported to be negative and statistically significant (β = -15.089, z-statistics (Wald) = -2.318, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor decreases the likelihood of financial distress with a goodness-of-fit of 55.3% (that is, Pseudo R^2 of 0.553).

Column 2 of Table 7.2 below shows the coefficient of the independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (*RNon-Audit$_{it}$*) is reported to be negative and statistically significant (β = -10.763, z-statistics (Wald) = -2.917, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 53.6% (that is, Pseudo R^2 of 0.536).

Column 3 of Table 7.2 below shows the coefficient of the independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (*Ln_Aud_Ten$_{it}$*) is reported to be negative and statistically significant (β = -12.505, z-statistics (Wald) = -0.715, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, audit firm tenure decreases the likelihood of financial distress with a goodness-of-fit of 53% (that is, Pseudo R^2 of 0.530).

Column 4 of Table 7.2 below shows the coefficient of the independent variable proxying the natural log of the total audit fee paid to the auditor (*Ln_Aud_Fee$_{it}$*) is reported to be negative and statistically significant (β = -11.128, z-statistics (Wald) = -0.977, and $p < 0.01$). As column 4 of Table 7.2 shows, while the coefficient obtained was a positive one with no control variables (from Table 7.1), with added control variables, the coefficient obtained is now a negative one. This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor decreases the likelihood of financial distress with a goodness-of-fit of 53.1% (that is, Pseudo R^2 of 0.531).

Last column 5 of Table 7.2 shows that when all four independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (*Big4$_{it}$* - β = -10.821, z-statistics (Wald) = -1.923, and $p < 0.01$, *RNon-Audit$_{it}$* - β = -7.861, z-statistics (Wald) = -2.898, and $p < 0.01$, *Ln_Aud_Ten$_{it}$* - β = -9.379, z-statistics (Wald) = -0.631 and $p < 0.01$, *Ln_Aud_Fee$_{it}$* - β = -9.769, z-statistics (Wald) = -1.039, and $p < 0.01$) and an overall goodness-of-fit of 61.2% (that is, Pseudo R^2 of 0.612) which implies that all four independent variables explain 61.2% of the variation in the Altman Z2-Score.

7.2.2.2 Control variables

As shown in column 1 of Table 7.2 below, where the independent variable *Big4$_{it}$* is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind$_{it}$* (β = -3.821, z-statistics (Wald) = -0.909, and $p < 0.01$), *BoD_Financial_Expertise$_{it}$* (β = -4.203, z-statistics (Wald) = -0.474, and $p < 0.01$), *Prop_Aud_Com_Ind$_{it}$* (β = 4.025, z-statistics (Wald) = 0.908, and $p < 0.01$), *Prop_Segment_Sales$_{it}$* (β = -1.843, z-statistics (Wald) = -0.282, and $p < 0.1$), *Ln_Total_Assets$_{it}$* (β = -6.527, z-statistics (Wald) = -0.238, and $p < 0.01$), *Ln_Age$_{it}$* (β = -4.258, z-statistics (Wald) = -0.330, and $p < 0.01$), *Earnings_Quality_EQ$_{it}$* (β = -2.564, z-statistics (Wald) = -0.170, and $p < 0.05$), *Leverage$_{it}$* (β = 2.538, z-statistics (Wald) = 0.037, and $p < 0.05$), *ROA$_{it}$* (β = -4.068, z-statistics (Wald) = -1.010, and $p < 0.01$), and *Aud_Opinion$_{it}$* (β = 27.619, z-statistics (Wald) = 4.516, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.2) return no statistically significant results when regressed with the independent variable *Big4$_{it}$* against the Altman Z2-Score.

From column 2 of Table 7.2 below, where the independent variable *RNon-Audit$_{it}$* is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables

$Prop\_BoD\_Ind_{it}$ (β = -3.942, z-statistics (Wald) = -0.977, and $p < 0.01$), $BoD\_Financial\_Expertise_{it}$ (β = -5.605, z-statistics (Wald) = -0.636, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 3.086, z-statistics (Wald) = 0.700, and $p < 0.01$), $Prop\_Segment\_Sales_{it}$ (β = -2.785, z-statistics (Wald) = -0.401, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ (β = -4.010, z-statistics (Wald) = -0.130, and $p < 0.01$), Ln_Age_{it} (β = -5.625, z-statistics (Wald) = -0.441, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -2.915, z-statistics (Wald) = -0.200, and $p < 0.01$), $Loss_{it}$ (β = -2.708, z-statistics (Wald) = -0.334, and $p < 0.01$), $Leverage_{it}$ (β = 3.621, z-statistics (Wald) = 0.049, and $p < 0.01$), ROA_{it} (β = -3.319, z-statistics (Wald) = -0.652, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 28.476, z-statistics (Wald) = 4.612, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.2) return no statistically significant results when regressed with the independent variable $RNon\text{-}Audit_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.2 below, where the independent variable $Ln\_Aud\_Ten_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -5.556, z-statistics (Wald) = -1.335, and $p < 0.01$), $BoD\_Financial\_Expertise_{it}$ (β = -2.353, z-statistics (Wald) = -0.283, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 3.628, z-statistics (Wald) = 0.811, and $p < 0.01$), $Prop\_Segment\_Sales_{it}$ (β = -3.258, z-statistics (Wald) = -0.432, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ (β = -1.982, z-statistics (Wald) = -0.063), and $p < 0.05$, $\mathrm{Sq\_Emp}_{it}$ (β = 1.786, z-statistics (Wald) = 0.007, and $p < 0.1$), Ln_Age_{it} (β = -4.742, z-statistics (Wald) = -0.350, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -2.760, z-statistics (Wald) = -0.166, and $p < 0.01$), ROA_{it} (β = -4.494, z-statistics (Wald) = -0.998, and $p < 0.01$), and $Aud\_Opinion_{it}$ (β = 28.756, z-statistics (Wald) = 4.701, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.2) return no statistically significant results when regressed with the independent variable $Ln\_Aud\_Ten_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.2 below, where the independent variable $Ln\_Aud\_Fee_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $BoD\_Financial\_Expertise_{it}$ (β = -5.130, z-statistics (Wald) = -0.634, and p <

0.01), *Prop_Aud_Com_Ind$_{it}$* (β = 1.933, z-statistics (Wald) = 0.481, and p < 0.1), *Aud_Com_Financial_Expertise$_{it}$* (β = 2.282, z-statistics (Wald) = 0.283, and p < 0.05), *Prop_Segment_Sales$_{it}$* (β = -3.152, z-statistics (Wald) = -0.473, and p < 0.01), *Ln_Total_Assets$_{it}$* (β = -9.684, z-statistics (Wald) = -0.527, and p < 0.01), *Ln_Age$_{it}$* (β = -3.105, z-statistics (Wald) = -0.256, and p < 0.01), *Earnings_Quality_EQ$_{it}$* (β = -2.338, z-statistics (Wald) = -0.152, and p < 0.05), *Leverage$_{it}$* (β = 2.370, z-statistics (Wald) = 0.050, and p < 0.05), *ROA$_{it}$* (β = -2.687, z-statistics (Wald) = -0.812, and p < 0.01), and *Aud_Opinion$_{it}$* (β = 26.502, z-statistics (Wald) = 4.440, and p < 0.01).

The remaining control variables (as per column 4 of Table 7.2) return no statistically significant results when regressed with the independent variable *Ln_Aud_Fee$_{it}$* against the Altman Z2-Score.

Last from column 5 of Table 7.2 below, where the four independent variables *Big4$_{it}$*, *RNon-Audit$_{it}$*, *Ln_Aud_Ten$_{it}$* and *Ln_Aud_Fee$_{it}$* are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind$_{it}$* (β = -4.209, z-statistics (Wald) = -1.215, and p < 0.01), *Prop_Aud_Com_Ind$_{it}$* (β = 3.862, z-statistics (Wald) = 1.075, and p < 0.01), *Ln_Total_Assets$_{it}$* (β = -10.456, z-statistics (Wald) = -0.706, and p < 0.01), Sq_Emp$_{it}$ (β = 2.364, z-statistics (Wald) = 0.011, and p < 0.05), *Earnings_Quality_EQ$_{it}$* (β = -2.068, z-statistics (Wald) = -0.142, and p < 0.05), *Loss$_{it}$* (β = -2.600, z-statistics (Wald) = -0.429, and p < 0.01), *Leverage$_{it}$* (β = -2.128, z-statistics (Wald) = -0.031, and p < 0.05), and *Aud_Opinion$_{it}$* (β = 21.527, z-statistics (Wald) = 4.190, and p < 0.01).

The remaining control variables (as per column 5 of Table 7.2) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Since the inclusions of variables representing financial leverage *Leverage$_{it}$* and return on assets *ROA$_{it}$* can be argued as these variables are also used in the Altman Z2-Score model, the above regressions were re-run and the control variables *Leverage$_{it}$* and *ROA$_{it}$* were omitted. The results obtained did not significantly defer to those explained in Table 7.2.

Table 7.2: Logistic Regression Results - Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
Big4$_{it}$	-2.318***				-1.923***

	(-15.089)				(-10.821)
RNon-Audit$_{it}$		-2.917***			-2.898***
		(-10.763)			(-7.861)
Ln_Aud_Ten$_{it}$			-0.715***		-0.631***
			(-12.505)		(-9.379)
Ln_Aud_Fee$_{it}$				-0.977***	-1.039***
				(-11.128)	(-9.769)
Prop_BoD_Ind$_{it}$	-0.909***	-0.977***	-1.335***	-0.395	-1.215***
	(-3.821)	(-3.942)	(-5.556)	(-1.550)	(-4.209)
BoD_Financial_Expertise$_{it}$	-0.474***	-0.636***	-0.283**	-0.634***	-0.125
	(-4.203)	(-5.605)	(-2.353)	(-5.130)	(-0.874)
AC_Size$_{it}$	-0.013	-0.022	-0.041	0.001	-0.022
	(-0.487)	(-0.809)	(-1.465)	(0.037)	(-0.651)
Prop_Aud_Com_Ind$_{it}$	0.908***	0.700***	0.811***	0.481*	1.075***
	(4.025)	(3.086)	(3.628)	(1.933)	(3.862)
Aud_Com_Financial_Expertise$_{it}$	0.090	0.042	0.073	0.283**	0.199
	(0.802)	(0.376)	(0.662)	(2.282)	(1.448)
Prop_Segment_Sales$_{it}$	-0.282*	-0.401***	-0.432***	-0.473***	-0.201
	(-1.843)	(-2.785)	(-3.258)	(-3.152)	(-1.284)
Ln_Total_Assets$_{it}$	-0.238***	-0.130***	-0.063**	-0.527***	-0.706***
	(-6.527)	(-4.010)	(-1.982)	(-9.684)	(-10.456)
Sq_Emp$_{it}$	0.006	0.006	0.007*	0.006	0.011**
	(1.570)	(1.472)	(1.786)	(1.496)	(2.364)
Ln_Age$_{it}$	-0.330***	-0.441***	-0.350***	-0.256***	-0.032
	(-4.258)	(-5.625)	(-4.742)	(-3.105)	(-0.349)
Earnings_Quality_EQ$_{it}$	-0.170**	-0.200***	-0.166***	-0.152**	-0.142**
	(-2.564)	(-2.915)	(-2.760)	(-2.338)	(-2.068)
Loss$_{it}$	-0.005	-0.334***	0.146	0.006	-0.429***
	(-0.041)	(-2.708)	(1.249)	(0.047)	(-2.600)
Leverage$_{it}$	0.037**	0.049***	0.004	0.050**	-0.031**
	(2.538)	(3.621)	(0.295)	(2.370)	(-2.128)
ROA$_{it}$	-1.010***	-0.652***	-0.998***	-0.812***	-0.282
	(-4.068)	(-3.319)	(-4.494)	(-2.687)	(-1.203)
Aud_Opinion$_{it}$	4.516***	4.612***	4.701***	4.440***	4.190***
	(27.619)	(28.476)	(28.756)	(26.502)	(21.527)
Constant	-2.742***	0.024	1.226*	2.190***	1.479*
	(-3.841)	(0.037)	(1.953)	(2.842)	(1.772)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-1364	-1417	-1434	-1128	-932.3
Pseudo_R2	0.553	0.536	0.530	0.531	0.612

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [6]*, Column 2 based on *Equation [7]*, Column 3 based on *Equation [8]*, Column 4 based on *Equation [9]* and Column 5 based on *Equation [10]*.

$$Z2_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [6]$$

$$Z2_{it} = \beta 0+\beta_1 RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [7]$$

$$Z2_{it} = \beta 0+\beta_1 Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [8]$$

$$Z2_{it} = \beta 0+\beta_1 Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [9]$$

$$Z2_{it} = \beta 0+\beta_1 Big4_{it}+\beta_2 RNon\_Audit_{it}+\beta_3 Ln\_Aud\_Ten_{it}+\beta_4 Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [10]$$

7.2.2.3 Summary

As shown in Table 7.2 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.553, 0.536, 0.530, 0.531 and 0.612 respectively. This implies that the independent variables in the regression models explain 55.3%, 53.6%, 53.0%, 53.1% and 61.2% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.2 using the Altman Z2-Score model provide support for the hypotheses H_1, H_2, H_3, and H_4 showing that big 4 auditor ($Big4_{it}$), the provision for non-audit services ($RNon\text{-}Audit_{it}$), auditor tenure ($Ln\_Aud\_Ten_{it}$) and audit fee ($Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.3 Existence of a lagged one-year key auditor attribute impact on financial distress in year zero: The Altman Base Model

Table 7.3 below presents the results of binary logistic regressions where the lagged one year (T_{-1}) four key auditor attributes used in this study (the existence of a Big 4 auditor (L.$Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L.$RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office (L.$Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor (L.$Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.3.1 Independent variables

As shown in column 1 of Table 7.3 below, the coefficient of the lagged one year (T–1) independent variable Big 4 auditor (L.$Big4_{it}$) is reported to be negative and statistically significant (β = -8.653, z-statistics (Wald) = -1.784, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 50.7% (that is, Pseudo R^2 of 0.507).

Column 2 of Table 7.3 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L.$RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant (β = -6.511, z-statistics (Wald) = -2.563, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 50.3% (that is, Pseudo R^2 of 0.503).

Column 3 of Table 7.3 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L.$Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -4.600, z-statistics (Wald) = -0.424, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 48.6% (that is, Pseudo R^2 of 0.486).

Column 4 of Table 7.3 below shows the coefficient of the lagged one year (T–

1) independent variable proxying the natural log of the total audit fee paid to the auditor (L.*Ln_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -6.175, z-statistics (Wald) = -0.700, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 48.4% (that is, Pseudo R^2 of 0.484).

Last column 5 of Table 7.3 shows that when all four lagged one year (T–1) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L.*Big4*$_{it}$ - β = -5.771, z-statistics (Wald) = -1.256, and $p < 0.01$, L.*RNon-Audit*$_{it}$ - β = -4.779, z-statistics (Wald) = -2.087 and $p < 0.01$, L.*Ln_Aud_Ten*$_{it}$ - β = -3.542, z-statistics (Wald) = -0.368 and $p < 0.01$, L.*Ln_Aud_Fee*$_{it}$ - β = -5.634, z-statistics (Wald) = -0.673, and $p < 0.01$) and an overall goodness-of-fit of 53% (that is, Pseudo R^2 of 0.530) which implies that that unison effect of all four independent variables in the year T_{-1} affect the Altman Z2-Score in the year T_0 by 53%.

7.2.3.2 Control variables

As shown in column 1 of Table 7.3 below, where the independent variable L.*Big4*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -4.616, z-statistics (Wald) = -1.587, and $p < 0.01$), *AC_Size*$_{it}$ (β = -2.995, z-statistics (Wald) = -0.123, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 5.024, z-statistics (Wald) = 1.613, and $p < 0.01$), *Prop_Segment_Sales*$_{it}$ (β = -1.979, z-statistics (Wald) = -0.479, and $p < 0.05$), *Ln_Total_Assets*$_{it}$ (β = -5.859, z-statistics (Wald) = -0.288, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -2.957, z-statistics (Wald) = -0.338, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.191, z-statistics (Wald) = -0.211, and $p < 0.05$), *Leverage*$_{it}$ (β = -1.769, z-statistics (Wald) = -0.026, and $p < 0.1$), *ROA*$_{it}$ (β = -2.184, z-statistics (Wald) = -0.483, and $p < 0.05$), and *Aud_Opinion*$_{it}$ (β = 18.386, z-statistics (Wald) = 4.595, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.3) return no statistically significant results when regressed with the independent variable L.*Big4*$_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.3 below, where the independent variable L.*RNon-*

Audit$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -4.812, z-statistics (Wald) = -1.669, and $p < 0.01$), *AC_Size*$_{it}$ (β = -3.282, z-statistics (Wald) = -0.137, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.704, z-statistics (Wald) = 1.567, and $p < 0.01$), *Prop_Segment_Sales*$_{it}$ (β = -2.396, z-statistics (Wald) = -0.527, and $p < 0.05$), *Ln_Total_Assets*$_{it}$ (β = -3.868, z-statistics (Wald) = -0.179, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -3.662, z-statistics (Wald) = -0.415, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.064, z-statistics (Wald) = -0.203, and $p < 0.05$), *Leverage*$_{it}$ (β = -2.059, z-statistics (Wald) = -0.029, and $p < 0.05$), *ROA*$_{it}$ (β = -2.470, z-statistics (Wald) = -0.548, and $p < 0.05$), and *Aud_Opinion*$_{it}$ (β = 19.410, z-statistics (Wald) = 4.647, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.3) return no statistically significant results when regressed with the independent variable L.*RNon-Audit*$_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.3 below, where the independent variable L.*Ln_Aud_Ten*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -5.064, z-statistics (Wald) = -1.708, and $p < 0.01$), *AC_Size*$_{it}$ (β = -3.627, z-statistics (Wald) = -0.151, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.930, z-statistics (Wald) = 1.604, and $p < 0.01$), *Prop_Segment_Sales*$_{it}$ (β = -2.301, z-statistics (Wald) = -0.507, and $p < 0.05$), *Ln_Total_Assets*$_{it}$ (β = -3.011, z-statistics (Wald) = -0.136, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -3.729, z-statistics (Wald) = -0.417, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.209, z-statistics (Wald) = -0.203, and $p < 0.05$), *Leverage*$_{it}$ (β = -2.070, z-statistics (Wald) = -0.031, and $p < 0.05$), *ROA*$_{it}$ (β = -2.569, z-statistics (Wald) = -0.604, and $p < 0.05$), and *Aud_Opinion*$_{it}$ (β = 18.669, z-statistics (Wald) = 4.685, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.3) return no statistically significant results when regressed with the independent variable L.*Ln_Aud_Ten*$_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.3 below, where the independent variable L.*Ln_Aud_Fee*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -3.471, z-statistics (Wald) = -1.254, and $p < 0.01$), *AC_Size*$_{it}$ (β = -2.510, z-statistics (Wald) = -0.118, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.023, z-statistics (Wald) = 1.473, and $p < 0.01$), *Prop_Segment_Sales*$_{it}$ (β = -1.896, z-statistics (Wald) = -0.442, and $p < 0.1$), *Ln_Total_Assets*$_{it}$ (β = -6.142, z-statistics (Wald) = -0.460, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -2.119, z-statistics (Wald) = -0.250, and $p < 0.05$), *Earnings_Quality_EQ*$_{it}$ (β = -2.296, z-statistics (Wald) = -0.226, and $p < 0.05$), *Leverage*$_{it}$ (β = -2.125, z-statistics (Wald) = -0.038, and $p < 0.05$), and *Aud_Opinion*$_{it}$ (β = 17.640, z-statistics (Wald) = 4.338, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.3) return no statistically significant results when regressed with the independent variable L.*Ln_Aud_Fee*$_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.3 below, where the four independent variables L.*Big4*$_{it}$, L.*RNon-Audit*$_{it}$, L.*Ln_Aud_Ten*$_{it}$ and L.*Ln_Aud_Fee*$_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -3.359, z-statistics (Wald) = -1.273, and $p < 0.01$), *AC_Size*$_{it}$ (β = -2.130, z-statistics (Wald) = -0.106, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.074, z-statistics (Wald) = 1.559, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -6.985, z-statistics (Wald) = -0.544, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.231, z-statistics (Wald) = -0.229, and $p < 0.05$), *Leverage*$_{it}$ (β = -2.610, z-statistics (Wald) = -0.044, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 16.839, z-statistics (Wald) = 4.467, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.3) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Since the inclusions of variables representing financial leverage *Leverage*$_{it}$ and return on assets *ROA*$_{it}$ can be argued as these variables are also used in the Altman Z2-Score model, the above regressions were re-run and the control variables *Leverage*$_{it}$ and *ROA*$_{it}$ were omitted. The results obtained did not significantly defer to those explained in Table 7.3.

Table 7.3: Logistic Regression Results – Lagged (on year) Key Auditor Attributes and Altman Z2 Score –Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L.*Big4*$_{it}$	-1.784***				-1.256***
	(-8.653)				(-5.771)
L.*RNon-Audit*$_{it}$		-2.563***			-2.087***
		(-6.511)			(-4.779)
L.*Ln_Aud_Ten*$_{it}$			-0.424***		-0.368***
			(-4.600)		(-3.542)
L.*Ln_Aud_Fee*$_{it}$				-0.700***	-0.673***
				(-6.175)	(-5.634)
Prop_BoD_Ind$_{it}$	-1.587***	-1.669***	-1.708***	-1.254***	-1.273***
	(-4.616)	(-4.812)	(-5.064)	(-3.471)	(-3.359)
BoD_Financial_Expertise$_{it}$	-0.062	-0.101	-0.064	-0.175	0.043
	(-0.373)	(-0.635)	(-0.399)	(-0.996)	(0.231)
AC_Size$_{it}$	-0.123***	-0.137***	-0.151***	-0.118**	-0.106**
	(-2.995)	(-3.282)	(-3.627)	(-2.510)	(-2.130)
Prop_Aud_Com_Ind$_{it}$	1.613***	1.567***	1.604***	1.473***	1.559***
	(5.024)	(4.704)	(4.930)	(4.023)	(4.074)
Aud_Com_Financial_Expertise$_{it}$	0.067	0.045	0.075	0.204	0.188
	(0.414)	(0.280)	(0.479)	(1.229)	(1.062)
Prop_Segment_Sales$_{it}$	-0.479**	-0.527**	-0.507**	-0.442*	-0.369
	(-1.979)	(-2.396)	(-2.301)	(-1.896)	(-1.463)
Ln_Total_Assets$_{it}$	-0.288***	-0.179***	-0.136***	-0.460***	-0.544***
	(-5.859)	(-3.868)	(-3.011)	(-6.142)	(-6.985)
Sq_Emp$_{it}$	0.008	0.008	0.006	0.009	0.009
	(1.450)	(1.521)	(1.174)	(1.517)	(1.540)
Ln_Age$_{it}$	-0.338***	-0.415***	-0.417***	-0.250**	-0.159
	(-2.957)	(-3.662)	(-3.729)	(-2.119)	(-1.288)
Earnings_Quality_EQ$_{it}$	-0.211**	-0.203**	-0.203**	-0.226**	-0.229**
	(-2.191)	(-2.064)	(-2.209)	(-2.296)	(-2.231)
Loss$_{it}$	-0.103	-0.170	-0.027	-0.022	-0.033
	(-0.660)	(-1.102)	(-0.173)	(-0.129)	(-0.183)
Leverage$_{it}$	-0.026*	-0.029**	-0.031**	-0.038**	-0.044***
	(-1.769)	(-2.059)	(-2.070)	(-2.125)	(-2.610)
ROA$_{it}$	-0.483**	-0.548**	-0.604**	-0.350	-0.207
	(-2.184)	(-2.470)	(-2.569)	(-1.319)	(-0.924)
Aud_Opinion$_{it}$	4.595***	4.647***	4.685***	4.338***	4.467***
	(18.386)	(19.410)	(18.669)	(17.640)	(16.839)
Constant	-2.546***	-0.009	0.503	1.336	0.125
	(-2.690)	(-0.010)	(0.574)	(1.309)	(0.116)
Observations	2,082	2,082	2,082	2,082	2,082
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-682.3	-689.0	-711.8	-590.9	-538.3
Pseudo_R2	0.507	0.503	0.486	0.484	0.530

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column 1 based on *Equation [11]*, Column 2 based on *Equation [12]*, Column 3 based on *Equation [13]*, Column 4 based on *Equation [14]* and Column 5 based on *Equation [15]*.

$$Z2_{it} = \beta 0+\beta_1 L.Big4it+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [11]$$

$$Z2_{it} = \beta 0+\beta_1 L.RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [12]$$

$$Z2_{it} = \beta 0+\beta_1 L.Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [13]$$

$$Z2_{it} = \beta 0+\beta_1 L.Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [14]$$

$$Z2_{it} = \beta 0+\beta_1 L.Big4_{it}+\beta_2 L.RNon\_Audit_{it}+\beta_3 L.Ln\_Aud\_Ten_{it}+\beta_4 L.Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [15]$$

7.2.3.3 Summary

As shown in Table 7.3 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.507, 0.503, 0.486, 0.484 and 0.530 respectively. This implies that the lagged independent variables in the regression models explain 50.7%, 50.3%, 48.6%, 48.4% and 53.0% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -1) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.3 using the Altman Z2-Score model provide support for the hypotheses H_{5a}, H_{6a}, H_{7a}, and H_{8a} showing that lagged (T – 1) big 4 auditor (L.$Big4_{it}$), lagged (T – 1) the provision for non-audit services (L.$RNon\text{-}Audit_{it}$), lagged (T – 1) auditor tenure (L.$Ln\_Aud\_Ten_{it}$) and lagged (T – 1) audit fee (L.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.4 Existence of a lagged two-years key auditor attribute impact on financial distress in year zero: The Altman Base Model

Table 7.4 below presents the results of binary logistic regressions where the lagged two-years (T_{-2}) four key auditor attributes used in this study (the existence of a Big 4 auditor (L2.*Big4$_{it}$*), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L2.*RNon-Audit$_{it}$*), the natural log of the actual number of years the auditor (audit firm) held office (L2.*Ln_Aud_Ten$_{it}$*), and the natural log of the total audit fee paid to the auditor (L2.*Ln_Aud_Fee$_{it}$*), are (logistically) regressed against financial distress, calculated using Altman Z2-Score models with added control variables.

7.2.4.1 Independent variables

As shown in column 1 of Table 7.4 below, the coefficient of the lagged two years (T–2) independent variable Big 4 auditor (L2.*Big4$_{it}$*) is reported to be negative and statistically significant (β = -7.354, z-statistics (Wald) = -2.209, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 56.3% (that is, Pseudo R^2 of 0.563).

Column 2 of Table 7.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L2.*RNon-Audit$_{it}$*) is reported to be negative and statistically significant (β = -4.607, z-statistics (Wald) = -2.660, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 55.7% (that is, Pseudo R^2 of 0.557).

Column 3 of Table 7.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L2.*Ln_Aud_Ten$_{it}$*) is reported to be negative and statistically significant (β = -1.663, z-statistics (Wald) = -0.215, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 53.7% (that is, Pseudo R^2 of 0.537).

Column 4 of Table 7.4 below shows the coefficient of the lagged two years (T–2) independent variable proxying the natural log of the total audit fee paid to the auditor (L2.*Ln_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -5.553, z-statistics (Wald) = -0.928, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 56.4% (that is, Pseudo R^2 of 0.564).

