Earnings quality of the successful efforts and full cost accounting methods in the oil and gas industry

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DECLARATION

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ABSTRACT

Title:

Earnings quality of the successful efforts and full cost accounting methods in the oil and gas industry

Key terms:

Earnings; earnings management; earnings quality; cash flows; successful efforts; full cost; exploration and production; upstream; oil and gas accounting; accounting methods; accounting standards; extractive activities; extractives industry; accrual quality; persistence; predictability; smoothness; value relevance; timeliness; conservatism.

From time to time over the last decades, the issue of accounting for exploration and production activities has been politically charged and hotly debated in the US and internationally. While there have been numerous empirical studies on this issue, the question related to which accounting method – successful efforts (SE) or full cost (FC) – provides investors and other users with more informative numbers or superior earnings quality and thus should be recommended for use by all upstream oil and gas firms, is still unresolved. The main difference between the FC and SE historical cost accounting methods lies in the treatment of costs of unsuccessful exploration activities, where such costs are capitalised under the FC method and expensed under the SE method. The International Accounting Standards Board (IASB), Financial Accounting Standards Board (FASB) and the Securities Exchange Commission (SEC), are still undecided on which accounting method to mandate for use by all upstream oil and gas companies so that the global investment community can be served better.

This thesis examines the earnings quality of two alternative accounting methods, SE and FC, used by upstream oil and gas firms in the US, with an aim of ascertaining which, if any, of the two methods provides superior earnings quality. Since there are different definitions of earnings quality, various measures of earnings quality have been used commonly in accounting research. However, in this study, seven measures of earnings quality are used to estimate the quality of earnings for SE and FC firms and form the hypotheses for the study. These include accruals quality, persistence, predictability, smoothness, value relevance, timeliness and conservatism. The study relied upon a longitudinal design to evaluate the issue of earnings quality of SE and FC firms, with the unit of analysis being at firm level, and the sample consisting of 84 US upstream oil and gas firms (43 SE firms and 41 FC firms), with data for the years 2007-2015. The required

data for the empirical study were extracted from the firms' financial statements, which were downloaded from the Osiris Financial Database. A comparative analysis approach was adapted in the data analysis and interpretation of the results, since this research sought to compare two alternative accounting methods. Microsoft Excel was used to compute the relevant research variables required for each earnings-quality measure and to generate graphs and tables, while the Statistical Package for the Social Sciences (SPSS) was used to generate the descriptive statistics, regression and correlation analysis, and performing hypothesis and significance tests, among others.

The results of this thesis indicate that SE firms have higher earnings quality than FC firms, based on earnings predictability, persistence, smoothness, accruals quality and timeliness. In all these cases except for smoothness, the difference between the earnings quality for SE and FC firms was statistically significant. However, based on value relevance and conservatism, FC firms have superior earnings quality than SE firms, although the difference in the earnings quality was not statistically significant for most years studied. Overall, since the results are significant for four out of the seven hypotheses tested, this study concludes that the SE method of accounting provides earnings quality superior to the FC method.

The contributions of this thesis are various, including, but not limited to addressing the ongoing debate about whether the SE or FC accounting method provides investors with numbers that are more informative or higher earnings quality. This thesis is extensive, as it looked at nine years of data of 84 firms and considered seven different measures of earnings quality that have been widely used in accounting research. Based on the literature consulted, it is also a much more recent study compared to previous research on this topic. Although this study was conducted on upstream oil and gas companies in the US, the results of the research are very relevant internationally, since most upstream oil and gas companies globally have adopted the accounting methods and practices used in the US. This study also provides an international comparison of the US GAAP with the UK GAAP and IFRS, specifically in accounting for extractive activities. Lastly, this study recommends that the IASB and the FASB undertake a joint project with the objective of the team coming up with a single method of accounting for the extractives industry.

OPSOMMING

Titel:

Verdienstegehalte van die suksesvolle pogings en vollekoste- rekeningkundige metodes in die olie- en gasindustrie

Sleutelterme:

verdienste; verdienstebestuur; verdienstegehalte; kontantvloei; suksesvolle pogings; vollekoste; eksplorasie en produksie; stroomop; olie- en gasrekeningkunde; rekeningkundige metodes; rekeningkundige standaarde; ekstraktiewe aktiwiteite; ekstraksiebedryf; aangroeiingsgehalte; volharding; voorspelbaarheid; gladheid; waarderelevansie; tydigheid; konserwatisme.

Van tyd tot tyd oor die laaste dekades is die polities gelaaide kwessie van rekeningkunde vir eksplorasie- en produksie-aktiwiteite heftig in Amerika en internasionaal gedebatteer. Alhoewel daar talle empiriese ondersoeke oor hierdie kwessie onderneem is, is die vraag nog nie opgelos nie ten opsigte van watter rekeningkundige metode, suksesvolle pogings (SE) of volle koste (FC), beleggers en ander gebruikers meer insiggewende syfers of beter verdienstegehalte bied en gevolglik aanbeveel moet word vir gebruik deur alle stroomop- olie- en gasfirmas. Die hoofverskil tussen die FC en SE se historiese koste- rekeningkundige metodes lê in die hantering van koste van onsuksesvolle eksplorasieaktiwiteite, waar sodanige koste onder die FC-metode gekapitaliseer word en volgens die SE-metode as uitgawe erken word. Die ‘International Accounting Standards Board’ (IASB), ‘Financial Accounting Standards Board’ (FASB) en die ‘Securities Exchange Commission’ (SEC) het nog nie besluit watter rekeningkundige metode aanbeveel moet word vir alle stroomop- olie- en gasmaatskappye nie, sodat die globale beleggingsgemeenskap beter bedien kan word.

Hierdie proefskrif ondersoek die verdienstegehalte van twee alternatiewe rekeningkundige metodes, SE en FC, wat deur stroomop- olie- en gasfirmas in Amerika gebruik word, ten einde vas te stel watter, indien enige, van die twee metodes beter verdienstegehalte lewer. Aangesien daar verskillende definisies van verdienstegehalte is, is verskeie maatstawwe van verdienstegehalte algemeen in rekeningkundige navorsing gebruik. In hierdie studie word egter sewe maatstawwe van verdienstegehalte gebruik om die gehalte van verdienste vir SE- en FC-firmas te bepaal en om die hipoteses vir die studie te formuleer. Hierdie maatstawwe sluit in: toevallingsgehalte, volharding, voorspelbaarheid, gladheid, waarderelevansie, tydigheid en konserwatisme. Die studie het op 'n longitudinale ontwerp staatgemaak om die kwessie van

verdienstegehalte van SE- en FC-firmas te evalueer, met die analise-eenheid op firmavlak en die steekproef wat bestaan uit 84 Amerikaanse stroomop- olie- en gasfirmas (43 SE-firmas en 41 FC-firmas), met data vir die jare 2007 tot 2015.

Die vereiste data vir die empiriese studie is geëkstraheer uit die finansiële state van die firmas, wat afgelaai is van die Osiris- Finansiële Databasis. 'n Vergelykende analise-benadering is in die data-analise en interpretasie van die resultate gebruik, aangesien hierdie navorsing twee alternatiewe rekeningkundige metodes wou vergelyk. Microsoft Excel is gebruik om die relevante navorsingsveranderlikes te bereken wat vereis word vir elke verdienstegehaltemaatstaf, asook om grafieke en tabelle te genereer, terwyl die Statistiese Pakket vir die Sosiale Wetenskappe (SPSS) onder meer gebruik is om die beskrywende statistiek en regressie- en korrelasieanalise te genereer, asook om hipoteses te toets en betekenistoetse uit te voer.

Die resultate van hierdie proefskrif dui aan dat SE-maatskappye ’n hoër verdienstegehalte as FC-firmas het, op grond van verdienstevoorspelbaarheid, volharding, gladheid, toevallingsgehalte en tydigheid. In al hierdie gevalle, buiten gladheid, was die verskil tussen die verdienstegehalte vir SE- en FC-firmas statisties betekenisvol. Gebaseer op waarde-relevansie en konserwatisme vertoon FC-firmas egter beter verdienstegehalte as SE-firmas, hoewel die verskil in verdienstegehalte nie statisties betekenisvol was vir meeste van die jare wat bestudeer is nie. As ’n geheel, aangesien die uitslae betekenisvol is vir vier uit die sewe hipoteses wat getoets is, kom hierdie studie tot die gevolgtrekking dat die SE- rekeningkundige metode beter verdienstegehalte as die FC-metode bied.

Hierdie proefskrif lewer verskeie bydraes, insluitende, maar nie beperk nie, tot die voortgesette debat oor of die SE of FC rekeningkundige metode meer insiggewende syfers of hoër verdienstegehalte aan beleggers bied. Hierdie proefskrif is omvattend, aangesien dit nege jaar se data van 84 firmas ondersoek het en sewe verskillende maatstawwe van verdienstegehalte in ag geneem het wat wyd in rekeningkundige navorsing gebruik word. Op grond van die literatuur wat geraadpleeg is, is dit ook 'n baie meer onlangse studie, vergeleke met vorige navorsing oor hierdie onderwerp. Alhoewel hierdie studie op stroomop- olie- en gasmaatskappye in Amerika onderneem is, is die resultate van die navorsing internasionaal baie relevant, aangesien die meeste stroomop- olie- en gasmaatskappye wêreldwyd die rekeningkundige metodes en praktyke wat in Amerika gebruik word, aangeneem het. Hierdie studie bied ook 'n internasionale vergelyking van die US GAAP met die UK GAAP en IFRS, spesifiek in die rekeningkunde vir ekstraktiewe aktiwiteite. Laastens beveel hierdie studie aan dat die IASB en die FASB 'n gesamentlike projek onderneem met die doel dat die span met 'n enkele metode van rekeningkunde vir die ekstraktiewe bedryf na vore kom.

TABLE OF CONTENTS

DECLARATION ..... **I**
LANGUAGE EDITING ..... **II**
ACKNOWLEDGEMENTS ..... **III**
ABSTRACT ..... **IV**
OPSOMMING ..... **VI**
TABLE OF CONTENTS ..... **VIII**
LIST OF TABLES ..... **XIV**
LIST OF FIGURES ..... **XVI**
LIST OF ACRONYMS ..... **XVII**

CHAPTER 1: PURPOSE, SCOPE AND EXTENT OF THE STUDY **1**

1.1 Introduction and background **1**
1.2 Justification and problem statement **4**
1.3 Objectives of the study **6**
1.3.1 Main objective of the study 6
1.3.2 Secondary objectives of the study 7
1.4 Overarching research hypothesis **7**
1.5 Research design and method **7**
1.5.1 Literature review 7
1.5.2 Empirical research 8
1.6 Scope of the study and chapter division **10**
1.7 Conclusion **11**

CHAPTER 2: PHILOSOPHICAL AND THEORETICAL FRAMEWORKS IN RESEARCH **13**

2.1 Introduction **13**
2.2 Philosophical assumptions **14**
2.2.1 Ontology 14
2.2.2 Epistemology 15
2.2.3 Axiology 16
2.3 Research philosophies **16**
2.3.1 Positivism 16
2.3.2 Critical realism 17
2.3.3 Interpretivism 18
2.3.4 Postmodernism 19
2.3.5 Pragmatism 20

2.3.6 Research philosophy adopted in this study 23
2.4 Theoretical frameworks in research 23
2.4.1 Stakeholder theory 24
2.4.2 Stewardship theory 25
2.4.3 Resource dependency theory 26
2.4.4 Regulatory capture theory 26
2.4.5 Agency theory 27
2.4.6 Regulation theory 29
2.4.6.1 FASB's Conceptual Framework for Financial Reporting 30
2.4.6.1.1 The objective of general purpose financial reporting 30
2.4.6.1.2 Qualitative characteristics of useful financial information 31
2.5 Conclusion 32

CHAPTER 3: UPSTREAM PETROLEUM ACTIVITIES AND HISTORY OF STANDARD SETTING FOR OIL AND GAS ACCOUNTING 34

3.1 Introduction 34
3.2 Upstream oil and gas activities 35
3.2.1 Phases of upstream oil and gas activities 35
3.2.2 Characteristics of upstream oil and gas activities 37
3.3 History of the US oil and gas industry 38
3.4 History of the US debate on oil and gas accounting 41
3.5 Reserve Recognition Accounting 45
3.6 History of the Extractive Industries Project 47
3.7 The Extractive Activities Discussion Paper 48
3.8 Conclusion 50

CHAPTER 4: STATUS OF ACCOUNTING FOR UPSTREAM ACTIVITIES IN THE OIL AND GAS INDUSTRY 52

4.1 Introduction 52
4.2 Successful efforts accounting method 53
4.2.1 Arguments in favour of the SE method 57
4.2.2 Arguments against the SE method 57
4.3 Full-cost accounting method 58
4.3.1 Arguments in favour of the FC method 60
4.3.2 Arguments against the FC method 61
4.4 Current disclosures about oil and gas producing activities 62
4.5 IFRS 6 Exploration for and evaluation of mineral resources 63

4.6 Accounting for oil and gas activities under UK GAAP 65
4.7 Comparison of FC and SE accounting methods to accounting for research and development costs under IAS 38 *Intangible Assets* 66
4.8 Main differences between US GAAP and IFRS in accounting for upstream oil and gas activities 68
4.8.1 Implication of the differences in accounting practices 69
4.9 Conclusion 71

CHAPTER 5: EARNINGS MANAGEMENT AND EARNINGS QUALITY 73

5.1 Introduction 73
5.2 Meaning of earnings management 74
5.3 Earnings management incentives 75
5.3.1 Capital market incentives 76
5.3.2 Meeting analysts' and investors' expectations 77
5.3.3 Contracting incentives 77
5.4 Earnings management techniques 78
5.4.1 "Cookie-jar-reserve" techniques 78
5.4.2 "Big-bath" techniques 79
5.4.3 "Big-bet-on-the-future" techniques 79
5.4.4 "Throw out" a problem child 80
5.4.5 "Flushing" the investment portfolio 80
5.4.6 Timing of adoption of new accounting standards 81
5.4.7 Sale/leaseback and asset exchange techniques 81
5.4.8 Write-off of long-term operating assets 81
5.4.9 Voluntary accounting changes 82
5.4.10 Operating versus non-operating income 82
5.5 Meaning of earnings quality 82
5.6 Measures of earnings quality 83
5.6.1 Predictability 84
5.6.2 Persistence 84
5.6.3 Smoothness 85
5.6.4 Accruals quality 86
5.6.5 Value relevance 87
5.6.6 Timeliness 88
5.6.7 Conservatism 88
5.6.8 Earnings quality measured by the relationship between operating cash flows and net profit 89

5.7 Empirical studies of earnings quality of SE and FC upstream oil and gas companies ... 90
5.8 Conclusion ... 92

CHAPTER 6: RESEARCH METHODOLOGY ... 94

6.1 Introduction ... 94
6.2 Research methodological choice ... 95
6.2.1 Quantitative research design ... 95
6.2.2 Qualitative research design ... 96
6.2.3 Mixed-methods research design ... 97
6.2.4 Research design for this study ... 98
6.3 Data types ... 98
6.3.1 Merits of using secondary data ... 99
6.3.2 Demerits of using secondary data ... 100
6.4 Sample selection ... 100
6.5 Earnings quality measures used in this research ... 104
6.5.1 Earnings predictability ... 105
6.5.2 Earnings persistence ... 105
6.5.3 Earnings smoothness ... 105
6.5.4 Accruals quality ... 105
6.5.5 Value relevance ... 105
6.5.6 Timeliness ... 106
6.5.7 Conservatism ... 106
6.6 Hypotheses of the study ... 106
6.7 Data analysis and interpretations ... 107
6.7.1 Exploring and presenting data ... 107
6.7.2 Descriptive statistics ... 108
6.7.3 Relationship between variables ... 108
6.7.4 Hypothesis testing ... 109
6.7.4.1 The *p*-value method of hypothesis testing ... 110
6.7.4.2 The independent samples *t*-tests ... 110
6.7.4.3 Analysis of variance (ANOVA) ... 111
6.7.5 Regression analysis ... 111
6.7.5.1 Significance tests of regression coefficients ... 112
6.7.5.2 The coefficient of determination ... 112
6.8 Reliability and validity of the data ... 113
6.8.1 Reliability ... 113

6.8.2 Validity 114
6.9 Limitations and mitigations 115
6.10 Ethical considerations 116
6.11 Conclusion 116

CHAPTER 7: ANALYSIS AND RESULTS 118

7.1 Introduction 118
7.2 Data preparation 118
7.3 Composition of SE and FC firms in the sample 119
7.4 Comparison of financial data for SE and FC firms 119
7.4.1 Market capitalisation 120
7.4.2 Enterprise value 121
7.4.3 Number of employees 122
7.4.4 Year-end market price 123
7.4.5 Depreciation, Depletion and Amortisation (DD&A) 123
7.4.6 Total assets 125
7.4.7 Total revenue 126
7.4.8 Earnings after tax (EAT) 127
7.4.9 Cash flows from operations (CFO) 127
7.4.10 Equity 128
7.4.11 Long-term debt 129
7.5 Comparison of financial ratios for SE and FC firms 130
7.5.1 Profitability ratios 131
7.5.1.1 Hypothesis tests of the profitability ratios for SE and FC firms 132
7.5.2 Efficiency ratios 140
7.5.2.1 Hypothesis tests of the efficiency ratios for SE and FC firms 141
7.5.3 Liquidity ratios 148
7.5.3.1 Hypothesis tests of the liquidity ratios for SE and FC firms 148
7.5.4 Gearing ratio 150
7.5.4.1 Hypothesis tests of the gearing ratio for SE and FC firms 151
7.5.5 Investment ratios 152
7.5.5.1 Hypothesis tests of the investment ratios for SE and FC firms 154
7.6 Research variables used in the empirical study 158
7.6.1 Descriptive statistics of the research variables 159
7.6.2 Hypothesis tests of the sample means of SE and FC firms 163
7.7 Earnings quality of SE and FC firms 169
7.7.1 Test of assumptions of multiple linear regression 169

7.7.1.1 The assumption of a linear relationship 170
7.7.1.2 The assumption of no multicollinearity 170
7.7.1.3 The assumption of normality 170
7.7.1.4 The assumption of homoscedasticity 171
7.7.2 Earnings quality measured by earnings predictability 172
7.7.3 Earnings quality measured by persistence 174
7.7.4 Earnings quality measured by earnings smoothness 176
7.7.5 Earnings quality measured by accruals quality 178
7.7.6 Earnings quality measured by value relevance 185
7.7.7 Earnings quality measured by timeliness 189
7.7.8 Earnings quality measured by conservatism 190
7.8 Conclusion 193

CHAPTER 8: DISCUSSION AND CONCLUSIONS 195

8.1 Introduction 195
8.2 Overview of the thesis 196
8.3 Discussion of the results 201
8.3.1 Composition of SE and FC firms 201
8.3.2 Comparison of financial data for SE and FC firms 201
8.3.3 Comparison of financial ratios for SE and FC firms 202
8.3.4 Descriptive statistics of the research variables 204
8.3.5 Earnings quality of SE and FC firms 205
8.3.5.1 Earnings quality measured by earnings predictability 205
8.3.5.2 Earnings quality measured by earnings persistence 205
8.3.5.3 Earnings quality measured by earnings smoothness 206
8.3.5.4 Earnings quality measured by accruals quality 206
8.3.5.5 Earnings quality measured by value relevance 207
8.3.5.6 Earnings quality measured by timeliness 208
8.3.5.7 Earnings quality measured by conservatism 208
8.4 Implications and unique contribution of the study 209
8.5 Limitations of the study 212
8.6 Recommendations for further research 213
8.7 Final conclusion 213

BIBLIOGRAPHY 215

APPENDIX: TEST OF ASSUMPTIONS OF MULTIPLE REGRESSION 248

LIST OF TABLES

Table 2.1: Comparison of the five research philosophies 21

Table 2.2: Agency theory overview 28

Table 2.3: FASB/IASB's meaning of each qualitative characteristic 31

Table 3.1: Description of phases if upstream oil and gas activities 36

Table 3.2: Characteristics of upstream oil and gas activities 37

Table 3.3: Project team's view on the main issues in the discussion paper 48

Table 4.1: Significant differences between US GAAP and IFRS in respect of upstream oil and gas activities 68