Last column 5 of Table 7.4 shows that when all four lagged two years (T–2) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L2.*Big4*$_{it}$ - β = -1.655, z-statistics (Wald) = -5.201, and $p < 0.01$, L2.*RNon-Audit*$_{it}$ - β = -3.684, z-statistics (Wald) = -2.160, and $p < 0.01$ and L2.*Ln_Aud_Fee*$_{it}$ - β = -4.926, z-statistics (Wald) = -0.926, and $p < 0.01$) and an overall goodness-of-fit of 59.9% (that is, Pseudo R^2 of 0.599) which implies that that unison effect of three of the four independent variables (namely L2.*Big4*$_{it}$, L2.*RNon-Audit*$_{it}$ and L2.*Ln_Aud_Fee*$_{it}$ in the year T_{-2} affect the Altman Z2-Score in the year T_0 by 59.9%. Column 5 of Table 7.4 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure shows a statistically insignificant correlation (L2.*Ln_Aud_Ten*$_{it}$ - β = 0.414, z-statistics (Wald) = 0.059 and $p > 0.1$).

7.2.4.2 Control variables

As shown in column 1 of Table 7.4 below, where the independent variable L2.*Big4*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.515, z-statistics (Wald) = -1.216, and $p < 0.05$), *AC_Size*$_{it}$ (β = -1.781, z-statistics (Wald) = -0.101, and $p < 0.1$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.160, z-statistics (Wald) = 1.826, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -2.749, z-statistics (Wald) = -0.193, and $p < 0.01$), *Sq_Emp*$_{it}$ (β = 1.808, z-statistics (Wald) = 0.015, and $p < 0.1$), *Ln_Age*$_{it}$ (β = -2.261, z-statistics (Wald) = -0.376, and $p < 0.05$), *Earnings_Quality_EQ*$_{it}$ (β = -1.862, z-statistics (Wald) = -0.293, and $p < 0.1$), *ROA*$_{it}$ (β = -2.377, z-statistics (Wald) = -0.735, and $p < 0.05$), and *Aud_Opinion*$_{it}$ (β = 13.301, z-statistics (Wald) = 5.111, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.4) return no statistically significant results when regressed with the independent variable L2.*Big4*$_{it}$

against the Altman Z2-Score.

From column 2 of Table 7.4 below, where the independent variable L2.$RNon\text{-}Audit_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -2.027$, z-statistics (Wald) = -1.118, and $p < 0.05$), AC_Size_{it} ($\beta = -2.026$, z-statistics (Wald) = -0.124, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 4.288$, z-statistics (Wald) = 1.882, and $p < 0.01$), Sq_Emp_{it} ($\beta = 2.138$, z-statistics (Wald) = 0.019, and $p < 0.05$), Ln_Age_{it} ($\beta = -2.373$, z-statistics (Wald) = -0.403, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -1.961$, z-statistics (Wald) = -0.323, and $p < 0.05$), ROA_{it} ($\beta = -2.394$, z-statistics (Wald) = -0.722, and $p < 0.05$), and $Aud\_Opinion_{it}$ ($\beta = 14.409$, z-statistics (Wald) = 5.231, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.4) return no statistically significant results when regressed with the independent variable L2.$RNon\text{-}Audit_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.4 below, where the independent variable L2.$Ln\_Aud\_Ten_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ ($\beta = -2.382$, z-statistics (Wald) = -1.127, and $p < 0.05$), AC_Size_{it} ($\beta = -2.095$, z-statistics (Wald) = -0.117, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 4.396$, z-statistics (Wald) = 1.882, and $p < 0.01$), Sq_Emp_{it} ($\beta = 1.679$, z-statistics (Wald) = 0.014, and $p < 0.1$), Ln_Age_{it} ($\beta = -2.611$, z-statistics (Wald) = -0.426, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -1.961$, z-statistics (Wald) = -0.328, and $p < 0.05$), ROA_{it} ($\beta = -2.531$, z-statistics (Wald) = -0.835, and $p < 0.05$), and $Aud\_Opinion_{it}$ ($\beta = 14.003$, z-statistics (Wald) = 5.231, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.4) return no statistically significant results when regressed with the independent variable L2.$Ln\_Aud\_Ten_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.4 below, where the independent variable L2.$Ln\_Aud\_Fee_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables AC_Size_{it} ($\beta = -2.093$, z-statistics (Wald) = -0.143, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 4.469$, z-statistics (Wald) = 2.291, and $p < 0.01$),

$Ln\_Total\_Assets_{it}$ ($\beta = -4.054$, z-statistics (Wald) = -0.424, and $p < 0.01$), Sq_Emp_{it} ($\beta = 1.797$, z-statistics (Wald) = 0.016, and $p < 0.1$), Ln_Age_{it} ($\beta = -2.102$, z-statistics (Wald) = -0.382, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -1.909$, z-statistics (Wald) = -0.339, and $p < 0.1$), and $Aud\_Opinion_{it}$ ($\beta = 13.209$, z-statistics (Wald) = 5.119, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.4) return no statistically significant results when regressed with the independent variable L2.$Ln\_Aud\_Fee_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.4 below, where the four independent variables L2.$Big4_{it}$, L2.$RNon\text{-}Audit_{it}$, L2.$Ln\_Aud\_Ten_{it}$ and L2.$Ln\_Aud\_Fee_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables AC_Size_{it} ($\beta = -1.721$, z-statistics (Wald) = -0.127, and $p < 0.1$), $Prop\_Aud\_Com\_Ind_{it}$ ($\beta = 4.196$, z-statistics (Wald) = 2.221, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ ($\beta = -4.670$, z-statistics (Wald) = -0.507, and $p < 0.01$), Sq_Emp_{it} ($\beta = 2.252$, z-statistics (Wald) = 0.021, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ ($\beta = -1.953$, z-statistics (Wald) = -0.333, and $p < 0.1$), and $Aud\_Opinion_{it}$ ($\beta = 12.082$, z-statistics (Wald) = 5.056, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.4) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued given that these variables are also used in the Altman Z2-Score model, the above regressions were re-run and the control variables $Leverage_{it}$ and ROA_{it} were omitted. The results obtained did not significantly defer to those explained in Table 7.4.

Table 7.4: Logistic Regression Results – Lagged (two years) Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L2.*Big4*$_{it}$	-2.209***				-1.655***
	(-7.354)				(-5.201)
L2.*RNon-Audit*$_{it}$		-2.660***			-2.160***
		(-4.607)			(-3.684)
L2.*Ln_Aud_Ten*$_{it}$			-0.215*		0.059
			(-1.663)		(0.414)
L2.*Ln_Aud_Fee*$_{it}$				-0.928***	-0.926***
				(-5.553)	(-4.926)
Prop_BoD_Ind$_{it}$	-1.216**	-1.118**	-1.127**	-0.813	-0.758
	(-2.515)	(-2.027)	(-2.382)	(-1.520)	(-1.274)
BoD_Financial_Expertise$_{it}$	-0.076	-0.097	-0.118	-0.250	-0.126
	(-0.339)	(-0.431)	(-0.537)	(-1.015)	(-0.481)
AC_Size$_{it}$	-0.101*	-0.124**	-0.117**	-0.143**	-0.127*
	(-1.781)	(-2.026)	(-2.095)	(-2.093)	(-1.721)
Prop_Aud_Com_Ind$_{it}$	1.826***	1.983***	1.882***	2.291***	2.221***
	(4.160)	(4.288)	(4.396)	(4.469)	(4.196)
Aud_Com_Financial_Expertise$_{it}$	-0.179	-0.097	-0.126	-0.004	0.019
	(-0.752)	(-0.398)	(-0.550)	(-0.014)	(0.067)
Prop_Segment_Sales$_{it}$	-0.252	-0.277	-0.282	-0.153	-0.151
	(-0.905)	(-0.995)	(-1.049)	(-0.512)	(-0.493)
Ln_Total_Assets$_{it}$	-0.193***	-0.110	-0.098	-0.424***	-0.507***
	(-2.749)	(-1.503)	(-1.456)	(-4.054)	(-4.670)
Sq_Emp$_{it}$	0.015*	0.019**	0.014*	0.016*	0.021**
	(1.808)	(2.138)	(1.679)	(1.797)	(2.252)
Ln_Age$_{it}$	-0.376**	-0.403**	-0.426***	-0.382**	-0.263
	(-2.261)	(-2.373)	(-2.611)	(-2.102)	(-1.366)
Earnings_Quality_EQ$_{it}$	-0.293*	-0.323**	-0.328**	-0.339*	-0.333*
	(-1.862)	(-1.961)	(-1.961)	(-1.909)	(-1.953)
Loss$_{it}$	0.265	0.190	0.352	0.426	0.217
	(1.099)	(0.793)	(1.455)	(1.537)	(0.772)
Leverage$_{it}$	-0.011	-0.014	-0.015	-0.025	-0.023
	(-0.621)	(-0.872)	(-0.776)	(-1.100)	(-1.201)
ROA$_{it}$	-0.735**	-0.722**	-0.835**	-0.598	-0.411
	(-2.377)	(-2.394)	(-2.531)	(-1.634)	(-1.348)
Aud_Opinion$_{it}$	5.111***	5.231***	5.231***	5.119***	5.056***
	(13.301)	(14.409)	(14.003)	(13.209)	(12.082)
Constant	-2.135	-0.530	-0.561	3.149**	1.928
	(-1.636)	(-0.384)	(-0.445)	(2.019)	(1.196)
Observations	1,172	1,172	1,172	1,172	1,172
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-327.2	-331.5	-346.8	-290.5	-266.9
Pseudo_R2	0.563	0.557	0.537	0.564	0.599

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [16]*, Column 2 based on *Equation [17]*, Column 3 based on *Equation [18]*, Column 4 based on *Equation [19]* and Column 5 based on *Equation [20]*.

$$Z2_{it} = \beta 0+\beta_1 L2.Big4it+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [16]$$

$$Z2_{it} = \beta 0+\beta_1 L2.RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [17]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [18]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+ \beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [19]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Big4_{it}+\beta_2 L2.RNon\_Audit_{it}+\beta_3 L2.Ln\_Aud\_Ten_{it}+\beta_4 L2.Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+ \beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [20]$$

7.2.4.3 Summary

As shown in Table 7.4 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.563, 0.557, 0.537, 0.564 and 0.599 respectively. This implies that the lagged independent variables in the regression models explain 56.3%, 55.7%, 53.7%, 56.4% and 59.9% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -2) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.4 using the Altman Z2-Score model provide support for the hypotheses H_{5b}, H_{6b}, H_{7b}, and H_{8b} showing that lagged (T – 2) big 4 auditor (L2.$Big4_{it}$), lagged (T – 2) the provision for non-audit services (L2.$RNon\text{-}Audit_{it}$), lagged (T – 2) auditor tenure (L2.$Ln\_Aud\_Ten_{it}$) and lagged (T – 2) audit fee (L2.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.5 Existence of a lagged three-years key auditor attribute impact on financial distress in year zero: The Altman Base Model

Table 7.5 below presents the results of binary logistic regressions where the lagged three-years (T_{-3}) four key auditor attributes used in this study (the existence of a Big 4 auditor (L3.$Big4_{it}$), the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L3.$RNon\text{-}Audit_{it}$), the natural log of the actual number of years the auditor (audit firm) held office (L3.$Ln\_Aud\_Ten_{it}$), and the natural log of the total audit fee paid to the auditor (L3.$Ln\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score models with added control variables.

7.2.5.1 Independent variables

As shown in column 1 of Table 7.5 below, the coefficient of the lagged three years (T–3) independent variable Big 4 auditor (L3.$Big4_{it}$) is reported to be negative and statistically significant (β = -5.566, z-statistics (Wald) = -1.859, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a Big 4 auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 52.3% (that is, Pseudo R^2 of 0.523).

Column 2 of Table 7.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the provision for non-audit services, calculated as the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor (L3.$RNon\text{-}Audit_{it}$) is reported to be negative and statistically significant (β = -5.341, z-statistics (Wald) = -2.985, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 53.1% (that is, Pseudo R^2 of 0.531).

Column 3 of Table 7.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the natural log of the actual number of years the auditor (audit firm) held office (L3.$Ln\_Aud\_Ten_{it}$) is reported to be negative and statistically significant (β = -2.264, z-statistics (Wald) = -0.298, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, audit firm tenure in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 50.3% (that is, Pseudo R^2 of 0.503).

Column 4 of Table 7.5 below shows the coefficient of the lagged three years (T–3) independent variable proxying the natural log of the total audit fee paid to the auditor (L3.*Ln_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -4.478, z-statistics (Wald) = -0.790, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in audit fee paid to the auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 51.9% (that is, Pseudo R^2 of 0.519).

Last column 5 of Table 7.5 shows that when all four lagged three years (T–3) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L3.*Big4*$_{it}$ - β = -3.303, z-statistics (Wald) = -1.188, and $p < 0.01$, L3.*RNon-Audit*$_{it}$ - β = -4.199, z-statistics (Wald) = -2.386, and $p < 0.01$ and L3.*Ln_Aud_Fee*$_{it}$ - β = -3.781, z-statistics (Wald) = -0.702, and $p < 0.01$) and an overall goodness-of-fit of 55.7% (that is, Pseudo R^2 of 0.557) which implies that that unison effect of three of the four independent variables (namely L3.*Big4*$_{it}$, L3.*RNon-Audit*$_{it}$ and L3.*Ln_Aud_Fee*$_{it}$ in the year T_{-3} affect the Altman Z2-Score in the year T_0 by 55.7%. Column 5 of Table 7.5 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L3.*Ln_Aud_Ten*$_{it}$ - β = -0.483, z-statistics (Wald) = -0.073 and $p > 0.1$). This is consistent with Table 7.4 when a lag of two-years was used.

7.2.5.2 Control variables

As shown in column 1 of Table 7.5 below, where the independent variable L3.*Big4*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.368, z-statistics (Wald) = -1.300, and $p < 0.05$), *AC_Size*$_{it}$ (β = -2.283, z-statistics (Wald) = -0.147, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.772, z-statistics (Wald) = 1.841, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -3.052, z-statistics (Wald) = -0.227, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -1.667, z-statistics (Wald) = -0.225, and $p < 0.1$), *ROA*$_{it}$ (β = -1.710, z-statistics (Wald) = -0.439, and $p < 0.1$), and *Aud_Opinion*$_{it}$ (β = 11.778, z-statistics (Wald) = 4.970, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.5) return no statistically significant results when regressed with the independent variable L3.*Big4*$_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.5 below, where the independent variable L3.*RNon-Audit*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.082, z-statistics (Wald) = -1.254, and $p < 0.05$), *AC_Size*$_{it}$ (β = -2.379, z-statistics (Wald) = -0.161, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.543, z-statistics (Wald) = 1.935, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -2.236, z-statistics (Wald) = -0.166, and $p < 0.05$), *Earnings_Quality_EQ*$_{it}$ (β = -1.717, z-statistics (Wald) = -0.269, and $p < 0.1$), *ROA*$_{it}$ (β = -1.921, z-statistics (Wald) = -0.497, and $p < 0.1$), and *Aud_Opinion*$_{it}$ (β = 13.191, z-statistics (Wald) = 4.988, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.5) return no statistically significant results when regressed with the independent variable L3.*RNon-Audit*$_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.5 below, where the independent variable L3.*Ln_Aud_Ten*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -2.257, z-statistics (Wald) = -1.212, and $p < 0.05$), *AC_Size*$_{it}$ (β = -2.521, z-statistics (Wald) = -0.162, and $p < 0.05$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.785, z-statistics (Wald) = 1.807, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -2.072, z-statistics (Wald) = -0.142, and $p < 0.05$), *Sq_Emp*$_{it}$ (β = 1.648, z-statistics (Wald) = 0.015, and $p < 0.1$), *Earnings_Quality_EQ*$_{it}$ (β = -1.748, z-statistics (Wald) = -00.251, and $p < 0.1$), *ROA*$_{it}$ (β = -1.939, z-statistics (Wald) = -0.557, and $p < 0.1$), and *Aud_Opinion*$_{it}$ (β = 12.237, z-statistics (Wald) = 4.977, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.5) return no statistically significant results when regressed with the independent variable L3.*Ln_Aud_Ten*$_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.5 below, where the independent variable L3.*Ln_Aud_Fee*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *AC_Size*$_{it}$ (β = -2.725, z-statistics (Wald) = -0.175, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 3.808, z-statistics (Wald) = 1.863, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -3.913, z-statistics (Wald) = -0.390, and $p < 0.01$), and *Aud_Opinion*$_{it}$ (β = 11.763, z-statistics (Wald) = 4.808, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.5) return no statistically significant results when regressed with the independent variable L3.*$Ln\_Aud\_Fee_{it}$* against the Altman Z2-Score.

Last from column 5 of Table 7.5 below, where the four independent variables L3.*$Big4_{it}$*, L3.*$RNon\text{-}Audit_{it}$*, L3.*$Ln\_Aud\_Ten_{it}$* and L3.*$Ln\_Aud\_Fee_{it}$* are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *AC_Size_{it}* (β = -2.337, z-statistics (Wald) = -0.162, and $p < 0.05$), *$Prop\_Aud\_Com\_Ind_{it}$* (β = 3.320, z-statistics (Wald) = 1.882, and $p < 0.01$), *$Ln\_Total\_Assets_{it}$* (β = -4.026, z-statistics (Wald) = -0.426, and $p < 0.01$), and *$Aud\_Opinion_{it}$* (β = 10.937, z-statistics (Wald) = 4.855, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.5) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Since the inclusions of variables representing financial leverage *$Leverage_{it}$* and return on assets *ROA_{it}* can be argued given that these variables are also used in the Altman Z2-Score model, the above regressions were re-run and the control variables *$Leverage_{it}$* and *ROA_{it}* were omitted. The results obtained did not significantly defer to those explained in Table 7.5.

Table 7.5: Logistic Regression Results – Lagged (three years) Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L3.*Big4*$_{it}$	-1.859***				-1.188***
	(-5.566)				(-3.303)
L3.*RNon-Audit*$_{it}$		-2.985***			-2.386***
		(-5.341)			(-4.199)
L3.*Ln_Aud_Ten*$_{it}$			-0.298**		-0.073
			(-2.264)		(-0.483)
L3.*Ln_Aud_Fee*$_{it}$				-0.790***	-0.702***
				(-4.478)	(-3.781)
Prop_BoD_Ind$_{it}$	-1.300**	-1.254**	-1.212**	-0.737	-0.958
	(-2.368)	(-2.082)	(-2.257)	(-1.295)	(-1.478)
BoD_Financial_Expertise$_{it}$	0.125	0.112	0.088	0.088	0.231
	(0.520)	(0.454)	(0.374)	(0.342)	(0.831)
AC_Size$_{it}$	-0.147**	-0.161**	-0.162**	-0.175***	-0.162**
	(-2.283)	(-2.379)	(-2.521)	(-2.725)	(-2.337)
Prop_Aud_Com_Ind$_{it}$	1.841***	1.935***	1.807***	1.863***	1.882***
	(3.772)	(3.543)	(3.785)	(3.808)	(3.320)
Aud_Com_Financial_Expertise$_{it}$	-0.403	-0.328	-0.371	-0.115	-0.180
	(-1.510)	(-1.199)	(-1.434)	(-0.432)	(-0.617)
Prop_Segment_Sales$_{it}$	-0.314	-0.366	-0.411	-0.480	-0.461
	(-1.137)	(-1.317)	(-1.472)	(-1.524)	(-1.499)
Ln_Total_Assets$_{it}$	-0.227***	-0.166**	-0.142**	-0.390***	-0.426***
	(-3.052)	(-2.236)	(-2.072)	(-3.913)	(-4.026)
Sq_Emp$_{it}$	0.014	0.014	0.015*	0.016	0.016
	(1.525)	(1.524)	(1.648)	(1.581)	(1.514)
Ln_Age$_{it}$	-0.251	-0.298	-0.298	-0.148	-0.022
	(-1.330)	(-1.578)	(-1.607)	(-0.747)	(-0.104)
Earnings_Quality_EQ$_{it}$	-0.225*	-0.269*	-0.251*	-0.205	-0.207
	(-1.667)	(-1.717)	(-1.748)	(-1.598)	(-1.607)
Loss$_{it}$	0.049	-0.024	0.069	0.060	-0.001
	(0.204)	(-0.097)	(0.283)	(0.224)	(-0.004)
Leverage$_{it}$	0.009	0.012	-0.000	-0.001	0.003
	(0.334)	(0.502)	(-0.004)	(-0.037)	(0.096)
ROA$_{it}$	-0.439*	-0.497*	-0.557*	-0.317	-0.242
	(-1.710)	(-1.921)	(-1.939)	(-1.092)	(-0.969)
Aud_Opinion$_{it}$	4.970***	4.988***	4.977***	4.808***	4.855***
	(11.778)	(13.191)	(12.237)	(11.763)	(10.937)
Constant	-2.702*	-1.074	-1.104	2.049	1.142
	(-1.948)	(-0.755)	(-0.832)	(1.324)	(0.672)
Observations	948	948	948	948	948
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-289.8	-284.8	-302.0	-261.0	-240.6
Pseudo_R2	0.523	0.531	0.503	0.519	0.557

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [21]*, Column 2 based on *Equation [22]*, Column 3 based on *Equation [23]*, Column 4 based on *Equation [24]* and Column 5 based on *Equation [25]*.

$$Z2_{it} = \beta 0+\beta_1 L3.Big4it+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [21]$$

$$Z2_{it} = \beta 0+\beta_1 L3.RNon\_Audit_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [22]$$

$$Z2_{it} = \beta 0+\beta_1 L3.Ln\_Aud\_Ten_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [23]$$

$$Z2_{it} = \beta 0+\beta_1 L3.Ln\_Aud\_Fee_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon i_t \quad [24]$$

$$Z2_{it} = \beta 0+\beta_1 L3.Big4_{it}+\beta_2 L3.RNon\_Audit_{it}+\beta_3 L3.Ln\_Aud\_Ten_{it}+\beta_4 L3.Ln\_Aud\_Fee_{it}+\beta_5 Prop\_BoD\_Ind_{it}+\beta_6 BoD\_Financial\_Expertise_{it}+\beta_7 AC\_Size_{it}+\beta_8 Prop\_Aud\_Com\_Ind_{it}+\beta_9 Aud\_Com\_Financial\_Expertise_{it}+\beta_{10} Prop\_Segment\_Sales_{it}+\beta_{11} Ln\_Total\_Assets_{it}+\beta_{12} Sq\_Emp_{it}+\beta_{13} Ln\_Age_{it}+\beta_{14} Earnings\_Quality\_EQ_{it}+\beta_{15} Loss_{it}+\beta_{16} Leverage_{it}+\beta_{17} ROA_{it}+\beta_{18} Aud\_Opinion_{it}+\beta_{19} Industry_{it}+\beta_{20} Year_{it}+\varepsilon i_t \quad [25]$$

7.2.5.3 Summary

As shown in Table 7.5 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.523, 0.531, 0.503, 0.519 and 0.557 respectively. This implies that the lagged independent variables in the regression models explain 52.3%, 53.1%, 50.3%, 51.9% and 55.7% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -3) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.5 using the Altman Z2-Score model provide support for the hypotheses H_{5c}, H_{6c}, H_{7c}, and H_{8c} showing that lagged (T – 3) big 4 auditor (L3.$Big4_{it}$), lagged (T – 3) the provision for non-audit services (L3.$RNon\text{-}Audit_{it}$), lagged (T – 3) auditor tenure (L3.$Ln\_Aud\_Ten_{it}$) and lagged (T – 3) audit fee (L3.$Ln\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.6 Existence of a key auditor attribute (using alternative measures) impact on financial distress: The Zmijewski Base Model

Table 7.6 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (auditor specialist (*$Aud\_Spec\_30_{it}$*), the provision of non-audit services (*$Cnon\_Audit_{it}$*), audit partner tenure (*$Ln\_Aud\_Part\_Ten_{it}$*), and proportion of audit fee paid / total assets (*$Prop\_Aud\_Fee_{it}$*), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with no control variables.

7.2.6.1 Independent variables

As shown in column 1 of Table 7.6 below, the coefficient of the independent variable auditor specialist (*$Aud\_Spec\_30_{it}$*) is reported to be negative and statistically significant (β = -14.131, z-statistics (Wald) = -1.069, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, the use of a specialist auditor decreases the likelihood of financial distress with a goodness-of-fit of 3.18% (that is, Pseudo R^2 of 0.06318).

Column 2 of Table 7.6 below shows the coefficient of the independent variable proxying for the provision of non-audit services (*$Cnon\_Audit_{it}$*) is reported to be negative and statistically significant (β = -16.829, z-statistics (Wald) = -1.005, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 4.33% (that is, Pseudo R^2 of 0.0433).

Column 3 of Table 7.6 below shows the coefficient of the independent variable proxying for the number of years the audit partner held office (*$Ln\_Aud\_Part\_Ten_{it}$*) is reported to be negative and statistically significant (β = -20.760, z-statistics (Wald) = -0.362, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, audit partner tenure decreases the likelihood of financial distress with a goodness-of-fit of 6.73% (that is, Pseudo R^2 of 0.0673).

Column 4 of Table 6.1 below shows the coefficient of the independent variable proxying the proportion of audit fee paid / total assets held by firm (*$Prop\_Aud\_Fee_{it}$*) is reported to be negative and statistically significant (β = -7.884, z-statistics (Wald) = -6.524, and $p < 0.01$). This result is as expected and implies that with the use of no control variable the higher the proportion of audit fee paid to the auditor to total assets, the higher the likelihood of financial distress with a goodness-of-fit of 8.21% (that is, Pseudo R^2 of 0.00821).

Last column 5 of Table 7.6 shows that when all four independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (*Aud_Spec_30$_{it}$* - β = -14.432, z-statistics (Wald) = -1.293, and p < 0.01, *Cnon_Audit$_{it}$* - β = -15.026, z-statistics (Wald) = -1.158, and p < 0.01, *Ln_Aud_Part_Ten$_{it}$* - β = -17.544, z-statistics (Wald) = -0.389 and p < 0.01, *Prop_Aud_Fee$_{it}$* - β = -7.067, z-statistics (Wald) = -5.793, and p < 0.01) and an overall goodness-of-fit of 22.8% (that is, Pseudo R^2 of 0.228) which implies that that unison effect of all four independent variables affect the Zmijewski ZFC-Score by 22.80%.

Table 7.6: Logistic Regression Results – Alternative measure of key Auditor Attributes and Zmijewski ZFC Score – Base Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
Aud_Spec_30$_{it}$	-1.069***				-1.293***
	(-14.131)				(-14.432)
Cnon_Audit$_{it}$		-1.005***			-1.158***
		(-16.829)			(-15.026)
Ln_Aud_Part_Ten$_{it}$			-0.362***		-0.389***
			(-20.760)		(-17.544)
Prop_Aud_Fee$_{it}$				-6.524***	-5.793***
				(-7.884)	(-7.067)
Constant	0.216***	-0.431***	1.066***	0.480***	1.266***
	(6.665)	(-11.072)	(17.763)	(7.802)	(14.153)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-3276	-3238	-3156	-2466	-2074
Pseudo_R2	0.0318	0.0433	0.0673	0.0821	0.228

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [30]*, Column 2 based on *Equation [31]*, Column 3 based on *Equation [32]*, Column 4 based on *Equation [33]* and Column 5 based on *Equation [34]*.

$$ZFC_{it} = \beta0 + \beta1\ Aud\_Spec\_30_{it} + \varepsilon_{it} \quad [30]$$

$$ZFC_{it} = \beta0 + \beta1\ Cnon\_Audit_{it} + \varepsilon_{it} \quad [31]$$

$$ZFC_{it} = \beta0 + \beta1\ Ln\_Aud\_Part\_Ten_{it} + \varepsilon_{it} \quad [32]$$

$$ZFC_{it} = \beta0 + \beta1\ Prop\_Aud\_Fee_{it} + \varepsilon_{it} \quad [33]$$

$$ZFC_{it} = \beta0 + \beta1\ Aud\_Spec\_30_{it} + \beta2\ Cnon\_Audit_{it} + \beta3\ Ln\_Aud\_Part\_Ten_{it} + \beta4\ Prop\_Aud\_Fee_{it} + \varepsilon_{it} \quad [34]$$

7.2.6.2 Summary

As shown in Table 7.6 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0318, 0.0433, 0.0673, 0.0821 and 0.228 respectively. This implies that the independent variables in the regression models explain 3.18%, 4.33%, 6.73%, 8.21%

and 22.8% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply all four auditor attributes (using alternative measures) under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.6 using the Zmijewski ZFC-Score model support the findings of Chapter Six in providing support for the hypotheses H_1, H_2, H_3 and H_4 showing that specialist auditors ($Aud\_Spec\_30_{it}$), the provision of non-audit services ($Cnon\_Audit_{it}$), audit partner tenure ($Ln\_Aud\_Part\_Ten_{it}$) and proportion of audit fee paid to total assets ($Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.7 Existence of a key auditor (using alternative measures) impact on financial distress: The Zmijewski Full Model

Table 7.7 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a specialist auditor ($Aud\_Spec\_30_{it}$), the provision of non-audit services ($Cnon\_Audit_{it}$), audit partner tenure ($Ln\_Aud\_Part\_Ten_{it}$), and proportion of audit fee paid / total assets ($Prop\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

7.2.7.1 Independent variables

As shown in column 1 of Table 7.7 below, the coefficient of the independent variable auditor specialist ($Aud\_Spec\_30_{it}$) is reported to be negative and statistically significant (β = -15.550, z-statistics (Wald) = -1.310, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor decreases the likelihood of financial distress with a goodness-of-fit of 10.5% (that is, Pseudo R^2 of 0.105).

Column 2 of Table 7.7 below shows the coefficient of the independent variable proxying for the provision of non-audit services ($Cnon\_Audit_{it}$) is reported to be negative and statistically significant (β = -14.536, z-statistics (Wald) = -0.993, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 9.89% (that is, Pseudo R^2 of 0.0989).

Column 3 of Table 7.7 below shows the coefficient of the independent variable proxying for the number of years the audit partner held office (*$Ln\_Aud\_Part\_Ten_{it}$*) is reported to be negative and statistically significant (β = -16.141, z-statistics (Wald) = -0.357, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the duration of audit partner tenure decreases the likelihood of financial distress with a goodness-of-fit of 10.7% (that is, Pseudo R^2 of 0.107).

Column 4 of Table 7.7 below shows the coefficient of the independent variable proxying for the proportion of audit fee paid / total assets held by firm (*$Prop\_Aud\_Fee_{it}$*) is reported to be negative and statistically significant (β = -4.854, z-statistics (Wald) = -5.772, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor to total assets of the auditee decreases the likelihood of financial distress with a goodness-of-fit of 11.2% (that is, Pseudo R^2 of 0.2112).

Last column 5 of Table 7.7 shows that when all four independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (*$Aud\_Spec\_30_{it}$* - β = -12.753, z-statistics (Wald) = -1.271, and $p < 0.01$, *$Cnon\_Audit_{it}$* - β = -13.234, z-statistics (Wald) = -1.134, and $p < 0.01$, *$Ln\_Aud\_Part\_Ten_{it}$* - β = -14.120, z-statistics (Wald) = -0.382 and $p < 0.01$, *$Prop\_Aud\_Fee_{it}$* - β = -4.450, z-statistics (Wald) = -4.815, and $p < 0.01$) and an overall goodness-of-fit of 24.9% (that is, Pseudo R^2 of 0.249) which implies that that unison effect of all four independent variables affect the Zmijewski ZFC-Score by 24.9%.

7.2.7.2 Control variables

As shown in column 1 of Table 7.7 below, where the independent variable *$Aud\_Spec\_30_{it}$* is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *$CEO\_Duality_{it}$* (β = 6.888, z-statistics (Wald) = -0.504, and $p < 0.01$), *Aud_Com_{it}* (β = -2.110, z-statistics (Wald) = -0.170, and $p < 0.05$), *$No\_Geographic\_Segments_{it}$* (β = -8.468, z-statistics (Wald) = -0.265, and $p < 0.01$), *$Ln\_Market\_Cap_{it}$* (β = -9.446, z-statistics (Wald) = -0.233, and $p < 0.01$) and *Ln_Sales_{it}* (β = -3.748, z-statistics (Wald) = -0.071, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.7) return no statistically significant results when regressed with the independent variable

$Aud\_Spec\_30_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 7.7 below, where the independent variable $Cnon\_Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables BoD_Tenure_{it} (β = 1.831, z-statistics (Wald) = 0.027, and $p < 0.1$), $CEO\_Duality_{it}$ (β = -4.338, z-statistics (Wald) = -0.324, and $p < 0.01$), $Aud\_Com\_Meet_{it}$ (β = -1.918, z-statistics (Wald) = -0.060, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -6.952, z-statistics (Wald) = -0.215, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -10.272, z-statistics (Wald) = -0.241, and $p < 0.01$) and Ln_Sales_{it} (β = -2.785, z-statistics (Wald) = -0.052, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.7) return no statistically significant results when regressed with the independent variable $Cnon\_Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 7.7 below, where the independent variable $Ln\_Aud\_Part\_Ten_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables Aud_Com_{it} (β = -1.786, z-statistics (Wald) = -0.147, and $p < 0.1$), $Aud\_Com\_Meet_{it}$ (β = -4.087, z-statistics (Wald) = -0.131, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ (β = -8.651, z-statistics (Wald) = -0.273, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.729, z-statistics (Wald) = -0.190, and $p < 0.01$) and Ln_Sales_{it} (β = -3.682, z-statistics (Wald) = -0.068, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.7) return no statistically significant results when regressed with the independent variable $Ln\_Aud\_Part\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 7.7 below, where the independent variable $Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables BoD_Tenure_{it} (β = 1.820, z-statistics (Wald) = 0.028, and $p < 0.1$), $CEO\_Duality_{it}$ (β = -2.081, z-statistics (Wald) = -00.175, and $p < 0.05$), $No\_Geographic\_Segments_{it}$ (β = -7.614, z-statistics (Wald) = -0.266, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -3.535, z-statistics (Wald) = -0.113, and $p < 0.01$) and Ln_Sales_{it} (β = -2.383, z-statistics (Wald) = -0.050, and $p < 0.05$).

The remaining control variables (as per column 4 of Table 7.7) return no statistically significant results when regressed with the independent variable $Prop\_Aud\_Fee_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 7.7 below, where the four independent variables $Aud\_Spec\_30_{it}$, $Cnon\_Audit_{it}$, $Ln\_Aud\_Part\_Ten_{it}$ and $Prop\_Aud\_Fee_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables BoD_Tenure_{it} (β = 1.684, z-statistics (Wald) = 0.030, and $p < 0.1$), Aud_Com_{it} (β = -1.747, z-statistics (Wald) = -0.176, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -8.071, z-statistics (Wald) = -0.315, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -3.173, z-statistics (Wald) = -0.114, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.7) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Table 7.7: Logistic Regression Results – Alternative measures of key auditor attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
$Aud\_Spec\_30_{it}$	-1.310***				-1.271***
	(-15.550)				(-12.753)
$Cnon\_Audit_{it}$		-0.993***			-1.134***
		(-14.536)			(-13.234)
$Ln\_Aud\_Part\_Ten_{it}$			-0.357***		-0.382***
			(-16.141)		(-14.120)
$Prop\_Aud\_Fee_{it}$				-5.772***	-4.450***
				(-4.854)	(-4.815)
$BoD\_Tenurei_{t}$	0.025	0.027*	0.019	0.028*	0.030*
	(1.613)	(1.831)	(1.307)	(1.820)	(1.684)
$CEO\_Duality_{it}$	-0.504***	-0.324***	0.110	-0.175**	0.059
	(-6.888)	(-4.338)	(1.394)	(-2.081)	(0.616)
Aud_Com_{it}	-0.170**	-0.065	-0.147*	-0.094	-0.176*
	(-2.110)	(-0.801)	(-1.786)	(-1.028)	(-1.747)
$Aud\_Com\_Meet_{it}$	-0.008	-0.060*	-0.131***	-0.016	-0.001
	(-0.264)	(-1.918)	(-4.087)	(-0.479)	(-0.030)
$No\_Geographic\_Segments_{it}$	-0.265***	-0.215***	-0.273***	-0.266***	-0.315***
	(-8.468)	(-6.952)	(-8.651)	(-7.614)	(-8.071)
$Ln\_Market\_Cap_{it}$	-0.233***	-0.241***	-0.190***	-0.113***	-0.114***
	(-9.446)	(-10.272)	(-7.729)	(-3.535)	(-3.173)
Ln_Sales_{it}	-0.071***	-0.052***	-0.068***	-0.050**	-0.007
	(-3.748)	(-2.785)	(-3.682)	(-2.383)	(-0.303)
Constant	-4.345***	-5.015***	-2.950***	-2.087***	-0.349
	(-11.086)	(-13.192)	(-7.231)	(-3.702)	(-0.558)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-2544	-2563	-2539	-2055	-1738
Pseudo_R2	0.105	0.0989	0.107	0.112	0.249

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [35]*, Column 2 based on *Equation [36]*, Column 3 based on *Equation [37]*, Column 4 based on *Equation [38]* and Column 5 based on *Equation [39]*.

$$ZFC_{it} = \beta_0+\beta_1 Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [35]$$

$$ZFC_{it} = \beta_0+\beta_1 CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [36]$$

$$ZFC_{it} = \beta_0+\beta 1Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [37]$$

$$ZFC_{it} = \beta_0+\beta 1Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [38]$$

$$ZFC_{it} = \beta_0+\beta_1 Aud\_Spec\_30_{it}+\beta_2 CNon\_Audit_{it}+\beta_3 Ln\_Aud\_Part\_Ten_{it}+\beta_4 Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it} +\varepsilon_{it} \quad [39]$$

7.2.7.3 Summary

As shown in Table 7.7 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.105, 0.0989, 0.107, 0.112 and 0.249 respectively. This implies that the independent variables in the regression models explain 10.5%, 9.89%, 10.7%, 11.2% and 24.9% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.7 using alternative measures for the four key auditor attributes and the Zmijewski ZFC-Score model support the findings of Chapter Six in providing support for the hypotheses H_1, H_2, H_3, and H_4 showing that auditor specialization (*Aud_Spec_30*$_{it}$), the provision of non-audit services (*Cnon_Audit*$_{it}$), audit partner tenure (*Ln_Aud_Part_Ten*$_{it}$) and proportion of audit fee paid by the auditee to total assets of the auditee (*Prop_Aud_Fee*$_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.8 Existence of a lagged one-year key auditor attribute (using alternative measures) impact on financial distress in year zero: The Zmijewski Full Model

Table 7.8 below presents the results of binary logistic regressions where the lagged one year (T_{-1}) four key auditor attributes used in this study (the existence of a specialist auditor (L.*Aud_Spec_30*$_{it}$), the provision of non-audit services (L.*Cnon_Audit*$_{it}$), audit partner tenure (L.*Ln_Aud_Part_Ten*$_{it}$), and the proportion of audit fee paid to the auditor over total assets of the auditee (L.*Prop_Aud_Fee*$_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

7.2.8.1 Independent variables

As shown in column 1 of Table 7.8 below, the coefficient of the lagged one year (T–1) independent variable auditor specialization (L.*Aud_Spec_30*$_{it}$) is reported to be negative and statistically significant (β = -5.686, z-statistics (Wald) = -0.730, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 7.79% (that is, Pseudo R^2 of 0.0779).

Column 2 of Table 7.8 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the provision of non-audit services (L.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -6.546, z-statistics (Wald) = -0.684, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 8.23% (that is, Pseudo R^2 of 0.0823).

Column 3 of Table 7.8 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the number of years the audit partner held office (L.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative though statistically significant (β = -0.798, z-statistics (Wald) = -0.028, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, the audit partner tenure in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.44% (that is, Pseudo R^2 of 0.0644).

Column 4 of Table 7.8 below shows the coefficient of the lagged one year (T–1) independent variable proxying the proportion of audit fee paid / total assets held by the auditee (L.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -2.670, z-statistics (Wald) = -1.772, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over total assets of the auditee in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 9.27% (that is, Pseudo R^2 of 0.0927).

Last column 5 of Table 7.8 shows that when all four lagged one year (T–1) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (L.*Aud_Spec_30*$_{it}$ - β = -5.547, z-statistics (Wald) = -0.768, and $p < 0.01$, L.*Cnon_Audit*$_{it}$ - β = -5.999, z-statistics (Wald) = -0.694, and $p < 0.01$, L.*Ln_Aud_Part_Ten*$_{it}$ - β = -1.058, z-statistics (Wald) = -0.043 and $p < 0.1$, L.*Prop_Aud_Fee*$_{it}$ - β = -2.479, z-statistics (Wald) = -1.891, and $p < 0.05$) and an overall goodness-of-fit of 12.7% (that is, Pseudo R^2 of 0.127) which implies that that unison effect of all four independent variables in the year T_{-1} affect the Zmijewski ZFC-Score in the year T_0 by 12.7%.

7.2.8.2 Control variables

As shown in column 1 of Table 7.8 below, where the independent variable L.$Aud\_Spec\_30_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -5.418, z-statistics (Wald) = -0.254, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.837, z-statistics (Wald) = -0.264, and $p < 0.01$) and Ln_Sales_{it} (β = -2.318, z-statistics (Wald) = -0.062, and $p < 0.05$).

The remaining control variables (as per column 1 of Table 7.8) return no statistically significant results when regressed with the independent variable L.$Aud\_Spec\_30_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 7.8 below, where the independent variable L.$Cnon\_Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables, $Aud\_Com\_Meet_{it}$ (β = -1.834, z-statistics (Wald) = -0.085, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -5.353, z-statistics (Wald) = -0.248, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.954, z-statistics (Wald) = -0.262, and $p < 0.01$) and Ln_Sales_{it} (β = -2.324, z-statistics (Wald) = -0.061, and $p < 0.05$).

The remaining control variables (as per column 2 of Table 7.8) return no statistically significant results when regressed with the independent variable L.$Cnon\_Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 7.8 below, where the independent variable L.$Ln\_Aud\_Part\_Ten_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -1.803, z-statistics (Wald) = -0.083, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -5.645, z-statistics (Wald) = -0.261, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.492, z-statistics (Wald) = -0.250, and $p < 0.01$) and Ln_Sales_{it} (β = -2.629, z-statistics (Wald) = -0.069, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.8) return no statistically significant results when regressed with the independent variable L.$Ln\_Aud\_Part\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 7.8 below, where the independent variable L.$Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-

Score, control variables which are reported to have statistical significance include the variables *No_Geographic_Segments*$_{it}$ (β = -5.093, z-statistics (Wald) = -0.271, and $p < 0.01$) and *Ln_Market_Cap*$_{it}$ (β = -5.590, z-statistics (Wald) = -0.221, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.8) return no statistically significant results when regressed with the independent variable L.*Prop_Aud_Fee*$_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 7.8 below, where the four independent variables L.*Aud_Spec_30*$_{it}$, L.*Cnon_Audit*$_{it}$, L.*Ln_Aud_Part_Ten*$_{it}$ and L.*Prop_Aud_Fee*$_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *No_Geographic_Segments*$_{it}$ (β = -4.744, z-statistics (Wald) = -0.258, and $p < 0.01$) and *Ln_Market_Cap*$_{it}$ (β = -5.910, z-statistics (Wald) = -0.240, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.8) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Table 7.8: Logistic Regression Results – Lagged (one year) Alternative Measure of Key Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L.$Aud\_Spec\_30_{it}$	-0.730***				-0.768***
	(-5.686)				(-5.547)
L.$Cnon\_Audit_{it}$		-0.684***			-0.694***
		(-6.546)			(-5.999)
L.$Ln\_Aud\_Part\_Ten_{it}$			-0.028*		-0.043
			(-0.798)		(-1.058)
L.$Prop\_Aud\_Fee_{it}$				-1.772***	-1.891**
				(-2.670)	(-2.479)
BoD_Tenure_{it}	0.030	0.025	0.027	0.027	0.030
	(1.346)	(1.154)	(1.259)	(1.257)	(1.302)
$CEO\_Duality_{it}$	-0.032	0.039	0.021	0.085	0.085
	(-0.260)	(0.307)	(0.173)	(0.619)	(0.605)
Aud_Com_{it}	-0.134	-0.131	-0.125	-0.155	-0.188
	(-1.094)	(-1.058)	(-1.028)	(-1.146)	(-1.354)
$Aud\_Com\_Meeti_{t}$	-0.054	-0.085*	-0.083*	-0.044	-0.024
	(-1.161)	(-1.834)	(-1.803)	(-0.915)	(-0.494)
$No\_Geographic\_Segments_{it}$	-0.254***	-0.248***	-0.261***	-0.271***	-0.258***
	(-5.418)	(-5.353)	(-5.645)	(-5.093)	(-4.744)
$Ln\_Market\_Cap_{it}$	-0.264***	-0.262***	-0.250***	-0.221***	-0.240***
	(-7.837)	(-7.954)	(-7.492)	(-5.590)	(-5.910)
Ln_Sales_{it}	-0.062**	-0.061**	-0.069***	-0.038	-0.010
	(-2.318)	(-2.324)	(-2.629)	(-1.293)	(-0.323)
Constant	-4.631***	-4.988***	-4.570***	-3.550***	-3.467***
	(-7.821)	(-8.501)	(-7.396)	(-4.909)	(-4.565)
Observations	2,082	2,082	2,082	2,082	2,082
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-1109	-1104	-1125	-933.4	-898.4
Pseudo_R2	0.0779	0.0823	0.0644	0.0927	0.127

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [40]*, Column 2 based on *Equation [41]*, Column 3 based on *Equation [42]*, Column 4 based on *Equation [43]* and Column 5 based on *Equation [44]*.

$$ZFC_{it} = \beta 0+\beta_1 \text{L.Aud\_Spec\_30}_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [40]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L.}CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [41]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L.}Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [42]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L.}Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [43]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L.}Aud\_Spec\_30_{it}+\beta_2 \text{L.}CNon\_Audit_{it}+\beta_3 \text{L.}Ln\_Aud\_Partner\_Ten_{it}+\beta_4 \text{L.}Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it}+\varepsilon_{it} \quad [44]$$

7.2.8.3 Summary

As shown in Table 7.8 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0779, 0.0823, 0.0644, 0.0927 and 0.127 respectively. This implies that the lagged independent variables in the regression models explain 7.79%, 8.23%, 6.44%, 9.27% and 12.7% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -1) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.8 using the Zmijewski ZFC-Score model support the findings of Chapter Six in providing support for the hypotheses H_{5a}, H_{6a}, H_{7a}, and H_{8a} showing that lagged (T – 1) auditor specialization (L.*Aud_Spec_30*$_{it}$), lagged (T – 1) the provision of non-audit services (L.*Cnon_Audit*$_{it}$), lagged (T – 1) audit partner tenure (L.*Ln_Aud_Part_Ten*$_{it}$) and lagged (T – 1) proportion of audit fee over total assets of auditee (L.*Prop_Aud_Fee*$_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.9 Existence of a lagged two-years key auditor attribute (using alternative measures) impact on financial distress in year zero: The Zmijewski Full Model

Table 7.9 below presents the results of binary logistic regressions where the lagged two-years (T_{-2}) four key auditor attributes used in this study (the existence of a specialist auditor (L2.*Aud_Spec_30*$_{it}$), the provision of non-audit services (L2.*Cnon_Audit*$_{it}$), audit partner tenure (L2.*Ln_Aud_Part_Ten*$_{it}$), and the proportion of the total audit fee paid to the auditor over total assets of the auditee (L2.*Prop_Aud_Fee*$_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

7.2.9.1 Independent variables

As shown in column 1 of Table 7.9 below, the coefficient of the lagged two years (T–2) independent variable auditor specialization (L2.*Aud_Spec_30*$_{it}$) is reported to be negative and statistically significant (β = -3.251, z-statistics (Wald) = -0.520, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 5.19% (that is, Pseudo R^2 of 0.519).

Column 2 of Table 7.9 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the provision of non-audit services (L2.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -4.702, z-statistics (Wald) = -0.638, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.05% (that is, Pseudo R^2 of 0.0605).

Column 3 of Table 7.9 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the number of years the audit partner held office (L2.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative but statistically insignificant (β = -1.500, z-statistics (Wald) = -0.064, and $p > 0.1$). The negative correlation is as expected and implies that with the use of added control variables, audit partner tenure in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.57% (that is, Pseudo R^2 of 0.0457). Column 3 of Table 7.9 however shows a loss of statistical significance for this variable (from a <0.1 significance in lagged T_{-1} regression, and a <0.01 significance in initial (unlagged) regression). This loss of significance can be explained by the mandatory audit partner rotation requirement prevailing in Australia whereby an audit partner can only hold office for a maximum period of 5 years prior to partner rotation being required.

Column 4 of Table 7.9 below shows the coefficient of the lagged two years (T–2) independent variable proxying the proportion of audit fee paid / total assets held by firm (L2.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -2.665, z-statistics (Wald) = -1.326, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over total assets held by the auditee in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.58% (that is, Pseudo R^2 of 0.0658).

Last column 5 of Table 7.9 shows that when all four lagged two years (T–2) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained

(L2.$Aud\_Spec\_30_{it}$ - β = -3.875, z-statistics (Wald) = -0.657, and $p < 0.01$, L2.$Cnon\_Audit_{it}$ - β = -4.850, z-statistics (Wald) = -0.706, and $p < 0.01$ and L2.$Prop\_Aud\_Fee_{it}$ - β = -2.437, z-statistics (Wald) = -1.073, and $p > 0.05$) and an overall goodness-of-fit of 9.86% (that is, Pseudo R^2 of 0.0986) which implies that that unison effect of three of the four independent variables (namely L2.$Aud\_Spec\_30_{it}$, L2.$Cnon\_Audit_{it}$ and L2.$Prop\_Aud\_Fee_{it}$ in the year T_{-2} affect the Zmijewski ZFC-Score in the year T_0 by 9.86%. Column 5 of Table 7.9 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L2.$Ln\_Aud\_Part\_Ten_{it}$ - β = -1.065, z-statistics (Wald) = -0.049, and $p > 0.1$).

7.2.9.2 Control variables

As shown in column 1 of Table 7.9 below, where the independent variable L2.$Aud\_Spec\_30_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.290, z-statistics (Wald) = -0.149, and $p < 0.05$), $No\_Geographic\_Segments_{it}$ (β = -3.379, z-statistics (Wald) = -0.195, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -4.638, z-statistics (Wald) = -0.208, and $p < 0.01$) and Ln_Sales_{it} (β = -2.686, z-statistics (Wald) = -0.092, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.9) return no statistically significant results when regressed with the independent variable L2.$Aud\_Spec\_30_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 7.9 below, where the independent variable L2.$Cnon\_Audit_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.684, z-statistics (Wald) = -0.177, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ (β = -3.511, z-statistics (Wald) = -0.205, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -4.419, z-statistics (Wald) = -0.197, and $p < 0.01$) and Ln_Sales_{it} (β = -2.438, z-statistics (Wald) = -0.083, and $p < 0.05$).

The remaining control variables (as per column 2 of Table 7.9) return no statistically significant results when regressed with the independent variable L2.$Cnon\_Audit_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 7.9 below, where the independent variable

L2.*Ln_Aud_Part_Ten*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -2.703, z-statistics (Wald) = -0.177, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -3.613, z-statistics (Wald) = -0.209, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.447, z-statistics (Wald) = -0.198, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -2.598, z-statistics (Wald) = -0.089, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.9) return no statistically significant results when regressed with the independent variable L2.*Ln_Aud_Part_Ten*$_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 7.9 below, where the independent variable L2.*Prop_Aud_Fee*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -2.172, z-statistics (Wald) = -0.145, and $p < 0.05$), *No_Geographic_Segments*$_{it}$ (β = -3.591, z-statistics (Wald) = -0.228, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -3.602, z-statistics (Wald) = -0.175, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -2.119, z-statistics (Wald) = -0.080, and $p < 0.05$).

The remaining control variables (as per column 4 of Table 7.9) return no statistically significant results when regressed with the independent variable L2.*Prop_Aud_Fee*$_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 7.9 below, where the four independent variables L2.*Aud_Spec_30*$_{it}$, L2.*Cnon_Audit*$_{it}$, L2.*Ln_Aud_Part_Ten*$_{it}$ and L2.*Prop_Aud_Fee*$_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com*$_{it}$ (β = -1.788, z-statistics (Wald) = -0.310, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -3.145, z-statistics (Wald) = -0.205, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.008, z-statistics (Wald) = -0.195, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -2.059, z-statistics (Wald) = -0.080, and $p < 0.05$).

The remaining control variables (as per column 5 of Table 7.9) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Table 7.9: Logistic Regression Results – Lagged (two years) Alternative Measure of Key Auditor Attributes and Zmijewski ZFC Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L2.*Aud_Spec_30*$_{it}$	-0.520***				-0.657***
	(-3.251)				(-3.875)
L2.*Cnon_Audit*$_{it}$		-0.638***			-0.706***
		(-4.702)			(-4.850)
L2.*Ln_Aud_Part_Ten*$_{it}$			-0.064		-0.049
			(-1.500)		(-1.065)
L2.*Prop_Aud_Fee*$_{it}$				-1.326***	-1.073**
				(-2.665)	(-2.437)
BoD_Tenure$_{it}$	0.005	-0.003	0.001	0.004	0.002
	(0.171)	(-0.109)	(0.028)	(0.154)	(0.059)
CEO_Duality$_{it}$	0.020	0.113	0.044	0.089	0.040
	(0.131)	(0.722)	(0.279)	(0.537)	(0.231)
Aud_Com$_{it}$	-0.148	-0.159	-0.107	-0.244	-0.310*
	(-0.938)	(-0.996)	(-0.681)	(-1.439)	(-1.788)
Aud_Com_Meet$_{it}$	-0.149**	-0.177***	-0.177***	-0.145**	-0.096
	(-2.290)	(-2.684)	(-2.703)	(-2.172)	(-1.434)
No_Geographic_Segments$_{it}$	-0.195***	-0.205***	-0.209***	-0.228***	-0.205***
	(-3.379)	(-3.511)	(-3.613)	(-3.591)	(-3.145)
Ln_Market_Cap$_{it}$	-0.208***	-0.197***	-0.198***	-0.175***	-0.195***
	(-4.638)	(-4.419)	(-4.447)	(-3.602)	(-4.008)
Ln_Sales$_{it}$	-0.092***	-0.083**	-0.089***	-0.080**	-0.080**
	(-2.686)	(-2.438)	(-2.598)	(-2.119)	(-2.059)
Constant	-4.298***	-4.339***	-4.376***	-3.498***	-4.089***
	(-5.236)	(-5.285)	(-5.196)	(-3.902)	(-4.610)
Observations	1,172	1,172	1,172	1,172	1,172
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-644.4	-638.6	-648.6	-568.0	-548.1
Pseudo_R2	0.0519	0.0605	0.0457	0.0658	0.0986

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [45]*, Column 2 based on *Equation [46]*, Column 3 based on *Equation [47]*, Column 4 based on *Equation [48]* and Column 5 based on *Equation [49]*.

$$ZFC_{it} = \beta 0+\beta_1 L2.Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [45]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [46]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [47]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [48]$$

$$ZFC_{it} = \beta 0+\beta_1 L2.Aud\_Spec\_30_{it}+\beta_2 L2.CNon\_Audit_{it}+\beta_3 L2.Aud\_Part\_Ten_{it}+\beta_4 L2.Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it}+\varepsilon_{it} \quad [49]$$

7.2.9.3 Summary

As shown in Table 7.9 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0591, 0.0605, 0.0457, 0.0658 and 0.0986 respectively. This implies that the lagged independent variables in the regression models explain 5.91%, 6.05%, 4.57%, 6.58% and 9.86% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -2) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.9 using the Zmijewski ZFC-Score model support the findings of Chapter Six in providing support for the hypotheses H_{5a}, H_{6a}, H_{7a}, and H_{8a} showing that lagged (T – 2) auditor specialization (L2.$Aud\_Spec\_30_{it}$), lagged (T – 2) the provision of non-audit services (L2.$Cnon\_Audit_{it}$), lagged (T – 2) audit partner tenure (L2.$Ln\_Aud\_Part\_Ten_{it}$) and lagged (T – 2) proportion audit fee / total assets (L2.$Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.10 Existence of a lagged three-years key auditor attribute (using alternative measures) impact on financial distress in year zero: The Zmijewski Full Model

Table 7.10 below presents the results of binary logistic regressions where the lagged three-years (T_{-3}) four key auditor attributes used in this study (auditor specialization (L3.$Aud\_Spec\_30_{it}$), the provision of non-audit services (L3.$Cnon\_Audit_{it}$), audit partner tenure (L3.$Ln\_Aud\_Part\_Ten_{it}$), and the the proportion of total total audit fee paid to the auditor to total assets of the auditee (L3.$Prop\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

7.2.10.1 Independent variables

As shown in column 1 of Table 7.10 below, the coefficient of the lagged three years (T–3) independent variable auditor specialization (L3.$Aud\_Spec\_30_{it}$) is reported to be negative and statistically significant (β = -3.360, z-statistics (Wald) = -0.603, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.62% (that is, Pseudo R^2

of 0.0462).