Table 6.1: Osiris initial search strategy 101

Table 6.2: Firms excluded from the initial sample 102

Table 6.3: Sampled FC and SE firms 103

Table 6.4: Hypotheses for the study 106

Table 7.1: Composition of SE and FC firms 119

Table 7.2: Average profitability ratios for SE and FE firms 131

Table 7.3: Independent samples test of the profitability ratios for SE and FC firms 133

Table 7.4: Average efficiency ratios for SE and FC firms 140

Table 7.5: Independent samples test of the efficiency ratios for SE and FC firms 142

Table 7.6: Average liquidity ratios for SE and FC firms 148

Table 7.7: Independent samples test of the current ratio for SE and FC firms 149

Table 7.8: Average gearing for SE and FC firms 150

Table 7.9: Independent samples test of the gearing ratios for SE and FC firms 151

Table 7.10: Average investment ratios for SE and FC firms 153

Table 7.11: Independent samples test of the investment ratios for SE and FC firms 154

Table 7.12: Research variables 158

Table 7.13: Descriptive statistics on research variables for SE and FC firms..... 161

Table 7.14: Independent samples test of equality of sample means for SE and FC firms 164

Table 7.15: Correlation coefficient between profit after tax for current and prior year 172

Table 7.16: Earnings predictability model estimation 173

Table 7.17: Coefficients of the regression of future profit and historical profit for SE and..... 174

Table 7.18: Correlation coefficient between EBIT and CFO..... 176

Table 7.19: Ratio of standard deviation of EBIT and CFO scaled by total assets 177

Table 7.20: Independent samples test of the ratios of standard deviation of EBIT and CFO for SE and FC firms 177

Table 7.21: Correlations of accruals quality variables 179

Table 7.22: Accruals quality model estimation 182

Table 7.23: Standard deviation of the regression residuals for SE and FC firms 183

Table 7.24: Independent samples test of the standard deviation of the regression residuals 185

Table 7.25: Correlations of value relevance variables 186

Table 7.26: Value relevance model estimation 188

Table 7.27: Timeliness model estimation..... 189

Table 7.28: Slope coefficients on negative returns and positive returns..... 190

Table 7.29: Independent samples test for the difference between negative and positive returns 193

Table 8.1: Summary findings of the study..... 209

LIST OF FIGURES

Figure 4.1: Accounting treatment of the four basic costs under the SE methods 56

Figure 4.2: Accounting treatment of the four basic costs under the FC method 60

Figure 7.1: Average market capitalisation for SE and FC firms..... 120

Figure 7.2: Average enterprise value for SE and FC firms..... 121

Figure 7.3: Number of employees for SE and FC firms..... 122

Figure 7.4: Average year-end market price for SE and FC firms..... 123

Figure 7.5: Average DD&A for SE and FC firms 124

Figure 7.6: Average total assets for SE and FC firms 125

Figure 7.7: Average Revenue for SE and FC firms..... 126

Figure 7.8: Average earnings after tax for SE and FC firms..... 127

Figure 7.9: Average cash flows from operations for SE and FC firms 128

Figure 7.10: Average equity for SE and FC firms..... 129

Figure 7.11: Long-term debt for SE and FC firms 130

Figure 8.1: Summary of the chapters in the thesis..... 200

LIST OF ACRONYMS

AICPA	American Institute of Certified Public Accountants
ANOVA	Analysis of Variance
APB	Accounting Principles Board
ARS	Accounting Research Study
ASC	Accounting Standards Codification
ASR	Accounting Series Release
BP	British Petroleum
CFO	Cash Flows from Operations
CRIRSCO	Committee for Minerals Reserves International Reporting Standards
CSR	Corporate Social Responsibility
DD&A	Depletion, Depreciation and Amortisation
DOE	Department of Energy
DPS	Dividends per share
E&E	Exploration and Evaluation
E&P	Exploration and Production
EARN	Earnings
EAT	Earnings after tax
EBIT	Earnings before interest and tax
EDGAR	Electronic Data Gathering, Analysis and Retrieval
EFA	Exploratory Factor Analysis
EITF	Emerging Issues Task Force
EPCA	Energy Policy and Conservation Act
EPS	Earnings per share
ERCs	Earnings Response Coefficients
EV	Enterprise Value
FASB	Financial Accounting Standards Board
FC	Full Cost
FRC	Financial Reporting Council
FRS	Financial Reporting Standard
FTC	Federal Trade Commission
G&G	Geological and Geophysical
GAAP	Generally Accepted Accounting Principles
IAS	International Accounting Standard
IASB	International Accounting Standards Board
IASC	International Accounting Standards Committee

IFRS	International Financial Reporting Standard
LNG	Liquefied Natural Gas
NWU	North-West University
OIAC	Oil Industry Accounting Committee
OPEC	Organisation of Petroleum Exporting Countries
PRMS	Petroleum Resource Management System
PROF	Profit after tax
RET	Return
ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
RRA	Reserve Recognition Accounting
SE	Successful Efforts
SEC	Securities and Exchange Commission
SFAS	Statement of Financial Accounting Standards
SIC	Standard Industry Classification
SMEs	Small and Medium-sized Entities
SORP	Statement of Recommended Practice
SPSS	Statistical Package for Social Sciences
TCA	Total current accruals
UK	United Kingdom
US	United States
USD	United States Dollar
VIF	Variance Inflation Factor

CHAPTER 1: PURPOSE, SCOPE AND EXTENT OF THE STUDY

1.1 Introduction and background

Oil and gas firms involved in the Exploration and Production (E&P) of crude oil and natural gas have the option of choosing between two historical accounting methods: the successful efforts (SE) method or full cost (FC) method, when accounting for the costs incurred. The fundamental accounting issue is whether to capitalise or expense the costs incurred in relation to E&P or "upstream" activities. Under FC accounting, all costs incurred in the search for oil and gas reserves are capitalised, irrespective of the success or failure of the exploration activity, while under the SE method, exploration costs are only capitalised if they result directly in the discovery of oil and gas reserves. Specifically, the SE method expenses all exploration costs that do not result in finding oil and gas reserves (Jennings *et al.*, 2000:57; Misund, 2017; Wright & Gallun, 2008:44-45).

Accounting by oil and gas firms has been debated since the 1970s, with attempts to have a uniform accounting method for comparability of financial statements being unsuccessful. In 1969, the American Institute of Certified Public Accountants (AICPA), which was then the main standard setter in the United States (US), issued Accounting Research Study No. 11 (ARS 11), titled "Financial Reporting in the Extractive Industries''. The study recommended the sole use of the SE method, eliminating the FC method. However, because of the pressure exerted on the AICPA by oil and gas firms objecting to the proposed elimination of the FC method, AICPA choose to defer their decision on the matter (Bryant, 2003:5; Nichols, 2012:22).

In 1975, following the oil and gas shortage caused by the Arab oil embargo, the US Congress passed the Energy Policy and Conservation Act (EPCA). The Act required the Securities Exchange Commission (SEC) to either develop oil and gas accounting rules or approve oil and gas accounting rules developed by the Financial Accounting Standards Board (FASB) if it felt those rules were accepted. In 1977, FASB (which assumed the role of setting standards in the US), upon the request of the SEC, issued Statement of Financial Accounting Standards (SFAS) No. 19, titled "Financial Accounting and Reporting for Oil and Gas Producing Companies" (SFAS 19). FASB (1977) recommended the SE method of accounting and eliminated the FC method. FASB argued that unsuccessful wells have little or no commercial value and thus costs incurred on them should not be included as assets on the balance sheet (Jennings *et al.*, 2000:58; Nichols, 2012:23).

Following the issuance of SFAS 19, there was a general outcry from independent oil and gas companies using FC accounting. They argued that the use of the SE method would result in volatility in earnings, consequently limiting their ability to raise capital from debt and equity markets (Cortese *et al*., 2009; Deakin, 1979; Misund *et al.,* 2015). Lobbying against the standard continued until the SEC gave in to the political pressures it faced and eventually rejected the elimination of FC accounting (Cortese & Irvine, 2010:11). The SEC therefore permitted the continued use of either the FC or the SE method. However, the SEC also proposed a new method of accounting known as Reserve Recognition Accounting (RRA), which would be developed in future to replace the SE and FC accounting methods. It is believed that neither of the two historical accounting methods disclosed in the financial statements – the most valuable asset of an oil and gas company – proved oil and gas reserves (Cortese, 2011; Jennings *et al.*, 2000:58-59; Wright & Gallun, 2008:49). The development of the RRA method was later abandoned due to a high level of subjectivity of proved reserves volumes and values (Nichols, 2012:23). Consequently, the FASB (1982) issued SFAS No. 69 “Disclosures about Oil and Gas producing activities” (SFAS 69), requiring all publicly traded companies with significant oil and gas producing activities to disclose supplementary information in their annual financial statements (Misund *et al.,* 2015; Wright & Gallun, 2008:49).

The International Accounting Standards Board (IASB)’s attempt to address this issue at the international level by narrowing the choice of accounting methods used by oil and gas companies was futile. In 2004, the IASB issued International Financial Reporting Standard (IFRS) number 6, “Exploration for and Evaluation of Mineral Resources” (IFRS 6) as an interim solution, designed to provide some guidance to entities reporting exploration and evaluation assets, and without making substantial changes to existing accounting practices. The IASB therefore did not take any position on the SE versus FC issue. Instead, it permitted a continuation of a choice between the two methods (Cortese, 2013; IASB, 2004).

Effective July 1, 2009, the FASB completed its Accounting Standards Codification ("Codification") of the US GAAP. The *Codification* became the single source of authoritative literature governing non-governmental GAAP in the US. At that time, all existing accounting standards, including those of the FASB and the Emerging Issues Task Force (EITF), as well as other related authoritative literature were superseded. The *Codification* was effective for all non-governmental organisations for interim and annual periods ending after September 15, 2009 (Bradbury & Harrison, 2015; Widelski, 2010).

Currently, public listed oil and gas companies in the US are required by the SEC to prepare their financial statements using either the SE or FC method of accounting (Chen *et al.,* 2018:80; Wright

& Gallun, 2008:50). Both SE and FC companies apply the guidance in the FASB Accounting Standards Codification (ASC) Topic 932, *Extractive Activities – Oil and Gas*. This topic provides guidance specific to oil and gas producing activities, and it contains several subtopics that interact with other topics in the Accounting Standards Codification (FASB, 2011). However, although SFAS 19, SFAS 69 and Reg. S-X 4-10 were superseded, almost all the content contained in these standards was maintained in the *Codification*, specifically in ASC 932 *Extractive Activities – Oil and Gas.* Privately held companies technically have no required method of accounting for E&P costs. However, many of these companies appear to follow either of the two historical cost methods required of public listed companies (Bradbury & Harrison, 2015; Jennings *et al.*, 2000:59). It is important to note that the FC method is currently allowed as a political compromise, based on the argument that the method recognises exploration risk as one of the major characteristics of the industry (Cortese, 2011; Misund *et al.,* 2015; Nichols, 2012). Costs of unsuccessful drilling are an essential part of the costs to search for oil and gas reserves, and thus capitalising both successful and unsuccessful wells achieves a better matching of the true costs of oil and gas reserves with the revenues that ultimately arise from production (IASC, 2000:85; Umobong, 2015).

In the light of the above, since the IASB, SEC and FASB are still undecided which accounting method provides investors with more informative numbers (i.e. superior earnings quality) and, as such, be recommended for use by oil and gas companies. There is still a need to do research studies on these two accounting methods. The proposed study investigated the quality of earnings of upstream oil and gas firms in the US, which use either SE or FC accounting methods, with an overall aim of determining which, if any, of the two methods provides superior earnings quality and thus more relevant information to investors. However, there is neither an agreed-upon meaning for “earnings quality”, nor a generally accepted approach to its measurement (Dechow *et al.,* 2010; Delkhosh & Sadeghi, 2017; Schipper & Vincent, 2003). According to Ranjbar *et al.* (2013:353), earnings quality is a broad concept that reports the stability, persistence, and lack of variability of profit. Beneish and Vargus (2002) refer to earnings quality as the possibility of sustainability of current earnings in the future. Schipper and Vincent (2003:97-98) define earnings quality as the extent to which the reported earnings faithfully represent Hicksian income, which is the amount that can be consumed (i.e. paid out as dividends) during the period, while leaving the firm equally well off at the beginning and at the end of the period. Nonetheless, the accounting literature has developed a variety of proxies for earnings quality, which focus on particular attributes of what earnings quality is considered (Latif *et al.,* 2017; Perotti & Wagenhofer, 2014:548).

Francis *et al.* (2004:295) and Huynh (2018) identify seven measures (attributes) of earnings quality that have been widely used in accounting research, categorised as either "accounting-based" or "market-based" attributes. The accounting-based earnings attributes, which include accruals quality, persistence, predictability and smoothness, assume that the function of earnings is to allocate cash flows to reported periods via accruals. The market-based attributes are value relevance, timeliness and conservatism, which assume that the function of earnings is to reflect economic income as represented by stock returns. Accrual quality as a measure of earnings quality assumes that earnings that map more closely into cash flows are of better quality (Francis *et al.*, 2004:295; Jaggi *et al.,* 2015). Persistence measures the extent to which current earnings persist or recur in the future, where high persistence is positively associated with more sustainable earnings and thus higher quality (Perotti & Wagenhofer, 2014:548). Predictability as a measure of earnings quality is defined as the ability of earnings to predict itself, and is based on the view that an earnings number that tends to repeat itself is of high quality (Larcker *et al.,* 2007; Lipe, 1990). According to Francis *et al.* (2004:302), earnings smoothness can be measured as the ratio of the standard deviation of earnings over the standard deviation of cash flow from operations, each scaled by opening total assets. Lower values indicate greater smoothness and less volatility in earnings, thus higher earnings quality. Value relevance as a measure of earnings quality is the ability of one or more accounting numbers to explain variation in stock returns (Latif *et al.,* 2017). Earnings with greater explanatory power are desirable; that is, earnings that explain greater variation in returns are of higher quality. Timeliness is similar to value relevance, since both measures rely on stock returns, as well as based on explanatory power. Timeliness is measured as the explanatory power of a reverse regression of earnings on returns, and it captures the ability of earnings to reflect both good and bad news impounded in returns (Francis *et al.*, 2004:303-306; Latif *et al.,* 2017). Conservatism as a marked-based earnings quality attribute is defined as the differential ability of accounting earnings to reflect economic losses (negative stock returns) versus economic gains (positive returns) (Ball *et al.,* 2000; Delkhosh & Sadeghi, 2017).

Therefore, all these earnings quality measures were reviewed in detail under the literature review section of the thesis with a view to identifying those attributes that will be applied in the empirical study and defining how each would be measured in the study.

1.2 Justification and problem statement

Accounting for oil and gas firms has been debated since the 1970s, with numerous academic studies conducted, aimed at exploring the use of FC and SE accounting methods in the upstream oil and gas industry. However, the issue of which accounting method best captures the underlying economic transactions of the firm is still unresolved (Umobong, 2015:1). Numerous investigations

into accounting for the extractive industries emerged following the FASB's controversial proposal in the late 1970s to eliminate the FC method of accounting for pre-production activities and require entities to report under the SE method (Cortese & Irvine, 2010:6). Many of these studies examined the market effects of the proposed change in accounting method (Baker, 1976:152-158; Collins & Dent, 1979; Dyckman & Smith, 1979; Lawrie, 1986). Collins and Dent (1979) examined whether the proposed elimination of FC accounting had an adverse effect on the security returns of FC versus SE firms. The empirical evidence presented in this study suggested that the proposal to eliminate FC accounting had a measurable negative impact on the equity securities of potentially affected firms. In another study, Dyckman and Smith (1979) investigated the joint hypothesis of market efficiency and information event content occasioned by FASB's release of the Exposure Draft, "Financial Accounting and Reporting by Oil and Gas Producing Companies", requiring all firms to report using the SE method. Their findings show a relative negative impact on the returns of FC firms' securities compared to the returns on SE firms' securities, particularly around the announcement date.

Other research studies examined the relationship between the choice of the FC or SE method and company characteristics such as age, size, leverage, exploration aggressiveness and demand for capital (Deakin, 1979:730-733; Deakin, 1989; Dhaliwal, 1980:78-84; Lilien & Pastena, 1982). Lilien and Pastena (1982) conclude that FC accounting is used by higher-leveraged firms and that larger-sized firms use SE. Their findings were similar to those of Dhaliwal (1980:78-84), who also found FC firms to be higher-leveraged than SE enterprises. Deakin (1989) found strong evidence in a study that FC firms are characterised by larger debt-equity ratios, higher activity in oil and gas exploration, and presence of management incentive plans that are dependent on accounting income.

More important for the proposed study, previous research has compared the SE and FC accounting methods in the oil and gas industry. Harris and Ohlson (1987), in their study of reserve-based supplemental disclosures, have found the SE regression to have higher explanatory power than FC regression, suggesting that the SE method is more useful than the FC method. Similarly, Bandyopadhyay (1994) studied the association between earnings and security prices of a sample of 39 integrated and independent oil and gas firms over the period from 1982–1990. He concluded that SE earnings are of higher quality than FC earnings because the FC method imparts considerable price-irrelevant elements to earnings. However, Bryant (2003) has established that the policy of capitalising costs with uncertain future benefits (FC) is more relevant to security returns and market value than partial capitalisation (SE). Bryant's sample consists of 112 independent oil and gas firms with data for the years 1994–1996. This creates contrasting

conclusions regarding the superiority of SE or FC methods in terms of earnings quality and thus necessitates further research.

More recently, Murdoch and Krause (2009) examined the earnings quality of SE and FC firms, and concluded that the SE method provides earnings quality superior to FC, with extremely significant results. However, their research applied only one measure of earnings quality, namely the "correlation between earnings and cash flows", ignoring other various measures of earnings quality. There could be a possibility of results being different when other earnings quality metrics are applied. The proposed study controlled for this by applying various earnings quality metrics in the measurement of earnings quality for SE and FC firms.

Furthermore, in terms of the time dimension, most of the studies conducted on these two methods were in the 20th century. This was because it was mainly the period when different standard setting bodies in the US debated the elimination of the FC accounting method. Conducting further research in the current century would reveal whether earlier findings are still applicable in modern times. The research would also uncover interesting characteristics relating to the earnings and cash flows of upstream oil and gas companies, which can be valuable to various stakeholders like banks, analysts and shareholders. Also, prior studies (Healy, 1985; DeFond & Jiambalvo, 1994; Nelson *et al.,* 2002; Rani *et al.,* 2013) strongly suggest that earnings management is becoming a common business practice in most companies today, with one of the opportunities for its occurrence being the overly flexible accounting regulation that provides for alternative accounting methods or approaches (Amat & Gowthorpe, 2004; Misund, 2016). This justifies the need for studying earnings management incentives and practices in this research.

Lastly, the topic is still very relevant and this study would be valuable to the IASB and FASB, which are still undecided on which accounting method is more superior and thus could be mandated for use by all upstream oil and gas companies.

1.3 Objectives of the study

1.3.1 Main objective of the study

The main objective of the study is to ascertain which, if any, of the two accounting methods (SE and FC) provides superior earnings quality using various earnings quality measures. The relevance of this study is that investors are likely to be misled in making decisions based on financial information if one method leads to significantly lower earnings quality; hence, the hypothesis to be tested. Therefore, the distinct contribution of this study is that it provides

empirical evidence as to whether there is a significant difference between earnings of SE and FC firms.

1.3.2 Secondary objectives of the study

The research objectives of this study are as follows:

1. To review the literature on the SE and FC accounting methods.
2. To review the literature on earnings management and the various earnings quality measures.
3. To compare financial data and financial ratios for SE and FC firms.
4. To compare the quality of earnings of SE and FC firms using various earnings quality measures empirically.

1.4 Overarching research hypothesis

To compare the earnings quality of SE and FC firms based on the seven earnings quality metrics, the broad hypothesis that would be tested in this study was formulated as follows:

Null hypothesis: There is no difference between the earnings quality of FC and SE firms.

Alternative hypothesis: There is a significant difference between the earnings quality of FC and SE firms.

1.5 Research design and method

The method used in this study is briefly set out below:

1.5.1 Literature review

As far as possible and to the knowledge of the candidate, relevant and recent literature was reviewed in order to establish a theoretical framework for the empirical study conducted. Generally, the literature review was structured to ensure that all the objectives of the study are captured for critical analysis. The literature included the following, amongst others:

- Oil and gas operations. This included a description of upstream and downstream activities, characteristics of upstream activities, and a brief history of the US oil and gas industry.
- History of standard setting for oil and gas accounting. This included the US debate on oil and gas accounting, Reserve Recognition Accounting (RRA), the history of the Extractive Industries Project, the Extractive Activities Discussion Paper and its status.

- Current accounting standards regulating financial reporting in the oil and gas industry, including a comparison of the IFRS, UK GAAP and US GAAP.
- The US GAAP: Features of FC and SE accounting methods, differences, similarities and theoretical arguments for and against the two methods, as well as disclosures about oil and gas producing activities per SFAS 69.
- The UK GAAP: a review of section 34 of FRS 102, The Financial Reporting Standard applicable in the UK and Republic of Ireland, which provides guidance on accounting for extractive activities (FRC, 2015).
- The International Financial Reporting Standards: a review of IFRS 6, "Exploration for and Evaluation of Mineral Resources".
- A review of research philosophies and relevant theoretical frameworks, including the stewardship theory, resource dependency theory, stakeholder theory, interest group theory, agency theory and regulation theory; with specific reference to FASB's conceptual framework for financial reporting.
- The concept of earnings management, earnings management incentives and techniques.
- The concept of earnings quality, and earnings quality measures. The earnings quality measures examined were classified as either accounting-based or market-based attributes. The accounting-based attributes are estimated using accounting data and these include accruals quality, persistence, predictability and smoothness. Market-based attributes rely on both accounting data and returns for their estimation, and they include timeliness, relevance and conservatism (Francis *et al.*, 2004:295; Gaio & Raposo, 2014; Latif *et al.,* 2017).
- A review and critical analysis of previous empirical studies on earnings quality of SE and FC accounting methods.

1.5.2 Empirical research

The purpose of the empirical research phase is to compare the earnings quality of SE and FC upstream oil and gas firms in the US during the period from 2007–2015. The sample was determined by extracting from the Osiris Financial Database, a list of all companies with primary Standard Industrial Classification (SIC) code 1311 (Crude Petroleum and Natural Gas). This list consists of firms that derive a significant portion of their income from exploration and production, and therefore, the choice of accounting method would influence their financial statements significantly. The following constraints were also taken into consideration in determining the sample: US firms listed on the stock exchange before 2007; firms that have relevant data available; and firms that applied the same accounting method consistently over the period. Annual reports of all upstream oil and gas companies in the US were downloaded from a public online

database called EDGAR (Electronic Data Gathering, Analysis and Retrieval), maintained by the SEC. It is a requirement for all public listed companies in the US to file their annual reports with the SEC (Securities Act, 1933). The purpose of these reports was to identify the accounting method used by each company. After applying the said constraints, 84 public listed upstream oil and gas companies were selected as the sample, including 41 FC firms and 43 SE firms. The sample size selected for the study is similar to sizes used in some other research studies. For example, Alipour *et al.* (2014) used a sample size of 81 firms in their study of earnings quality of Iranian public and private firms, while Abdelghany (2005) selected 90 listed companies.

The required data for the empirical study were extracted from the firms' financial statements that were downloaded from the Osiris Financial Database. This database provided annual financial statements over a number of years for all public listed companies worldwide. The researcher chose to focus on US firms because the FC and SE methods originated there. It was also more practical to identify categories of US E&P firms using either FC or SE accounting methods. Because of the constraints mentioned, the analysis covered a nine-year period from 2007–2015. A longitudinal design was used to compare the earnings quality for SE and FC firms. A longitudinal design is one that involves a study of a particular phenomenon (or phenomena) over time. It therefore allows a researcher to assess the impact of a treatment over time (Saunders *et al.*, 2009; Sekaran & Bougie, 2013). The earnings quality measures discussed in the literature review section were used to estimate the earnings quality of SE and FC firms over the study period.

A comparative analysis approach was adapted in the data analysis and interpretation of the results, since this research sought to compare two accounting methods used by upstream oil and gas companies. Microsoft Excel was used to compute the relevant research variables required for each earnings quality measure, and to generate graphs and tables. The Statistical Package for the Social Sciences (SPSS) was used to generate the descriptive statistics, regression and correlation analysis, and performing hypothesis and significance tests, among others. Specifically, the *p*-value (probability value) method was used in hypothesis testing. The use of SPSS helped the researcher to make the research work more scientific and reliable since it provides a number of statistical tools such as ANOVA, independent samples *t*-test, chi squire test, exploratory factor analysis (EFA), and so on, which could be applied in the thesis with the help of the SPSS software (Johnson, 2011). It therefore played a significant role in the process of interpreting and analysing data retrieved from various methods (Frankfort-Nachmias & Nachmias, 1996).

1.6 Scope of the study and chapter division

Chapter 1: Purpose, scope and extent of the study

This chapter highlights the background of the study, justification of undertaking the research, research objectives and hypotheses, methods used in the study (literature review and empirical study), chapter overview and conclusion.

Chapter 2: Philosophical and theoretical frameworks in research

This chapter explores the underlying philosophical assumptions made by researchers when undertaking research, as well as the major research philosophies, which include positivism, critical realism, interpretivism, pragmatism and postmodernism. The chapter further discusses the relevant research theories, with particular emphasis on the "agency theory", considered relevant for this thesis, as well as how it links to FASB's conceptual framework for financial reporting.

Chapter 3: Upstream petroleum activities and history of standard setting for oil and gas accounting

This chapter reviews recent and relevant literature regarding the background and politics of standard setting for oil and gas accounting. Specifically, the following areas are addressed in this chapter: a description of upstream and downstream activities; characteristics of upstream activities; a brief history of the US oil and gas industry; the US debate on oil and gas accounting; Reserve Recognition Accounting (RRA); the history of the Extractive Industries Project; and the Extractive Activities Discussion Paper and its status.

Chapter 4: Status of accounting for upstream activities in the oil and gas industry

In this chapter, an international comparison of the US GAAP with the UK GAAP and IFRS 6 is conducted. Under the US GAAP, the chapter reviewed the nature of SE and FC accounting methods as prescribed in the FASB Accounting Standards Codification (ASC) Topic 932, *Extractive Activities – Oil and Gas*, the differences, similarities and theoretical arguments for and against the two methods, and disclosures about oil- and gas-producing activities in terms of SFAS 69. Under the UK GAAP, section 34 of FRS 102, *The Financial Reporting Standard applicable in the UK and Republic of Ireland*, which provides guidance on accounting for extractive activities (FRC, 2015), was reviewed, followed by a review of IFRS 6, and a comparison of these three standards. The chapter concluded with a discussion on international implications emanating from the differences.

Chapter 5: Earnings management and earnings quality

This chapter examines the concept of earnings management, earnings management incentives and techniques, the concept of earnings quality, as well as earnings quality measures. The

earnings quality measures examined are classified as either accounting-based or market-based attributes. Accounting-based attributes are estimated using accounting data and these include accruals quality, persistence, predictability and smoothness, while market-based attributes rely on both accounting data and returns for their estimation, and they include timeliness, relevance and conservatism (Francis *et al.*, 2004:295). Previous empirical studies on earnings quality of the SE and FC accounting methods are also reviewed critically.

Chapter 6: Research methodology

This chapter builds on Chapter 2 of this study. Based on the research philosophy chosen for the study, this chapter explores the three research methodological choices, i.e. quantitative, qualitative or mixed-methods research design, with an aim of identifying the appropriate research design and strategies for this study. It proceeds with sections describing the data types, sample selection, and earnings quality measures used in this study. The chapter concludes by explicating the analysis approach for the empirical data, the limitations and mitigations in the research methodology, and ethical considerations.

Chapter 7: Analysis and results

In this chapter, all the results from the data analysis are presented. The results are presented in the form of tables and graphs. The chapter starts by presenting a comparison of the key financial data and financial ratios for SE and FC firms. This is followed by the descriptive statistics of the study variables and relationships between the variables. The chapter concludes by presenting the results of the comparisons of the earnings quality of SE and FC firms using the seven earnings quality methods. The results from the analysis are interlinked and contrasted to existing literature in the next chapter.

Chapter 8: Discussion and conclusions

In this chapter, the results of the empirical study conducted in Chapter 7 and the literature reviewed in the earlier chapters are discussed and summarised, as well as conclusions and recommendations made. Research limitations, recommendations for further research, and implications of the research are also addressed in this chapter. The contribution to science is also illustrated.

1.7 Conclusion

In this chapter, the reader was introduced to the study, and a justification and problem statement for the study were provided, culminating in the research objectives and hypothesis for the study. A description of the research design and method (literature review and empirical research) was given and the chapter concluded with an overview of the chapters to follow. From the review of

the relevant literature, it is evident that accounting for E&P activities has been politically charged and hotly debated in the US for decades, the focus being whether SE or FC methods provided investors with more informative number and, as such, to be mandated for use by all oil and gas companies. This debate relating to the issue “earnings quality” is still ongoing; hence, the relevance for this study.

The next chapter of the study reviews the philosophical and theoretical frameworks in research.

CHAPTER 2: PHILOSOPHICAL AND THEORETICAL FRAMEWORKS IN RESEARCH

2.1 Introduction

"Research", in simple terms, refers to the search for knowledge. Saunders *et al.* (2009:5) define research as "something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge", whereas the Advanced Learner's Dictionary of Current English (1952:1069) gives the meaning of research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge". Slesinger and Stephenson (1930) refer to research as "the manipulation of things, concepts or symbols for the purpose of generalising to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art". According to Woody (cited by Kothari, 2004:1), research encompasses

> defining and redefining problems, formulating a hypothesis or suggested solutions; collecting, organising and evaluating data; making deductions and reaching conclusions; and finally carefully testing the conclusions to determine whether they fit the formulated hypothesis.

Therefore, it can be concluded from the definitions above that research is generally based on logical relationships and not just beliefs, and that it is intended to find out things and add to existing knowledge, or solve problems.

Research studies can be classified into two categories – basic research and applied research (Sreejesh *et al.*, 2014:4). Basic research, also termed fundamental or pure research, is research that is undertaken primarily to discover new knowledge or interpretations and establish facts or principles in a particular field, rather than solving a pragmatic problem. The focus here is to increase knowledge about particular phenomena through testing, refining and elaborating theory with relatively little attention being given to its practical applications (Saunders *et al.*, 2009:8-9; Sreejesh *et al.*, 2014:4). This kind of research is undertaken largely at universities and mainly for academic purposes. Conversely, "applied research" refers to study undertaken to discover the applications and uses of theories, knowledge and principles in actual work or in solving practical problems; in other words, any research that is used to answer a specific question, determine why something failed or succeeded, solve a specific, pragmatic problem, or to gain better understanding of the problem. This research is undertaken by people based in a variety of settings, including organisations and universities (Arnold, 1997:169; Saunders *et al.*, 2009:8-9;

Sreejesh *et al.*, 2014:4). Although the purpose and context of these two research forms vary, there are fewer differences in the research methods and tools used for their conduct.

This chapter explores the underlying philosophical assumptions made by researchers when undertaking research, as well as some of the major research philosophies and various theories that may be relevant for this thesis. Most importantly, the "agency theory", considered more relevant for this thesis, as well as how it links to FASB's conceptual framework for financial reporting was discussed. It is important to note that this is a monograph-style thesis in which the researcher demonstrates possession of a broad knowledge of research philosophies, assumptions and theories, even though not everything was directly applicable to this study. This approach was also followed in a number of other doctoral theses in this field (Matashu, 2016; van der Merwe, 2014; Viviers, 2016).

2.2 Philosophical assumptions

The term "research philosophy" refers to "a system of beliefs and assumptions about the development of knowledge" (Antwi & Hamza, 2015; Saunders *et al.*, 2016:124). Research philosophy concerns the development of knowledge in a particular field, where the knowledge development may not necessarily be a new theory, but even the answering of a specific problem in a particular organisation, thus also developing new knowledge. Whether a researcher is aware of the assumptions or not, a number of assumptions will have to be made at every stage of the research process (Burrell & Morgan, 1979; Kellmereit, 2016). These assumptions do shape the way the researcher understands the research questions, the methods used, and how the findings are interpreted (Crotty, 1998). These assumptions can be categorised as assumptions about human knowledge (epistemological assumptions); about the realities encountered in the research study (ontological assumptions); and the ways and extent to which the researcher's values influence the research process (axiological assumptions) (Crotty, 2003:8-10; Durant-Law, 2005; Guba & Lincoln, 1994:108; Saunders *et al.*, 2016:124). A set of assumptions that are well thought out and are consistent will constitute a credible research philosophy that supports the researcher's choice of methodology, research strategy, data-collection procedures and analysis procedures, thus providing a coherent research project in which all research elements fit together (Saunders *et al.*, 2016:124-125).

2.2.1 Ontology

Ontology is concerned with assumptions about the nature of reality and its characteristics (Crotty, 2003:10; Graue, 2016). Ontological assumptions shape the way a researcher sees and studies research objects, and this therefore determines the choice of the research area for the research

project (Saunders *et al.*, 2016:127). Researchers embrace multiple realities when conducting research, as do the individuals being studied and the readers of the study (Moustakas, 1994). Blaikie (2010) describes ontology as "the science or study of being", and develops this description for the social sciences to encompass "claims about what exists, what it looks like, what units make it up and how these units interact with each other". In short, ontology describes the researcher's view (claims or assumptions) on the nature of reality. More precisely, the assumptions could be an objective reality representing what really exists (objectivism) or only a subjective reality created in the researcher's mind (subjectivism) (Ahmed, 2008; Burrell & Morgan, 1982; Crotty, 2003:10-11).

2.2.2 Epistemology

Epistemology concerns assumptions about what constitutes acceptable knowledge, valid and legitimate knowledge, and how knowledge can be communicated to others (Burrell & Morgan, 1982; Tumele, 2016). It is the philosophy of knowledge and justification (Audi, 2000). According to Blaikie (2010), epistemology is a theory or science of the method or grounds of knowledge containing a set of claims or assumptions about ways of gaining knowledge of reality, how that which exists may be known, what can be known, and the criteria that have to be satisfied, in order to be described as knowledge. Chia (2003) describes epistemology as "how and what it is possible to know", whereas Hatch and Cunliffe (2006) summarise the concept as "knowing how you can know". With the epistemology assumption, the researcher tries to get as close as possible to the participants being studied, implying that subjective evidence is assembled based on views of individuals. The longer the researcher stays in the field or get to know the participants, the more they "know what they know" from first-hand information (Wolcott, 2008). This implies that the researcher tries to minimise the "distance" or "objective separateness" between him or herself and those being researched (Guba & Lincoln, 1988:94).

Epistemology is considered more obviously relevant in research than ontology, which seems to be rather abstract (Crotty, 2003:8). With the multidisciplinary context of business and management, different types of knowledge – ranging from numerical data to textual and visual data, from facts to interpretations, including narratives, stories, and even fictional accounts – can all be considered legitimate (Saunders *et al.*, 2016:127). Therefore, researchers adopt different epistemologies in their research, which offer a much greater choice of methods. For example, the (positivist) assumption that objective facts offer the best scientific evidence is likely to result in the choice of quantitative research methods. In other words, it is the researcher's epistemological assumptions that will govern what is considered legitimate for the research.

2.2.3 Axiology

This refers to the role of values and ethics in the research process (Mingers, 2003). Axiology includes assumptions about how researchers deal with both their own values and those of the research participants (Durant-Law, 2005:6; Saunders *et al.*, 2016). As a result, the researcher's values are of great importance towards the credibility of the results obtained during the research process. Heron (1996) argues that values are the guiding reason for all human action, and that researchers demonstrate axiological skill in articulating their values as a basis for making judgements about the research they are conducting and the process they follow in doing it. For example, conducting a research study where the researcher places high importance on data collected through interviews, suggests that the researcher values personal interaction with the respondents more highly than their views expressed through an anonymous questionnaire (Saunders *et al.*, 2016:128). In other words, a researcher needs to be clear about his or her own value position since it can aid in deciding on the appropriate ethical behaviour and to justify this in the case of queries about decisions made.

2.3 Research philosophies

Research philosophy is an important basis for research methodology that provides for the collection of data in an effective and appropriate manner. According to Johnson and Christensen (2014), research philosophy is a perspective that is based on a set of shared assumptions, values, concepts and practices. Five major research philosophies are widely used in business and management research: positivism, critical realism, interpretivism, postmodernism and pragmatism (Gray, 2013:21; Saunders *et al.*, 2016:135).

2.3.1 Positivism

Positivism adopts the philosophical stance of the natural scientist and relates to working with an observable social reality to produce law-like generalisations similar to those produced by the physical and natural scientists (Remenyi *et al*., 1998:32). From the literature, it is clear that positivism can be defined in various ways. According to Smith (1998), positivists assume things can be studied as facts with the relationship between these facts established as scientific laws. Such laws are considered to have the status of truth and social objects can be studied in more detail – the same way as natural objects. Outhwaite (1987) suggests three distinct generations of positivist philosophy. The first generation, generally known as the 'Enlightenment', allowed the contemplation of social life to break away from religious interpretations and establish human beings as the main protagonists in the development and communication of scientific knowledge. The next generation, 'Logical Positivism', which promises unambiguous and accurate knowledge,

originated in the works of philosophers of the early 20th century collectively known as the Vienna Circle (Ayer, 1936; Carnap, 1932). The last generation of positivism developed in the post-war period and was commonly associated with Hemple (1965), who focused on the need for reasoning that moves from theoretical ideas, or a set of given premises, to a logical conclusion through deductive thinking.

According to Saunders *et al.* (2016:136), positivists focus on strictly scientific empirical methods designed to produce data and facts uninfluenced by human interpretation or bias, as summarised in Table 2.1 below. A researcher who adopts an extreme positivist position would see organisations and other entities as real in the same way as physical objects and natural phenomena are real. Epistemologically, a researcher would focus on discovering observable and measurable facts and regularities, which would lead to the production of credible and meaningful data (Crotty, 1998). Therefore, universal rules and laws are created through causal relationships in the data, which help to explain and predict behaviour and events in organisations (Gill & Johnson, 2010).

A positivist researcher might use existing theory to develop hypotheses, which would be tested and confirmed, resulting in further development of theory that can then be tested by further research (Saunders *et al.,* 2016). However, a positivist may not necessarily always start the research with existing theory. In the entire research process, the researcher remains neutral and detached from the research and data in order to avoid influencing the findings (Crotty, 1998). Most often, the positivist researcher will be likely to use a highly structured methodology in order to facilitate replication, and with emphasis on quantifiable observations that can be analysed statistically (Gill & Johnson, 2002).

2.3.2 Critical realism

This is another philosophical position that focuses on explaining what is seen and experienced in terms of the underlying structures of reality that shape the observable events (Saunders *et al.,* 2016). Critical realism occupies a middle ground between the two positions of positive direct realism and postmodernist nominalism. It originated in the late 20th century in the work of Roy Bhaskar in response to these two positions (Reed, 2005). Critical realists consider “reality” as the most important philosophical consideration, since it is external and independent, but not directly accessible through observation and knowledge of it by the researcher (see Table 2.1) (Saunders *et al.,* 2016). According to Reed (2005), there are two steps to understanding the world under critical realism; firstly, the sensations and events that are experienced, and secondly, the mental processing that continues after the experience, referred to as “retroduction”. Bhaskar (1989) argues that the social world can better be understood if the social structures that have given rise

to the phenomena are understood. Therefore, much of the critical realist research takes the form of in-depth historical analysis of social and organisational structures. It focuses on providing an explanation for observable organisational events by exploring the underlying causes and mechanisms in which deep social structures shape everyday organisational life (Saunders *et al.,* 2016).

2.3.3 Interpretivism

Interpretivism is a subjectivist philosophy that emphasises that human beings are different from physical phenomena because they create meanings. Interpretive researchers argue that social sciences research needs to be different from natural sciences, because human beings and social worlds cannot be studied in the same way as physical phenomena (see Table 2.1; Saunders *et al.,* 2016:140). Interpretive research is focused on the meanings that people attach to norms, rules and values that regulate their interactions, with care taken not to impose a previous understanding of norms, rules, and values on others. Interpretivism emerged from the works of German, French and English thinkers in the early and mid-twentieth century (Crotty, 1998). According to Willis (1995), interpretivists believe that there is no single correct route or particular method of knowledge. Walsham (1993) argues that, under interpretive research, there are no 'correct' or 'incorrect' theories. Instead, they are judged based on how interesting they are to the researcher as well as those involved in the same area.