Column 2 of Table 7.10 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the provision of non-audit services (L3.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -3.226, z-statistics (Wald) = -0.487, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.55% (that is, Pseudo R^2 of 0.0455).

Column 3 of Table 7.10 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the number of years the audit partner held office (L3.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative but statistically insignificant (β = -0.843, z-statistics (Wald) = -0.040, and $p > 0.1$). The negative correlation is as expected and implies that with the use of added control variables, an increase in the duration of the audit partner tenure in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 3.65% (that is, Pseudo R^2 of 0.30365). The loss of statistical significance is consistent with the use of a lagged T_{-2} audit partner tenure as Tables 7.4 describes.

Column 4 of Table 7.10 below shows the coefficient of the lagged three years (T–3) independent variable proxying the proportion of audit fee paid / total assets held by firm (L3.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -2.256, z-statistics (Wald) = -9.599, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over total assets held by the auditee in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.90% (that is, Pseudo R^2 of 0.0490).

Last column 5 of Table 7.10 shows that when all four lagged three years (T–3) independent variables are simultaneously regressed (logistically) against the Zmijewski ZFC-Score, comparable results to as outlined above is obtained (L3.*Aud_Spec_30*$_{it}$ - β = -3.788, z-statistics (Wald) = -0.708, and $p < 0.01$, L3.*Cnon_Audit*$_{it}$ - β = -3.602, z-statistics (Wald) = -0.574, and $p < 0.01$, L3.*Prop_Aud_Fee*$_{it}$ - β = -2.127, z-statistics (Wald) = -9.806, and $p < 0.05$) and an overall goodness-of-fit of 7.57% (that is, Pseudo R^2 of 0.0757) which implies that that unison effect of three of the four independent variables (namely L3.*Aud_Spec_30*$_{it}$, L3.*Cnon_Audit*$_{it}$ and L3.*Prop_Aud_Fee*$_{it}$ in the year T_{-3} affect the Zmijewski ZFC-Score in the year T_0 by 7.57%. Column 5 of Table 7.10 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L3.*Ln_Aud_Part_Ten*$_{it}$ - β = -0.851, z-statistics (Wald) = -0.043 and p > 0.1). This is consistent with Table 7.4 when a lag of two-years was used.

7.2.10.2 Control variables

As shown in column 1 of Table 7.10 below, where the independent variable L3.*Aud_Spec_30*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *No_Geographic_Segments*$_{it}$ (β = -2.032, z-statistics (Wald) = -0.124, and p < 0.05), *Ln_Market_Cap*$_{it}$ (β = -3.806, z-statistics (Wald) = -0.189, and p < 0.01) and *Ln_Sales*$_{it}$ (β = -2.575, z-statistics (Wald) = -00.090, and p < 0.05).

The remaining control variables (as per column 1 of Table 7.10) return no statistically significant results when regressed with the independent variable L3.*Aud_Spec_30*$_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 7.10 below, where the independent variable L3.*Cnon_Audit*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.965, z-statistics (Wald) = -0.148, and p < 0.05), *No_Geographic_Segments*$_{it}$ (β = -2.160, z-statistics (Wald) = -0.133, and p < 0.05), *Ln_Market_Cap*$_{it}$ (β = -3.627, z-statistics (Wald) = -0.177, and p < 0.01) and *Ln_Sales*$_{it}$ (β = -2.156, z-statistics (Wald) = -0..077, and p < 0.05).

The remaining control variables (as per column 2 of Table 7.10) return no statistically significant results when regressed with the independent variable L3.*Cnon_Audit*$_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 7.10 below, where the independent variable L3.*Ln_Aud_Part_Ten*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.931, z-statistics (Wald) = -0.145, and p < 0.1), *No_Geographic_Segments*$_{it}$ (β = -2.190, z-statistics (Wald) = -0.134, and p < 0.05), *Ln_Market_Cap*$_{it}$ (β = -3.517, z-statistics (Wald) = -0.172, and p < 0.01) and

Ln_Sales_{it} (β = -2.372, z-statistics (Wald) = -0.084, and $p < 0.05$).

The remaining control variables (as per column 3 of Table 7.10) return no statistically significant results when regressed with the independent variable L3.$Ln\_Aud\_Part\_Ten_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 7.10 below, where the independent variable L3.$Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.336, z-statistics (Wald) = -0.154, and $p < 0.05$), $Ln\_Market\_Cap_{it}$ (β = -2.675, z-statistics (Wald) = -0.141, and $p < 0.01$) and Ln_Sales_{it} (β = -1.802, z-statistics (Wald) = -0.068, and $p < 0.1$).

The remaining control variables (as per column 4 of Table 7.10) return no statistically significant results when regressed with the independent variable L3.$Prop\_Aud\_Fee_{it}$ against the Zmijewski ZFC-Score.

Last from column 5 of Table 7.10 below, where the four independent variables L3.$Aud\_Spec\_30_{it}$, L3.$Cnon\_Audit_{it}$, L3.$Ln\_Aud\_Part\_Ten_{it}$ and L3.$Prop\_Aud\_Fee_{it}$ are regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables Aud_Com_{it} (β = -1.930, z-statistics (Wald) = -0.362, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -1.943, z-statistics (Wald) = -0.131, and $p < 0.1$), $Ln\_Market\_Cap_{it}$ (β = -3.253, z-statistics (Wald) = -0.174, and $p < 0.01$) and Ln_Sales_{it} (β = -1.787, z-statistics (Wald) = -0.069, and $p < 0.1$).

The remaining control variables (as per column 5 of Table 7.10) return no statistically significant results when regressed with the independent variables against the Zmijewski ZFC-Score.

Table 7.10: Logistic Regression Results – Lagged (three years) Alternative Measure of Key Auditor Attributes and Zmijewski ZFC Score –Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L3.$Aud\_Spec\_30_{it}$	-0.603***				-0.708***
	(-3.360)				(-3.788)
L3.$Cnon\_Audit_{it}$		-0.487***			-0.574***
		(-3.226)			(-3.602)
L3.$Ln\_Aud\_Part\_Ten_{it}$			-0.040		-0.043
			(-0.843)		(-0.851)
L3.$Prop\_Aud\_Fee_{it}$				-9.599**	-9.806**
				(-2.256)	(-2.127)
BoD_Tenure_{it}	0.015	0.011	0.011	0.019	0.025
	(0.489)	(0.365)	(0.359)	(0.620)	(0.770)
$CEO\_Duality_{it}$	-0.268	-0.184	-0.229	-0.090	-0.129
	(-1.544)	(-1.052)	(-1.313)	(-0.487)	(-0.678)
Aud_Com_{it}	-0.141	-0.112	-0.082	-0.277	-0.362*
	(-0.802)	(-0.634)	(-0.467)	(-1.504)	(-1.930)
$Aud\_Com\_Meet_{it}$	-0.110	-0.148**	-0.145*	-0.073	-0.028
	(-1.487)	(-1.965)	(-1.931)	(-0.977)	(-0.383)
$No\_Geographic\_Segments_{it}$	-0.124**	-0.133**	-0.134**	-0.154**	-0.131*
	(-2.032)	(-2.160)	(-2.190)	(-2.336)	(-1.943)
$Ln\_Market\_Cap_{it}$	-0.189***	-0.177***	-0.172***	-0.141***	-0.174***
	(-3.806)	(-3.627)	(-3.517)	(-2.675)	(-3.253)
Ln_Sales_{it}	-0.090**	-0.077**	-0.084**	-0.068*	-0.069*
	(-2.575)	(-2.156)	(-2.372)	(-1.802)	(-1.787)
Constant	-3.955***	-3.890***	-3.816***	-2.877***	-3.616***
	(-4.464)	(-4.377)	(-4.229)	(-3.040)	(-3.783)
Observations	948	948	948	948	948
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-522.6	-523.0	-527.9	-475.3	-461.9
Pseudo_R2	0.0462	0.0455	0.0365	0.0490	0.0757

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [50]*, Column 2 based on *Equation [51]*, Column 3 based on *Equation [52]*, Column 4 based on *Equation [53]* and Column 5 based on *Equation [54]*.

$$ZFC_{it} = \beta 0+\beta_1 \text{L3.}Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [50]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L3.}CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [51]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L3.}Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [52]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L3.}Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [53]$$

$$ZFC_{it} = \beta 0+\beta_1 \text{L3.}Aud\_Spec\_30it+\beta_2 \text{L3.}CNon\_Audit_{it}+\beta_3 \text{L3.}Aud\_Part\_Ten_{it}+\beta_4 \text{L3.}Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it}+\varepsilon_{it} \quad [54]$$

7.2.10.3 Summary

As shown in Table 7.10 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0462, 0.0455, 0.0365, 0.0490 and 0.0757 respectively. This implies that the lagged independent variables in the regression models explain 4.62%, 4.55%, 3.65%, 4.90% and 7.57% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -3) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.10 using the Zmijewski ZFC-Score model support the findings of Chapter Six in providing support for hypotheses H_{5c}, H_{6c}, H_{7c}, and H_{8c} showing that lagged (T – 3) specialist auditor (L3.$Aud\_Spec\_30_{it}$), lagged (T – 3) the provision of non-audit services (L3.$Cnon\_Audit_{it}$), lagged (T – 3) auditor tenure (L3.$Ln\_Aud\_Part\_Ten_{it}$) and lagged (T – 3) audit fee (L3.$Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.11 Existence of a key auditor attribute (using alternative measures) impact on financial distress: The Altman Base Model

Table 7.11 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a specialist auditor ($Aud\_Spec\_30_{it}$), the provision of non-audit services ($Cnon\_Audit_{it}$), the number of years the auditor (audit partner) held office ($Ln\_Aud\_Part\_Ten_{it}$), and the proportion of the total audit fee paid to the auditor over total assets held by the auditee ($Prop\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with no control variables.

7.2.11.1 Independent variables

As shown in column 1 of Table 7.11 below, the coefficient of the independent variable auditor specialization ($Aud\_Spec\_30_{it}$) is reported to be negative and statistically significant (β = -2.296, z-statistics (Wald) = -0.177, and $p < 0.05$). This result is as expected and implies that with the use of no control variable, the use of a specialist auditor decreases the likelihood of financial distress with a goodness-of-fit of 0.0875% (that is, Pseudo R^2 of 0.000875).

Column 2 of Table 7.11 below shows the coefficient of the independent variable proxying for the provision of non-audit services (*$Cnon\_Audit_{it}$*) is reported to be negative and statistically significant (β = -9.046, z-statistics (Wald) = -0.560, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 1.34% (that is, Pseudo R^2 of 0.0134).

Column 3 of Table 7.11 below shows the coefficient of the independent variable proxying for the number of years the audit partner held office (*$Ln\_Aud\_Part\_Ten_{it}$*) is reported to be negative and statistically significant (β = -20.869, z-statistics (Wald) = -0.393, and $p < 0.01$). This result is as expected and implies that with the use of no control variable, audit partner tenure decreases the likelihood of financial distress with a goodness-of-fit of 7.32% (that is, Pseudo R^2 of 0.0732).

Column 4 of Table 7.11 below shows the coefficient of the independent variable proxying the proportion of audit fee paid / total assets held by firm (*$Prop\_Aud\_Fee_{it}$*) is reported to be positive and statistically insignificant (β = 0.675, z-statistics (Wald) = 0.023, and $p > 0.1$) though a negative coefficient is expected. This result implies that with the use of no control variable the higher the proportion of audit fee paid to the auditor to total assets, the higher likelihood of financial distress with a goodness-of-fit of 0.0103% (that is, Pseudo R^2 of 0.000103) – hence statistically insignificant. It is important to note that similar results were obtained for variable *$Prop\_Aud\_Fee_{it}$* when using the Zmijewski's model (as per Table 7.1).

Last column 5 of Table 7.11 shows that when all four independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (*$Aud\_Spec\_30_{it}$* - β = -0.460, z-statistics (Wald) = -0.040, and $p > 0.1$ (therefore statistically insignificant), *$Cnon\_Audit_{it}$* - β = -8.774, z-statistics (Wald) = -0.664, and $p < 0.01$, *$Ln\_Aud\_Part\_Ten_{it}$* - β = -20.223, z-statistics (Wald) = -0.460 and $p < 0.01$, *$Prop\_Aud\_Fee_{it}$* - β = -0.4512, z-statistics (Wald) = -0.163, and $p < 0.01$) and an overall goodness-of-fit of 10.8% (that is, Pseudo R^2 of 0.108) which implies that that unison effect of all four independent variables affect the Altman Z2-Score by 10.8%.

Table 7.11: Logistic Regression Results – Alternative measure of Key Auditor Attributes and Altman Z2 Score – Base Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
Aud_Spec_30it	-0.177**				-0.040
	(-2.296)				(-0.460)
Cnon_Auditit		-0.560***			-0.664***
		(-9.046)			(-8.774)
Ln_Aud_Part_Tenit			-0.393***		-0.460***
			(-20.869)		(-20.223)
Prop_Aud_Feeit				-0.023	-0.163***
				(-0.675)	(-4.512)
Constant	-0.719***	-1.011***	0.318***	-1.056***	1.924***
	(-20.964)	(-23.525)	(5.476)	(-2.753)	(4.592)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-3057	-3018	-2836	-2404	-2146
Pseudo_R2	0.000875	0.0134	0.0732	0.000103	0.108

Robust z-statistics in parentheses
**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [1]*, Column 2 based on *Equation [2]*, Column 3 based on *Equation [3]*, Column 4 based on *Equation [4]* and Column 5 based on *Equation [5]*.

$$Z2_{it} = \beta0 + \beta1\ Aud\_Spec\_30_{it} + \varepsilon_{it} \quad [55]$$

$$Z2_{it} = \beta0 + \beta1\ Cnon\_Audit_{it} + \varepsilon_{it} \quad [56]$$

$$Z2_{it} = \beta0 + \beta1\ Ln\_Aud\_Part\_Ten_{it} + \varepsilon_{it} \quad [57]$$

$$Z2_{it} = \beta0 + \beta1\ Prop\_Aud\_Fee_{it} + \varepsilon_{it} \quad [58]$$

$$Z2_{it} = \beta0 + \beta1\ Aud\_Spec\_30_{it} + \beta2\ Cnon\_Audit_{it} + \beta3\ Ln\_Aud\_Part\_Ten_{it} + \beta4\ Prop\_Aud\_Fee_{it} + \varepsilon_{it} \quad [59]$$

7.2.11.2 Summary

As shown in Table 7.11 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.000875, 0.0134, 0.0732, 0.000103 and 0.108 respectively. This implies that the independent variables in the regression models explain 0.0875%, 1.34%, 7.32%, 0.0103% and 10.8% of the variation in the dependent variable (the Altman Z2-Score). These results may imply three out of the four auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.11 using the Altman Z2-Score model support the findings of Chapter Six in providing support for hypotheses H_1, H_2, and H_3, showing that specialist auditors (*Aud_Spec_30it*), the provision of non-audit services (*Cnon_Auditit*) and auditor tenure (*Ln_Aud_Part_Tenit*) have a statistically significant association with financial distress with all coefficients being negative. However, Table 7.11 using the Altman Z2-Score model rejects the hypothesis H_4

showing that audit fee (*Prop_Aud_Fee*$_{it}$) has a statistical insignificant negative association with financial distress.

7.2.12 Existence of a key auditor attribute (using alternative measures) impact on financial distress: The Altman Full Model

Table 7.12 below presents the results of binary logistic regressions where the four key auditor attributes used in this study (the existence of a specialist auditor (*Aud_Spec_30*$_{it}$), the provision of non-audit services (*Cnon_Audit*$_{it}$), the number of years the auditor (audit partner) held office (*Ln_Aud_Part_Ten*$_{it}$), and the proportion of the total audit fee paid to the auditor over total assets held by the auditee (*Prop_Aud_Fee*$_{it}$)), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.12.1 Independent variables

As shown in column 1 of Table 7.12 below, the coefficient of the independent variable auditor specialization (*Aud_Spec_30*$_{it}$) is reported to be negative and statistically significant (β = -4.340, z-statistics (Wald) = -0.355, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor decreases the likelihood of financial distress with a goodness-of-fit of 5.84% (that is, Pseudo R^2 of 0.0584).

Column 2 of Table 7.12 below shows the coefficient of the independent variable proxying for the provision of non-audit services (*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -8.141, z-statistics (Wald) = -0.572, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services decreases the likelihood of financial distress with a goodness-of-fit of 6.78% (that is, Pseudo R^2 of 0.0678).

Column 3 of Table 7.12 below shows the coefficient of the independent variable proxying for the number of years the audit partner held office (*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative and statistically significant (β = -13.740, z-statistics (Wald) = -0.335, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the duration of the audit partner tenure decreases the likelihood of financial distress with a goodness-of-fit of 9.41% (that is, Pseudo R^2 of 0.0941).

Column 4 of Table 7.12 below shows the coefficient of the independent variable proxying the proportion of audit fee paid / total assets held by firm (*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -12.168, z-statistics (Wald) = -0.751, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over total assets held by the auditee decreases the likelihood of financial distress with a goodness-of-fit of 9.97% (that is, Pseudo R^2 of 0.0997).

Last column 5 of Table 7.12 shows that when all four independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (*Aud_Spec_30*$_{it}$ - β = -0.544, z-statistics (Wald) = -0.053, and $p < 0.1$ (Table 7.6 shows a statistically insignificant correlation, however with control variables, Table 7.12 now shows a statistically significant correlation), *Cnon_Audit*$_{it}$ - β = -9.359, z-statistics (Wald) = -0.814, and $p < 0.01$, *Ln_Aud_Part_Ten*$_{it}$ - β = -12.758, z-statistics (Wald) = -0.360 and $p < 0.01$, *Prop_Aud_Fee*$_{it}$ - β = -12.213, z-statistics (Wald) = -0.821, and $p < 0.01$) and an overall goodness-of-fit of 16.6% (that is, Pseudo R^2 of 0.166) which implies that that unison effect of all four independent variables affect the Altman Z2-Score by 16.6%.

7.2.12.2 Control variables

As shown in column 1 of Table 7.12 below, where the independent variable *Aud_Spec_30*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *CEO_Duality*$_{it}$ (β = -8.441, z-statistics (Wald) = -0.677, and $p < 0.01$), *Aud_Com*$_{it}$ (β = -1.856, z-statistics (Wald) = -0.157, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -4.856, z-statistics (Wald) = -0.151, and $p < 0.01$) and *Ln_Market_Cap*$_{it}$ (β = -9.537, z-statistics (Wald) = -0.230, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.12) return no statistically significant results when regressed with the independent variable *Aud_Spec_30*$_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.12 below, where the independent variable *Cnon_Audit*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *CEO_Duality*$_{it}$ (β = -7.787, z-statistics (Wald) = -0.634, and $p < 0.01$, *No_Geographic_Segments*$_{it}$ (β = -4.183, z-statistics (Wald) = -0.131, and $p < 0.01$) and

Ln_Market_Cap$_{it}$ (β = -10.015, z-statistics (Wald) = -0.241, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.12) return no statistically significant results when regressed with the independent variable *Cnon_Audit*$_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.12 below, where the independent variable *Ln_Aud_Part_Ten*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *CEO_Duality*$_{it}$ (β = -2.820, z-statistics (Wald) = -0.249, and $p < 0.01$), *Aud_Com*$_{it}$ (β = -2.155, z-statistics (Wald) = -0.189, and $p < 0.05$), *Aud_Com_Meet*$_{it}$ (β = -2.918, z-statistics (Wald) = -0.092, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -5.366, z-statistics (Wald) = -0.179, and $p < 0.01$) and *Ln_Market_Cap*$_{it}$ (β = -7.873, z-statistics (Wald) = -0.192, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.12) return no statistically significant results when regressed with the independent variable *Ln_Aud_Part_Ten*$_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.12 below, where the independent variable *CEO_Duality*$_{it}$ (β = -5.954, z-statistics (Wald) = -0.543, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -4.620, z-statistics (Wald) = -0.170, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -13.630, z-statistics (Wald) = -0.436, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -3.987, z-statistics (Wald) = -0.112, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.12) return no statistically significant results when regressed with the independent variable *Prop_Aud_Fee*$_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.12 below, where the four independent variables *Aud_Spec_30*$_{it}$, *Cnon_Audit*$_{it}$, *Ln_Aud_Part_Ten*$_{it}$ and *Prop_Aud_Fee*$_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com*$_{it}$ (β = -1.721, z-statistics (Wald) = -0.181, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -4.143, z-statistics (Wald) = -0.160, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -13.047, z-statistics (Wald) = -0.430, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -3.298, z-statistics (Wald) = -0.095, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.12) return no

statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Table 7.12: Logistic Regression Results – Alternative measure of Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
$Aud\_Spec\_30_{it}$	-0.355***				-0.053*
	(-4.340)				(-0.544)
$Cnon\_Audit_{it}$		-0.572***			-0.814***
		(-8.141)			(-9.359)
$Ln\_Aud\_Part\_Ten_{it}$			-0.335***		-0.360***
			(-13.740)		(-12.758)
$Prop\_Aud\_Fee_{it}$				-0.751***	-0.821***
				(-12.168)	(-12.213)
BoD_Tenure_{it}	0.017	0.018	0.014	0.024	0.021
	(1.141)	(1.247)	(0.950)	(1.535)	(1.315)
$CEO\_Duality_{it}$	-0.677***	-0.634***	-0.249***	-0.543***	-0.148
	(-8.441)	(-7.787)	(-2.820)	(-5.954)	(-1.434)
Aud_Com_{it}	-0.157*	-0.114	-0.189**	-0.138	-0.181*
	(-1.856)	(-1.340)	(-2.155)	(-1.367)	(-1.721)
$Aud\_Com\_Meet_{it}$	-0.031	-0.046	-0.092***	0.054	0.032
	(-0.991)	(-1.476)	(-2.918)	(1.539)	(0.863)
$No\_Geographic\_Segments_{it}$	-0.151***	-0.131***	-0.179***	-0.170***	-0.160***
	(-4.856)	(-4.183)	(-5.366)	(-4.620)	(-4.143)
$Ln\_Market\_Cap_{it}$	-0.230***	-0.241***	-0.192***	-0.436***	-0.430***
	(-9.537)	(-10.015)	(-7.873)	(-13.630)	(-13.047)
Ln_Sales_{it}	-0.001	-0.013	-0.008	-0.112***	-0.095***
	(-0.061)	(-0.671)	(-0.435)	(-3.987)	(-3.298)
Constant	-4.142***	-4.516***	-2.603***	-1.222**	0.396
	(-11.352)	(-12.474)	(-6.750)	(-2.432)	(0.734)
Observations	4,876	4,876	4,876	4,876	4,876
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-2437	-2413	-2345	-1879	-1740
Pseudo_R2	0.0584	0.0678	0.0941	0.0997	0.166

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [60]*, Column 2 based on *Equation [61]*, Column 3 based on *Equation [62]*, Column 4 based on *Equation [63]* and Column 5 based on *Equation [64]*.

$$Z2_{it} = \beta 0+\beta_1 Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it} +\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [60]$$

$$Z2_{it} = \beta 0+\beta_1 CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+ \beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [61]$$

$$Z2_{it} = \beta 0+\beta_1 Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [62]$$

$$Z2_{it} = \beta 0+\beta_1 Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [63]$$

$$Z2_{it} = \beta 0+\beta_1 Aud\_Spec\_30it+\beta_2 CNon\_Audit_{it}+\beta_3 Ln\_Aud\_Part\_Ten_{it}+\beta_4 Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it} +\varepsilon_{it} \quad [64]$$

7.2.12.3 Summary

As shown in Table 7.12 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0584, 0.0678, 0.0941, 0.0997 and 0.166 respectively. This implies that the independent variables in the regression models explain 5.84%, 6.78%, 9.41%, 9.97% and 16.6% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.12 using the Altman Z2-Score model support the findings of Chapter Six in providing support for hypotheses H_1, H_2, H_3, and H_4 showing that specialist auditor ($Aud\_Spec\_30_{it}$), the provision of non-audit services ($Cnon\_Audit_{it}$), auditor tenure ($Ln\_Aud\_Part\_Ten_{it}$) and audit fee ($Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.13 Existence of a lagged one-year key auditor attribute (using alternative measures) impact on financial distress in year zero: The Altman Full Model

Table 7.13 below presents the results of binary logistic regressions where the lagged one year (T_{-1}) four key auditor attributes used in this study (the existence of a specialist auditor (L.*Aud_Spec_30*$_{it}$), the provision of non-audit services (L.*Cnon_Audit*$_{it}$), the number of years the auditor (audit partner) held office (L.*Ln_Aud_Part_Ten*$_{it}$), and the proportion of the total audit fee paid to the auditor over the total assets held by the auditee (L.*Prop_Aud_Fee*$_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.13.1 Independent variables

As shown in column 1 of Table 7.13 below, the coefficient of the lagged one year (T–1) independent variable specialist auditor (L.*Aud_Spec_30*$_{it}$) is reported to be negative and statistically significant (β = -1.221, z-statistics (Wald) = -0.154, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.61% (that is, Pseudo R^2 of 0.0461).

Column 2 of Table 7.13 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the provision of non-audit services (L.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -5.482, z-statistics (Wald) = -0.558, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 5.81% (that is, Pseudo R^2 of 0.0581).

Column 3 of Table 7.13 below shows the coefficient of the lagged one year (T–1) independent variable proxying for the number of years the audit partner held office (L.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative and statistically significant (β = -0.562, z-statistics (Wald) = -0.020, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, audit partner tenure in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.56% (that is, Pseudo R^2 of 0.0456).

Column 4 of Table 7.13 below shows the coefficient of the lagged one year

(T–1) independent variable proxying the proportion of audit fee paid / total assets held by firm (L.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -2.304, z-statistics (Wald) = -3.380, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over total assets held by the auditee in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 7.49% (that is, Pseudo R^2 of 0.0749).

Last column 5 of Table 7.13 shows that when all four lagged one year (T–1) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L.*Aud_Spec_30*$_{it}$ - β = -0.731, z-statistics (Wald) = -0.098, and $p < 0.1$, L.*Cnon_Audit*$_{it}$ - β = -4.946, z-statistics (Wald) = -0.550 and $p < 0.01$, L.*Ln_Aud_Part_Ten*$_{it}$ - β = -0.239, z-statistics (Wald) = -0.009 and $p < 0.1$, L.*Prop_Aud_Fee*$_{it}$ - β = -2.269, z-statistics (Wald) = -3.847, and $p < 0.05$) and an overall goodness-of-fit of 8.72% (that is, Pseudo R^2 of 0.0872) which implies that that unison effect of all four independent variables in the year T_{-1} affect the Altman Z2-Score in the year T_0 by 8.72%.

7.2.13.2 Control variables

As shown in column 1 of Table 7.13 below, where the independent variable L.*Aud_Spec_30*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -2.680, z-statistics (Wald) = -0.118, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -3.899, z-statistics (Wald) = -0.184, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -7.075, z-statistics (Wald) = -0.223, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -1.883, z-statistics (Wald) = -0.050, and $p < 0.1$).

The remaining control variables (as per column 1 of Table 7.13) return no statistically significant results when regressed with the independent variable L.*Aud_Spec_30*$_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.13 below, where the independent variable L.*Cnon_Audit*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -2.649, z-statistics (Wald) = -0.117, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -3.532, z-statistics (Wald) = -0.168, and $p < 0.01$) and

$Ln\_Market\_Cap_{it}$ (β = -7.371, z-statistics (Wald) = -0.231, and $p < 0.01$) .

The remaining control variables (as per column 2 of Table 7.13) return no statistically significant results when regressed with the independent variable L.$Cnon\_Audit_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.13 below, where the independent variable L.$Ln\_Aud\_Part\_Ten_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.625, z-statistics (Wald) = -0.114, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ (β = -3.849, z-statistics (Wald) = -0.181, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.013, z-statistics (Wald) = -0.222, and $p < 0.01$) and Ln_Sales_{it} (β = -1.734, z-statistics (Wald) = -0.046, and $p < 0.1$).

The remaining control variables (as per column 3 of Table 7.13) return no statistically significant results when regressed with the independent variable L.$Ln\_Aud\_Part\_Ten_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.13 below, where the independent variable L.$Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.406, z-statistics (Wald) = -0.107, and $p < 0.05$), $No\_Geographic\_Segments_{it}$ (β = -2.969, z-statistics (Wald) = -0.157, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.086, z-statistics (Wald) = -0.173, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.13) return no statistically significant results when regressed with the independent variable L.$Prop\_Aud\_Fee_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.13 below, where the four independent variables L.$Aud\_Spec\_30_{it}$, L.$Cnon\_Audit_{it}$, L.$Ln\_Aud\_Part\_Ten_{it}$ and L.$Prop\_Aud\_Fee_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.414, z-statistics (Wald) = -0.111, and $p < 0.05$), $No\_Geographic\_Segments_{it}$ (β = -2.771, z-statistics (Wald) = -0.149, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.249, z-statistics (Wald) = -0.181, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.13) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Table 7.13: Logistic Regression Results – Lagged (one year) Alternative Measure of Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L.$Aud\_Spec\_30_{it}$	-0.154*				-0.098*
	(-1.221)				(-0.731)
L.$Cnon\_Audit_{it}$		-0.558***			-0.550***
		(-5.482)			(-4.946)
L.$Ln\_Aud\_Part\_Ten_{it}$			-0.020*		-0.009*
			(-0.562)		(-0.239)
L.$Prop\_Aud\_Fee_{it}$				-3.380**	-3.847**
				(-2.304)	(-2.269)
BoD_Tenure_{it}	0.002	-0.000	0.002	0.005	0.003
	(0.107)	(-0.006)	(0.109)	(0.260)	(0.146)
$CEO\_Duality_{it}$	0.092	0.108	0.091	0.056	0.095
	(0.730)	(0.848)	(0.726)	(0.403)	(0.660)
Aud_Com_{it}	0.014	0.009	0.010	0.048	0.042
	(0.115)	(0.075)	(0.081)	(0.357)	(0.310)
$Aud\_Com\_Meet_{it}$	-0.118***	-0.117***	-0.114***	-0.107**	-0.111**
	(-2.680)	(-2.649)	(-2.625)	(-2.406)	(-2.414)
$No\_Geographic\_Segments_{it}$	-0.184***	-0.168***	-0.181***	-0.157***	-0.149***
	(-3.899)	(-3.532)	(-3.849)	(-2.969)	(-2.771)
$Ln\_Market\_Cap_{it}$	-0.223***	-0.231***	-0.222***	-0.173***	-0.181***
	(-7.075)	(-7.371)	(-7.013)	(-4.086)	(-4.249)
Ln_Sales_{it}	-0.050*	-0.040	-0.046*	-0.016	-0.008
	(-1.883)	(-1.494)	(-1.734)	(-0.550)	(-0.274)
Constant	-4.860***	-5.045***	-4.716***	-3.236***	-3.504***
	(-9.186)	(-9.681)	(-8.538)	(-4.153)	(-4.309)
Observations	2,082	2,082	2,082	2,082	2,082
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-1136	-1121	-1136	-937.1	-924.6
Pseudo_R2	0.0461	0.0581	0.0456	0.0749	0.0872

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [65]*, Column 2 based on *Equation [66]*, Column 3 based on *Equation [67]*, Column 4 based on *Equation [68]* and Column 5 based on *Equation [69]*.

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [65]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [66]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [67]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [68]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.Aud\_Spec\_30it+\beta_2 \mathrm{L}.CNon\_Audit_{it}+\beta_3 \mathrm{L}.Ln\_Aud\_Part\_Ten_{it}+\beta_4 \mathrm{L}.Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it}+\varepsilon_{it} \quad [69]$$

7.2.13.3 Summary

As shown in Table 7.13 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0461, 0.0581, 0.0456, 0.0749 and 0.0872 respectively. This implies that the lagged independent variables in the regression models explain 4.61%, 5.81%, 4.56%, 7.49% and 8.72% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -1) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.13 using the Altman Z2-Score model support the findings of Chapter Six in providing support for hypotheses H_{5a}, H_{6a}, H_{7a}, and H_{8a} showing that lagged (T – 1) specialist auditor (L.$Aud\_Spec\_30_{it}$), lagged (T – 1) the provision of non-audit services (L.$Cnon\_Audit_{it}$), lagged (T – 1) auditor tenure (L.$Ln\_Aud\_Part\_Ten_{it}$) and lagged (T – 1) audit fee (L.$Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.14 Existence of a lagged two-years key auditor attribute (using alternative measures) impact on financial distress in year zero: The Altman Full Model

Table 7.14 below presents the results of binary logistic regressions where the lagged two-years (T_{-2}) four key auditor attributes used in this study (the existence of a specialist auditor (L2.$Aud\_Spec\_30_{it}$), the provision of non-audit services (L2.$Cnon\_Audit_{it}$), the actual number of years the auditor (audit partner) held office (L2.$Ln\_Aud\_Part\_Ten_{it}$), and the proportion of the total audit fee paid to the auditor over the total assets held by the auditee (L2.$Prop\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score models with added control variables.

7.2.14.1 Independent variables

As shown in column 1 of Table 7.14 below, the coefficient of the lagged two years (T–2) independent variable auditor specialization (L2.$Aud\_Spec\_30_{it}$) is reported to be negative and statistically significant (β = -1.139, z-statistics (Wald) = -0.188, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-2}

decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.11% (that is, Pseudo R^2 of 0.0411).

Column 2 of Table 7.14 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the provision of non-audit services (L2.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -2.983, z-statistics (Wald) = -0.422, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.73% (that is, Pseudo R^2 of 0.0473).

Column 3 of Table 7.14 below shows the coefficient of the lagged two years (T–2) independent variable proxying for the number of years the audit partner held office (L2.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative and statistically significant (β = -2.430, z-statistics (Wald) = -0.111, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, an increase in duration of the audit partner tenure in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.48% (that is, Pseudo R^2 of 0.0448).

Column 4 of Table 7.14 below shows the coefficient of the lagged two years (T–2) independent variable proxying the proportion of audit fee paid / total assets held by firm (L2.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -1.802, z-statistics (Wald) = -1.609, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over the total assets held by the auditee in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.11% (that is, Pseudo R^2 of 0.0611).

Last column 5 of Table 7.14 shows that when all four lagged two years (T–2) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L2.*Aud_Spec_30*$_{it}$ - β = -0.533, z-statistics (Wald) = -0.092, and $p < 0.1$, L2.*Cnon_Audit*$_{it}$ - β = -3.038, z-statistics (Wald) = -0.456, and $p < 0.01$, L2.*Prop_Aud_Fee*$_{it}$ - β = -2.180, z-statistics (Wald) = -0.105, and $p < 0.05$ and L2.*Ln_Aud_Part_Ten*$_{it}$ - β = -1.783, z-statistics (Wald) = -1.837 and $p > 0.1$) and an overall goodness-of-fit of 7.38% (that is, Pseudo R^2 of 0.0738) which implies that that unison effect of three of the four independent variables (namely L2.*Aud_Spec_30*$_{it}$, L2.*Cnon_Audit*$_{it}$, L2.*Prop_Aud_Fee*$_{it}$ and L2.*Ln_Aud_Part_Ten*$_{it}$ in the year T_{-2} affect the Altman Z2-Score in the year T_0 by 7.38%.

7.2.14.2 Control variables

As shown in column 1 of Table 7.14 below, where the independent variable L2.*Aud_Spec_30*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.922, z-statistics (Wald) = -0.126, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -3.083, z-statistics (Wald) = -0.193, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.395, z-statistics (Wald) = -0.197, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -1.864, z-statistics (Wald) = -0.069, and $p < 0.1$).

The remaining control variables (as per column 1 of Table 7.14) return no statistically significant results when regressed with the independent variable L2.*Aud_Spec_30*$_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.14 below, where the independent variable L2.*Cnon_Audit*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.750, z-statistics (Wald) = -0.113, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -2.902, z-statistics (Wald) = -0.181, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.505, z-statistics (Wald) = -0.200, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -1.835, z-statistics (Wald) = -0.068, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.14) return no statistically significant results when regressed with the independent variable L2.*Cnon_Audit*$_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.14 below, where the independent variable L2.*Ln_Aud_Part_Ten*$_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.729, z-statistics (Wald) = -0.110, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -2.907, z-statistics (Wald) = -0.182, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.535, z-statistics (Wald) = -0.205, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -1.943, z-statistics (Wald) = -0.073, and $p < 0.1$).

The remaining control variables (as per column 3 of Table 7.14) return no statistically significant results when regressed with the independent variable L2.$Ln\_Aud\_Part\_Ten_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.14 below, where the independent variable L2.$Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.745, z-statistics (Wald) = -0.191, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -2.895, z-statistics (Wald) = -0.153, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.14) return no statistically significant results when regressed with the independent variable L2.$Prop\_Aud\_Fee_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.14 below, where the four independent variables L2.$Aud\_Spec\_30_{it}$, L2.$Cnon\_Audit_{it}$, L2.$Ln\_Aud\_Part\_Ten_{it}$ and L2.$Prop\_Aud\_Fee_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.726, z-statistics (Wald) = -0.193, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -2.999, z-statistics (Wald) = -0.159, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.14) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Table 7.14: Logistic Regression Results – Lagged (two years) Alternative Measure of Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L2.*Aud_Spec_30*$_{it}$	-0.188*				-0.092*
	(-1.139)				(-0.533)
L2.*Cnon_Audit*$_{it}$		-0.422***			-0.456***
		(-2.983)			(-3.038)
L2.*Ln_Aud_Part_Ten*$_{it}$			-0.111**		-0.105**
			(-2.430)		(-2.180)
L2.*Prop_Aud_Fee*$_{it}$				-1.609*	-1.837*
				(-1.802)	(-1.783)
BoD_Tenure$_{it}$	-0.020	-0.024	-0.022	-0.016	-0.024
	(-0.740)	(-0.838)	(-0.781)	(-0.551)	(-0.830)
CEO_Duality$_{it}$	0.126	0.133	0.061	0.072	0.063
	(0.761)	(0.803)	(0.360)	(0.409)	(0.343)
Aud_Com$_{it}$	-0.171	-0.201	-0.147	-0.222	-0.217
	(-1.027)	(-1.201)	(-0.879)	(-1.243)	(-1.202)
Aud_Com_Meet$_{it}$	-0.126*	-0.113*	-0.110*	-0.089	-0.088
	(-1.922)	(-1.750)	(-1.729)	(-1.369)	(-1.294)
No_Geographic_Segments$_{it}$	-0.193***	-0.181***	-0.182***	-0.191***	-0.193***
	(-3.083)	(-2.902)	(-2.907)	(-2.745)	(-2.726)
Ln_Market_Cap$_{it}$	-0.197***	-0.200***	-0.205***	-0.153***	-0.159***
	(-4.395)	(-4.505)	(-4.535)	(-2.895)	(-2.999)
Ln_Sales$_{it}$	-0.069*	-0.068*	-0.073*	-0.065	-0.062
	(-1.864)	(-1.835)	(-1.943)	(-1.602)	(-1.528)
Constant	-4.693***	-4.861***	-5.141***	-3.675***	-4.202***
	(-5.779)	(-6.127)	(-6.181)	(-3.891)	(-4.397)
Observations	1,172	1,172	1,172	1,172	1,172
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-599.1	-595.3	-596.9	-525.9	-518.8
Pseudo_R2	0.0411	0.0473	0.0448	0.0611	0.0738

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [70]*, Column 2 based on *Equation [71]*, Column 3 based on *Equation [72]*, Column 4 based on *Equation [73]* and Column 5 based on *Equation [74]*.

$$Z2_{it} = \beta 0+\beta_1 L2.Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [70]$$

$$Z2_{it} = \beta 0+\beta_1 L2.CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [71]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [72]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon_{it} \quad [73]$$

$$Z2_{it} = \beta 0+\beta_1 L2.Aud\_Spec\_30_{it}+\beta_2 L2.CNon\_Audit_{it}+\beta_3 L2.Ln\_Aud\_Part\_Ten_{it}+\beta_4 L2.Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it}+\varepsilon_{it} \quad [74]$$

7.2.14.3 Summary

As shown in Table 7.14 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0411, 0.0473, 0.0448, 0.0611 and 0.0738 respectively. This implies that the lagged independent variables in the regression models explain 4.11%, 4.73%, 4.48%, 6.11% and 7.38% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -2) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.14 using the Altman Z2-Score model support the findings of Chapter Six in providing support for the hypotheses H_{5b}, H_{6b}, H_{7b}, and H_{8b} showing that lagged (T – 2) specialist auditor (L2.$Aud\_Spec\_30_{it}$), lagged (T – 2) the provision of non-audit services (L2.$Cnon\_Audit_{it}$), lagged (T – 2) auditor tenure (L2.$Ln\_Aud\_Part\_Ten_{it}$) and lagged (T – 2) audit fee (L2.$Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.15 Existence of a lagged three-years key auditor attribute (using alternative measures) impact on financial distress in year zero: The Altman Full Model

Table 7.15 below presents the results of binary logistic regressions where the lagged three-years (T_{-3}) four key auditor attributes used in this study (the existence of a specialist auditor (L3.$Aud\_Spec\_30_{it}$), the provision of non-audit services (L3.$Cnon\_Audit_{it}$), the actual number of years the auditor (audit partner) held office (L3.$Ln\_Aud\_Part\_Ten_{it}$), and the proportion of the total audit fee paid to the auditor over the total assets held by the auditee (L3.$Prop\_Aud\_Fee_{it}$), are (logistically) regressed against financial distress, calculated using Altman Z2-Score models with added control variables.

7.2.15.1 Independent variables

As shown in column 1 of Table 7.15 below, the coefficient of the lagged three years (T–3) independent variable auditor specialization (L3.$Aud\_Spec\_30_{it}$) is reported to be negative and statistically significant (β = -0.461, z-statistics (Wald) = -0.085, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, the use of a specialist auditor in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.93% (that is, Pseudo R^2 of 0.0493).

Column 2 of Table 7.15 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the provision of non-audit services (L3.*Cnon_Audit*$_{it}$) is reported to be negative and statistically significant (β = -3.449, z-statistics (Wald) = -0.539, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the provision of non-audit services in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.06% (that is, Pseudo R^2 of 0.0606).

Column 3 of Table 7.15 below shows the coefficient of the lagged three years (T–3) independent variable proxying for the number of years the audit partner held office (L3.*Ln_Aud_Part_Ten*$_{it}$) is reported to be negative but statistically significant (β = -0.771, z-statistics (Wald) = -0.039, and $p > 0.1$). The negative correlation is as expected and implies that with the use of added control variables, an increase in duration of the audit partner tenure in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.97% (that is, Pseudo R^2 of 0.0497). The lack of statistical significance is consistent with Tables 7.4 and 7.5 above.

Column 4 of Table 7.15 below shows the coefficient of the lagged three years (T–3) independent variable proxying the proportion of audit fee paid / total assets held by firm (L3.*Prop_Aud_Fee*$_{it}$) is reported to be negative and statistically significant (β = -1.805, z-statistics (Wald) = -1.378, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, an increase in the proportion of audit fee paid to the auditor over the total assets held by the auditee in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.41% (that is, Pseudo R^2 of 0.0641).

Last column 5 of Table 7.15 shows that when all four lagged three years (T–3) independent variables are simultaneously regressed (logistically) against the Altman Z2-Score, comparable results to as outlined above is obtained (L3.*Aud_Spec_30*$_{it}$ - β = -0.087, z-statistics (Wald) = -0.017, and $p < 0.1$, L3.*Cnon_Audit*$_{it}$ - β = -3.501, z-statistics (Wald) = -0.579, and $p < 0.01$ and L3.*Prop_Aud_Fee*$_{it}$ - β = -1.709, z-statistics (Wald) = -1.857, and $p < 0.1$) and an overall goodness-of-fit of 7.76% (that is, Pseudo R^2 of 0.0776) which implies that that unison effect of three of the four independent variables (namely L3.*Aud_Spec_30*$_{it}$, L3.$Cnon\_Audit_{it}$ and L3.$Prop\_Aud\_Fee_{it}$ in the year T_{-3} affect the Altman Z2-Score in the year T_0 by 7.76%. Column 5 of Table 7.15 however shows that when looking at the unison effect of all four key auditor attributes, variable auditor tenure loses its significance, though still with a negative correlation (L3.$Ln\_Aud\_Part\_Ten_{it}$ - β = -0.0627, z-statistics (Wald) = -0.033 and $p > 0.1$). This is consistent with Tables 7.4 and 7.5 when a lag of two-years and three-years respectively were used.

7.2.15.2 Control variables

As shown in column 1 of Table 7.15 below, where the independent variable L3.$Aud\_Spec\_30_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.827, z-statistics (Wald) = -0.203, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.510, z-statistics (Wald) = -0.230, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.15) return no statistically significant results when regressed with the independent variable L3.$Aud\_Spec\_30_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.15 below, where the independent variable L3.$Cnon\_Audit_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.762, z-statistics (Wald) = -0.196, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.768, z-statistics (Wald) = -0.241, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.15) return no statistically significant results when regressed with the independent variable L3.$Cnon\_Audit_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.15 below, where the independent variable L3.$Ln\_Aud\_Part\_Ten_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.762, z-statistics (Wald) = -0.196, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.596, z-statistics (Wald) = -0.234, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.15) return no statistically significant results when regressed with the independent variable L3.$Ln\_Aud\_Part\_Ten_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.15 below, where the independent variable

L3.$Prop\_Aud\_Fee_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ ($\beta = -2.997$, z-statistics (Wald) = -0.244, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ ($\beta = -3.523$, z-statistics (Wald) = -0.202, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.15) return no statistically significant results when regressed with the independent variable L3.$Prop\_Aud\_Fee_{it}$ against the Altman Z2-Score.

Last from column 5 of Table 7.15 below, where the four independent variables L3.$Aud\_Spec\_30_{it}$, L3.$Cnon\_Audit_{it}$, L3.$Ln\_Aud\_Part\_Ten_{it}$ and L3.$Prop\_Aud\_Fee_{it}$ are regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ ($\beta = -2.797$, z-statistics (Wald) = -0.235, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ ($\beta = -3.789$, z-statistics (Wald) = -0.218, and $p < 0.01$).

The remaining control variables (as per column 5 of Table 7.15) return no statistically significant results when regressed with the independent variables against the Altman Z2-Score.

Table 7.15: Logistic Regression Results – Lagged (three years) Alternative Measure of Key Auditor Attributes and Altman Z2 Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)	(5)
L3.$Aud\_Spec\_30_{it}$	-0.085*				-0.017*
	(-0.461)				(-0.087)
L3.$Cnon\_Audit_{it}$		-0.539***			-0.579***
		(-3.449)			(-3.501)
L3.$Ln\_Aud\_Part\_Ten_{it}$			-0.039		-0.033
			(-0.771)		(-0.627)
L3.$Prop\_Aud\_Fee_{it}$				-1.378*	-1.857*
				(-1.805)	(-1.709)
BoD_Tenure_{it}	-0.000	-0.001	-0.001	0.012	0.011
	(-0.012)	(-0.023)	(-0.019)	(0.371)	(0.335)
$CEO\_Duality_{it}$	-0.129	-0.102	-0.151	-0.123	-0.094
	(-0.685)	(-0.534)	(-0.797)	(-0.613)	(-0.459)
Aud_Com_{it}	-0.154	-0.183	-0.150	-0.287	-0.307
	(-0.828)	(-0.973)	(-0.807)	(-1.445)	(-1.520)
$Aud\_Com\_Meet_{it}$	-0.104	-0.105	-0.100	-0.050	-0.051
	(-1.425)	(-1.429)	(-1.390)	(-0.680)	(-0.670)
$No\_Geographic\_Segments_{it}$	-0.203***	-0.195***	-0.196***	-0.244***	-0.235***
	(-2.827)	(-2.678)	(-2.762)	(-2.997)	(-2.797)
$Ln\_Market\_Cap_{it}$	-0.230***	-0.241***	-0.234***	-0.202***	-0.218***
	(-4.510)	(-4.768)	(-4.596)	(-3.523)	(-3.789)
Ln_Sales_{it}	-0.054	-0.049	-0.057	-0.042	-0.035
	(-1.408)	(-1.256)	(-1.459)	(-1.021)	(-0.818)
Constant	-4.968***	-5.272***	-5.146***	-4.181***	-4.663***
	(-5.678)	(-6.061)	(-5.795)	(-4.311)	(-4.730)
Observations	948	948	948	948	948
Year_Dummy	Included	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included	Included
Log_Pseudolikelihood	-487.0	-481.2	-486.8	-434.5	-428.2
Pseudo_R2	0.0493	0.0606	0.0497	0.0641	0.0776

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [75]*, Column 2 based on *Equation [76]*, Column 3 based on *Equation [77]*, Column 4 based on *Equation [78]* and Column 5 based on *Equation [79]*.

$$Z2_{it} = \beta 0+\beta_1 \text{L3}.Aud\_Spec\_30_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [75]$$

$$Z2_{it} = \beta 0+\beta_1 \text{L3}.CNon\_Audit_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [76]$$

$$Z2_{it} = \beta 0+\beta_1 \text{L3}.Ln\_Aud\_Part\_Ten_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [77]$$

$$Z2_{it} = \beta 0+\beta_1 \text{L3}.Prop\_Aud\_Fee_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon_{it} \quad [78]$$

$$Z2_{it} = \beta 0+\beta_1 \text{L3}.Aud\_Spec\_30_{it}+\beta_2 \text{L3}.CNon\_Audit_{it}+\beta_3 \text{L3}.Ln\_Aud\_Part\_Ten_{it}+\beta_4 \text{L3}.Prop\_Aud\_Fee_{it}+\beta_5 Bod\_Tenure_{it}+\beta_6 CEO\_Duality_{it}+\beta_7 Aud\_Com_{it}+\beta_8 Aud\_Com\_Meet_{it}+\beta_9 No\_Geographic\_Segments_{it}+\beta_{10} Ln\_Market\_Cap_{it}+\beta_{11} Ln\_Sales_{it}+\beta_{12} Industry_{it}+\beta_{13} Year_{it} +\varepsilon_{it} \quad [79]$$

7.2.15.3 *Summary*

As shown in Table 7.15 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, 4 and 5 as 0.0493, 0.0606, 0.0497, 0.0641 and 0.0776 respectively. This implies that the lagged independent variables in the regression models explain 4.93%, 6.06%, 4.97%, 6.41% and 7.76% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that all of the four key auditor attributes under consideration for this study using the lagged effect (T -3) may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.15 using the Altman Z2-Score model support the findings of Chapter Six in providing support for hypotheses H_{5c}, H_{6c}, H_{7c}, and H_{8c} showing that lagged (T – 3) specialist auditor (L3.$Aud\_Spec\_30_{it}$), lagged (T – 3) the provision of non-audit services (L3.$Cnon\_Audit_{it}$), lagged (T – 3) auditor tenure (L3.$Ln\_Aud\_Part\_Ten_{it}$) and lagged (T – 3) audit fee (L3.$Prop\_Aud\_Fee_{it}$) have a statistically significant association with financial distress with all coefficients being negative.

7.2.16 Existence of a composite key auditor attribute and lagged (one, two and three years) composite key auditor attribute impact on financial distress in year zero: The Altman Full Model

Table 7.16 below presents the results of binary logistic regressions where the composite score (AQ_{it}) and lagged (one, two, and three years) composite score (L.AQ_{it}, L2.AQ_{it}, and L3.AQ_{it} respectively) of the four key auditor attributes used in this study calculated as $\sum$ ($Big4_{it}$, $RNon\text{-}Audit_{it}$, $Ln\_Aud\_Ten_{it}$ and $Ln\_Aud\_Fee_{it}$) is (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.16.1 *Independent variables*

As shown in column 1 of Table 7.16 below, the coefficient of the independent variable composite auditor attributes (AQ_{it}) is reported to be negative and statistically significant (β = -13.779, z-statistics (Wald) = -0.833, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a composite auditor attributes decreases the likelihood of financial distress with a goodness-of-fit of 51.1% (that is, Pseudo R^2 of 0.511).

Column 2 of Table 7.16 below shows the coefficient of the independent variable lagged one-year (T_{-1}) composite auditor attributes (L.AQ_{it}) is reported to be negative and statistically significant (β = -9.214, z-statistics (Wald) = -0.694, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 51% (that is, Pseudo R^2 of 0.510).

Column 3 of Table 7.16 below shows the coefficient of the independent variable lagged two-years (T_{-2}) composite auditor attributes (L2.AQ_{it}) is reported to be negative and statistically significant (β = -6.668, z-statistics (Wald) = -0.776, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 56.9% (that is, Pseudo R^2 of 0.569).

Last, column 4 of Table 7.16 below shows the coefficient of the independent variable lagged three-years (T_{-3}) composite auditor attributes (L3.AQ_{it}) is reported to be negative and statistically significant (β = -5.882, z-statistics (Wald) = -0.701, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, with added control variables, an increase in the in the composite auditor attributes in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 53.1% (that is, Pseudo R^2 of 0.531).

7.2.16.2 Control variables

As shown in column 1 of Table 7.16 below, where the independent variable AQ_{it} is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables *Prop_BoD_Ind*$_{it}$ (β = -5.677, z-statistics (Wald) = -1.435, and $p < 0.01$), *Prop_Aud_Com_Ind*$_{it}$ (β = 4.601, z-statistics (Wald) = 1.109, and $p < 0.01$), *Prop_Segment_Sales*$_{it}$ (β = -2.970, z-statistics (Wald) = -0.480, and $p < 0.01$), *Ln_Total_Assets*$_{it}$ (β = -8.708, z-statistics (Wald) = -0.335, and $p < 0.01$), *Ln_Age*$_{it}$ (β = -2.765, z-statistics (Wald) = -0.214, and $p < 0.01$), *Earnings_Quality_EQ*$_{it}$ (β = -2.245, z-statistics (Wald) = -0.138, and $p < 0.05$), *Leverage*$_{it}$ (β = 2.708, z-statistics (Wald) = 0.043, and $p < 0.01$), *ROA*$_{it}$ (β = -2.938, z-statistics (Wald) = -0.511, and p <

0.01), and $Aud\_Opinion_{it}$ (β = 25.921, z-statistics (Wald) = 4.419, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.16) return no statistically significant results when regressed with the independent variable AQ_{it} against the Altman Z2-Score.