According to Burrell and Morgan (1979:28), the interpretive research philosophy is concerned with understanding the world as it is and the fundamental nature of the social world with a subjective experience. It seeks explanation on individual consciousness and subjectivity, with reference to the participant rather than the observer of action. Similarly, Reeves and Hedberg (2003:32) argue that the interpretive paradigm is concerned with understanding the world as it is from subjective experience of individuals. They stress the need of putting analysis in context. As a result, they use meaning orientated research methodologies like interviewing or participant observation that rely more on a subjective relationship between the researcher and subjects.

According to Saunders *et al.* (2016:140), interpretivist research creates new, richer understandings and interpretations of social worlds and contexts. This means that research objects like organisations are looked at from perspectives of different groups of people. For example, the ways in which different employees see and experience the organisation are different and many so that they could be seen as experiencing different work place realities. Therefore, if research focuses on the experiences that are common to all at all times, the importance of the differences between them and their individual circumstances would be lost, and consequently the understanding of the organisation that the research delivers will reflect this. Important to note is

that interpretivist researchers have to be empathetic when conducting research. However, the researcher has a challenge of entering the social world of the research participants as well as to understand that world from their point of view. As a result, it has been argued that interpretivist philosophy is more appropriate in business and management research because business situations are complex and are often unique (Gray, 2013; Johnson & Christensen, 2014; Saunders *et al.,* 2016).

2.3.4 Postmodernism

This research philosophy emerged in the late twentieth century from the works of French philosophers including Jean-Francois Lyotard, Jacques Derrida, Michel Foucault, Gilles Deleuze, Felix Guattari and Jean Baudrillard (Saunders *et al.,* 2016). This paradigm stresses the role of language and power relations seeking to question accepted ways of thinking and give voice to alternative views that have been marginalised and silenced by dominant views (see Table 2.1). According to Chia (2003), postmodernists go further than interpretivists do in their critique of positivism and objectivism. They believe that any sense of order is provisional and without foundation, and can only be brought about by language with its categories and classifications. They emphasise the chaotic primacy of flux, movement, fluidity and change, and therefore rejecting the modern objectivist and realist ontology.

Postmodernism has been viewed "as an enterprise that calls for the death of all scientific inquiry; the end of all new knowledge; the dissolution of any standards that may be used to judge one theory against another; a banishment into utter relativism wherein a clamour of fragmented and contentious voices reigns" (Kilduff & Mehra, 1997:454). It therefore has a goal of radically changing the established ways of thinking and knowledge. Thomas (1993:23) calls postmodernists "armchair radicals", who focus their arguments on changing ways of thinking rather than calling for action based on these changes.

Postmodernist researchers approach the organisational world by focusing on the ongoing processes of organising; managing and ordering that constitute entities such as 'management', 'performance' and 'resources'. They challenge organisational concepts and theories in order to demonstrate the perspectives and realities they exclude and leave silent, and whose interests they serve (Saunders *et al.,* 2016). Postmodernists also recognise that power relations between the researcher and research subjects shape the knowledge created in the research process. Therefore, it is important for researchers to be open about their moral and ethical positions (axiology) since it can influence the power relations between them and the research subjects (Calás & Smircich, 1997).

2.3.5 Pragmatism

Pragmatism asserts that the most important determinant of the epistemology, ontology and axiology adopted is the research question (Saunders *et al.,* 2009). This research philosophy originated from the works of philosophers Charles Pierce, William James and John Dewey, in the late-nineteenth century USA (Kelemen & Rumens, 2008). Pragmatism is not committed to any one system of philosophy and reality, because it tries to reconcile objectivism and subjectivism, facts and values, accurate and rigorous knowledge, and different experiences. It does this by considering theories, concepts, ideas, hypotheses and research findings in terms of their practical consequences, rather than in an abstract form (see Table 2.1).

Pragmatist researchers have a freedom of choice regarding the methods, techniques, and procedures of research that best meet their needs and purposes. They therefore do not see the world as an absolute unity. Pragmatists agree that research always occurs in social, historical, political and other contexts. They believe in an external world independent of the mind as well as those lodged in the mind (Cherryholmes, 1992; Murphy, 1990; Rorty, 1990; Tashakkori & Teddlie, 2003).

For pragmatist research, a wide range of research strategies is adopted, the choice of which is driven by the nature of the research problem. Research starts with a problem that will be addressed and research questions to answered. It focuses on contributing practical solutions for future practice. The research questions are likely to incorporate the pragmatist emphasis of the practical outcomes (Saunders *et al.,* 2016:143). The researcher's values influence the process of inquiry, which is initiated by doubt, with a belief that there is something wrong, and later re-creates the belief after resolving the problem (Elkjaer & Simpson, 2011). Pragmatists believe that there are many different ways of undertaking research and interpreting the world, as well as that the approach chosen is the one that would enable credible, well founded, reliable and relevant data to collect and move the research forward (Kelemen & Rumens, 2008).

Table 2.1 on the following page contrasts the five research philosophies that were discussed in the previous sub-sections.

Table 2.1: Comparison of the five research philosophies

Research philosophy	Axiology (role of values)	Epistemology (how reality is known)	Ontology (the nature of reality)	Methodology (approach to inquiry)	Research methods
Positivism	Researcher is independent from the data and maintains objectivity during the research process. Research is not influenced by value judgements.	Scientific methods are used which lead to law-like generalisations. Facts are observable and measurable. Research contributes to causal and prediction explanations.	Naïve realism: real reality but apprehendable. A single reality exists (Universalism). Researcher may not be able to understand it or get to it because of lack of absolutes.	Experimental /manipulative; verification of hypothesis. Typically, deductive and highly structured. Object of research is to create new knowledge.	Quantitative methods of analysis are used. Large samples of data are analysed using inferential statistics. Sampling is probabilistic.
Critical realism	Researcher is value-laden. Researcher recognises cultural experiences, upbringing and worldviews; therefore, tries to be objective as possible by minimising errors and bias during the research process.	Transactional/ subjectivist. Knowledge is historically situated and value mediated. Facts are social constructions. Research contributes to historical causal explanation.	Researcher is external, independent and Intransient. Research is stratified, with objective structures and causal mechanisms.	Retroductive; in-depth historically situated analysis of pre-existing structures and emerging agency.	A range of methods and data types can be used, depending on the subject matter. Purposive sampling is usually used.
Interpretivism	Researcher is value bound and reflexive. The researcher cannot be separated from what is researched; will hence be subjective. Interpretations of the researcher are key towards research contribution.	Researcher is a subjectivist. Psychologically and socially constructed. Research focuses on narratives, stories, perceptions and interpreta-tions. Research contributes to new understandings and worldviews.	Research provides multiple meanings, interpretations and realities. Change of processes, experiences and practices. Socially constructed through culture and language.	Use of an inductive method of emergent ideas obtained through various method. A literary style of writing is more used.	Qualitative methods of analysis are used, but a range of data can be interpreted. Small samples are taken purposively Involves in-depth investigations.

Research philosophy	Axiology (role of values)	Epistemology (how reality is known)	Ontology (the nature of reality)	Methodology (approach to inquiry)	Research methods
Postmodernism	Researcher is value constituted and radically reflexive. There are power relations between the researcher and the research. Some research narratives are suppressed at the expense of others.	Dominant ideologies determine the "truth". Researcher focuses on absences, silences and oppressed meanings, interpretations and voices. High influence of power relations which results to dominant views as contribution.	Socially constructed by power relations. Change of processes, experiences and practices. Some meanings, interpretations, realities are dominated and silenced by others.	Typically, deconstructive. Use of collaborative processes of research.	Typically, qualitative methods of data analysis are used on a range of data types. Anomalies, silences and absences are investigated deeply.
Pragmatism	Researcher is value-driven. and reflexive Research progress depends on the researcher's doubts and beliefs.	Focus on problems, practices and relevance. Provides a practical meaning of knowledge in specific terms. Contributes to solving of problems and informs future practice.	Complex, rich, external "Reality" contributes to ideas. Results to changes in processes, experiences and practices.	Following research problem and research question.	A range of methods: mixed, multiple, qualitative, quantitative and action research. Focus on practical solutions and outcomes.

(Sources: Audi, 2000; Crotty, 2003; Gelo, 2012:119; Guba & Lincoln, 1994:109; Saunders *et al.,* 2016:136-137, summarised)

Research philosophies can also be differentiated from a dimension that relates to the political or ideological orientation of researchers towards the social world they investigate. This ideological dimension has two opposing poles or extremes, referred to "sociology of regulation", i.e. "regulation perspective" and "sociology of radical change", i.e. "radical change perspective" (Burrell & Morgan, 1979:16-17; Saunders *et al.,* 2016:132). Radical change research approaches organisational problems in a visionary and utopian way, with a viewpoint of overturning the existing state of affairs. Such researchers fundamentally question the way things are done in organisations. They thus provide insights that would change the organisational and social worlds (Burrell & Morgan, 1979). On the other hand, researchers working with the regulation perspective

are concerned mainly with the need for regulation of societies and behaviour, by improving within the framework of how things are done at present rather than radically challenging the current position (Saunders *et al.,* 2016). Theoretical frameworks like the FASB Conceptual Framework for Financial Reporting are grounded in and flow from the regulation perspective. The "Framework" provides a context for setting accounting standards, which help in regulating organisations to ensure that they act in public interest.

2.3.6 Research philosophy adopted in this study

Researchers base their work on a single or multiple philosophical perspectives, depending on the kind of work they are doing. Following the discussions above, the research philosophy underlying this study relates mainly to positivism. In addition, the study also has footprints of the pragmatism research philosophy.

Positivist assumptions are considered to give the researcher greater independence to undertake research in a value-free way and from an objective stance (see Table 2.1). The researcher remains neutral and detached from the study and data, thus avoiding influencing the findings (Crotty, 1998). According to Saunders *et al.* (2016), a positivist researcher might use existing theory to develop hypotheses which would then be tested and confirmed, partially, wholly, or refuted, resulting in further development of theory that can then be tested through further research. This assertion justifies the researcher's choice of positivism as the philosophical stance for this study.

Notwithstanding the above, it is further argued that a positivist researcher may not be able to exclude his/her values in the research process, because researchers exercise choice in a number of areas, including the issue to study, the research objectives to undertake, the type of data and the methods to use in the collection of the data, amongst others. The researcher is hence also influenced by the pragmatist stance (Saunders *et al.,* 2016:138). The pragmatist philosophical stance emphasises the importance of the research problem towards determining the research design and strategy for the study (see Table 2.1). Research starts with a problem, and aims at contributing practical solutions that inform future practice. This explains the researcher's choice of mild pragmatist assumptions in this study.

2.4 Theoretical frameworks in research

The different research paradigms underpin the development of various common theories, which provide a foundation for research questions and methodologies (Mitchell, 2014). These theories provide a grounding framework for empirical research and the development of general models

(Wisker, 2005). Some of the common theories in accounting research include, but are not limited to, the following:

2.4.1 Stakeholder theory

This is a theory of organisational management and business ethics that incorporates morals and values in managing an organisation (Freeman, 1984). Stakeholder theory is a view of capitalism that contests the shareholder theory. The theory suggests that, for a business to succeed and be sustainable, it should not only create value to just the shareholders, but also to other parties that have a "stake" in the actions of the corporation such as customers, suppliers, communities, government bodies, trade associations, political groups, employees, financiers and competitors. Directors should keep the interests of all these stakeholders aligned in the same direction to keep the company with momentum and real power (Harrison *et al.,* 2015; Linden & Freeman, 2017; Miles, 2012; Phillips, 2003).

In the context of earnings management and earnings quality, the stakeholder theory provides a foundation for the relationship between earnings management and corporate social responsibility (CSR) (Almahrog *et al.,* 2015:351). According to the stakeholder theory, CSR is seen as obligatory for a firm to be more accountable by providing information to a wide range of stakeholders (Buhr, 2001; Guay *et al.,* 1996; Saleem *et al.,* 2016). However, since managers attempt to attend to multidimensional stakeholder objectives, the information asymmetry between managers and stakeholders is high (Grougiou *et al.,* 2014). Hence, the prevalence of information asymmetry avails an opportunity for managers to engage in earnings management (Saleem *et al.,* 2016). In addition, Hoque (2006) argues that managers engage in earnings management for personal interests at the expense of other stakeholders. More so, companies that practice CSR to negotiate diverse stakeholders' interests are unintentionally expected to practice earnings management (Grougiou *et al.,* 2014; Sun *et al.,* 2010). However, Gras-Gil *et al.* (2016), in their study, found a negative impact of CSR practices on earnings management. They conclude that engaging in socially responsible activities not only improves stakeholder satisfaction, but also has a positive effect on corporate reputation.

General purpose financial reports are designed to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity. Although other parties, such as regulators and members of the public may find the financial reports useful, these reports are not primarily directed to them (FASB, 2010; IASB, 2010b; Zhang, 2011). According to stakeholder theory, the purpose of a business is to create as much value as possible for stakeholders (Farmaki & Farmakis, 2018). However, to meet the objective of general purpose financial reporting, the

directors will strive to create value for shareholders and other lenders of finance since they are the primary users of financial reports; hence, the other stakeholders are ignored.

2.4.2 Stewardship theory

The stewardship theory is complementary to the agency theory (Keay, 2017). While the agency theory focuses on control and conflict, stewardship theory provides a non-economic premise for explaining relationships and emphasises co-operations and collaboration (Bernstein *et al.,* 2016; Keay, 2017; Sundaramuthy & Lewis, 2003). The stewardship theory argues that managers or executives of a company will not foster their own economic interests, as it is in the agency theory, but will act in the best interest of their company and its stakeholders in a way that leads to organisational utility instead of self-serving benefits (Davis *et al.,* 1997; Donaldson, 1990; Donaldson & Davis, 1991; Siddik & Kabiraj, 2016). While aiming at achieving the organisational ends, the personal needs of directors are also met (Kluvers & Tippett, 2011; Sundaramuthy & Lewis, 2003). Therefore, directors acting as stewards are concerned about acting honourably, and "doing the right thing" (Stout, 2003:8). They avoid behaviours that harm the company, demonstrate self-restraint and do not use CSR to obscure earnings manipulations. This reduces the degree of earnings management, resulting in high quality financial reports (Chiang, 2015:456).

Stewardship theory recognises the value of having structures and systems that empower the steward, offering maximum autonomy premised on trust. As a result, the steward achieves greater utility accruing from sustaining organisational goals than through self-serving behaviour (Glinkowska & Kaczmarek, 2015; Hao *et al.,* 2017). The theory emphasises the need for the alignment of the interests of the principal and the agent, just like the agency theory. However, unlike the agency theory, it is assumed under the stewardship theory that managers and executives are stewards whose behaviour is aligned automatically on appointment, with the interests of the principals (Arthurs, 2003; Davis *et al.,* 1997; Keay, 2017; Mswaka & Aluko, 2015).

This theory has been applied in research on earnings management, including the influence of corporate governance on earnings management practices (Patrick *et al.,* 2015); the effectiveness of corporate governance mechanisms on constraining earnings management (Alzoubi & Selamat, 2012); the link between market return, governance and earnings management (Farooque *et al.,* 2014); and financial reports quality and corporate social responsibility (Chiang, 2015), to name but a few examples.

2.4.3 Resource dependency theory

Whereas the agency theory focuses on the board's monitoring and controlling role, the resource dependency theory explains how directors ensure that their organisations access the resources they need (Daily *et al.,* 2003; Mswaka & Aluko, 2015). The resource dependency theory, developed by Pfeffer (1973) and Pfeffer and Salancik (1978), emphasises that the board of directors exist as a provider of resources to executives or managers in order to help them achieve organisational goals. Boards enhance organisational performance through accessibility to resources (Patrick *et al.,* 2015) by establishing relationships with the external environment to attract resources to the organisation and creating buffers against adverse external changes (Hillman *et al.,* 2000). The theory recommends interventions by the board through providing strong financial, human, and intangible support to executives (Drees & Heugens, 2013; Sharif & Yeoh, 2014). For example, board members who are professionals can use their expertise to train and mentor executives in a way that improves organisational performance. References to the resource dependence theory seem to be extremely scarce in the research field of earnings management or earnings quality. However, in one of the few references to the resource dependency theory in this field, Patrick *et al*. (2015) offer an explanation as to the influence of corporate governance on earnings management practices.

2.4.4 Regulatory capture theory

Regulatory capture theory or interest-group capture theory, developed by George Stigler in the 1970s, explains situations where a regulatory body or government agency, set up to regulate an industry for the benefit of the society, acts instead for the interests of the industry it is regulating (Canning, 2017; Cortese, 2011; Young *et al.,* 2017). Regulatory capture is a form of government failure, and occurs when a regulatory agency promotes the commercial or political concerns of special interest groups who dominate the industry it is charged to regulate, instead of acting in public interest (Hong & Kim, 2017; Potter *et al.,* 2014). In this theory, an industry subject to regulation mobilises its power to secure rules that are favourable to its members (Cortese, 2011; Mitnick, 1980; Stigler, 1971; Tai, 2017). There is substantial evidence showing that accounting standards are created or adapted to suit particular interest groups (Cortese, 2011; Cortese, 2013; Georgiou, 2004; Saemann, 1999; Weetman, 2001).

Most applications of this theory in research have focused on the relationship between an industry and the state, although the theory has also been applied in cases where the regulator is a self-governing professional agency (Cortese, 2011; Roberts & Kurtenbach, 1998; Walker, 1987). Cortese (2011), for example, used the regulatory capture theory to examine the process of standardising oil and gas accounting in the US in the 1970s. He argued that the standard setting

efforts failed because the regulators were captured by the industry players, and specifically by those opposed to the elimination of the FC accounting method. The impact of powerful players in the setting of IFRS 6, an accounting standard for extractive industries, was examined by Cortese *et al.* (2010), who found that the regulatory process of setting IFRS 6 had been captured by powerful extractive industries constituents, hence the failure to eliminate choice and instead merely codified existing industry practice. Other studies using regulatory capture theory focused on banking regulation, regulatory capture and inequality (Manish & O'Reilly, 2018); balancing competing values to ensure regulatory effectiveness (Potter *et al.,* 2014); establishment and early function of the Australian Accounting Standards Review Board (ASRB) (Walker, 1987); problems of interest representation and democratic consolidation (Goodfellow, 2017); and industry business associations (Marques, 2017), among others.

2.4.5 Agency theory

An agency relationship is one in which "one or more persons (the principal) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent" (Jensen & Meckling, 1976). The employer (principal) and employee (agent) relationship is perhaps the most recognised form of agency relationship. Other examples include: state (principal) and ambassador (agent), constituents (principal) and elected representative (agent), organisation (principal) and lobbyist (agent), or shareholders (principal) and directors (agent) (Delves & Patrick, 2010:1).

Agency theory is the study of the agency relationship and the issues that arise from this, particularly the principal and agent may not always share the same interests (Delves & Patrick, 2010:1). Agency theory tries to describe the principal-agent relationship using the metaphor of a contract (Jensen & Meckling, 1976). The theory is concerned with resolving two problems that can arise in an agency relationship, which include conflict in the desires or goals of the principal and agent, and it is difficult and costly for the principal to verify the actual activities of the agent (Eisenhardt, 1989:58; Gündüz, 2018). Therefore, the focus of the theory is to determine the most efficient contract governing the principal-agent relationship given the assumptions about people, organisations and information. Table 2.3 below provides an overview of the agency theory.

Table 2.2: Agency theory overview

Key idea	Principal-agent relationships should reflect efficient organisation of information and risk-bearing costs
Unit of analysis	Contract between principal and agent
Human assumptions	Self-interest, bounded rationality, and risk aversion
Organisational assumptions	Partial goal conflict among participants, efficiency as the effectiveness criterion, and information asymmetry between principal and agent
Information assumption	Information is a commodity that can be purchased
Contracting problems	Agency (moral hazards and adverse selection), and risk sharing
Problem domain	Relationships in which the principal and agent have partly differing goals and risk preferences (e.g. compensation, regulation, leadership, impression management, whistle-blowing, vertical integration, transfer pricing)

(Source: Eisenhardt, 1989:59)

The agency problem in companies originates from the principals (shareholders) not being able to run the business themselves and therefore having to rely on agents (directors) to do so for them (Alipour *et al.,* 2014). This separation of ownership from management can cause issues if there is a breach of trust by directors through either intentional action, omission, neglect or incompetence. This breach may be due to directors pursuing their own interests rather than those of the shareholders. They might also have different attitudes towards risk-taking than the shareholders have.