From column 2 of Table 7.16 below, where the independent variable L.AQ_{it} is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -4.628, z-statistics (Wald) = -1.645, and $p < 0.01$), AC_Size_{it} (β = -3.145, z-statistics (Wald) = -0.130, and $p < 0.01$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 5.018, z-statistics (Wald) = 1.619, and $p < 0.01$), $Prop\_Segment\_Sales_{it}$ (β = -2.286, z-statistics (Wald) = -0.526, and $p < 0.05$), $Ln\_Total\_Assets_{it}$ (β = -6.205, z-statistics (Wald) = -0.320, and $p < 0.01$), Ln_Age_{it} (β = -2.165, z-statistics (Wald) = -0.252, and $p < 0.05$), $Earnings\_Quality\_EQ_{it}$ (β = -1.939, z-statistics (Wald) = -0.185, and $p < 0.1$), $Leverage_{it}$ (β = 1.858, z-statistics (Wald) = 0.032, and $p < 0.1$), ROA_{it} (β = -2.049, z-statistics (Wald) = -0.462, and $p < 0.05$), and $Aud\_Opinion_{it}$ (β = 19.331, z-statistics (Wald) = 4.634, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.16) return no statistically significant results when regressed with the independent variable L.AQ_{it} against the Altman Z2-Score.

As shown in column 3 of Table 7.16 below, where the independent variable L2.AQ_{it} is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -2.054, z-statistics (Wald) = -1.132, and $p < 0.05$), AC_Size_{it} (β = -1.973, z-statistics (Wald) = -0.117, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 4.561, z-statistics (Wald) = 2.078, and $p < 0.01$), $Ln\_Total\_Assets_{it}$ (β = -3.168, z-statistics (Wald) = -0.247, and $p < 0.01$), $Sq\text{-}Emp_{it}$ (β = 1.868, z-statistics (Wald) = -0.016, and $p < 0.1$), $Earnings\_Quality\_EQ_{it}$ (β = -1.902, z-statistics (Wald) = -0.288, and $p < 0.1$), ROA_{it} (β = -2.184, z-statistics (Wald) = -0.698, and $p < 0.05$), and $Aud\_Opinion_{it}$ (β = 14.207, z-statistics (Wald) = 5.251, and $p < 0.01$).

The remaining control variables (as per column 3 of Table 7.16) return no statistically significant results when regressed with the independent variable L2.AQ_{it}

against the Altman Z2-Score.

From column 4 of Table 7.16 below, where the independent variable L3.AQ_{it} is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Prop\_BoD\_Ind_{it}$ (β = -2.027, z-statistics (Wald) = -1.228, and $p < 0.05$), AC_Size_{it} (β = -2.324, z-statistics (Wald) = -0.149, and $p < 0.05$), $Prop\_Aud\_Com\_Ind_{it}$ (β = 3.705, z-statistics (Wald) = 1.830, and $p < 0.01$), $Aud\_Com\_Financial\_Expertise_{it}$ (β = -1.681, z-statistics (Wald) = -0.452, and $p < 0.1$), $Ln\_Total\_Assets_{it}$ (β = -3.804, z-statistics (Wald) = -0.298, and $p < 0.01$), $Earnings\_Quality\_EQ_{it}$ (β = -1.700, z-statistics (Wald) = -0.230, and $p < 0.1$), and $Aud\_Opinion_{it}$ (β = 12.538, z-statistics (Wald) = 5.004, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.16) return no statistically significant results when regressed with the independent variable L3.AQ_{it} against the Altman Z2-Score.

Since the inclusions of variables representing financial leverage $Leverage_{it}$ and return on assets ROA_{it} can be argued given these variables are also used in the Altman Z2-Score model, the above regressions were re-run and the control variables $Leverage_{it}$ and ROA_{it} were omitted. The results obtained did not significantly defer to those explained in Table 7.16.

Table 7.16: Logistic Regression Results – Composite Auditor Attributes (AQ) and lagged (one, two and three years) AQ with Altman Z2-Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)
AQ_{it}	-0.833***			
	(-13.779)			
L. AQ_{it}		-0.694***		
		(-9.214)		
L2. AQ_{it}			-0.776***	
			(-6.668)	
L3. AQ_{it}				-0.701***
				(-5.882)
$Prop\_BoD\_Ind_{it}$	-1.435***	-1.645***	-1.132**	-1.228**
	(-5.677)	(-4.628)	(-2.054)	(-2.027)
$BoD\_Financial\_Expertise_{it}$	0.137	-0.012	-0.076	0.182
	(1.100)	(-0.076)	(-0.334)	(0.741)
AC_Size_{it}	-0.049	-0.130***	-0.117**	-0.149**
	(-1.634)	(-3.145)	(-1.973)	(-2.324)
$Prop\_Aud\_Com\_Ind_{it}$	1.109***	1.619***	2.078***	1.830***
	(4.601)	(5.018)	(4.561)	(3.705)
$Aud\_Com\_Financial\_Expertise_{it}$	-0.042	0.046	-0.206	-0.452*
	(-0.346)	(0.287)	(-0.845)	(-1.681)
$Prop\_Segment\_Sales_{it}$	-0.480***	-0.526**	-0.362	-0.446
	(-2.970)	(-2.286)	(-1.254)	(-1.530)
$Ln\_Total\_Assets_{it}$	0.335***	0.320***	0.247***	0.298***
	(-8.708)	(-6.205)	(-3.168)	(-3.804)
Sq_Emp_{it}	-0.004	-0.008	-0.016*	-0.015
	(1.122)	(1.350)	(1.868)	(1.604)
Ln_Age_{it}	-0.214***	-0.252**	-0.181	-0.064
	(-2.765)	(-2.165)	(-1.026)	(-0.334)
$Earnings\_Quality\_EQ_{it}$	-0.138**	-0.185*	-0.288*	-0.230*
	(-2.245)	(-1.939)	(-1.902)	(-1.700)
$Loss_{it}$	-0.135	-0.135	0.281	0.067
	(1.115)	(0.860)	(1.172)	(0.282)
$Leverage_{it}$	0.043***	0.032*	0.024	0.004
	(2.708)	(1.858)	(1.229)	(0.152)
ROA_{it}	0.511***	0.462**	0.698**	0.408
	(-2.938)	(-2.049)	(-2.184)	(-1.578)
$Aud\_Opinion_{it}$	4.419***	4.634***	5.251***	5.004***
	(25.921)	(19.331)	(14.207)	(12.538)
Constant	-3.120***	-2.705***	-3.012**	-3.826***
	(-4.549)	(-2.880)	(-2.139)	(-2.720)
Observations	4,876	2,082	1,172	948
Year_Dummy	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included
Log_Pseudolikelihood	-1195	-678.1	-322.5	-284.7
Pseudo_R2	0.511	0.510	0.569	0.531

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [80]*, Column 2 based on *Equation [81]*, Column 3 based on *Equation [82]* and Column 4 based on *Equation [83]*.

$$Z2_{it} = \beta 0+\beta_1 AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [80]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [81]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [82]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ_{it}+\beta_2 Prop\_BoD\_Ind_{it}+\beta_3 BoD\_Financial\_Expertise_{it}+\beta_4 AC\_Size_{it}+\beta_5 Prop\_Aud\_Com\_Ind_{it}+\beta_6 Aud\_Com\_Financial\_Expertise_{it}+\beta_7 Prop\_Segment\_Sales_{it}+\beta_8 Ln\_Total\_Assets_{it}+\beta_9 Sq\_Emp_{it}+\beta_{10} Ln\_Age_{it}+\beta_{11} Earnings\_Quality\_EQ_{it}+\beta_{12} Loss_{it}+\beta_{13} Leverage_{it}+\beta_{14} ROA_{it}+\beta_{15} Aud\_Opinion_{it}+\beta_{16} Industry_{it}+\beta_{17} Year_{it}+\varepsilon_{it}, \quad [83]$$

7.2.16.3 Summary

As shown in Table 7.16 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, and 4 as 0.511, 0.510, 0.569 and 0.531 respectively. This implies that the independent variables in the regression models explain 51.1%, 51%, 56.9% and 53.1% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that the composite score of all of the four key auditor attributes along with the lagged composite auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.16 (column 1) using the Altman Z2-Score model provide support for the hypothesis H_9 showing that composite auditor attributes (AQ_{it}) has a statistically significant association with financial distress with all coefficients being negative. In addition, results from Table 7.16 (columns 2, 3, and 4) using the Altman Z2-Score model do not reject the hypotheses H_{10a}, H_{10b}, and H_{10c} showing the lagged one, two, and three-years (T_{-1}, T_{-2}, and T_{-3}) auditor attributes (L.AQ_{it}, L2.AQ_{it}, and L3.AQ_{it} respectively) have a statistically significant association with financial distress in the year T_0 with all coefficients being negative.

7.2.17 Existence of a composite alternative measure of key auditor attribute and lagged (one, two, and three years) composite key alternative auditor attribute impact on financial distress in year zero: The Zmijewski Full Model

Table 7.17 below presents the results of binary logistic regressions where the composite score ($AQ2_{it}$) and lagged (one, two, and three years) composite score (L.$AQ2_{it}$, L2.$AQ2_{it}$, and L3.$AQ2_{it}$ respectively) of the four key auditor attributes used in this study calculated as ∑ (*Aud_Spec_30*$_{it}$, *Cnon-Audit*$_{it}$, *Ln_Aud_Part_Ten*$_{it}$ and *Prop_Aud_Fee*$_{it}$) is (logistically) regressed against financial distress, calculated using Zmijewski ZFC-Score model with added control variables.

7.2.17.1 Independent variables

As shown in column 1 of Table 7.17 below, the coefficient of the independent variable composite auditor attributes ($AQ2_{it}$) is reported to be negative and statistically significant (β = -2.879, z-statistics (Wald) = -0.138, and $p < 0.01$). This result is as expected and implies that with the use of added control variables, the use of a composite auditor attributes decreases the likelihood of financial distress with a goodness-of-fit of 5.46% (that is, Pseudo R^2 of 0.0546).

Column 2 of Table 7.17 below shows the coefficient of the independent variable lagged one-year (T_{-1}) composite auditor attributes (L.$AQ2_{it}$) is reported to be negative and statistically significant (β = -1.560, z-statistics (Wald) = -0.094, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 6.52% (that is, Pseudo R^2 of 0.0652).

Column 3 of Table 7.17 below shows the coefficient of the independent variable lagged two-years (T_{-2}) composite auditor attributes (L2.$AQ2_{it}$) is reported to be negative and statistically significant (β = -0.248, z-statistics (Wald) = -0.018, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.42% (that is, Pseudo R^2 of 0.0442).

Last, column 4 of Table 7.17 below shows the coefficient of the independent variable lagged three-years (T_{-3}) composite auditor attributes (L3.$AQ2_{it}$) is reported to be negative and statistically significant ($\beta = -1.119$, z-statistics (Wald) = -0.090, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, with added control variables, an increase in the in the composite auditor attributes in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 3.71% (that is, Pseudo R^2 of 0.0371).

7.2.17.2 Control variables

As shown in column 1 of Table 7.17 below, where the independent variable $AQ2_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $CEO\_Duality_{it}$ ($\beta = 2.551$, z-statistics (Wald) = 0.246, and $p < 0.05$), Aud_Com_{it} ($\beta = -2.098$, z-statistics (Wald) = -0.197, and $p < 0.05$), $Aud\_Com\_Meet_{it}$ ($\beta = -2.728$, z-statistics (Wald) = -0.091, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ ($\beta = -6.741$, z-statistics (Wald) = -0.244, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ ($\beta = -9.120$, z-statistics (Wald) = -0.235, and $p < 0.01$) and Ln_Sales_{it} ($\beta = -2.984$, z-statistics (Wald) = -0.059, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.17) return no statistically significant results when regressed with the independent variable $AQ2_{it}$ against the Zmijewski ZFC-Score.

From column 2 of Table 7.17 below, where the independent variable L.$AQ2_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ ($\beta = -5.600$, z-statistics (Wald) = -0.260, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ ($\beta = -7.497$, z-statistics (Wald) = -0.250, and $p < 0.01$) and Ln_Sales_{it} ($\beta = -2.717$, z-statistics (Wald) = -0.072, and $p < 0.01$).

The remaining control variables (as per column 2 of Table 7.17) return no statistically significant results when regressed with the independent variable L.$AQ2_{it}$ against the Zmijewski ZFC-Score.

As shown in column 3 of Table 7.17 below, where the independent variable L2.$AQ2_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ ($\beta = -2.747$, z-statistics (Wald) = -0.179, and $p < 0.01$), *No_Geographic_Segments*$_{it}$ (β = -3.630, z-statistics (Wald) = -0.209, and $p < 0.01$), *Ln_Market_Cap*$_{it}$ (β = -4.373, z-statistics (Wald) = -0.195, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -2.575, z-statistics (Wald) = -0.088, and $p < 0.05$).

The remaining control variables (as per column 3 of Table 7.17) return no statistically significant results when regressed with the independent variable L2.*AQ2*$_{it}$ against the Zmijewski ZFC-Score.

From column 4 of Table 7.17 below, where the independent variable L3.*AQ2*$_{it}$ is regressed with the control variables against the Zmijewski ZFC-Score, control variables which are reported to have statistical significance include the variables *Aud_Com_Meet*$_{it}$ (β = -1.833, z-statistics (Wald) = -0.138, and $p < 0.1$), *No_Geographic_Segments*$_{it}$ (β = -2.258, z-statistics (Wald) = -0.138, and $p < 0.05$), *Ln_Market_Cap*$_{it}$ (β = -3.399, z-statistics (Wald) = -0.167, and $p < 0.01$) and *Ln_Sales*$_{it}$ (β = -2.350, z-statistics (Wald) = -0.083, and $p < 0.05$).

The remaining control variables (as per column 4 of Table 7.17) return no statistically significant results when regressed with the independent variable L3.*AQ2*$_{it}$ against the Zmijewski ZFC-Score.

Table 7.17: Logistic Regression Results – Composite Alternative Auditor Attributes (AQ2) and lagged (one, two and three years) AQ2 with Zmijewski ZFC-Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)
$AQ2_{it}$	-0.138***			
	(-2.879)			
L. $AQ2_{it}$		-0.094**		
		(-1.560)		
L2. $AQ2_{it}$			-0.018**	
			(-0.248)	
L3. $AQ2_{it}$				-0.090**
				(-1.119)
BoD_Tenure_{it}	0.024	0.027	0.002	0.012
	(1.491)	(1.255)	(0.085)	(0.389)
$CEO\_Duality_{it}$	0.246**	0.011	0.070	-0.223
	(2.551)	(0.090)	(0.450)	(-1.289)
Aud_Com_{it}	-0.197**	-0.122	-0.124	-0.100
	(-2.098)	(-1.001)	(-0.790)	(-0.575)
$Aud\_Com\_Meet_{it}$	-0.091***	-0.076	-0.179***	-0.138*
	(-2.728)	(-1.631)	(-2.747)	(-1.833)
$No\_Geographic\_Segments_{it}$	-0.244***	-0.260***	-0.209***	-0.138**
	(-6.741)	(-5.600)	(-3.630)	(-2.258)
$Ln\_Market\_Cap_{it}$	-0.235***	-0.250***	-0.195***	-0.167***
	(-9.120)	(-7.497)	(-4.373)	(-3.399)
Ln_Sales_{it}	-0.059***	-0.072***	-0.088**	-0.083**
	(-2.984)	(-2.717)	(-2.575)	(-2.350)
Constant	-3.941***	-4.550***	-4.118***	-3.494***
	(-8.824)	(-7.610)	(-4.904)	(-3.875)
Observations	4,876	2,082	1,172	948
Year_Dummy	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included
Log_Pseudolikelihood	-1916	-1124	-649.7	-527.6
Pseudo_R2	0.0546	0.0652	0.0442	0.0371

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [84]*, Column 2 based on *Equation [85]*, Column 3 based on *Equation [86]* and Column 4 based on *Equation [87]*.

$$ZFC_{it} = \beta 0+\beta_1 AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [84]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [85]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [86]$$

$$ZFC_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it} +\varepsilon i_t \quad [87]$$

7.2.17.3 *Summary*

As shown in Table 7.17 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, and 4 as 0.0546, 0.0652, 0.0442 and 0.0371 respectively. This implies that the independent variables in the regression models explain 5.46%, 6.52%, 4.42% and 3.71% of the variation in the dependent variable (the Zmijewski ZFC-Score). These results may imply that the composite score of all of the four key alternative auditor attributes along with the lagged composite alternative auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.17 (column 1) using the Zmijewski ZFC-Score model provide support for the hypothesis H_9 showing that composite alternative auditor attributes ($AQ2_{it}$) has a statistically significant association with financial distress with all coefficients being negative. In addition, results from Table 7.17 (columns 2, 3, and 4) using the Zmijewski ZFC-Score model do not reject the hypotheses H_{10a}, H_{10b}, and H_{10c} showing the lagged one, two, and three-years (T_{-1}, T_{-2}, and T_{-3}) auditor attributes (L.$AQ2_{it}$, L2.$AQ2_{it}$, and L3.$AQ2_{it}$ respectively) have a statistically significant association with financial distress in the year T_0 with all coefficients being negative.

7.2.18 Existence of a composite alternative measure of key auditor attribute and lagged (one, two, and three years) composite key alternative auditor attribute impact on financial distress in year zero: The Altman Full Model

Table 7.18 below presents the results of binary logistic regressions where the composite score ($AQ2_{it}$) and lagged (one, two, and three years) composite score (L.$AQ2_{it}$, L2.$AQ2_{it}$, and L3.$AQ2_{it}$ respectively) of the four key auditor attributes used in this study calculated as ∑ ($Aud\_Spec\_30_{it}$, $Cnon\text{-}Audit_{it}$, $Ln\_Aud\_Part\_Ten_{it}$ and $Prop\_Aud\_Fee_{it}$) is (logistically) regressed against financial distress, calculated using Altman Z2-Score model with added control variables.

7.2.18.1 *Independent variables*

As shown in column 1 of Table 7.18 below, the coefficient of the independent variable composite auditor attributes ($AQ2_{it}$) is reported to be negative and statistically significant (β = -0.858, z-statistics (Wald) = -0.041, and $p < 0.05$). This result is as expected and implies that with the use of added control variables, the use of a composite auditor attributes decreases the likelihood of financial distress with a goodness-of-fit of 3.73% (that is, Pseudo R^2 of 0.0373).

Column 2 of Table 7.18 below shows the coefficient of the independent variable lagged one-year (T_{-1}) composite auditor attributes (L.$AQ2_{it}$) is reported to be negative and statistically significant (β = -0.551, z-statistics (Wald) = -0.034, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-1} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.56% (that is, Pseudo R^2 of 0.0456).

Column 3 of Table 7.18 below shows the coefficient of the independent variable lagged two-years (T_{-2}) composite auditor attributes (L2.$AQ2_{it}$) is reported to be negative and statistically significant (β = -1.064, z-statistics (Wald) = -0.085, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, an increase in the in the composite auditor attributes in the year T_{-2} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 4.11% (that is, Pseudo R^2 of 0.0411).

Last, column 4 of Table 7.18 below shows the coefficient of the independent variable lagged three-years (T_{-3}) composite auditor attributes (L3.$AQ2_{it}$) is reported to be negative and statistically significant (β = -0.911, z-statistics (Wald) = -0.079, and $p < 0.1$). This result is as expected and implies that with the use of added control variables, with added control variables, an increase in the in the composite auditor attributes in the year T_{-3} decreases the likelihood of financial distress in the year T_0 with a goodness-of-fit of 5% (that is, Pseudo R^2 of 0.0500).

7.2.18.2 Control variables

As shown in column 1 of Table 7.18 below, where the independent variable $AQ2_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $CEO\_Duality_{it}$ (β = 2.187, z-statistics (Wald) = 0.204, and $p < 0.05$), $Aud\_Com\_Meet_{it}$ (β = -2.655, z-statistics (Wald) = -0.083, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ (β = -5.344, z-statistics (Wald) = -0.195, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -9.037, z-statistics (Wald) = -0.214, and $p < 0.01$).

The remaining control variables (as per column 1 of Table 7.18) return no

statistically significant results when regressed with the independent variable $AQ2_{it}$ against the Altman Z2-Score.

From column 2 of Table 7.18 below, where the independent variable L.$AQ2_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -2.627, z-statistics (Wald) = -0.114, and $p < 0.01$), $No\_Geographic\_Segments_{it}$ (β = -3.849, z-statistics (Wald) = -0.182, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -7.144, z-statistics (Wald) = -0.225, and $p < 0.01$) and Ln_Sales_{it} (β = -1.792, z-statistics (Wald) = -0.048, and $p < 0.1$).

The remaining control variables (as per column 2 of Table 7.18) return no statistically significant results when regressed with the independent variable L.$AQ2_{it}$ against the Altman Z2-Score.

As shown in column 3 of Table 7.18 below, where the independent variable L2.$AQ2_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $Aud\_Com\_Meet_{it}$ (β = -1.839, z-statistics (Wald) = -0.118, and $p < 0.1$), $No\_Geographic\_Segments_{it}$ (β = -3.029, z-statistics (Wald) = -0.189, and $p < 0.01$), $Ln\_Market\_Cap_{it}$ (β = -4.523, z-statistics (Wald) = -0.203, and $p < 0.01$) and Ln_Sales_{it} (β = -1.905, z-statistics (Wald) = -0.071, and $p < 0.1$).

The remaining control variables (as per column 3 of Table 7.18) return no statistically significant results when regressed with the independent variable L2.$AQ2_{it}$ against the Altman Z2-Score.

From column 4 of Table 7.18 below, where the independent variable L3.$AQ2_{it}$ is regressed with the control variables against the Altman Z2-Score, control variables which are reported to have statistical significance include the variables $No\_Geographic\_Segments_{it}$ (β = -2.791, z-statistics (Wald) = -0.198, and $p < 0.01$) and $Ln\_Market\_Cap_{it}$ (β = -4.635, z-statistics (Wald) = -0.235, and $p < 0.01$).

The remaining control variables (as per column 4 of Table 7.18) return no statistically significant results when regressed with the independent variable L3.$AQ2_{it}$ against the Altman Z2-Score.

Table 7.18: Logistic Regression Results – Composite Alternative Auditor Attributes (AQ2) and lagged (one, two and three years) AQ2 with Altman Z2-Score – Full Model

VARIABLES	(1)	(2)	(3)	(4)
$AQ2_{it}$	-0.041**			
	(-0.858)			
L. $AQ2_{it}$		-0.034*		
		(-0.551)		
L2. $AQ2_{it}$			-0.085*	
			(-1.064)	
L3. $AQ2_{it}$				-0.079*
				(-0.911)
BoD_Tenure_{it}	0.018	0.002	-0.020	-0.000
	(1.213)	(0.115)	(-0.728)	(-0.007)
$CEO\_Duality_{it}$	0.204**	0.084	0.115	-0.128
	(2.187)	(0.668)	(0.699)	(-0.681)
Aud_Com_{it}	-0.062	0.012	-0.175	-0.153
	(-0.675)	(0.096)	(-1.050)	(-0.829)
$Aud\_Com\_Meet_{it}$	-0.083***	-0.114***	-0.118*	-0.106
	(-2.655)	(-2.627)	(-1.839)	(-1.456)
$No\_Geographic\_Segments_{it}$	-0.195***	-0.182***	-0.189***	-0.198***
	(-5.344)	(-3.849)	(-3.029)	(-2.791)
$Ln\_Market\_Cap_{it}$	-0.214***	-0.225***	-0.203***	-0.235***
	(-9.037)	(-7.144)	(-4.523)	(-4.635)
Ln_Sales_{it}	-0.023	-0.048*	-0.071*	-0.056
	(-1.220)	(-1.792)	(-1.905)	(-1.434)
Constant	-4.147***	-4.875***	-4.887***	-5.158***
	(-10.629)	(-9.174)	(-5.945)	(-5.833)
Observations	4,876	2,082	1,172	948
Year_Dummy	Included	Included	Included	Included
Industry_Dummy	Included	Included	Included	Included
Log_Pseudolikelihood	-2013	-1136	-599.2	-486.7
Pseudo_R2	0.0373	0.0456	0.0411	0.0500

Robust z-statistics in parentheses

**** p<0.01, ** p<0.05, * p<0.1; Pease refer to Appendix-1 for variables definition.*

Column 1 based on *Equation [88]*, Column 2 based on *Equation [89]*, Column 3 based on *Equation [90]* and Column 4 based on *Equation [91]*.

$$Z2_{it} = \beta 0+\beta_1 AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [88]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [89]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [90]$$

$$Z2_{it} = \beta 0+\beta_1 \mathrm{L2}.AQ2_{it}+\beta_2 Bod\_Tenure_{it}+\beta_3 CEO\_Duality_{it}+\beta_4 Aud\_Com_{it}+\beta_5 Aud\_Com\_Meet_{it}+\beta_6 No\_Geographic\_Segments_{it}+\beta_7 Ln\_Market\_Cap_{it}+\beta_8 Ln\_Sales_{it}+\beta_9 Industry_{it}+\beta_{10} Year_{it}+\varepsilon i_t \quad [91]$$

7.2.18.3 Summary

As shown in Table 7.18 above, the goodness-of-fit (or coefficient of determinant, Pseudo R^2) for logistic regression shown in columns 1, 2, 3, and 4 as 0.0373, 0.0456, 0.0411 and 0.0500 respectively. This implies that the independent variables in the regression models explain 3.73%, 4.56%, 4.11% and 5.00% of the variation in the dependent variable (the Altman Z2-Score). These results may imply that the composite score of all of the four key alternative auditor attributes along with the lagged composite alternative auditor attributes under consideration for this study may significantly assist the firm to lower the likelihood of financial distress.

In summary, the results from Table 7.18 (column 1) using the Altman Z2-Score model provide support for the hypothesis H_9 showing that composite alternative auditor attributes ($AQ2_{it}$) has a statistically significant association with financial distress with all coefficients being negative. In addition, results from Table 7.18 (columns 2, 3, and 4) using the Altman Z2-Score model do not reject the hypotheses H_{10a}, H_{10b}, and H_{10c} showing the lagged one, two, and three-years (T_{-1}, T_{-2}, and T_{-3}) auditor attributes (L.$AQ2_{it}$, L2.$AQ2_{it}$, and L3.$AQ2_{it}$ respectively) have a statistically significant association with financial distress in the year T_0 with all coefficients being negative.

7.3 SUMMARY OF RESULTS

Table 7.19 provides a summary of results from Chapter Six (Tables 6.2 to 6.6) and Chapter Seven (Tables 7.2 to 7.18).

Overall, the sensitivity tests support the main findings of this study (from Chapter Six) by consistently showing the four key auditor attributes adopted by this study to have a statistically significant negative association with the likelihood of financial distress (using both the Altman Z2-Score and the Altman Z2-Score models).

Table 7.19: Summary of results

Hypotheses		Main Results: Conclusion	Main Results: R^2	Sensitivity Results: Z2 and Auditor Attributes: Conclusion	Z2 and Auditor Attributes: R^2	ZFC and Alt. Auditor Attributes: Conclusion	ZFC and Alt. Auditor Attributes: R^2	Z2 and Alt. Auditor Attributes: Conclusion	Z2 and Alt. Auditor Attributes: R^2
H_1	Negative association between $Big4_{it}$ ($Aud\_Spec\_30_{it}$) and likelihood of financial distress	*Supported*	0.349	*Supported*	0.553	*Supported*	0.1050	*Supported*	0.0584
H_2	Negative association between $RNon\text{-}Audit_{it}$ ($Cnon\_Audit_{it}$) and likelihood of financial distress	*Supported*	0.381	*Supported*	0.536	*Supported*	0.0989	*Supported*	0.0678
H_3	Negative association between $Ln\_Aud\_Ten_{it}$ ($Aud\_Part\_Ten_{it}$) and likelihood of financial distress	*Supported*	0.317	*Supported*	0.530	*Supported*	0.1070	*Supported*	0.0941
H_4	Negative association between $Ln\_Aud\_Fee_{it}$ ($Prop\_Aud\_Fee_{it}$) and likelihood of financial distress	*Supported*	0.294	*Supported*	0.531	*Supported*	0.1120	*Supported*	0.0997
H_{5a}	Negative association between lagged one year L.$Big4_{it}$ (L.$Aud\_Spec\_30_{it}$) and likelihood of financial distress	*Supported*	0.361	*Supported*	0.507	*Supported*	0.0779	*Supported*	0.0461
H_{5b}	Negative association between lagged two years L2.$Big4_{it}$ (L2.$Aud\_Spec\_30_{it}$) and likelihood of financial distress	*Supported*	0.409	*Supported*	0.563	*Supported*	0.0519	*Supported*	0.0411
H_{5c}	Negative association between lagged three years L3.$Big4_{it}$ (L3.$Aud\_Spec\_30_{it}$) and likelihood of financial distress	*Supported*	0.353	*Supported*	0.523	*Supported*	0.0462	*Supported*	0.0493
H_{6a}	Negative association between lagged one year L.$RNon\text{-}Audit_{it}$ (L.$Cnon\_Audit_{it}$) and likelihood of financial distress	*Supported*	0.376	*Supported*	0.503	*Supported*	0.0823	*Supported*	0.0581
H_{6b}	Negative association between lagged two years L2.$RNon\text{-}Audit_{it}$ (L2.$Cnon\_Audit_{it}$) and likelihood of financial distress	*Supported*	0.423	*Supported*	0.557	*Supported*	0.0605	*Supported*	0.0473
H_{6c}	Negative association between lagged three years L3.$RNon\text{-}Audit_{it}$ (L3.$Cnon\_Audit_{it}$) and likelihood of financial distress	*Supported*	0.360	*Supported*	0.531	*Supported*	0.0455	*Supported*	0.0606

H_{7a}	Negative association between lagged one year L.*Ln_Aud_Ten*$_{it}$ (L.*Aud_Part_Ten*$_{it}$) and likelihood of financial distress	*Supported*	0.351	*Supported*	0.486	*Supported*	0.0644	*Supported*	0.0456
H_{7b}	Negative association between lagged two years L2.*Ln_Aud_Ten*$_{it}$ (L2.*Aud_Part_Ten*$_{it}$) and likelihood of financial distress	*Supported*	0.397	*Supported*	0.537	*Supported*	0.0457	*Supported*	0.0448
H_{7c}	Negative association between lagged three years L3.*Ln_Aud_Ten*$_{it}$ (L3.*Aud_Part_Ten*$_{it}$) and likelihood of financial distress	*Supported*	0.344	*Supported*	0.503	*Supported*	0.0365	*Supported*	0.0497
H_{8a}	Negative association between lagged one year L.*Ln_Aud_Fee*$_{it}$ (L.*Prop_Aud_Fee*$_{it}$) and likelihood of financial distress	*Supported*	0.331	*Supported*	0.484	*Supported*	0.0927	*Supported*	0.0749
H_{8b}	Negative association between lagged two years L2.*Ln_Aud_Fee*$_{it}$ (L2.*Prop_Aud_Fee*$_{it}$) and likelihood of financial distress	*Supported*	0.390	*Supported*	0.564	*Supported*	0.0658	*Supported*	0.0611
H_{8c}	Negative association between lagged three years L3.*Ln_Aud_Fee*$_{it}$ (L3.*Prop_Aud_Fee*$_{it}$) and likelihood of financial distress	*Supported*	0.334	*Supported*	0.519	*Supported*	0.0490	*Supported*	0.0641
H_{9}	Negative association between auditor attributes composite score AQ$_{it}$ (*AQ2*$_{it}$) and likelihood of financial distress	*Supported*	0.497	*Supported*	0.511	*Supported*	0.0546	*Supported*	0.0373
H_{10a}	Negative association between lagged one year auditor attributes composite score L.*AQ*$_{it}$ (L.*AQ2*$_{it}$) and likelihood of financial distress	*Supported*	0.409	*Supported*	0.510	*Supported*	0.0652	*Supported*	0.0456
H_{10b}	Negative association between lagged two years auditor attributes composite score L2.*AQ*$_{it}$ (L2.*AQ2*$_{it}$) and likelihood of financial distress	*Supported*	0.443	*Supported*	0.569	*Supported*	0.0442	*Supported*	0.0411
H_{10c}	Negative association between lagged three years auditor attributes composite score L3.*AQ*$_{it}$ (L3.*AQ2*$_{it}$) and likelihood of financial distress	*Supported*	0.372	*Supported*	0.531	*Supported*	0.0371	*Supported*	0.0500

7.4 SUMMARY OF THE CHAPTER

Chapter Seven presents the main findings of binary logistic regressions from a comprehensive set of robustness and sensitivity tests completed. Specifically, the results of logistic regressions using alternative measurements of the key auditor attributes and financial distress are examined. These alternative measures are regressed against the likelihood of financial distress (proxied by both the Zmijewski ZFC-Score and the Altman Z2-Score models). Furthermore, lagged analysis (using lagged of T_{-1}, T_{-2} and T_{-3} proxy of the key auditor attributes) are also presented. Last, a comparison of results between the main analysis results (Chapter Six) and sensitivity analysis results (Chapter Seven) is provided.

CHAPTER EIGHT:

IMPLICATIONS AND CONCLUSIONS

8.1 OVERVIEW OF THE CHAPTER

Chapter Eight reviews the major conclusions and implications of this study. Determination of acceptance or rejection of the hypotheses based on empirical results (from Chapter Six) is made, henceforth leading to the key findings of this study. This is then followed by a discussion on the implications and contributions with limitations and future research opportunities also emphasized. Last, an overarching summary of this study is provided.

8.2 STUDY OVERVIEW

This study focuses on providing a comprehensive examination on the association between four pivotal auditor attributes (namely, Big 4 auditor, the provision of non-audit services, auditor tenure (audit firm) and audit fee) and firm's likelihood of facing financial distress (using the Zmijewski ZFC-Score for the main analyses).

The theoretical perspective presented by agency theory best serves the analytical approach of this research and is most relevant given its close affinity with corporate governance and earnings quality issues. Based on the underlying perspective of agency theory and results from related prior studies, a number of directional hypotheses determining the association between the four key auditor attributes examined in this study and financial distress are hypothesized.

A negative direction is postulated for the association of Big 4 auditor and financial distress, the provision for non-audit services and financial distress, audit firm tenure and financial distress and last, audit fee and financial distress. Similarly, when lagged regression for the four key auditor attributes (for T_{-1}, T_{-2} and T_{-3})[35] are used, a negative direction between each of the lagged key auditor attributes (that is, lagged Big 4, lagged provision for non-audit services, lagged audit firm tenure and lagged audit fee) is hypothesized.

So as to empirically analyse to assess the evidence for the hypotheses, the selected auditor attributes (independent variables) were logistically regressed against

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[35] Whereby T_{-1} is a lag of one year, T_{-2} is a lag of two years and T_{-3} is a lag of three years.

financial distress (dependent variables) proxied by the Zmijewski ZFC-Score model. The data required for the dependent, independent and control variables are obtained from the Annual Reports Collection (Connect 4 Pty Ltd), Morningstar DatAnalysis Premium, Osiris and Sirca Corporate Governance Database.

For the purpose of analysis, an initial pool of all listed firms (on the ASX) in accordance with the DatAnalysis database are obtained for each of the observation years (2008 to 2014). From the data obtained, a number of exclusions are applied in keeping with prior literature. Such exclusions include financial institutions and trusts and investments. For the firms remaining, data required to calculate the Zmijewski ZFC-Score is gathered (downloaded and/or hand calculated) and the ZFC-Score is calculated for each of these firms. From this initial sample, firms deemed to be healthy (per the ZFC-Score) are then matched to the closest comparable distressed firm, based on year, size (proxied by total assets) and industry. Logistic regressions between the dependent and independent (and control) variables are then performed using 4,876 firm-year observations (992 observations for 2008, 874 for 2009, 652 for 2010, 612 for 2011, 536 for 2012, 632 for 2013 and 578 for 2014). Conclusions provided by the statistical analyses on the hypotheses are provided in the next section.

8.3 MAJOR CONCLUSIONS OF THE STUDY

8.3.1 The acceptance or rejection of hypotheses

Table 8.1 provides a summary of the overall acceptance or rejection of the testable hypotheses as formulated and examined (based on the empirical analyses of Chapter Six and Seven) in this study. Tables 6.1 to 6.6 present the main empirical results of this study respectively using the Zmijewski ZFC-score (without and with control variables). Specifically, Tables 6.1 and 6.2 present the main analyses of the full model, Tables 6.3, 6.4 and 6.5 present the lagged (T_{-1}, T_{-2}, and T_{-3} respectively) main empirical results of the full model. Last, Table 6.6 presents the main results for a composite auditor attributes and lagged composite auditor attributes. Tables 7.1 to 7.19 follows similar structure to Chapter Six (as detailed above) but with the use of alternative measures for the independent variables (that is, the selected four auditor attributes) and alternative proxy for financial distress (that is, the Altman Z2-Score).

It is postulated in hypothesis H_1 that client firms engaging a Big4 auditor may exhibit a lower level of financial distress. The results from Chapters Six and Seven provide evidence supporting hypothesis H_1 by showing a statistically significant negative association between the engagement of a Big4 auditor and financial distress.

With regards to hypothesis H_2, it is postulated that client firms paying higher non-audit fees to the incumbent auditor may exhibit a lower level of financial distress. The results from the analyses conducted support the acceptance of hypothesis H_2 by showing a statistically significant negative association between paying higher non-audit fees to the incumbent auditor and financial distress.

It is suggested in hypothesis H_3 that client firms with longer audit firm tenure incumbent auditor may exhibit a lower level of financial distress. The results from Chapters Six and Seven support the acceptance of hypothesis H_3 by showing a statistically significant negative association between client firms with longer audit firm tenure incumbent and financial distress.

With regards to hypothesis H_4, it is suggested that client firms paying higher audit fees to the incumbent auditor may exhibit a lower level of financial distress. The results from the analyses conducted support the acceptance of hypothesis H_4 by showing a statistically significant negative association between client firms paying higher audit fees to the incumbent auditor and financial distress.

It is proposed in hypothesis H_{5a} that client firms engaging a Big4 auditor in the year T=-1 (one year prior) may exhibit a lower level of financial distress in the year T=0. The results obtained support the acceptance of hypothesis H_{5a} by showing a statistically significant negative association between the engagement of a Big4 auditor in the year T=-1 and financial distress in the year T=0.

With regards to hypothesis H_{5b}, it is postulated in that client firms engaging a Big4 auditor in the year T=-2 may exhibit a lower level of financial distress in the year T=0. The results from the regressions conducted support the acceptance of hypothesis H_{5b} by showing a statistically significant negative association between the engagement of a Big4 auditor in the year T=-2 and financial distress in the year T=0.

It is suggested in hypothesis H_{5c} that client firms engaging a Big4 auditor in the year T=-3 may exhibit a lower level of financial distress in the year T=0. The results from Chapters Six and Seven support the acceptance of hypothesis H_{5c} by showing a statistically significant negative association between the engagement of a Big4 auditor in the year T=-3 and financial distress in the year T=0.

It is proposed in hypothesis H_{6a} that client firms paying higher non-audit fees to the incumbent auditor in the year T=-1 may exhibit a lower level of financial distress in the year T=0. The results obtained support the acceptance of hypothesis H_{6a} by showing a statistically significant negative association between paying higher non-audit fees in the year T=-1 to the incumbent auditor and financial distress in the year T=0.

With regards to hypothesis H_{6b}, it is suggested in that client firms paying higher non-audit fees to the incumbent auditor in the year T=-2 may exhibit a lower level of financial distress in the year T=0. The results from the analyses conducted support the acceptance of hypothesis H_{6b} by showing a statistically significant negative association between paying higher non-audit fees in the year T=-2 to the incumbent auditor and financial distress in the year T=0.

It is proposed in hypothesis H_{6c} that client firms paying higher non-audit fees to the incumbent auditor in the year T=-3 may exhibit a lower level of financial distress in year T=0. The results from the main and sensitivity analyses support the acceptance of hypothesis H_{6c} by showing a statistically significant negative association between paying higher non-audit fees in the year T=-3 to the incumbent auditor and financial distress in the year T=0.

With regards to hypothesis H_{7a}, it is claimed that client firms with longer audit firm tenure incumbent auditor in the year T=-1 may exhibit a lower level of financial distress in the year T=0. The results from regressions performed support the acceptance of hypothesis H_{7a} by showing a statistically significant negative relationship between client firms with longer audit firm tenure incumbent in the year T=-1 and financial distress in the year T=0.

It is postulated in hypothesis H_{7b} that client firms with longer audit firm tenure incumbent auditor in the year T=-2 may exhibit a lower level of financial distress in the year T=0. The results obtained from Chapters Six and Seven support the acceptance of hypothesis H_{7b} by showing a statistically significant negative association between client firms with longer audit firm tenure incumbent in the year T=-2 and financial distress in the year T=0.

With regards to hypothesis H_{7c}, it is suggested that client firms with longer audit firm tenure incumbent auditor in the year T=-3 may exhibit a lower level of financial distress in the year T=0. The results from the analyses conducted support the acceptance of hypothesis H_{7c} by showing a statistically significant negative association between client firms with longer audit firm tenure incumbent in the year T=-3 and financial distress in the year T=0.

Table 8.1: Acceptance/Rejection of Hypotheses

Hypothesis	Description	Accept/Reject
H_1	Client firms engaging a Big4 auditor will be less likely to suffer financial distress than client firms engaging a non-Big4 auditor.	**Accept √**
H_2	Client firms paying higher non-audit service fees to the incumbent auditor will be less likely to suffer financial distress than client firms paying lower non-audit service fees to the incumbent auditor.	**Accept √**
H_3	Client firms with longer audit firm tenure will less likely to suffer financial distress than client firms with shorter audit firm tenure.	**Accept √**
H_4	Client firms paying higher audit fees to the incumbent auditor will less likely to suffer financial distress than client firms paying lower audit fees.	**Accept √**
H_{5a}	Client firms engaging a Big4 auditor in the year t_{-1} will be less likely to suffer financial distress in the year t_0 than client firms engaging a non-Big4 auditor.	**Accept √**
H_{5b}	Client firms engaging a Big4 auditor in the year t_{-2} will be less likely to suffer financial distress in the year t_0 than client firms engaging a non-Big4 auditor.	**Accept √**
H_{5c}	Client firms engaging a Big4 auditor in the year t_{-3} will be less likely to suffer financial distress in the year t_0 than client firms engaging a non-Big4 auditor.	**Accept √**
H_{6a}	Client firms paying higher non-audit service fees to the incumbent auditor in the year t_{-1} will be less likely to suffer financial distress in the year t_0 than client firms paying lower non-audit service fees to the incumbent auditor.	**Accept √**
H_{6b}	Client firms paying higher non-audit service fees to the incumbent auditor in the year t_{-2} will be less likely to suffer financial distress in the year t_0 than client firms paying lower non-audit service fees to the incumbent auditor.	**Accept √**
H_{6c}	Client firms paying higher non-audit service fees to the incumbent auditor in the year t_{-3} will be less likely to suffer financial distress in the year t_0 than client firms paying lower non-audit service fees to the incumbent auditor.	**Accept √**

H_{7a}	Client firms with longer audit firm tenure in the year t_{-1} will less likely to suffer financial distress in the year t_0 than client firms with shorter audit firm tenure.	**Accept** √
H_{7b}	Client firms with longer audit firm tenure in the year t_{-2} will less likely to suffer financial distress in the year t_0 than client firms with shorter audit firm tenure.	**Accept** √
H_{7c}	Client firms with longer audit firm tenure in the year t_{-3} will less likely to suffer financial distress in the year t_0 than client firms with shorter audit firm tenure.	**Accept** √
H_{8a}	Client firms paying higher audit fees to the incumbent auditor in the year t_{-1} will less likely to suffer financial distress in the year t_0 than client firms paying lower audit fees.	**Accept** √
H_{8b}	Client firms paying higher audit fees to the incumbent auditor in the year t_{-2} will less likely to suffer financial distress in the year t_0 than client firms paying lower audit fees.	**Accept** √
H_{8c}	Client firms paying higher audit fees to the incumbent auditor in the year t_{-3} will less likely to suffer financial distress in the year t_0 than client firms paying lower audit fees.	**Accept** √
H_9	Client firms engaging an auditor composed of a higher set of quality attributes will be less likely to suffer financial distress than client firms engaging an auditor composed of a lower set of quality attributes.	**Accept** √
H_{10a}	Client firms engaging an auditor composed of a higher set of quality attributes in the year t_{-1} will be less likely to suffer financial distress in the year t_0 than client firms engaging an auditor composed of a lower set of quality attributes.	**Accept** √
H_{10b}	Client firms engaging an auditor composed of a higher set of quality attributes in the year t_{-2} will be less likely to suffer financial distress in the year t_0 than client firms engaging an auditor composed of a lower set of quality attributes.	**Accept** √
H_{10c}	Client firms engaging an auditor composed of a higher set of quality attributes in the year t_{-3} will be less likely to suffer financial distress in the year t_0 than client firms engaging an auditor composed of a lower set of quality attributes.	**Accept** √

It is proposed in hypothesis H_{8a} that client firms paying higher audit fees to the incumbent auditor in the year T=-1 may exhibit a lower level of financial distress in the year T=0. The results obtained from the main and sensitivity analyses support the acceptance of hypothesis H_{8a} by showing a statistically significant negative relationship between client firms paying higher audit fees to the incumbent auditor in the year T=-1 and financial distress in the year T=0.

With regards to hypothesis H_{8b}, it is postulated that client firms paying higher audit fees to the incumbent auditor in the year T=-2 may exhibit a lower level of financial distress in the year T=0. The results obtained support the acceptance of hypothesis H_{8b} by showing a statistically significant negative association between client firms paying higher audit fees to the incumbent auditor in the year T=-2 and financial distress in the year T=0.

Regarding hypothesis H_{8c}, it is postulated that client firms paying higher audit fees to the incumbent auditor in the year T=-3 may exhibit a lower level of financial distress in the year T=0. The results obtained from Chapters Six and Seven support the acceptance of hypothesis H_{8c} by showing a statistically significant negative association between client firms paying higher audit fees to the incumbent auditor in the year T=-3 and financial distress in the year T=0.

It is claimed in hypothesis H_9 that client firms engaging an auditor with a higher composite score may exhibit a lower level of financial distress than firms engaging an auditor with a lower composite score. The results of the analyses support the acceptance of hypothesis H_9 by showing a statistically significant negative association between the engagement of an auditor with a higher composite score and financial distress.

With regards to hypothesis H_{10a}, it is postulated that client firms engaging an auditor with a higher composite score in the year T=-1 may exhibit a lower level of financial distress in the year T=0. The results of the analyses support the acceptance of hypothesis H_{10a} by showing a statistically significant negative association between an auditor scoring a higher composite score in the year T=-1 and financial distress in the year T=0.

It is suggested in hypothesis H_{10b} that client firms engaging an auditor with a higher composite score in the year T=-2 may exhibit a lower level of financial distress in the year T=0. The results of the analyses backing the acceptance of hypothesis H_{10b}

by showing a statistically significant negative association between an auditor scoring a higher composite score in the year T=-2 and financial distress in the year T=0.

With regards to hypothesis H_{10c}, it is claimed that client firms engaging an auditor with a higher composite score in the year T=-3 may exhibit a lower level of financial distress in the year T=0. The results of the analyses support the acceptance of hypothesis H_{10c} by showing a statistically significant negative relationship between an auditor scoring a higher composite score in the year T=-3 and financial distress in the year T=0.

8.3.2 The relevance of Agency Theory

Results from Table 8.1 validates the use of agency theory due to the acceptance of hypotheses H_1 to H_{10}. Extant literature, especially agency theorists have long postulated that corporate governance structures (such as external audit, internal audit, board of directors and audit committees) assist in lessening agency conflicts (Hill and Jones 1992; Fama 1980). These mechanisms in place to mitigate agency conflicts are proposed to play a crucial role in the provision of monitoring controls on management decisions and actions in order to minimize agency costs. This effect subsequently results in the safeguard of shareholders' wealth (Gay and Simnett 2012; Stiles and Taylor 2001). The safeguarding of company's assets and shareholders' wealth in turn assist in minimizing the likelihood of financial distress.

8.4 IMPLICATIONS OF THE STUDY

Results from this study offer a number of significant insights into understanding the association between pivotal auditor attributes and financial distress. In addition, finding from this research provide important implications to key stakeholders, namely, regulators, investors, scholars, and auditees. The implications for the respective key stakeholders are identified in the following subsections.

8.4.1 Regulators

Results obtained from this study suggest that the auditor attributes selected (that is, auditor brand name (Big 4), provision of non-audit services, auditor tenure and audit fees) all have a statistically significant relationship with firm's likelihood of facing financial distress. This association provide major implications to regulators. First, regulatory initiatives such as SOX in the US and CLERP 9 in Australia have been introduced so as to regulate the auditor-auditee engagement as a result of accounting and audit failures over the past decades. Example of such regulations include the length of audit partner tenure and the payment to the auditor for the provision of non-audit services.

Though legislations contained in CLERP 9 does not ban auditors from providing non-audit services to auditees, it however imposes extensive disclosure requirements in regards to the provision of non-audit services by the incumbent auditor[36]. The effectiveness of the implementation of such regulations as part of CLERP 9, especially in key capital market determinants such as earnings management has been well researched in extant literature[37]. However, an examination of the impact of CLERP 9 (especially the disclosure requirements imposed on the provision of non-audit services) on firms' distressed risk is lacking. Results of this study suggest that the provision of non-audit services has a statistically negative relationship with financial distress (this result is also consistent in the sensitivity tests). This implies that if incumbent auditors are to provide non-audit services to auditees, auditees financial distress risk may decrease. This can be as a result of an increase in auditor knowledge about the auditee and consequently an improvement in the efficiency in detecting misstatements as suggested by Schneider et al. (2006). Findings of this study therefore supports the knowledge spilled-over hypothesis which is well-researched in extant literature (Stanley 2011; Griffin and Lont 2010; Callaghan et al. 2009; Gul et al. 2007; Schneider et al. 2006; Lennox 2005; Larcker and Richardson 2004; Menon and Williams 2004; Geiger and Rama 2003; Barkess et al. 2002; Franker et al. 2002; Beaver 1966). This finding will be valuable for officials in that it provides more understanding on the impact of CLERP 9. In this case, whilst the benefits of imposing disclosure requirements on the provision of non-audit services is proven, this study adds a different dimension (that is, the impact of providing non-audit services may assist reduce financial distress risk) therefore supporting regulators decision of not banning incumbent auditors from providing non-audit services to auditees. This study provides evidence on the effectiveness of regulatory changes, specifically CLERP 9, on the enhancement of the quality of financial reporting and by association, the capital market.

[36]For reporting periods commencing from the 1st July 2004, CLERP 9 requires the inclusion of details of fees paid to the incumbent auditor in the directors' report. Such details need to include itemize amount paid to the auditor for each of the non-audit services provided during the year. In addition, also required is a statement by the audit committee (or board in its absence) that the non-audit services provided during the year were aligned with the general standard of independence of auditors imposed by the Corporations Act 2001 and that the non-audit services provided have not compromised auditor independence (Behan Legal 2004).

[37]Extant literature include studies finding a statistically significant positive association between the provision of non-audit services and earnings management in the pre-CLERP 9 period (Hussain 2013; Coulton, Ruddock, and Taylor 2007; Chai and Jubb 2000) however the same association is found to be statistically insignificant in the post-CLERP 9 era (Hussain 2013).

On a similar note, another requirement of CLERP 9 is the mandatory audit partner rotation, whereby audit partners of an Australian listed firm is obligated to rotate after five successive years and can only return after a two-year gap. Extant literature agree this strategy to be successful for Big 4 auditors to achieve a better-quality audit, however, finds this detrimental to non-Big 4 auditors suggesting that the learning experience obtained through longer audit partner tenure to be crucial for smaller sized auditors. This has led to scholars questioning the 'one size fits all' requirements for audit partner rotation (Hamilton et al 2005). This study adopts audit (firm) tenure as a pivotal auditor attributes for the main analysis and audit (partner) tenure as a pivotal auditor attributes for the sensitivity analysis. Results obtained suggest both of these auditor attributes (audit firm tenure and audit partner tenure) to have a statistically significant negative relationship with financial distress. This implies that longer audit tenure (whether firm or partner tenure) assist firms mitigate any financially distressed position. Results from this study therefore supports existing studies questioning the audit partner rotation requirement, especially the "one fit all" approach which may encourage regulators to consider the adverse effect of mandatory audit partner rotation, especially for non-Big 4 auditors.

8.4.2 Investors

Extant literature commonly recognizes a significant asymmetrical information gap between corporate management and investors as a consequence of the agency gap which results in the separation between ownership and control (Campbell, Moroney and Hamilton 2014; Gay and Simnett 2012; Klein 1998; Vafeas and Theodorou 1998). This asymmetrical information gap leads investors to significant uncertainties in establishing a firm's accurate value. As such, investors generally rely heavily on accounting information reported in financial reports to make investment decisions (to buy, sell or hold shares) (Moroney, Campbell, and Hamilton 2014; Klein 1998; Vafeas and Theodorou 1998). One of the key role of an external audit is the provision of assurance to outside investors (along with other stakeholders) on the credibility and reliability of reported financial information by providing independent verification of the information reported in the financial reports (Moroney, Campbell, and Hamilton 2014; Gay and Simnett 2012; Jensen and Meckling 1976). Given the key role that the external audit function plays, the use of audit quality by investors as a tool to make investment decisions has been suggested in prior literature (Lee et al. 2003; Copley and Douthett 2002). However, given the multi-dimensional nature of audit quality, determining it (that is the quality of the audit) can be a daunting task (Blasam, Krishnan, and Yang 2003). Investors may however be able to form an opinion on the quality of an audit by gathering details of identifiable auditor attributes (such as these adopted in this study namely, auditor name (Big4), the provision of non-audit services, audit tenure and audit fees). Prior studies have generally shown these attributes to be reliable proxies for audit quality. The four auditor attributes selected for the purposes of this study, therefore, may provide investors with an indication of the underlying quality of the audit and the firm's value and, by association, the firm's risks (such as financial distress risks).

Furthermore, the results derived from this study suggest that an external auditor possessing the four pivotal auditor attributes used in this study will help its auditees to mitigate distressed risks on a timely manner. Should firms facing a higher likelihood of financial distress not manage these risks in an effective and efficient manner, the result can be the erosion of shareholder wealth and the loss of investors and creditors trusts. Distressed firms (if not dealt in a timely manner) may choose to divert corporate resources to debt restructuring at the expense of business opportunities. This could levy significant direct and indirect costs on key stakeholders (such as shareholders and creditors). Such costs may include the costs of restructuring the firm's debt as well as the opportunity costs (loss of earnings due to the inability to invest the money in income producing avenues). In addition, financially distressed firms are more likely to engage in income increasing earnings manipulation (Rosner 2003).