Under situations of conflicts, directors may not always act in the best interests of shareholders, thus preventing the maximisation of shareholder wealth, reducing firm value, and making shareholders incur additional monitoring costs (Fleming *et al.,* 2005; Gündüz, 2018). Managers tend to manage earnings due to reasons such as to increase their own compensation (Bergstresser & Philippon, 2006; Kuang, 2008), for tax purposes (Dhaliwal *et al.,* 2004), to avoid reporting losses, or to prevent debt covenant violation (DeFond & Jiambalvo, 1994). Management of earnings affects the *relevance* and *faithful representation* of financial information, and reduces earnings quality, thus resulting to incorrect decisions by users of the financial reports.

Upstream oil and gas companies in the U.S. currently have the option to choose either SE or FC accounting methods to account for their exploration and production activities (Wright & Gallun, 2008). However, the possibility of choosing between two accounting methods could provide room for earnings management, since managers have different motivations for choosing particular accounting methods (Fields *et al.,* 2001). For example, managers may behave opportunistically by choosing an accounting method that will probably increase their compensation over the next years, rather than selecting a method that will provide the most relevant information to investors

(Bryant, 2003:6). In addition, the practice of choosing between two accounting methods may inhibit comparability of financial statements, which could lead to users making inappropriate decisions.

Agency theory provides the basic framework for the relationship between the quality of accounting information and corporate governance structure (Jensen & Meckling, 1976). Good corporate governance of a company can eliminate agency problems through effective monitoring of management, which can reduce managements' opportunistic behaviour and thus increased quality and reliability of financial reporting (Fama & Jensen, 1983; Niu, 2006). Managers can therefore be effectively monitored, for example through employing independent directors on the board, or through large shareholders. However, monitoring is likely to bring about agency costs arising from significant shareholder engagement with the company (Fama & Jensen, 1983). In addition, since earnings related information is used in monitoring management of a company, high quality accounting information (quality earnings) also decreases the information asymmetry between managers and shareholders, leading to more efficient investments (Haw *et al.,* 2001; Sami & Zhou, 2004).

2.4.6 Regulation theory

There has been considerable maturation in the area of regulation over the past decades. Since the 1970s, regulation has developed from economic theory regulation, through consumer protection and environmental regulatory activity, into an international field of practice and research expanding specifically in the 1980s and 1990s (Koop & Lodge, 2017; Majone, 1996; Stigler, 1971). Regulation theory is a currently fashionable type of Marxist economic theory (Lyu, 2016; Painter, 2002). In this case, regulation not only means rules and regulations, but also the self-regulation mechanisms of a system. Regulation theory sees the intimate interconnections between the economy and society, because the economy happens in the context of social, cultural, political and other systems (Bieling *et al.,* 2016; Koop & Lodge, 2017).

Regulation of accounting became a topical issue more so after the economic crash of the 1920-30s that, amongst other things, led to the search for and development of accounting principles and accounting theory (Gaffikin, 2005). The major objective of accounting is to provide information to most users that is useful in making economic decisions (FASB, 2010; IASB, 2010b). Such users do not have access to complete information. They are at an information disadvantage and hence information asymmetry exists. Because of this information asymmetry, there is a need for accounting regulation. In addition, the regulation extends beyond the information to the preparers of the financial information, that is the accountants and auditors, to ensure that they competently provide and/or supervise the provision of financial information.

Standard-setting accountancy bodies such as the IASB and the FASB have attempted to regulate the accounting practice by developing the generally accepted accounting principles (GAAP) and the Conceptual Framework for Financial Reporting that serve as the basis of an accounting theory. The ensuing sub-section discusses the FASB's Conceptual Framework for Financial Reporting, being one of the major forms of accounting regulation for the FASB, but also relevant to this study.

2.4.6.1 FASB's Conceptual Framework for Financial Reporting

On 28 September 2010, the IASB and the US FASB released their Conceptual Framework for Financial Reporting (hereinafter called the *Conceptual Framework*). This was the result of the first phase of the IASB/FASB joint project aimed at improving and converging their frameworks for the International Financial Reporting Standards (IFRS) and the US Generally Accepted Accounting Practices (GAAP) (Zhang, 2011:3). The *Conceptual Framework,* also referred to by FASB as the "Statement of Financial Accounting Concepts No. 8", replaced FASB Concepts Statements No.1 "Objectives of Financial Reporting by Business Enterprises", and No. 2 "Qualitative Characteristics of Accounting Information". According to FASB (2010), the *Conceptual Framework* is "a coherent system of interrelated objectives and fundamental concepts that prescribe the nature, function, and limits of financial accounting and reporting and that is expected to lead to consistent guidance". It is intended to serve the public interest by providing the structure and direction for financial accounting and reporting, thereby providing information that is useful to capital and other markets to operate efficiently in the allocation of scarce resources in the economy and society (FASB, 2010). The Statement of Financial Accounting Concepts No. 8 includes two chapters, namely Chapter 1 "The Objective of General Purpose Financial Reporting", and Chapter 2 "Qualitative Characteristics of Useful Financial Information".

2.4.6.1.1 <u>The objective of general purpose financial reporting</u>

The objective of general-purpose financial reporting forms the foundation of the *Conceptual Framework,* since the other aspects of the framework flow logically from the objective. According to FASB (2010:1), the objective of general purpose financial reporting "is to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity". These primary users require financial reports to help them assess the prospects for future net cash flows to an entity, so as to make decisions about buying, selling or holding equity and debt instruments, and providing or settling loans and other forms of credit. To achieve this, financial reports must be relevant, complete, neutral and free from error, thus achieving higher-quality earnings (FASB, 2010).

General-purpose financial reports provide information about the entity's financial position, i.e. information about the entity's economic resources and the claims against the reporting entity, as well as financial performance, which are the effect of transactions and other events that change a reporting entity's economic resources and claims. Both types of information are useful to the users in making decisions about providing resources to an entity. Information about an entity's financial performance during a period is useful in assessing the reporting entity's past and future ability to generate net future cash flows through its operations rather than by obtaining additional resources directly from investors and creditors (FASB, 2010:4-5). This supports the argument that earnings quality is closely aligned with current and future entity cash flows (Murdoch & Krause, 2009:100).

2.4.6.1.2 Qualitative characteristics of useful financial information

Qualitative characteristics are the attributes that make financial information useful to users for making decisions about the reporting entity (FASB, 2010). The *Conceptual Framework* distinguishes the qualitative characteristics into two categories: fundamental and enhancing qualitative characteristics. The fundamental qualitative characteristics, which include *relevance* and *faithful representation*, distinguish useful financial reporting from information that is not useful or misleading. On the other hand, enhancing qualitative characteristics, which include *comparability*, *verifiability*, *timeliness*, and *understandability*, distinguish information that is more useful from less useful information (FASB, 2010:16-21; IASB, 2010b:16-21). The meaning of each of the qualitative characteristics, according to FASB and IASB, is summarised in Table 2.2 below.

Table 2.3: FASB/IASB's meaning of each qualitative characteristic

Qualitative characteristic	Meaning
Relevance	Information is *relevant* if it is capable of making a difference in the decisions made by users. Thus, financial information is capable of making a difference in decisions if it has predictive value or confirmatory value, or both. Financial information has predictive value if it can be used as an input to processes employed by users to predict future outcomes, while for confirmatory value, financial information should be able to provide feedback about previous evaluations.
Faithful representation	Financial reports must represent the phenomena that it purports to represent faithfully. To achieve this, information must be complete, neutral, and free from error. Financial information is complete if it includes all information necessary for a user to understand the phenomena being depicted. A neutral depiction is without bias in the selection or representation of financial information, while 'free from error' means there are no errors or omissions in the description of the phenomenon and no errors made in the process by which the financial information was produced.

Qualitative characteristic	Meaning
Comparability	Comparability as a qualitative characteristic enables users to identify and understand similarities in, and differences among items. Therefore, information about a reporting entity is more useful if it can be compared with similar information of other entities and with similar information of the same entity for another period or another date. This can only be achieved if there is consistency by an entity in the use of accounting methods.
Verifiability	This helps to assure users that information faithfully represents the economic phenomena it purports to represent. It means that different knowledgeable and independent observers could reach consensus that a particular depiction is a faithful representation.
Timeliness	This means having information available to users in time to be capable of influencing their decisions. Generally, the older the information is, the less useful it may be and thus irrelevant. However, information reported on a timely basis when not all aspects of the transaction are known, may not be complete or free from error.
Understandability	Financial reports are prepared for users who have a reasonable knowledge of business and economic activities and can review and analyse the information diligently. Excluding information considered by the entity to be inherently complex and difficult to understand, makes the reports incomplete and thus potentially misleading.

(Sources: FASB, 2010:16-21; IASB, 2010b:16-21; summarised)

This research study will focus on earnings as the summary performance indicator, cognisant of the fact that the FASB's Conceptual Framework considers the entire financial reporting package, which includes all the financial statement line items, notes, and schedules to the financial statements. The "Conceptual Framework" focuses on "decision usefulness", explained in terms of *relevance* and *faithful representation* of financial information, as the criterion for assessing the quality of financial reporting and consequently the earnings quality (Schipper & Vincent, 2003:103; also see Table 2.2). High quality financial reports, thus superior earnings quality, result when the reported financial numbers have predictive value or confirmatory value, or both, and are complete, neutral and free from error. This implies that such numbers are relevant and are faithfully represented; thus, they are capable of making a difference in the decisions made by users. Therefore, the fundamental qualitative characteristics are pertinent to this study particularly in defining the concept of earnings quality and consequently the earnings quality measures or metrics.

2.5 Conclusion

This chapter explored the underlying philosophical assumptions made by researchers when undertaking research, as well as the major research philosophies. Positivism was the philosophical position selected to guide the research in the remainder of this thesis. A positivist

researcher is detached, neutral and independent of what is researched. The researcher maintains an objective stance and conducts the research using a highly structured methodology, to enable him/her generalise and quantify the observations and evaluate the results using statistical methods (see Table 2.1).

Various theories that are considered relevant in the field of accounting were also explored. The "Agency theory", which was considered the more relevant theory for this thesis, was specifically discussed in detail with the view to linking it to FASB's conceptual framework for financial reporting (Regulation theory). It is quite clear from the analysis in this chapter that the agency theory provides a basic framework for the relationship between the quality of earnings and corporate governance structure. Good corporate governance structures within the company can eliminate the agency problems due to effective monitoring of management resulting in improved earnings quality.

The fundamental qualitative characteristics in the FASB's conceptual framework for financial reporting would be pertinent in the next chapters, specifically in defining the concept of earnings quality and consequently the earnings quality measures. Financial reports should provide information about a reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity. This can be achieved better if these reports contain information that is relevant, complete, neutral and free from error; hence, superior earnings quality.

From the analysis in this chapter, it is clear that there is no one best research philosophy. When developing own research philosophy, the researcher needs to be aware of the depth of difference and disagreements between these distinct philosophies. This will help the researcher to justify his or her own philosophical stance in relation to the chosen research method.

In the next chapters, an attempt will be made to explore the study topic in detail by consulting a large body of literature in this field.

CHAPTER 3: UPSTREAM PETROLEUM ACTIVITIES AND HISTORY OF STANDARD SETTING FOR OIL AND GAS ACCOUNTING

3.1 Introduction

The word “petroleum” refers to crude oil and natural gas. These constitute mixtures of hydrocarbons (hydrogen and carbon atoms), which are molecules, and are found in various shapes and shapes in connected pore spaces of underground rock formations (Jennings *et al.,* 2000:1). Petroleum reservoirs constitute remains of small marine plants and animals that lived millions of years ago, and are generally located thousands of feet below the surface. Oil and gas are discovered and produced through wells drilled down to the reservoirs, where such wells are either “exploratory wells” (wells drilled to discover or delineate petroleum reservoirs), or “development wells” (wells drilled to produce a portion of previously discovered oil and gas) (Jennings *et al.,* 2000:1; Wright & Gallun, 2008). The use of petroleum by human beings is as old as recorded history, dating as far back as more than five thousand years ago. The Chinese were the first to discover underground oil and gas deposits, and they even transported these hydrocarbons in bamboo pipelines (Brock *et al.,* 2007:2).

The petroleum industry is one of the largest, most complex and important global industries. The industry touches everyone’s lives through the various products produced. It influences a country’s national security, geopolitics, elections and international conflicts. As a result, prices for crude oil and natural gas are probably the two most closely watched commodity prices on the global market (Inkpen & Moffett, 2011:3). Further, because of the complexity and importance of the industry, the issue of accounting for upstream petroleum activities has been politically charged and hotly debated in the US since the 1970s, with numerous resultant academic studies (Bryant, 2003:5; Misund, 2017; Nichols, 2012:22).

This chapter explores the recent and relevant literature regarding the background and politics of standard setting for oil and gas accounting. Specifically, the following areas are addressed in this chapter: a description of upstream and downstream activities, characteristics of upstream activities, a brief history of the US oil and gas industry, the US debate on oil and gas accounting, Reserve Recognition Accounting (RRA), the history of the Extractive Industries Project, and the Extractive Activities Discussion Paper and its status.

3.2 Upstream oil and gas activities

Oil and gas operations have traditionally been classified as being either upstream or downstream. Upstream activities, also frequently referred to as exploration and production (E&P) activities, include acquisition, exploration, drilling, developing and producing crude oil and natural gas (Ejededawe, 2014; Wright & Gallun, 2008:1). Specifically, upstream activities include activities involved in finding and producing oil and gas, up to the initial point when the oil or gas can be sold or used. Conversely, downstream activities generally comprise of refining, processing, marketing and distribution of oil and gas products. However, because of the increasing complexity of modern petroleum operations, some activities with characteristics of both upstream and downstream activities are referred to as midstream (Davies *et al.*, 2014; Wright & Gallun, 2008:1). Examples of activities that may be in the midstream value chain include storing, trading and transporting of crude oil and natural gas (Inkpen & Moffett, 2011:23).

An oil and gas company may be classified as either an "integrated oil and gas company", i.e. one involved in E&P activities as well as at least one downstream activity, or an "independent oil and gas company", which is one involved primarily in only E&P activities (Wright & Gallun, 2008). Examples of integrated oil and gas companies include Total, Shell, BP Amoco and Chevron Corporation, among others.

3.2.1 Phases of upstream oil and gas activities

Upstream petroleum activities are almost universally classified into phases or sets of activities designed to achieve certain goals or obtain certain results. These phases have historically been of great importance in accounting for upstream oil and gas activities. For example, in determining whether to expense or capitalise expenditure, many enterprises have considered the phase when the cost was incurred as a major decision criterion (IASC, 2000:26). Upstream petroleum activities are typically divided into the following phases: (1) pre-license prospecting, (2) acquisition, (3) exploration, (4) evaluation and appraisal, (5) development, (6) production and (7) closure (Ejededawe, 2014; IASB, 2010a:165-166; IASC, 2000:26; Wright & Gallun, 2005:9). The first five of these phases may collectively be referred to as pre-production activities, and the last two phases may be referred to as production phases (Wright & Gallun, 2005:9). It is worth noting that the sequencing of these phases is not the same for all companies and for all projects. For example, a company may decide to combine two or more of these phases into one single phase or, in some cases, the phases may overlap. Table 3.1 below contains a description of each of the phases of the upstream oil and gas activities.

Table 3.1: Description of phases if upstream oil and gas activities

Phase	Description
Prospecting	Prospecting generally covers a large area. Typically, it is undertaken before acquiring exploration rights. It involves searching for a geological anomaly or structure that might warrant detailed exploration. Prospecting usually involves researching and analysing historical geological data and carrying out topographical, geological and geophysical studies.
Acquisition	This phase involves obtaining from the mineral rights owner the legal rights to explore for, develop and produce oil and gas in a particular area. Legal rights may be acquired by outright ownership, obtaining a lease or concession, entering into a production sharing agreement, entering into a joint venture or a risk service contract.
Exploration	Exploration refers to the detailed examination of a geographical area of interest that has shown sufficient mineral-producing potential to merit further exploration. Exploration activities include conducting topographical, geological, geochemical and geophysical studies; and carrying out exploratory drilling, trenching and sampling activities. Accounting for exploration costs may be challenging since the costs incurred are likely to be quite large while the likelihood of future economic benefits can be highly uncertain. These are some of the issues being studied in this research thesis.
Evaluation and appraisal	This involves determining the technical feasibility and commercial viability of oil and gas deposits that have been found through exploration. Evaluation activities include drilling appraisal wells to gain additional information about the size and characteristics of the reservoir; detailed engineering studies to determine how best the reservoir can be developed to obtain maximum recovery; and detailed economic evaluations to determine whether development of the reserves is commercially justified.
Development	After the formulation of a development plan, companies move into the development phase. Development is the establishment of access to the mineral reserves and other preparations for commercial production. Such activities include drilling production wells, constructing platforms and gas plants, as well as installing the equipment and facilities necessary for lifting the oil and gas, as well as for handling, storing and processing or treating the oil and gas. Development activities often continue during production.
Production	Production involves extracting the oil and gas from the reservoir and treating the oil and gas in order to make it marketable or transportable. Production activities include lifting the oil or gas to the surface, gathering production from individual wells to a common point in the field, field treating, field processing and storage of the production in field storage tanks.
Closure or decommissioning and abandonment	At the end of the productive life of an oil and gas field, the site must be restored to its pre-existing condition. The closure phase therefore involves plugging and abandoning wells, removing equipment and facilities, as well as rehabilitating and restoring the operational site and abandoning the site.

(Source: IASB, 2010a:165-166; IASC, 2000:25-38; Wright & Gallun, 2005:9-19, summarised).

3.2.2 Characteristics of upstream oil and gas activities

Accounting for upstream activities poses many technical and theoretical problems and has been subject to much controversy, specifically on accounting procedures used by upstream oil and gas firms. Reasons for the controversy relate to the characteristics of the oil and gas industry (Wright & Gallun, 2008:48). Table 3.2 below summarises the characteristics of the upstream oil and gas industry.

Table 3.2: Characteristics of upstream oil and gas activities

Characteristics	Explanation
High level of risk	The industry has the inherent risks of finding, or not finding, commercially viable oil and gas reserves despite huge investments. The general historical experience has been that less than 20% of oil and gas properties acquired ever become commercially productive. This record has improved in recent years due to the development of new technologies (such as 3-D seismic technology) resulting in a higher exploration success rate. This characteristic of the oil and gas industry creates an accounting problem of whether to capitalise or expense the unsuccessful exploration costs incurred, with different views put forward in support of the two approaches.
Long time span from when costs are first incurred until benefits are realised	An enterprise may spend years prospecting, exploring, evaluating and developing the field, before commercial production starts. Many offshore fields have an economic field life of around 20 to 25 years, with a peak production in the first three to four years. For example, Clair field in the UK was discovered in 1977, but the first oil from the field was only produced in December 2004.
High cost of investment	The costs of individual oil and gas projects are very high. For example, around USD20–USD100 million is required to drill an offshore exploration well. In addition, the cost to develop some offshore fields can run into billions of dollars. Extremely high costs, together with the high risk factor involved and the long time span before a return on investment is received, increase the potential impact on the financial statements, particularly on capitalised unsuccessful exploration costs.
Lack of correlation between the size of expenditure and the value of any resulting reserves	Despite technological advances in recent years, there are still possibilities for exploration activities to hit a dry hole. Substantial costs may be incurred in the exploration phase without resulting in any income streams. Sometimes, however, a company may incur low costs in finding no oil, or may be more fortunate and incur low costs and find considerable oil. In addition, the declining annual revenues over the life of a field are disproportionate to the declining overhead costs. All of the above therefore creates an accounting dilemma of preparing the statement of profit or loss based on the matching principle.
High government regulation	This regulation includes outright government ownership of the petroleum resources, unusual tax benefits or penalties, price controls, restrictions on imports and exports, restrictions on production and distribution, as well as environmental, health and safety regulations, among others. These controls have necessitated the development of special accounting rules to reflect the legal and economic effects of the controls appropriately.