If financially distressed firms are unable to resolve their distressed position effectively in a timely manner, these firms may then face insolvency risks. Subsequently this may lead to these distressed firms having to file for bankruptcy should they be unable to deal with the insolvency matters. However, if a financially distressed firm is able to effectively manage and overcome a distressed position, shareholder confidence may increase which may subsequently lean to an improvement in market capitalisation. It is therefore utmost importance to be able to assess a distressed position in a timely manner, so as to preserve shareholders' (that is, investors) wealth.

8.4.3 Scholars

Given the prominent role played by financial reporting in ensuring the efficient operation of capital markets, scholars have thoroughly investigated both the quality of financial reporting by firms and the effectiveness of corporate governance instruments (such as the external audit function) in improving the credibility of information in financial reports. The attainment of high quality financial reporting is underpinned by agency theory which can be moderated by, amongst other things, a quality audit. Scholars examining audit quality have in the past generally proxied for audit quality with a single auditor attributes in spite of acknowledging the multi-dimensional nature of audit quality which cannot be measured by a single auditor attribute (Balsam, Krishnan, and Yang 2003). In so doing, such investigation potentially ignores complementary or supplementary influences of omitted attributes which may potentially mask the findings. This study however undertakes a broader holistic approach by considering several auditor attributes. Similarly, to date, there is a lack of research looking into a number of auditor attributes and their association with firms facing financial distress. Results from this study indicate that all of the four pivotal auditor attributes investigated are significantly associated with financial distress. Further results from this study based on composite measure of audit quality also reveals significant association with financial distress (though as previously discussed, disadvantages to using a composite measure includes the need to dichotomise the variables). Given the exploratory nature of this study along with the promising results obtained, a large number of possible avenues can be taken by scholars for future research.

First, scholars can choose to look into the effect of other auditor attributes and its linkage with financial distress. In addition, researchers should consider using other measures of audit quality, especially variables related to the audit process such as planning, evaluation of internal control and audit risks. The external audit function being one of many other mechanisms of corporate governance, scholars can elect to investigate the linkage of other corporate governance mechanisms (e.g., the internal audit function, the board of directors, the audit committee or the remuneration committee) with financial distress.

Second, the findings of this study consistently display comparable results are obtained when proxying financial distress with two different models (namely, the Zmijewski ZFC-Score and the Altman Z2-Score). However, there exists a significant number of literature reporting models such as the Merton BSM (Black-Scholes-Merton 2010) and the Shumway (2001) outperform accounting-based models in the prediction of bankruptcy (Wu, Graunt, and Gray 2010; Tanthanongsakkun, Pitt, and Treepongkaruna 2009; Vassalou and Xing 2004). Scholars undertaking future research can look at proxying financial distress with these other measures to see if the results of this study can be replicated. Similarly, instead of looking at the linkage between these four pivotal auditor attributes and financial distress, researches can investigate the association of these four pivotal auditor attributes and other capital markets determinants (such as financial reporting quality and earnings quality).

This study uses logistic regressions as the principal statistical tool to investigate the relationship between the four chosen auditor attributes and financial distress. Since this study is quantitative in nature, scholars have the possibility of including other qualitative techniques (such as interviews and / or questionnaires) in the determination of audit quality, especially given the fact that a number of different approaches may be required to fully capture audit quality (due to its multi-dimensional nature). Last, given that this study is based only on an Australian perspective (that is, a single nation focus), this has implications for researches in that only one dimension of institutional, economic, cultural and social settings was examined. Therefore, scholars undertaking future research should consider other settings (that is, different institutional, economic, cultural and social conditions, or even an international perspective).

8.4.4 Auditees/firms/corporate management

Results provided by this study also have significant implications for firms. The increasing number of corporate failures has resulted in an increased demand for responsible corporate governance, in an attempt to discharge extensive corporate accountability (Porter 2009). Effective corporate accountability necessitates independent and effective quality monitoring instruments. In addition, a key principle of agency theory is that the separation of ownership (shareholders) may lead to the agent (management) not acting in the best interests of the shareholders but rather their own personal interests (Moroney, Campbell, and Hamilton 2014; Gay and Simnett 2012). In an attempt to reduce agency costs and to align the interests of the shareholders and the agents (management) and to prevent the latter from furthering their self-interests at the expense of the former, principals (owners) often depend on monitoring controls (Gay and Simnett 2012; Fama and Jensen 1983). The external audit function is one of such monitoring controls commonly debated in prior studies as an effective means of reducing the opportunistic behaviour of management (Knechel et al. 2013). Hence, an auditee can implement initiatives (such as those provided in this study namely, the hiring of a reputable auditor (big4 auditor), the provision of non-audit services to the incumbent auditor, longer audit tenure and allowing the auditor to perform more detailed testing and investigations thereby higher audit fee) in an effort to mitigate both agency costs and the risk of financial distress.

Other initiative an auditee could adopt to potentially assist in reducing the likelihood of financial distress involve improving their corporate governance mechanisms such as the introduction of an internal audit function so as to assist external auditors implement and monitor internal controls, which may lead to a deterrent in fraudulent activities (committed by corporate management or other employees) or misappropriation of assets. Another example of such initiative can be the implementation of an audit committee which is increasingly required to oversee the financial reporting process and actively liaise with and monitor the external auditors (Chen and Zhou 2007; Carcello and Neal 2000). By implementing or increasing the audit committee effectiveness (such as through appropriate resourcing and adequate authority) the audit committee may reduce the possibility of fraudulent activities, misappropriation of assets or errors in the financial statements which in turn can reduce the firm's likelihood of facing a financially distressed position.

8.4.5 The auditing profession

The findings from this research also have significant implications for the auditing profession based on both the auditor attributes and the auditee features examined.

Given that this study indicates certain auditee characteristics are significantly associated with the likelihood of financial distress, incumbent auditors can utilize this information to their advantage and increase audit effectiveness. Similarly, potential auditors (when deciding on whether to accept an engagement) can use this information for decision-making purposes. Specifically, the results from this study indicate that firm board of director characteristics (such as board of director independence) has a consistently significant negative association with financial distress. Similarly, audit committee characteristics (such as audit committee financial expertise) show consistently significant negative association with financial distress. The same significant negative association is noted for total assets, age, and return on assets. These outcomes indicate that auditors need to increase their focus when auditing younger, smaller firms without an independent board of directors and with an audit committee having a low financial expertise. Should the auditor accept the engagement with such firms, strategies such as increasing the level of professional scepticism, increasing the quantity of substantive testings, or assigning more experienced auditors to the audit team should be implemented (Reichelt and Wang 2010; Chen, Kelly and Salterio 2009).

Similarly, the audit profession can use the results of this study to assess the benefits or drawback on imposing restrictions on the provision of non-audit services. The provision of non-audit services by contracted auditors has long been deemed as one of the main factors leading to an impairment of the auditor's independence. Franker et al. (2002) state that the provision of non-audit services may potentially impair auditor's independence when the auditee receives preferential treatments like overseeing of "immaterial" discrepancies in the financial statement; less arduous audit procedures or the auditor not testing assertions thoroughly. Auditors may be tempted to act in such a way so as not to run the risk of losing a high-fee paying client if an unfavourable opinion is given (Geiger and Rama 2003; Barkess et al. 2002; Franker et al. 2002). However, Schneider et al. (2006) argue that the provision of non-audit services by contracted auditors may yield a higher audit quality due to the increase in the auditors' knowledge about the auditee and therefore improve the efficiency of detecting misstatements. This view, commonly referred to the knowledge spilled-over, is supported by several considerable scholars (Stanley 2011; Griffin and Lont 2010; Callaghan et al. 2009; Gul et al. 2007; Schneider et al. 2006; Lennox 2005; Larcker and Richardson 2004; Menon and Williams 2004; Geiger and Rama 2003; Barkess et al. 2002; Franker et al. 2002; Beaver 1966). Findings of this study may assist the auditing profession by providing another argument in favour of the provision of non-audit services for the fact that the results show a consistent statistically significant negative association with financial distress (that is, the provision of non-audit services by the incumbent auditor assist in the reduction of the likelihood of financial distress).

8.5 MAJOR CONTRIBUTIONS OF THE STUDY

This Australian study provides a thorough examination of the auditor attributes and financial distress linkage by using a comprehensive range of fundamental auditor attributes along with two different proxies for financial distress. Results obtained as part of this study provide various important contributions. First, this study is the first (to the best of the researcher's knowledge) to examine such an association with the use of these pivotal auditor attributes. Consequently, the benefits derived is two-fold. In the first instance, this study helps to provide a deeper understanding of business and economic factors that are likely to exacerbate or mitigate financial distress, which costs and determinants are becoming increasingly important given the recent economic turmoil and the increasing number of corporate collapses. On a similar note, this study further helps in the provision of a deeper comprehension of the external audit function as a monitoring mechanism (based on the Agency Theory concept) and the degree to which it benefits the auditee (by helping firms mitigate its financial distressed risks) as well as other stakeholders (by improving the credibility of financial reporting by listed firms). In so doing, this study assists in providing a critical analysis of an effective corporate governance contribution by the external audit function by investigating whether key external auditor attributes impact on the likelihood of financial distress, thereby aiming to contribute to the limited Australian empirical evidence on this association (that is, the association between pivotal auditor attributes and financial distress). These results, therefore, have important significance for the effective and efficient process of capital markets, scholars, auditors and firm's actions.

Second, the consistent results that this study provide (both from Chapter Six – Main Results and Chapter Seven – Sensitivity Results) strengthen the conclusions that are derived from this study's statistical analysis. From the four pivotal auditor attributes adopted in this study (namely, Big4 auditor, provision for non-audit services, audit tenure and audit fee) all four auditor attributes are found to effectively reduce the likelihood of financial distress. Based on this information, regulators, auditors and scholars can utilize the results from this study to further investigate and possibly regulate key corporate governance instruments (especially the external audit function). This is done in an attempt to increase the quality and efficiency of the external audit process so as to improve the integrity of firms' financial reporting processes and subsequently attempt to provide capital market players with a tool to mitigate firms' risks of financial distress. Henceforth, results of this study will have real economic consequences for auditees, auditors, regulators and scholars alike.

Third, given that the results from this study suggest the statistically significant negative association between the four pivotal auditor attributes (proxyies for the external audit function), scholars can extend similar studies to investigate other key corporate governance mechanisms that may also be effective in improving the integrity of the financial reporting process and subsequently mitigate the likelihood of financial distress. This further strengthen the contributions and benefits provided by the results of this study to auditees, auditors, regulators and scholars.

Fourth, this study contributes to extant literature by suggesting that each dimension of audit quality (i.e. big four auditor, the provision of non-audit services, auditor tenure and audit fee) have a significant role in improving firm performance. Hence, this study suggests that ignoring a single auditor attribute may tamper firms' effort in improving performance. Furthermore, investors should also not ignore any one of the auditor attributes in their investment decision making process.

Fifth, this study provides methodological contribution to extant literature by being the first to examine the impact of four key auditor attributes on financial distress in an Australian regulatory environment. This is because the Australian regulatory environment is different from the US environment in several contexts. For instance, the US follows a rule-based approach with more strict regulations whereas Australia follows a more principle-based approach with more flexibility in applying standards. Furthermore, litigation risks are higher in the US as compared to Australia where more opportunities exist for firms to manipulate accounting numbers.

In summary, results of this study benefit a number of key capital market players. Policy makers and regulators are able to determine the effectiveness and true impact of legislation impacting on the auditor attributes (as well as on corporate governance) in an attempt to improve firms' quality of financial reporting. This also benefits capital market partakers by having a flow on effect of minimizing poor corporate reporting practices and, possibly, subsequent financially distressed firms and in turn corporate failure. In addition, external auditors are able to use the findings of this study to assist them in determining which of the four attributes adopted in this study significantly influence auditees' (or potential clients) performance and hence financial distress. The auditors can also apply information on which client features are most significantly associated with financial distress to their advantage so as to enhance audit effectiveness. Evidence from this study will also help scholars to identify which specific auditor attributes to investigate in future research.

8.6 LIMITATIONS OF THE STUDY

Whilst Although this study has several strengths, it is not absent with limitations. First, even though there are a significant number of studies in the extant literature using accounting-based models such as Zmijewski and Altman to determine financial distress (or to predict firms' bankruptcy risks) (Wu, Graunt, and Gray 2010; Tanthanongsakkun, Pitt, and Treepongkaruna 2009) there also exist significant number of literature that report models such as the Merton BSM (Black-Scholes-Merton 2010) and the Shumway (2001) outperform accounting-based models in the prediction of bankruptcy (Wu, Graunt, and Gray 2010; Tanthanongsakkun, Pitt, and

Treepongkaruna 2009; Vassalou and Xing 2004). Whilst acknowledging reports of these negative performance, there has been a significant number of studies dedicated to finding the best model to predict corporate failure but in vain (Balcaen and Ooghe 2006). In fact, let alone the empirical identification of the best model to predict corporate failure, even the definition of corporate failure lacks undivided consensus. In addition, the use of accounting-based models in the prediction of financial distress (not bankruptcy) is still prominent in extant literature.

Second, given the multi-dimensional nature of audit quality (Blasam, Krishnan, and Yang 2003), prior researches have used a number of auditor attributes to measure audit quality. This study specifically targets four auditor attributes. Even though these four selected attributes are the most commonly cited in prior studies as being key auditor attributes (Francis 2011; Carcello and Nagy 2004; Ashbaugh et al. 2003; Blasam, Krishnan, and Yang 2003; Balsam, Krishnan, and Yang 2003; Kim et al. 2003; Carcello et al. 1992); there may be other auditor attributes that could be significantly associated with financial distress.

Third, in order to test the hypotheses, data for all the variables (dependent, independent and control) adopted in this study were collected from the respective companies' annual reports. This approach to data collection can potentially posit as a further limitation due to the amount and type of data that can be collected. Such an example can be the proxies used to measure for the auditor attributes adopted in this study. Whilst there can be other alternative proxies, these are excluded due to their firm-specific nature.

Fourth, even though this study includes a large number of control variables (in addition to the independent variables) in the tests performed so as to control for additional possible influencers of the likelihood of financial distress, it is without doubt that there are additional factors that may impact financial distress. For example, corporate culture, economic, and management style and integrity may impact the risk of financial distress but were omitted from this study due to their lack of effective measurements. However, since this study does not focus on the causality but rather the association between key auditor attributes and financial distress, the consequence of this issue may not be significant in affecting the findings of this study.

Fifth, for data collection purposes, sample firms selected was done by matching distressed firms (measured by the Zmijewski ZFC-Score) with the closest comparable healthy firms (based on year, size, and industry). Admittedly, the use of matching based solely on the Zmijewski ZFC-Score rather than using both the Zmijewski ZFC-Score and the Altman Z2-Score has limitations. However, these two models show an agreeance (whereby both models agree on either a firm-year observation being healthy or distressed) of 79%. Furthermore, this study adopts the use of the Zmijewski ZFC-Score model as the main proxy for financial distress. The Altman Z2-Score is only used to provide robustness to the main findings. Therefore, the consequence of this issue may not be significant in affecting the findings of this study.

Sixth, it is argued that non-audit services, such as consulting services by auditors may also have a more direct bearing on addressing financial and operational problems that cause financial distress. However, the data may not be available to disentangle this direct effect of auditors' consulting activities on reducing financial distress. Hence, this is acknowledged as a limitation of this study which may be considered for further research to examine the impact of individual component of non-audit services, such as consulting services, on financial distress.

Last, this study focuses on publicly listed firms from only one country, namely Australia. This can potentially limit the ability to generalize the findings derived from empirical tests of this study to other institutional and domestic settings. However, Australia has a mature and well-developed capital market with active contribution from regulators, investors and the audit discipline (Goodwin and Kent 2006; Francis 1984). Moreover, given the historical linkage to the UK, Australia will have comparable institutional structures established grounded on principles and values shared with many other countries with the same historical linkage. This consequently provide confidence that the findings of this study can be applied to research based on alternative institutional and domestic settings.

While the limitations pertaining to this study are duly acknowledged, these do not offset this study's findings, strengths or contributions highlighted.

8.7 SUGGESTIONS FOR FUTURE RESEARCH

Findings of this study (as well as its limitations, as noted above) raise a number of possible future research avenues. First future research may include other auditor quality attributes to test their association with financial distress. Second, whilst both proxies of financial distress used in this study yields comparable results, it will be interesting to see whether other proxies of financial distress provide a converging or diverging view to this study. Third, this study only focuses on the linkage between one of the corporate governance instruments (namely external audit) and financial distress. Future studies may wish to look at the impact of other corporate governance instruments on financial distress. Such instruments may include internal audit function, board of director and audit committee. Fourth, with sufficient available data, future studies may wish to consider change in auditor attributes (that is change from a Big4 to a non-Big4, from high provision for non-audit services to low provision, from high audit tenure to low tenure, from high audit fee to low fee and vice versa) and the likelihood of financial distress. Last, to generalize the findings of this study (which is focussed on a single nation focus, Australia), future study on the audit quality (or auditor attributes) and financial distress association can be undertaken in another domestic, regional, or broader international setting. Subsequent related research can be performed by choosing nations with varying regulatory and institutional settings.

8.8 SUMMARY OF THE STUDY

The binary logistic analysis (including lagged analysis) of this study yielded significant insights into the association between four key auditor attributes (namely Big4 auditor, the provision for non-audit services, audit tenure and audit fees) and the likelihood of financial distress faced by publicly listed firms. An examination of the financial distress – auditor attributes linkage is of regulatory, professional and capital market investor interests. This thorough analysis of the auditor attributes and financial distress linkage involved extensive statistical tests based on a sample of 4,876 firm-year observations spanning from the year 2008 to 2014. This study finds the engagement of Big4 auditors, provision of non-audit services, audit tenure and audit to negatively (and significantly) impact of firm's likelihood of facing financial distress. Further analysis suggests that the lagged effect of these pivotal external auditor attributes to also negatively (and significantly) impact of firm's likelihood of facing financial distress. Aside from the auditor traits adopted in this study, the results obtained also show certain client features such as firm's performance, firm's size, leverage, and other auditor attributes (such as the qualification of audited financial reports) to be significant determinants of financial distress. Overall, findings from this study provide valuable insights and understanding in respect to the auditor attributes and financial distress to key stakeholders. This study is however not without limitations but these limitations provide a fruitful avenue for future research.

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APPENDIX - 1:

VARIABLE DEFINITION

Dependent Variables:

ZFC_{it}	= For firm *i* for time period *t*, a value of "1" will be assigned if the calculated results using the Zmijewski model is equal to or greater than 0.5, otherwise a value "0" will be assigned;
$Z2_{it}$	= For firm *i* for time period *t*, a value of one (1) will be assigned if the calculated results using the Altman's model is less than 2.6, otherwise a value "0" will be assigned;

Independent Variables:

$Big4_{it}$	= A dichotomous indicator variable representing Big N auditors; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* is from a big 4 accounting firm (i.e. KPMG, PriceWaterhouseCoopers, Deloitte and Touche and Ernst and Young); otherwise a score of zero (0) will be awarded;
L. / L2. / L3.$Big4_{it}$	= A dichotomous indicator variable representing lagged Big N auditors; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* (where $t = t_{-1}, t_{-2}$, and t_{-3})[38] is from a big 4 accounting firm (i.e. KPMG, PriceWaterhouseCoopers, Deloitte and Touche and Ernst and Young); otherwise a score of zero (0) will be awarded;
$Aud\_Spec\_30_{it}$	= A dichotomous indicator variable representing Auditor Specialization, following the industry market share approach suggested by Krishnan (2003b); where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* is considered an industry specialist for auditing purpose in the industry sector to which form *i* is categorized by the GICS codes (30% market share within the specific industry); otherwise a score of zero (0) will be awarded;
L. / L2. / L3.$Aud\_Spec\_30_{it}$	= A dichotomous indicator variable representing lagged Auditor Specialization, following the industry market share approach suggested by Krishnan (2003b); where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* (where $t = t_{-1}, t_{-2}$, and t_{-3}) is considered an industry specialist for auditing purpose in the industry sector to which form *i* is categorized by the GICS codes (30% market share within the specific industry); otherwise a score of zero (0) will be awarded;
$RNon\text{-}Audit_{it}$	= A continuous measure denoting the ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor *j* by auditee *i* during time period *t*. Following Palmrose (1986) non-audit services is calculated as the fee charged for accounting related management

[38] Whereby L. represents T_{-1} as a lag of one year, L2. Represents T_{-2} as a lag of two years, and L3. Represents T_{-3} as a lag of three years.

advisory services + the fee charged for non-accounting related management services + the fee charged for taxation services;

L. / L2. / L3.*RNon-Audit*$_{it}$ = A continuous measure denoting the lagged ratio of fee charged by the auditor for the provision of non-audit services to total fees paid to the auditor *j* by auditee *i* during time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3}). Following Palmrose (1986) non-audit services is calculated as the fee charged for accounting related management advisory services + the fee charged for non-accounting related management services + the fee charged for taxation services;

Cnon_Audit$_{it}$ = A dichotomous indicator variable representing the provision of non-audit services; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* earns proportion of non-audit fees to total fees < or = to 25%;

L. / L2. / L3.*Cnon_Audit*$_{it}$ = A dichotomous indicator variable representing the lagged provision of non-audit services; where a score of one (1) will be given to firm *i* if the auditor contracted during period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3}) earns proportion of non-audit fees to total fees < or = to 25%;

Aud_Ten$_{it}$ = Natural log of continuous measure denoting the actual number of years the auditor (audit firm) held office will be used;

L. / L2. / L3.*Aud_Ten*$_{it}$ = Natural log of continuous measure denoting lagged the actual number of years the auditor (audit firm) held office will be used during time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3});

Ln_Aud_Part_Ten$_{it}$ = Natural log of continuous measure denoting the actual number of years the audit partner office will be used;

L. / L2. / L3.*LnAud_Part_Ten*$_{it}$ = Lagged Natural log of continuous measure denoting the actual number of years the audit partner office will be used for firm *i* during period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3});

Aud_Fee$_{it}$ = Natural log of audit fee paid by firm *i* at the end of time period *t*;

L. / L2. / L3.*Aud_Fee*$_{it}$ = Natural log of audit fee paid by firm *i* at the end of time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3});

Prop_Aud_Fee$_{it}$ = Proportion of audit fee paid / total assets held by firm *i* at the end of time period *t*;

L. / L2. / L3.*Prop_Aud_Fee*$_{it}$ = Proportion of audit fee paid / total assets held by firm *i* at the end of time period *t*;

AQ$_{it}$ = Sum of the individual component scores underpinning auditor quality (i.e. Big4 (*Big4*$_{it}$); Non-audit services (*RNon-Audit*$_{it}$); audit tenure (*Aud_Ten*$_{it}$); and audit fee (*Aud_Fee*$_{it}$) for firm *i* at the end of time period *t*;

L. / L2. / L3.*AQ*$_{it}$ = Sum of the lagged individual component scores underpinning auditor quality (i.e. Big4 (*Big4*$_{it}$); Non-audit services (*RNon-Audit*$_{it}$); audit tenure (*Aud_Ten*$_{it}$); and audit fee (*Aud_Fee*$_{it}$) for firm *i* at the end of time period *t* (where $t = t_{-1}, t_{-2},$ *and* t_{-3}).

Control Variables:

Prop_BoD_Ind$_{it}$	=	The proportion of independent directors to total number of directors on the board of the firm *i* at the end of time period *t*;
BoD_Financial_ Expertise$_{it}$	=	A dichotomous indicator variable representing Board of Directors Financial Expertise. Following Agrawal and Knoeber (1996); and Klein (1998), a value of 1 is awarded if 50% of more of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification (CA, or CPA); and (2) Over 5 years' experience as a member of a board;
BoD_Tenure$_{it}$	=	The average number of years for which the members on the board of a firm *i* have served on the board at the end of time period *t*;
CEO_Duality$_{it}$	=	A dichotomous indicator variable representing CEO Duality whereby a value of one (1) is awarded if the CEO and Chair of the Board are the same person; otherwise a value of zero (0) is awarded;
Aud_Com$_{it}$	=	A dichotomous indicator variable representing the existence of an audit committee for firm *i* at the end of time period *t* whereby a value of one (1) is awarded if an audit committee exists; otherwise a value of zero (0) is awarded;
Aud_Com_Meet$_{it}$	=	The number of audit committee meetings per year of firm *i* at the end of time period *t*;
AC_Size$_{it}$	=	The number of members on the Audit Committee board for firm *i* in period *t*;
Prop_Aud_Com_Ind$_{it}$	=	The proportion of independent directors to total number of directors on the audit committee of the firm *i* at the end of time period *t*;
Aud_Com_Financial_ Expertise$_{it}$	=	A dichotomous indicator variable representing Audit Committee Financial Expertise. Following Klein (1998) and Krishnan and Visvanathan (2007), a value of 1 is awarded if over 50% of the members of the board have financial expertise; otherwise 0 is awarded. Financial Expertise is measured as (1) Financial Related Qualification; and (2) Over 5 years' experience as in a finance related role;
Prop_Segment_Sales$_{it}$	=	Proportion of offshore sales for firm *i* at the end of time period *t*;
No_Geographic_Segm ents$_{it}$	=	Number of segments outside Australia for firm *i* at the end of time period *t*;
Ln_Total_Assets$_{it}$	=	Natural log of total assets for firm *i* at the end of time period *t*;
Ln_Market_Cap$_{it}$	=	Natural Log of Market capitalisation for firm *i* at the end of time period *t*;
Ln_Sales$_{it}$	=	Natural log of sales during the year for firm i at the end of time period *t*.
Sq_Emp$_{it}$	=	Square root of the number of employees for firm *i* at the end of time period *t*;

Ln_Age_{it}	=	Natural Log of age of firm *i* in the period *t*;
$Earnings\_Quality\_EQ_{it}$	=	The modified traditional discretionary accrual measures Jones (1995) model. $TA_{it} = \beta 0(1/ASSETS_{it-1}) + \beta 1(\Delta SALES_{it} - \Delta Receivable_{it}) + \beta 3PPE_{it} + \varepsilon_{it}$ (Kothari, Leone and Wasley 2005);
$Loss_{it}$	=	A dichotomous indicator variable where firm *i* is given a score of one (1) if the firm reported a loss in year *t*; otherwise, firm *i* is scored zero (0);
$Leverage_{it}$	=	Total debt to total assets of firm *i* at the end of time period *t*;
ROA_{it}	=	The return on assets of firm *i* at the end of time period *t*;
$Aud\_Opinion_{it}$	=	A dichotomous indicator variable whereby firm *i* is given a score of one (1) if during time period *t* the firm received a qualified audit opinion; otherwise, firm *i* is scored zero (0);
$\sum Industry_{it}$	=	$Energy_{it} + Materials_{it} + Industrials_{it} + Consumer\_Discretionary_{it} + Consumer\_Staples_{it} + Health\_Care_{it} + Information\_Technology_{it} + Telecommunication\_Services_{it} + Utilities_{it}$
$Energy_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the energy industry and zero (0) if otherwise in 2008.
$Materials_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the materials industry and zero (0) if otherwise in 2008.
$Industrials_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the industrials industry and zero (0) if otherwise in 2008.
$Consumer\_Discretionary_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the consumer discretionary industry and zero (0) if otherwise in 2008.
$Consumer\_Staples_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the consumer staples industry and zero (0) if otherwise in 2008.
$Health\_Care_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the health care industry and zero (0) if otherwise in 2008.
$Information\_Technology_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the information technology industry and zero (0) if otherwise in 2008.
$Telecommunication\_Services_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the telecommunication services industry and zero (0) if otherwise in 2008.
$Utilities_{it}$	=	A dichotomous variable given the score one (1) if the firm *i* is in the utilities industry and zero (0) if otherwise in 2008.
$Year_{it}$	=	Series indicator variables controlling time temporal differences of reporting periods for firm-year observations with firm *i* scored one (1) if financial data corresponds to time period t; otherwise scored zero (0).
ε_{it}	=	The error term.