Characteristics	Explanation
Unique cost sharing agreements	High costs and high risks have led E&P companies to enter into many kinds of co-operative ventures to explore, develop and produce hydrocarbons. Most major oil and gas projects are undertaken through joint venture or co-operative arrangements that are rarely found in other industries. Such contracts set out the financing arrangements as well as how enterprises share risks and high costs. They often provide special benefits accruing to one or more parties to the agreements in order to compensate them for the special risks they assume. These contracts often create financial reporting problems for which traditional accounting principles give limited guidance.
Finite field life	Petroleum reserves are the underlying assets of upstream oil and gas companies and, consequently, the lifeblood of the company. These companies can only stay in business if they replace the oil and gas produced with new reserves. However, the life of an oil and gas reserve is finite. This characteristic creates a going concern problem since financial statements are normally prepared on a "going concern" basis.

(Source: Chen *et al.,* 2018; IASC, 2000:18-21; Wright & Gallun, 2008:48, summarised)

This study focuses on upstream activities of companies engaged in international oil and gas operations. This is because a specialised set of accounting rules and standards apply to the financial accounting and reporting of upstream oil and gas operations (Obara & Nangih, 2017; Wright & Gallun, 2008:2). These rules (SE and FC), which are complex and are applied by both independent and integrated upstream oil and gas companies in the US are the primary focus of this study.

3.3 History of the US oil and gas industry

In order to understand the significance of financial accounting and reporting in the US oil and gas industry, it is important to know how the industry has developed over time, with particular emphasis on how upstream companies in the US have adapted to the emerging global market place.

The history of the US petroleum industry dates back to the early 19th century when whale oil was widely used as lamp fuel. However, due to its declining and uncertain supply, people began using alternative illuminating oils called kerosene or coal oil, extracted from mined coal, mined asphalt and surface crude oil seepages. Also, during the same time, US settlers that were drilling wells to produce salt brine for salt production often found crude oil mixed with the produced salt brine (Brock *et al.,* 2007:4; Edgar, 1975:9-10).

Interest grew substantially in the mid-1850s as scientists reported on the possibility of manufacturing kerosene from crude oil, if oil supply could be found in sufficiently large quantities. In 1856, George Bissell, an investor in the Pennsylvania Rock Oil Company, concluded that

similar types of wells could be drilled to produce crude oil for extracting valuable kerosene. Consequently, Bissell's company drilled their first commercial oil well in 1859 at a site on Oil Creek near Titusville, Pennsylvania, under the supervision of Colonel Edwin L. Drake, a retired railway conductor. The company used a steam-powered, cable-tool rig with a wooden derrick to drill the 69-feet well, and produced approximately five barrels of crude oil per day (Jennings *et al.,* 2000:10). The "Drake Well" is often referred to as the "first" commercial oil well, and its significance is majorly attributed to its role in causing prompt additional drilling, refining and marketing to support business enterprises (Brock *et al.,* 2007:4; Edgar, 1975:9-12).

Following the success of the Drake Well, there was increased oil drilling in other locations in the Appalachian Mountains, where oil was seeping to the surface, or where salt drillers had previously found oil fouling their salt wells (Harold *et al.,* 1963). At the start of the US Civil war, approximately 200 wells were producing more than 500 000 barrels of crude oil annually, and by 1870, annual production had exceeded 25 million barrels. This was because of the increased demand for lubricants as a replacement for turpentine. Transportation of crude oil was a challenge from the earliest days, and this was partially addressed by the use of wooden barrels that were filled with oil and hauled by teamsters on horse-drawn wagons to railroad spurs or river barge docks, where oil was emptied into large wooden tanks placed on flatbed railroad cars (Brock *et al.,* 2007:5).

The 1880s saw "Standard Oil Company", which had been formed through the merger of five petroleum firms, control approximately 90% of the US refinery industry, as well as dominating the global petroleum industry. However, between 1911 and 1915, the company broke up into several companies due to the federal antitrust laws. These companies include ExxonMobil, Chevron, BP Amoco and Conoco, which today have a combined market value exceeding USD 200 billion (Brock *et al.,* 2007:5; Jennings *et al.,* 2000:11-12).

During the 1920s, there was increased competition in the petroleum industry resulting from the formation of more companies. As a result, production increased to match the demand, but the industry experienced price fluctuations and changes in regulations. During the 1930s, due to fear of a domestic oil shortage, American companies began to search for foreign oil in various regions like the Middle East, South America and Africa, with significant discoveries made. Although there was some offshore drilling in the late 1800s, it was not until the late 1930s that wells were drilled using structures similar to the offshore platforms of today. There was also increased use of gasoline, natural gas and natural liquids during the 1930s (Brock *et al.,* 2007:5-6; Inkpen & Moffett, 2011:3-4; Jennings *et al.,* 2000:12-13).

Following World War II, there was a tremendous growth in the natural gas industry arising from the advent of a longline pipeline, and the birth of the petrochemical industry. Natural gas had been

discovered in large commercial quantities in Texas and other southwestern states of the US, but it was difficult to transport the gas over long distances. Therefore, natural gas transmission pipelines were constructed to link remote producing areas to large population centres (Jennings *et al.,* 2000; Wright & Gallun, 2008:3).

During the 1950s and 1960s, the US increased its reliance on imported crude oil and refined products. In 1960, a world oil cartel, the Organisation of Petroleum Exporting Countries (OPEC), was formed. In 1973, OPEC members cut off all oil exports to the US, causing an increase in the price of crude oil, and consequently an energy crisis in the US. This crisis prompted the passing of the Energy Policy and Conservation Act of 1975, which purpose was to encourage energy conservation, reduce reliance on imported oil and encourage the development of alternative energy sources. The Act also required the SEC to either prescribe oil and gas accounting rules or approve oil and gas accounting rules developed by the FASB. However, with the easing of the crisis, the country's attention turned away from the energy matters. For example, according to the US Department of Energy, the US reliance on imported oil increased by 142% between 1984 and 2000 (Brock *et al.,* 2007; Nichols, 2012; Wright & Gallun, 2008).

The 1990s were marked by five major trends namely (Brock *et al.,* 2007:8):

- the rising use of oil and gas futures;
- a growth in natural gas production and value in the US;
- continued restructuring of the US oil and gas industry;
- increased focus on E&P investments by US companies; and
- continued success with deep water drilling and improvements in technological and operational efficiencies.

Due to the greater historical and expected volatility in oil and gas prices, petroleum companies and end-users increased their use of petroleum futures to hedge or speculate on the crude oil and natural-gas prices (Jennings *et al.,* 2000:21).

Currently, the petroleum industry is considered a high-technology business with a number of innovations playing a key role in all parts of the industry (Brock *et al.,* 2007:11; Inkpen & Moffett, 2011:34). There have been a number of innovations in areas such as deep-water drilling and Liquefied Natural Gas (LNG) shipping. In the upstream industry, several key technological improvements have been developed, including the increased use of 3-D seismic data to reduce the exploration risk, as well as the application of horizontal and directional drilling methods to improve reservoir production. Financial instruments are also used as a way of limiting exposure

to resource price movements (Inkpen & Moffett, 2011), which obviously adds to the accounting complexity in the industry.

The application of new techniques has allowed the industry to recover oil and gas deposits located in remote, hot, high-pressure environments inside the earth, and deep off shore, with reduced environmental impact (Brock *et al.,* 2007:11-12). The development of new drilling and recovery methods has encouraged industry collaborations, mergers and partnerships among companies to share best practices and increase productivity. As a result, companies have found competitive advantage in the sharing of exploration risks and in spreading the huge capital outlays amongst the partners (Brock *et al.,* 2007:11-12; Inkpen & Moffett, 2011).

3.4 History of the US debate on oil and gas accounting

Upstream oil and gas companies in the US follow either the SE or the FC methods of accounting. Prior to the 1950s, almost all oil companies used the SE accounting method in various forms (Cortese, 2011; Johnston & Johnston, 2006:60). The full-cost method arose in the 1950s and by 1970, close to half of the publicly traded oil and gas companies had adopted this method (Dehne, 1983). By the mid-1960s, accountants and analysts were concerned about the diverse accounting methods used by E&P companies. Not only were both methods applied, but there were also a number of variations in applying these methods (Jennings *et al.,* 2000:58). Consequently, it became difficult to compare financial statements of these companies, resulting in the merits and demerits of each method debated for many years (Jennings *et al.,* 2000:58; Misund, 2017; Wright & Gallun, 2008:48).

Evidence of the debate on SE versus FC accounting methods dates back as far as 1964 when the AICPA – the then main standard setter in the US – commissioned an Accounting Research Study (ARS) of various accounting practices used in the extractive industries to make recommendations to the Accounting Principles Board (APB) (Nichols, 2012:22; Wolk *et al.,* 2000:560-561). In 1969, following the study, the AICPA issued *Accounting Research Study No. 11,* "Financial Reporting in the Extractive Industries" (ARS 11). The study recommended the sole use of the SE method rather than the FC method (Field, 1969:150-151).

Following the publication of ARS 11 in 1969, the APB asked its committee on extractive industries to review the recommendations of ARS 11, and thereafter draft an APB opinion that would narrow the acceptable practices used in the extractive industries. Through its paper, "Accounting and Reporting Practices in the Petroleum Industry" of 1971, the committee also favoured the SE method (Wolk *et al.,* 2000:561). This prompted a public hearing on the paper scheduled by the APB. However, just before the public hearing in late 1971, the Federal Power Commission issued

Order No. 440, requiring the use of the FC method for all mineral leases acquired after October 6, 1969 (Federal Power Commission, 1971:36; Wolk *et al.,* 2000).

Because of Order No. 440 and the different reactions to the SE method at the public hearing, the APB chose not to issue an opinion on the two accounting methods and accordingly dropped its long-term projects from its agenda, including accounting for extractive activities (Wolk *et al.,* 2000:561). Subsequently, FASB, the successor of APB was required to deal with the complex and politically sensitive issues surrounding an appropriate method of accounting for oil and gas exploration and production costs (Wright & Gallun, 2008:48). Although accounting for the oil and gas industry was proposed as a subject to be on FASB's original agenda, it decided not to pursue it (Zeff, 1978). Meanwhile, the SEC proposed that enterprises not using the SE method should disclose what their net income would have been using the SE method (SEC, 1972). It was therefore obvious that the SEC preferred the SE to the FC method. Later, however, the SEC withdrew its proposal (Wolk *et al.,* 2000).

The debate on oil and gas continued, with the next major event being the Arab oil embargo of 1973, which significantly influenced accounting in the oil and gas industry in the US (Nichols, 2012). Throughout that period, public policy was focused on attaining self-sufficiency in energy supplies. In the pursuit of this goal, US oil and gas producers reported significant increases in income, an issue that stimulated opposition to the industry and consequently created doubt in the reporting practices being used (Wolk *et al.,* 2000:561). In 1975, following these events, the US Congress passed the Energy Policy and Conservation Act (Nichols, 2012). The act called for establishing a national energy database, which included financial information. Accounting practices were to be developed for use by all oil and gas producers in reports to be filed with the Department of Energy (Brock *et al.,* 2007:36-37). The act required the SEC either to prescribe accounting rules applicable to crude oil and gas producers or to rely on oil and gas accounting rules developed by the FASB, as long as the rules were acceptable to the SEC (Energy Policy and Conservation Act, 1975).

In response to a request from the SEC, the FASB began work on accounting for the oil and gas industry (Wright & Gallun, 2008). The FASB worked closely with the SEC, issuing a discussion memorandum in December 1976, holding a public hearing in the spring of 1977, and issuing an exposure draft in July 1977, requiring the SE accounting method (Wolk *et al.,* 2000:562). Also, prior to issuing the exposure draft, the FASB had started on several empirical research studies, which were however inconclusive. In December 1977, the FASB issued its Statement of Financial Accounting Standards (SFAS) No. 19, entitled "Financial Accounting and Reporting for Oil and Gas Producing Companies" (SFAS 19). This statement

- prescribed a version of the SE method of accounting to be followed in determining the costs for capitalisation;
- established principles of accounting for conveyances of mineral interests;
- required comprehensive deferred income tax allocations; and
- specific audited disclosures of proved reserves of oil and gas as well as of certain costs related to mineral activities (Brock *et al.,* 2007:37; FASB, 1977; Jennings *et al.,* 2000:58; Wright & Gallun, 2008:49).

SFAS 19 was to become effective for fiscal years beginning after December 15, 1978 (FASB, 1977).

Political pressure started to mount following the issuance of SFAS 19 (Nichols, 2012:23). The statement was severely criticised at SEC hearings in March and April 1978, primarily by independent producers from across the US (Brock *et al.,* 2007; Nichols, 2012). They argued that the mandatory use of the SE method would result in volatility in their earnings and consequently impairing their ability to raise capital (Dehne, 1983; Katz, 1985). The petroleum industry was under attack for high profiteering and little competition (Wolk *et al.,* 2000:572). The outcry reached various stakeholders including the Congress, the Federal Trade Commission (FTC), as well as the Department of Energy (DOE) (Nichols, 2012:23). For example, the DOE filed a letter with the SEC stating that they believed the elimination of the FC method would result in an annual decline in exploration expenditures in the US by about $600 million, about 8 percent of annual domestic exploration expenditures (Collins & Dent, 1979). Further to this, the FTC's Bureau of Competition opposed the elimination of the FC method. They argued that independent producers using the FC method would be afraid of the impact of income volatility due to the use of the SE method and would react by eliminating high-risk exploration efforts, which would result in a slow-down in the nation's economic resources (Randall, 1978).

By August 1978, the SEC had given in to the political pressure it faced and rejected the elimination of the FC accounting method (Nichols, 2012). Accordingly, it issued Accounting Series Release (ASR) No. 253. In December 1978, the SEC also issued Accounting Series Releases No. 257 and No. 258 on rules for SE and FC accounting, respectively. ASR 257 and SFAS 19 were virtually identical, except for certain reserve definitions (Misund, 2017; Wright & Gallun, 2008). ASR 253 concluded that neither the SE nor the FC accounting methods provided meaningful financial statements, because both methods did not recognise the value of the oil and gas reserves discovered or the discovery activity's true income, i.e. reserve value-added less related discovery costs (Jennings *et al.,* 2000:58; Misund & Osmundsen, 2017). For this reason, the SEC also proposed a new, revolutionary method to be explored, known as Reserve Recognition

Accounting (RRA). Under this method, revenue would be recognised when reserves were discovered versus when produced and sold, and assets would be a valuation of the estimated future production of proved oil and gas reserves in place, discounted at a rate of 10% (Jennings *et al.,* 2000:58-59; Misund & Osmundsen, 2017; Wright & Gallun, 2008:49). RRA was to replace the FC and SE methods by 1981, after the trial period of RRA statements being presented as supplemental information (Power *et al.,* 2017; Wright & Gallun, 2008).

In February 1981, the SEC announced that RRA was inappropriate for adoption as the primary basis for oil and gas accounting, due to the shortcomings of the method, specifically the high level of subjectivity surrounding proved reserves volumes and values (Johnston & Johnston, 2006:58; Misund *et al.,* 2015). Additionally, the SEC announced that the FASB would undertake a project to develop supplemental disclosure requirements for oil and gas companies. The FASB consequently issued SFAS 69, “Disclosures about oil and gas producing activities”, in November 1982, which established required disclosures for oil and gas producing activities. In December 1982, the SEC adopted these rules with minor revisions (Jennings *et al.,* 2000; Misund & Osmundsen, 2017). SFAS 69 required publicly traded companies with significant oil and gas producing activities to disclose supplementary information in their annual financial statements. These disclosures are both historical and value based (FASB, 1982)

Once again, the controversy over the two accounting methods flared up briefly in 1986, when Clarence Sampson, the then Chief Accountant of the SEC recommended that the FC method be eliminated for use by publicly held companies (Brock *et al.,* 2007:38; Nichols, 2012:24). He believed that the SE method was theoretically sounder and that its mandatory use by all oil and gas companies would make their financial statements comparable and thus more useful and relevant to the investment community (Ingersoll, 1986). However, the commission rejected this proposal and both methods continued to be acceptable for financial accounting and reporting.

In 1996, the SEC issued Regulation S-X Rule 4-10, prescribing the financial accounting and reporting standards for oil and gas producing activities of SEC registrants (SEC, 1996). According to Rule 4-10, “Financial accounting and reporting for oil and gas producing activities pursuant to the Federal Securities Laws and the Energy Policy and Conservation Act of 1975”, SE companies followed SFAS 19 as amended, while FC companies followed the SEC rules provided under Reg. S-X 4-10 (SEC, 1996). In addition, irrespective of the accounting method used by the company, disclosures prepared according to SFAS 69 were to be presented as supplemental information to the financial statements (Cortese, 2011; Wright & Gallun, 2008:50).

Effective 1 July 2009, the FASB completed its Accounting Standards Codification ("Codification") of the US GAAP. The Codification became the single source of authoritative literature governing

non-governmental GAAP in the US. At that time, all existing accounting standards including those of the FASB and the Emerging Issues Task Force (EITF), as well as other related authoritative literature, were superseded (Bradbury & Harrison, 2015; Widelski, 2010). The Codification was effective for all non-governmental organisations for interim and annual periods ending after September 15, 2009.

Currently, both SE and FC companies in the US apply the guidance in the FASB Accounting Standards Codification (ASC) Topic 932 (ASC 932), "Extractive Activities – Oil and Gas". This Topic provides guidance specific to oil and gas producing activities, and it contains several Subtopics that interact with other Topics in the Accounting Standards Codification (FASB, 2011; Misund & Osmundsen, 2017). However, although SFAS 19, SFAS 69 and Reg. S-X 4-10 were superseded, almost all of the content contained in these standards was maintained in the Codification, specifically in ASC 932.

From the above historical review, it is clear that accounting by oil and gas companies is marred by controversy and political pressure. There appears to be conflict between adopting the "right" accounting method, which should result in relevant and reliable information for financial decision-making on the one hand, and what could be more beneficial to the pockets of the oil and gas firms or the greater economy on the other hand. Since the SEC and FASB have to date failed to agree on one accounting method for the oil and gas industry, the debate over accounting for upstream oil and gas companies in the US still continues.

3.5 Reserve Recognition Accounting

As discussed earlier, Reserve Recognition Accounting (RRA) was one of the many methods considered by the SEC and FASB in an effort to find a way to represent the actual value of oil and gas assets adequately (Johnston & Johnston, 2006:58; Power *et al.,* 2017). The SEC believed that the historical cost model (SE and FC methods) did not provide adequate information to decision-makers due to its non-disclosure of the value of recoverable reserves in the financial reports (Misund *et al.*, 2015; Naggar, 1978; Wolk *et al.,* 2000:573). Consequently, the SEC gave three primary reasons for favouring the development of RRA. Firstly, SE and FC methods fail to provide sufficient information on the financial position and operating results for oil and gas producers. Secondly, additional information outside the basic financial statements is required to permit assessments of the financial position and performance of an oil and gas enterprise and to allow comparisons between it and other enterprises. Thirdly, an accounting method based on valuation of oil and gas reserves was needed to provide sufficiently useful information (SEC, 1978). However, some commentators argue that the SEC proposed RRA because of the political

pressures it faced; on the one hand, from the proponents of SFAS 19, the FASB and the major oil companies that largely used the SE method; and on the other hand from other independent oil and gas producers who saw SFAS 19 as a possible deterrent to petroleum exploration due to write off of costs faster (Gorton, 1991).

The SEC issued Release 33-5969 in August 1978, requiring the presentation of RRA financial statements as supplemental information during the trial period from January 1979 to November 1982, and thereafter to be the basis for the primary financial statements thus replacing the SE and FC methods (Johnston & Johnston, 2006:58; Wolk *et al.,* 2000; Wright & Gallun, 2008:49). The RRA method would recognise the value of a company's reserves as an asset. In addition, additions to proved reserves could be recognised as assets, and at the same time included in the company's earnings (Cortese, 2011; Johnston & Johnston, 2006). In order to estimate the value of the company's assets, the valuation method required under RRA was as follows:

- firstly, estimating the timing of future production or proved reserves, based on current (balance sheet date) economic conditions;
- secondly, estimating future revenue by using the estimate from the above and applying current prices for oil and gas, adjusted for fixed contractual escalations;
- thirdly, estimating the future net revenue by deducting from the estimated future revenue, the costs to develop and produce the proved reserves on basis of current cost levels; and
- lastly, determining the present value of future net revenue by discounting future net revenue at ten percent (Wolk *et al.,* 2000:573-574; Wright & Gallun, 2008).

Following its implementation, RRA received significant criticism from the oil and gas industry due to inaccuracies in reserves reporting, emanating from the subjective and unreliable assumptions made (Johnston & Johnston, 2006; Nichols, 2012). The method considered only proved reserves and not total reserves, thus excluding significant quantities of other categories of reserves like probable and possible reserves. Moreover, it did not anticipate future price and cost changes and as such assumed that changes in costs would result in similar changes in prices. Furthermore, the discount rate of 10% was considered arbitrary. It did not consider factors like risk, which is considered important in the determination of an appropriate discount rate (Misund & Osmundsen, 2017; Wolk *et al.,* 2000:574-575). A number of research studies were therefore carried out on the reliability of the information presented using the RRA method, with most studies concluding that RRA's relevance was more than offset by its lack of reliability (Cortese, 2011; Price Waterhouse & Co., 1979). As a result, in 1981, the SEC decided to abandon the method.

3.6 History of the Extractive Industries Project

Accounting and reporting for extractive industries has long been a subject of discussion in the international arena (Misund *et al.,* 2015; Nichols, 2012). In fact, in April 1998, the board of the IASC added to its agenda a project on financial accounting and reporting in the extractive industries, that is, the petroleum and mining industries. Consequently, the board appointed a steering committee charged with a responsibility of developing a standard for the extractive industries (Cortese, 2013; IASC, 2000).

In November 2000, the steering committee released an Issues Paper, titled "Extractive Industries Issues Paper". The objectives of this paper included the promotion of a common understanding of the accounting issues and the potential for improving existing financial reporting in upstream activities in the extractive industries, as well as to provide a comprehensive analysis of the major issues in upstream financial reporting and the alternatives for resolving those issues. It also aimed to solicit comments from interested parties on the appropriate financial reporting standards and guidelines to be developed for the extractive industries, and endeavoured to be the first step in the development of one or more International Accounting Standards on this topic by the IASC Board (Cortese *et al.,* 2010; IASC, 2000). However, after the comment period of the Issues Paper, the project stalled, and in 2001, the IASB who was the successor body to the IASC announced that the project would be restarted when time permitted (Nichols, 2012:24).

The IASB was forced to consider the issue again when the European Union decided to require listed companies issuing consolidated financial statements to conform with International Accounting Standards beginning with fiscal year 2005 (Nichols, 2012; IASB, 2004). The extractive industry desired guidance from the IASB on how accounting standards could be applied to the industry. The IASB therefore undertook a short-term project on the accounting for exploration and evaluation expenditures, designed to make limited improvements to accounting practices without requiring major changes that might be reversed in any comprehensive project on extractive activities. This short-term project led to the issue of IFRS 6, "Exploration for and Evaluation of Mineral Resources" in December 2004 (Deloitte, 2016b; IASB, 2004). It is also at the same time that the IASB announced the beginning of the research stage of a project aimed at issuing a comprehensive standard for extractive activities (IASB, 2004).

The research team for the extractive industries project included representatives from the national standard setting bodies of Canada, Australia, South Africa and Norway, assisted by an advisory panel consisting of members from the industry, the investment community, and public accounting and securities regulators across the globe. The team was charged with the responsibility of developing a comprehensive standard for extractive industries. They hoped to release a

discussion paper by 2008 and issue a final comprehensive standard in 2011 (Deloitte, 2016b; Nichols, 2012:25). Important to note is that neither of these target dates was met; however, a discussion paper was issued in 2010 (Cortese, 2013; IASB, 2010a), which is considered in the next section.

3.7 The Extractive Activities Discussion Paper

The IASB published the project team's discussion paper on 6 April 2010, following the release of a working draft of the discussion paper in August 2009. It was developed after wide consultation with industry participants to identify and analyse financial reporting issues associated with extractive activities. Comments about the contents of the discussion paper were to be received by 30 July 2010. The discussion paper concentrated on the following main issues:

- the definition of reserves and resources;
- the determination of the reserves and resources that qualify to be recognised as assets;
- their initial measurement and subsequent measurement;
- supplementary disclosures; and
- "Publish What You Pay" disclosures (IASB, 2010a).

Table 3.3 below summarises the conclusions made by the project team on each of the main issues in the discussion paper.

Table 3.3: Project team's view on the main issues in the discussion paper

Main issue	Project team's view
Definition of reserves and resources	The project team recommended in the discussion paper that both the Committee for Minerals Reserves International Reporting Standards (CRIRSCO) Template and the Petroleum Resource Management System (PRMS) definitions of reserves and resources are suitable for use in future IFRS for extractive activities. The definitions were similar and thus capable of providing a platform for setting comparable accounting and disclosure requirements for both minerals and oil and gas properties. Both the CRIRSCO Template and the PRMS regard reserves as being quantities of minerals or oil and gas that are discovered, available for extraction, recoverable and are in economic quantities.
Determination of which reserves and resources qualify to be recognised as assets	The team recommended that a legal rights approach be taken to the recognition of assets. An asset is recognised once exploration rights have been obtained. Additional information obtained subsequent to the rights of acquisition is considered to be enhancing the legal rights and, as such, the costs are capitalised. An asset should be derecognised when it no longer meets the criteria for recognition.

Main issue	Project team's view
The initial and subsequent measurement of reserves and resources that qualify as assets	Because of the difficulty of determining the fair value of reserves, the historical cost method was recommended for use in the initial and subsequent measurement of the assets. The team also proposed the continued practice of the units of production depletion method, but it recommended the application of a uniform basis of calculation for both the oil and gas and the minerals industry.
Supplementary disclosures	The following disclosures were proposed by the team: • reserve quantities including proved and probable reserves with disclosure of the estimation method and the main assumptions used, • a reconciliation of changes in the reserve quantities and a sensitivity analysis to the main assumptions used; • a current value measurement if assets are measured at historical cost; • a fair value measurement including the estimate, main assumptions, sensitivity analysis of assumptions and a reconciliation of changes in reserve values if assets are measured at fair value; • production revenues; and • exploration, development and production costs.
"Publish What You Pay" disclosures	According to the project team, it was expected that country-specific information would be disclosed for reserve quantities, production quantities, developmental and production costs, together with a listing of key subsidiaries where that information is material to the entity. In addition, reserve values and production revenues would be disclosed, but not on a country-by-country basis. The project team noted that further study is required to conclude on whether the country-by-country disclosure of payments to governments is justifiable on cost-benefit grounds.

(Source: IASB, 2010a:24-163; Nichols, 2012:26-28, summarised)

Comments on the contents of the discussion paper were submitted by various respondents and by the deadline, 141 comment letters had been filed with the IASB. The comments were mainly from large mining or oil and gas companies and industry stakeholders from various geographical regions (Nichols, 2012). Generally, the respondents supported the idea of developing a comprehensive standard for extractive industries, though some of the specific proposals were not agreed to. For example, most respondents agreed that the historical cost method should be used for asset recognition and measurement. However, many respondents were concerned about the capitalisation of information obtained from exploration and evaluation activities. They argued that capitalisation of the information was contrary to the IASB's conceptual framework since the information may not have future economic benefit (Nichols, 2012).

At the October 2010 IASB board meeting, the board discussed the project team's proposals together with the comments received. This was an educational session only; no decisions were made (Deloitte, 2016b). At the time, the IASB regarded the extractive activities research project

as completed. Therefore, any subsequent decisions on extractive activities would be made only within the context of developing a possible future agenda (FRSC & SAICA, 2014:3). In December 2012, the IASB effectively discontinued this project and activated a broader research project on intangible assets as part of its response to its Agenda consultation 2011. This broader project is designed to assess the feasibility of developing one set of reporting requirements for investigative, exploratory and developmental activities across a wide range of industries (Deloitte, 2016b).

FASB, the US standard setting body, has decided not to get involved with the IASB's extractive industries project. Despite the US having a good representation on the IASB board (3 of 14 members), it was not represented on the extractive industries project team which comprised of national standard setters in South Africa, Canada, Norway and Australia (Nichols, 2012:30). It seems reasonable to believe that the FASB could have had a representation on the team if they had desired, especially given the prominence of extractive industries companies in the US. Therefore, one may believe that the FASB could possibly be avoiding this hot topic due to the history of political pressure from the US industry members regarding accounting and reporting for extractive activities.

3.8 Conclusion

This chapter mainly explored the recent and relevant literature regarding the background and politics of standard setting for oil and gas accounting in the US and to some extent in the international arena. The chapter specifically reviewed the phases of upstream oil and gas operations (being relevant to the current study) and the characteristics that are common to upstream oil and gas activities. A history about the US petroleum industry was also reviewed in order to gain insight on how the business of oil and gas has developed over time, and to understand the importance and nature of financial accounting and reporting in the petroleum industry. This was followed with a discussion on the history of the US debate on oil and gas accounting, the Reserve Recognition Accounting (RRA) method, and a review of the IASB's current position on oil and gas accounting, specifically by reviewing the history of the Extractive Industries Project and the Extractive Activities Discussion Paper.

What is quite evident from the discussion in this chapter is that accounting for extractive industries has been a political hot topic for decades in the US and to some extent in the international arena. While the FASB tried to see the FC accounting method effectively eliminated, it could not happen, due to the political pressure that ensued from various stakeholders opposing the proposal, resulting in its rejection by the SEC. The IASB's failure to move ahead in a timely manner towards the issuance of a comprehensive standard for extractive activities could perhaps also be ascribed

to significant political pressure, similar to that experienced by the FASB, especially given the fact that the discussion paper on extractive activities effectively proposes the elimination of the FC method.

It is hoped that the IASB, being an “independent” standard setting body and with representation from several countries, would later resist the political pressures and thus release a final standard containing the elements proposed in the discussion paper. However, it is believed that in the future, the US will eventually adopt the IFRSs (Nichols, 2012:31). When this happens, US companies would have to follow the extractive industries standard, which significantly requires the application of the SE method. Therefore, with one single method of accounting, the financial statements of oil and gas companies would be more comparable and thus more useful to the global investment community (Ingersoll, 1986).

The choice of accounting method could have a significant impact on the earnings quality of oil and gas companies, which forms the topic of this thesis. The next chapter of the thesis will attempt to explore the current accounting practices in the oil and gas industry, by specifically comparing the US GAAP with the UK GAAP and IFRS 6.

CHAPTER 4: STATUS OF ACCOUNTING FOR UPSTREAM ACTIVITIES IN THE OIL AND GAS INDUSTRY

4.1 Introduction

Under the current US GAAP, upstream oil and gas companies follow either the FC or the SE method of accounting for exploration and production activities. Both SE and FC companies in the US apply the guidance in the FASB Accounting Standards Codification (ASC) Topic 932 ('ASC 932') *Extractive Activities – Oil and Gas*. This topic provides guidance specific to oil and gas producing activities, and it contains several subtopics that interact with other topics in the Accounting Standards Codification (FASB, 2011; Misund & Osmundsen, 2017). The ASC, which was approved by the FASB in July 2009, superseded all the then-existing SEC accounting and reporting standards by reorganising the existing authoritative literature into only one level of authoritative US GAAP.

Prior to the Codification, the SE method was governed by SFAS 19, *Financial Accounting and Reporting by Oil and Gas Producing Activities*, while the FC method was governed by SEC Regulation S-X Rule 4-10, *Financial Accounting and Reporting for Oil and Gas Producing Activities Pursuant to the Federal Securities Laws and the Energy Policy and Conservation Act of 1975* (Ernst & Young, 2009). In addition, irrespective of the method used by a company, disclosures prepared according to SFAS 69, *Disclosures about Oil and Gas Producing Activities* were required to be presented as supplemental information to the financial statements (Misund, 2018; Wright & Gallun, 2008). However, although these standards were superseded, almost all the content contained in these standards was maintained in the *Codification*, specifically in ASC 932, *Extractive Activities – Oil and Gas.*

At the international level, upstream oil and gas companies using IFRS are specifically guided by IFRS 6, *Exploration for and Evaluation of Mineral Resources*. IFRS 6 provides financial reporting requirements for entities that recognise assets used in the exploration for and evaluation of mineral resources (IASB, 2004). For E&P companies reporting under the UK GAAP, they are currently required to prepare their financial statements following the guidance in FRS 102, *The Financial Reporting Standard applicable in the UK and Republic of Ireland*. Section 34.11 of FRS 102 provides that entities following the UK GAAP that are engaged in extractive activities shall apply the requirements of IFRS 6 (FRC, 2015:239).

This chapter explores the requirements of US GAAP and compares it with UK GAAP and IFRS 6. Under US GAAP, the chapter reviews the nature of SE and FC accounting methods as prescribed

by ASC 932, the differences, similarities and theoretical arguments for and against the two methods, and the disclosure requirements about oil and gas producing activities as per SFAS 69 or ASC 932-235-50. This chapter also reviews IFRS, specifically IFRS 6, to understand the differences and similarities between US GAAP and IFRS 6, if any. Under UK GAAP, FRS 102 is reviewed, with an aim of comparing it with other accounting practices to identify differences and similarities, if any. The reason for reviewing UK GAAP and IFRS, even though this study is focused on US companies, is that many of the US listed companies are actually global companies with operations in many parts of the world. Furthermore, by comparing the US GAAP principles to IFRS and UK GAAP, the results of the study could be interpreted in a wider international context, which effectively increases generalisability of the research results, if accounting principles are found to be similar in other parts of the world.

The chapter concludes with a discussion on international implications emanating from the differences in these practices.

4.2 Successful efforts accounting method

The four basic types of costs (acquisition, exploration, development and production) incurred by oil and gas companies in the US must be accounted for using either the full cost (FC) or the successful efforts (SE) accounting method (Misund, 2017; Wright & Gallun, 2008:44). As far as the four basic costs are concerned, the fundamental accounting issue is whether to capitalise or expense the costs incurred. If the costs are expensed as incurred, they are treated as period expenses and thus written off to the statement of profit or loss while, if capitalised, the costs may subsequently be expensed as expiration takes place through either abandonment, impairment or depletion during production of reserves. Therefore, the primary difference between the SE and FC accounting methods is the capitalisation or expensing of the costs incurred, and consequently a difference in the timing of the expense or loss charge against the revenue (Obara & Nangih, 2017; Wright & Gallun, 2008).

The SE accounting method is the practice of capitalising only those pre-discovery costs, which are directly identifiable with the discovery of commercial reserves and treating all other costs as operating expenses (Misund, 2017; Sunder, 1976). The SE method creates a direct relationship between the costs incurred and reserves discovered. This implies that only exploratory drilling costs that are successful, i.e. result directly in the discovery of proved oil and gas reserves, are capitalised, and unsuccessful exploratory drilling costs resulting in no future economic benefits are therefore expensed (Brock *et al.,* 2007; Davies *et al.,* 2014). Under the SE method, the size

of the cost centre over which costs are accumulated and amortised could be a lease, field or reservoir, though most SE companies use the field (Obara & Nangih, 2017; Wolk *et al.,* 2000:558).

Successful Efforts companies in the US apply the guidance in the FASB ASC 932 *Extractive Activities – Oil and Gas,* which superseded SFAS 19. This topic provides authoritative guidance specific to oil and gas producing activities. These activities involve the acquisition of mineral interests in properties, exploration (including prospecting), development and production of crude oil and natural gas (FASB, 1977; FASB, 2011).

Acquisition costs include costs incurred to purchase, lease or otherwise acquire a property or mineral rights. For US operations, the common costs under this category include bonuses and options to purchase or lease properties, costs applicable to minerals when land including mineral rights are purchased, brokers' fees, recording fees, legal expenses and other costs incurred in acquiring properties (Brock *et al.,* 2007:39; Davies *et al.,* 2014). Paragraph 932-360-25-7 of the ASC requires all such costs to be capitalised as “unproved property acquisition costs”, if the property has not yet been evaluated whether it has proved reserves. Upon evaluation of the property through exploration, drilling or lapse of the lease, if proved reserves are found, the acquisition costs are reclassified to “proved property acquisition costs”; otherwise, the costs become costs of abandoned or worthless property (FASB, 1977:8; FASB, 2011:432).

Exploration costs include costs incurred in identifying areas that may warrant examination, and examining specific areas that possibly have prospects of oil and gas reserves, including drilling exploratory and test wells. Exploration costs can include costs of topographical, geological and geophysical studies, salaries and other expenses of geologists, geophysical crews and others conducting those studies. These costs are sometimes collectively referred to as geological and geophysical studies (G&G costs) (Brock *et al.,* 2007:42; Davies *et al.,* 2014). Other types of exploratory costs include costs of carrying and retaining undeveloped property, dry-hole and bottom-hole contributions, costs of drilling and equipping exploratory and test wells (FASB, 1977). All non-drilling exploration costs, including G&G costs, costs of carrying and retaining undeveloped properties as well as dry-hole and bottom-hole contributions are expensed when incurred. On the other hand, the costs of drilling exploratory and test wells are capitalised as part of the enterprises’ “uncompleted wells and equipment” pending the discovery of proved reserves (FASB, 1977:8-9; FASB, 2011:433). If proved reserves are found, exploratory drilling costs are transferred to “wells and equipment” for the appropriate Depletion, Depreciation and Amortisation (DD&A) computation with a view of charging it as an expense over the useful life of the well. However, if no proved reserves are discovered (dry holes), drilling costs are immediately written off to expenses (Obara & Nangih, 2017; Wright & Gallun, 2008).

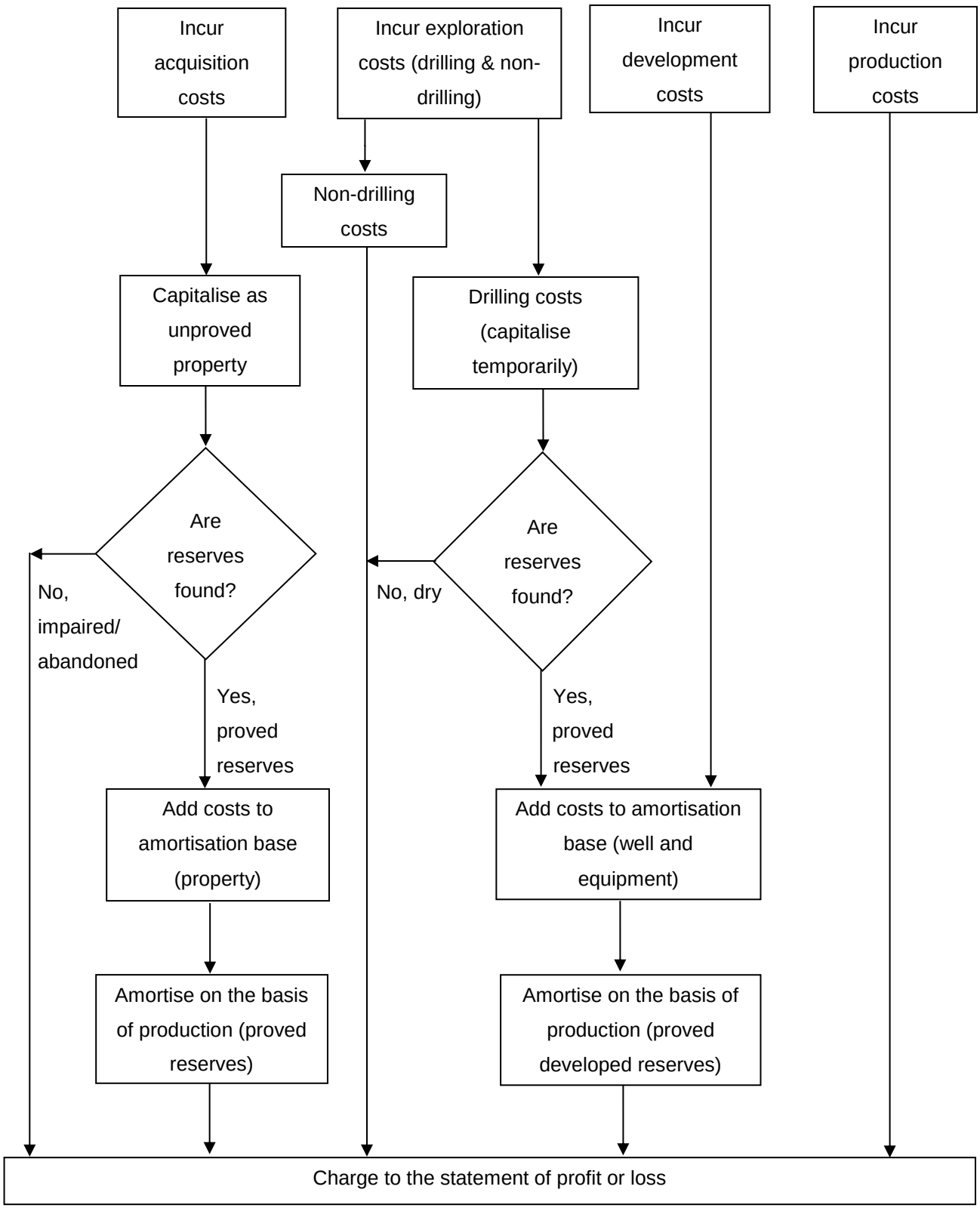
Development costs are incurred to obtain access to proved reserves and to provide facilities for extracting, treating, gathering and storing the oil and gas (FASB, 2011). They include costs of development wells that are used to produce proved reserves, plus production facilities such as lease flow lines, separators, treaters, heaters, storage tanks, improved recovery systems and nearby gas processing systems (Jennings *et al.,* 2000:64; Umobong, 2015). Paragraph 932-360-25-14 of the ASC requires development costs to be capitalised as part of the cost of an enterprise's wells and related equipment and facilities (FASB, 2011). Thus, all costs incurred to drill and equip development wells, development-type stratigraphic test wells and service wells are development costs and are capitalised, irrespective of whether the well is successful or unsuccessful (FASB, 2011:434).

Production costs are the costs of activities that involve lifting the oil and gas to the surface, as well as gathering, treating, field processing and field storage. These costs are expensed in the period when incurred. Examples of production costs or lifting costs include costs of labour to operate the wells and related equipment and facilities, repairs and maintenance, materials and supplies, fuel for operating the wells and related equipment, property taxes, insurance, severance taxes and DD&A costs (Jennings *et al.,* 2000:65; FASB, 1977:10; Umobong, 2015).

The costs of acquiring or constructing support equipment or facilities used in oil and gas producing activities are capitalised (FASB, 2011). Examples of support equipment and facilities include seismic equipment, drilling equipment, construction and grading equipment, vehicles, repair shops, warehouses, supply points, camps and division, district or field offices (FASB, 1977). The depreciation of support equipment or facilities used in oil and gas producing activities is accounted for as exploration cost, development cost or production cost, as appropriate (FASB, 2011:437).

Subsequent to the initial recognition, paragraph 932-360-35-3 of the ASC requires all costs of an entity's wells and related equipment and facilities, and costs of related properties, to be amortised as the related oil and gas reserves are produced, i.e. using the units of production method. This method requires the estimation of the total number of units of oil or gas reserves in a property or group of properties, and the number of units produced in the current period. Therefore, the amortisation plus the lifting costs become part of the cost of oil and gas produced (FASB, 2011).

The accounting treatments of the four basic costs incurred by oil and gas companies under the SE method are summarised in the figure on the next page.



(Source: Wright & Gallun, 2008:52)

Figure 4.1: Accounting treatment of the four basic costs under the SE methods

4.2.1 Arguments in favour of the SE method

The SE method is conservative because the method minimises the measurement of assets and recognises losses when incurred (Baker, 1976:157; Misund, 2017). SE is consistent with the "matching concept" and reflects the traditional concept of an "asset", which is that only those costs that will provide the company with a future economic benefit are shown in the balance sheet (IASC, 2000:79-80). According to IASB's Conceptual Framework for Financial Reporting, "an asset is a resource controlled by an entity as a result of past events and from which future economic benefits are expected to flow to the entity" (IASB, 2010b:26). Costs incurred on unsuccessful wells have little or no commercial value and should not be included as assets in the balance sheet. Katz (1985) asserts that the SE method provides a direct relationship between production and exploration, which leads to less risk for the SE method since the method only capitalises costs that produce future economic benefits. This therefore allows users of financial statements to estimate an entity's future cash flows better (Abushaiba & Eldanfour, 2014).

The SE method is consistent with the underlying philosophy of FASB's Statement of Financial Accounting Standards No. 2, *Accounting for Research and Development Costs*, which argues for the immediate expensing of research and development costs due to the uncertainty of future economic benefit (FASB, 1974). This argument is similar to exploration efforts where, once a well is dry, the costs are typically irrecoverable and there will be no future economic benefit from such a well; thus, the costs should be charged to expenses (Baker, 1976:157). However, SFAS 2 explicitly excludes activities that are unique to enterprises in the extractive industries, such as prospecting, acquisition of mineral rights, exploration, drilling, mining and related mineral development (FASB, 1974).

The method also allows for a realistic assessment of management's success or failures in its efforts to find new reserves and the cost of finding those reserves. If costs of unsuccessful exploration activities are capitalised rather than expensed, and combined with prior years' capitalised costs and current year's successful activities, the efficiency and effectiveness of management cannot be evaluated in the statement of profit or loss due to the income smoothing that results (IASC, 2000:80). Under the SE method, this income smoothing is greatly reduced or eliminated, which enables assessment of management's success or failure based on the amount of costs written off as unsuccessful activities.

4.2.2 Arguments against the SE method

Under the SE method, the Statement of profit or loss can sometimes give a misleading picture of the company in terms of success in finding new reserves because of the effect of decisions to

expand or curtail exploration efforts (Misund, 2017). A reduction in exploration expense arising from the curtailment of exploration efforts would likely result in an increase in reported earnings in the years when exploration is cut back since there would also be a reduction in dry-hole costs written off. Conversely, an aggressive enterprise may increase its exploration expenditures, which would result in an increase in the current charge to expenses for unsuccessful exploration efforts, reducing reported profits, even though the increased exploration may result in more reserves that will generate profits in the future (IASC, 2000:80). In addition, the SE method provides a means of "earnings management" because of its effect on earnings arising from the increase or decrease in exploration efforts. Critics of the SE method argue that management can smooth its income to some extent through adjusting the timing of exploration expenditures for discretionary period costs (IASC, 2000). Therefore, there is a risk of users making inappropriate decisions based on the financial statements under the SE method.

Critics of the SE method also argue that the method causes earnings variability since earnings change from period to period attributed to costs of unsuccessful activities which are of no commercial viability, and are as such charged to the statement of profit or loss (Misund *et al.,* 2015; Umobong, 2015). The earnings variability affects the investor's reliance on the financial statements since useful investment decisions might not be made from such financial statements (Cooper *et al.*, 1979).

4.3 Full-cost accounting method

According to Sunder (1976), full costing (FC) refers to the practice of capitalising all pre-discovery costs irrespective of their result, and amortising the costs over the discovered reserves on a pro rata basis. The pre-discovery costs include the costs of G&G studies, property acquisition and carrying costs, as well as exploratory drilling costs. Under the FC method, both successful and unsuccessful exploration costs incurred are capitalised because both costs are considered a necessary part of the cost of finding oil and gas reserves, even though the unsuccessful costs have no future economic benefit (Misund *et al.,* 2015; Wright & Gallun, 2008:44). This rationale acknowledges that dry holes are an unavoidable part of the exploration effort of an oil and gas company (Johnston & Johnston, 2006:61; Obara & Nangih, 2017). Establishing a direct relationship between costs incurred and reserves discovered is not relevant to recording the costs as assets under the FC method (Wolk *et al.,* 2000:558). Therefore, FC companies generally have a smoother stream of net income because their income does not highly depend on the exploration success rate in a given year (Nichols, 2012:22).

Section 932-10-S99 SEC Materials of the ASC includes the text of SEC Regulation S-X Rule 4-10, Financial Accounting and Reporting for Oil and Gas Producing Activities Pursuant to the Federal Securities Laws and Energy Policy and Conservation Act of 1975 (FASB, 2011). This section governs the use of the FC method in the US. Particularly, it specifies the costs to be capitalised under the full cost method which include all costs associated with property acquisition, exploration and development activities, regardless of whether the costs result in a discovery of reserves (FASB, 2011:371). However, costs related to production, general corporate overheads or similar activities are charged to expenses as incurred. The capitalised costs are aggregated and amortised within the appropriate cost centre, usually established on a country-by-country basis. These costs are amortised based on the unit of production using the proved oil and gas reserves (SEC, 1996).

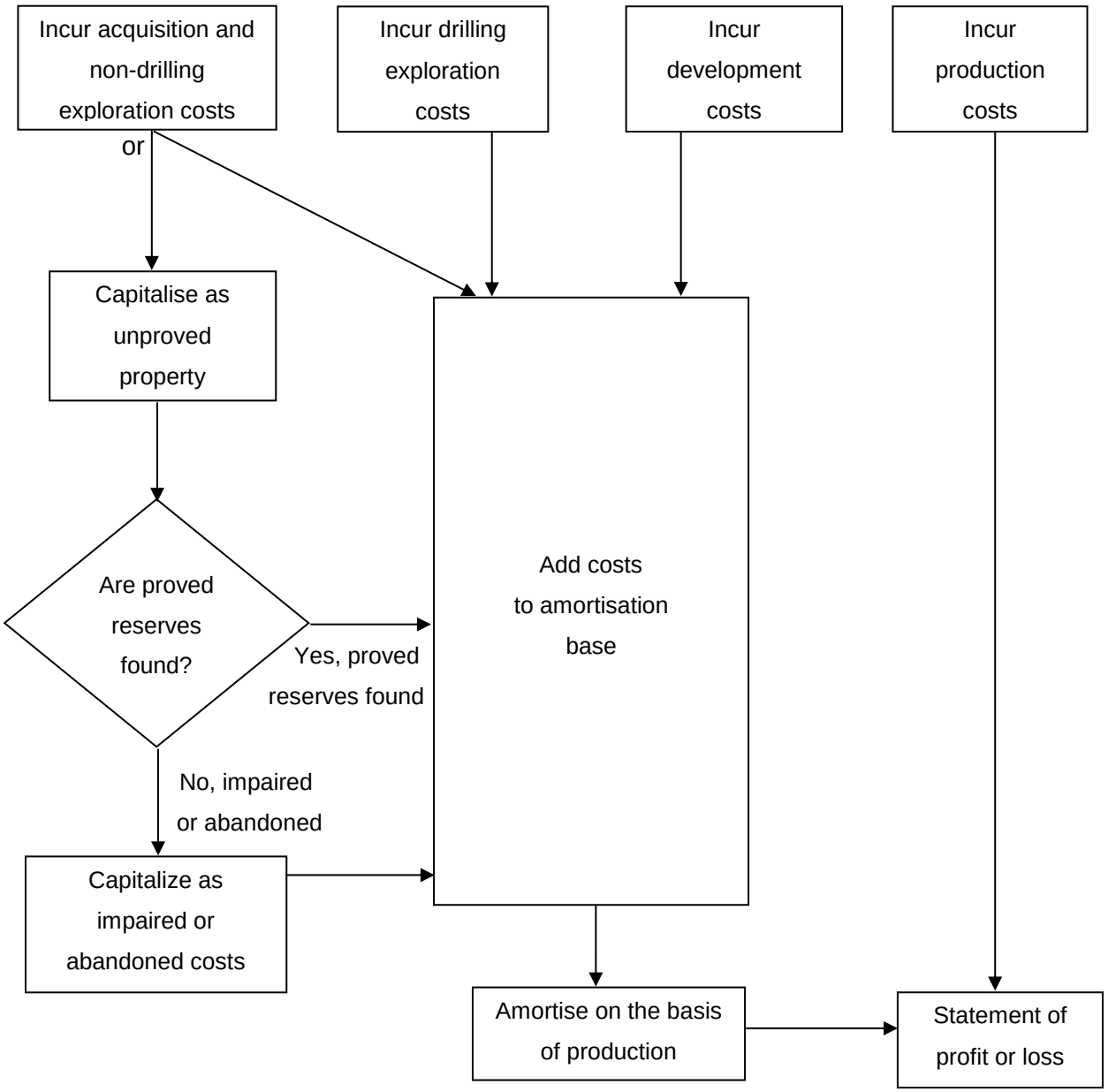
In addition, the costs to be amortised as DD&A include all capitalised costs less accumulated amortisation, but excluding all costs of investments in unproved properties and major development projects in progress; the estimated future expenditures to be incurred in developing proved reserves; and the estimated dismantling and abandonment costs, net of salvage values (SEC, 1996; Brock *et al.,* 2007:50-51). The unproved properties and exploratory costs that are excluded from the amortisation base are periodically assessed for impairment until it is demonstrable that proved reserves are attributed to the properties. In case of impairment, the impairment should be included in the amortisation base. For costs applicable to individually insignificant unproved properties, these could be placed in a group and then included in the amortisation base (Jennings *et al.,* 2000:79; Obara & Nangih, 2017).

SEC Regulation S-X Rule 4-10 places a cost ceiling or limitation on capitalised costs for companies using the FC method. For each cost centre (country), capitalised costs (less accumulated amortisation and related deferred income taxes) shall not exceed:

- the sum of the present value at a 10% discount of future net revenues of proved reserves based on hedge-adjusted prices;
- unproved property costs and preproduction costs not being amortised; and
- the lower of cost or estimated fair value of unproven properties included in the costs being amortised

less income tax effects related to the differences between the book and tax bases of the properties involved (Brock *et al.,* 2007:51; FASB, 2011; SEC, 1996:32; Wright & Gallun, 2008:743-744).

Figure 4.2 presents a flow chart overview of the accounting treatment of the four basic costs: acquisition, exploration, development and production costs incurred, under the FC method of accounting.



(Source: Wright & Gallun, 2008:64)

Figure 4.2: Accounting treatment of the four basic costs under the FC method

4.3.1 Arguments in favour of the FC method

The FC method recognises exploration risk as one of the major characteristics of the oil and gas industry (Umobong, 2015). Oil and gas companies are in the business of searching for oil and

gas reserves and later drill the wells to attain the reserves. However, these wells could be either successful or unsuccessful. Proponents of the FC method argue that the costs of unsuccessful wells are necessary costs to find commercial oil and gas reserves, since they provide information that could ultimately lead to a successful commercial discovery (Abushaiba & Eldanfour, 2014:121). Therefore, costs of successful and unsuccessful wells should be capitalised because the costs of unsuccessful well are needed to find successful wells (Pruett & van Zante, 2003; Umobong, 2015). This helps to achieve a better matching of the true costs of oil and gas reserves with the revenues that ultimately arise from the production (IASC, 2000:85)

Proponents of the FC method also argue that the method helps companies to report financial statements that give a more favourable view of their income and financial position (Abushaiba & Eldanfour, 2014). This method also reduces or eliminates some of the disadvantages of using the SE method (see 4.2.2). The FC method eliminates variability in reported earnings since the total capitalised costs (successful and unsuccessful) are amortised over a given period of time (IASC, 2000; Nichols, 2012). This is attractive for investors and allows firms to raise capital from the capital and money markets irrespective of the company's size (Cortese *et al.,* 2009).

4.3.2 Arguments against the FC method

Baker (1976) believes that the capitalisation of costs of unsuccessful activities is contrary to the "matching concept" since, in the future, these costs will not match the economic benefits. The matching concept provides that revenues should be matched with the corresponding costs of producing such revenues (Johnston & Johnston, 2006). Therefore, the costs of unsuccessful activities should not be postponed, since they do not provide future revenue; they are losses (Baker, 1976). Relatedly, the IASB through the "Extractives Industries Issues Paper" (IASC, 2000:85-86) argues that the costs of unsuccessful activities fail to meet the definition of an asset, since they provide no future economic benefits and as such should immediately be charged to expenses.

Critics of the FC method also argue that oil and gas firms using the FC method inflate their current earnings in the statement of profit or loss due to the capitalisation of costs of unsuccessful activities (Abushaiba & Eldanfour, 2014:122). Capitalising such costs results in improperly deferring the effects of expenses thus delaying the immediate recognition of a loss (IASC, 2000:85-86; Naggar, 1978). Such inaccurate financial statements have an adverse effect on investors, since they reflect information that does not assist investors to understand the company's true operations, which causes investors to make inaccurate decisions (Pruett & van Zante, 2003).

4.4 Current disclosures about oil and gas producing activities

Section 932-235-50 of the ASC provides the current disclosure requirements about oil and gas producing activities. These disclosures are generally similar to those in SFAS 69, *Disclosures about oil and gas producing activities*. SE and FC companies are required to prepare a comprehensive set of disclosures as supplemental information to the financial statements, dealing with historically based and future-value-based information. This requirement applies specifically to publicly traded companies with significant oil and gas producing activities (FASB, 1977; Misund & Osmundsen, 2017; Wright & Gallun, 2008:617). The reason for exempting from SFAS 69 non-publicly traded enterprises and publicly traded companies that do not have significant oil and gas activities is that the cost of providing that information by such companies exceeds the benefits (Chung *et al.,* 1993).

The historical-based disclosures include:

- proved reserve quantity information;
- capitalised costs relating to oil and gas producing activities;
- costs incurred for property acquisition, exploration, and development; and
- results of operations for oil and gas producing activities,

while the value-based disclosures include a standardised measure of discounted future net cash flows relating to proved oil and gas reserve quantities and changes in the standardised measure of the discounted cash flows relating to proved oil and gas reserve quantities (FASB, 1982; FASB, 2011:397; Misund, 2018:4-5; Wright & Gallun 2008:618). Similarly, public and non-public companies are also required to disclose two informational items, being the accounting method used in accounting for oil and gas producing activities and the manner of disposing of capitalised costs (Misund, 2018; Wright & Gallun, 2008:50).

The standardised measure of discounted future net cash flows is a unique disclosure that was introduced by SFAS 69. This disclosure resulted from the SEC's concern about the value of oil and gas reserves, the most significant asset of a company, not included in an entity's historical-cost financial statements (Misund & Osmundsen, 2017; Wright & Gallun, 2008:637). The standardised measure is calculated by estimating future cash inflows from proved reserves at current prices, less estimated future development and production costs and income taxes relating to the cash flows, both to be computed using current costs and rates (Cortese, 2011; Wolk *et al.,* 2000:577). The resulting amount is then discounted at 10%. In addition to computing the standardised measure figure, companies must also disclose and explain the aggregated change in the standardised measure from one period to the next (FASB, 1982). From the above, it can

be seen that the calculation of the standardised measure is very similar to the calculation of income from exploration and development under the SEC's RRA method (see Chapter 3).

However, SFAS 69 has been criticised for its lack of reliability since it does not reflect the "true value" of a company's proved reserves. This is because the assumptions considered in estimating the standardised measure exclude assumptions regarding future prices, costs and technology, and all companies must use the same arbitrary discount rate of 10% (Cortese, 2011; Misund, 2017; Wright & Gallun, 2008:638-639). The figure is just a standardised estimate aimed at aiding comparison between firms. There is also no requirement to subject the disclosures to external audit, since they are not part of the primary financial statements.

4.5 IFRS 6 Exploration for and evaluation of mineral resources

IFRS 6 was issued by the IASB in December 2004, when the European Union decided to require listed companies issuing consolidated financial statements to conform with IFRS effective 1 January 2005 (Nichols, 2012:24). The standard was issued because there were different views on how exploration and evaluation (E&E) expenditures should be accounted for and there was no specific guidance in IFRS dealing with the issue (Cortese *et al.,* 2010; IASB, 2004). IFRS 6 is an interim standard and a short-term solution to problems of accounting for exploration and evaluation activities. It was issued specifically to provide some guidance to the extractives industry until a comprehensive standard is issued in the future. In addition, since E&E activities had to be specifically excluded from IAS 16 *Property, Plant and Equipment* and IAS 38 *Intangible Assets*, the IASB developed and issued IFRS 6 (Cortese *et al.,* 2010; Salendrez & Tang, 2016).

The objective of IFRS 6 is to specify the financial reporting for the exploration and evaluation of mineral resources. Particularly, the standard requires the following: limited improvements to existing accounting practices for exploration and evaluation expenditures; assessment of exploration and evaluation assets for impairment in accordance with IAS 36 *Impairment of Assets*; and disclosures that explain the amounts in the entity's financial statements arising from the exploration for and evaluation of mineral resources (IASB, 2004; Salendrez & Tang, 2016). IFRS 6 applies to all exploration and evaluation expenditures incurred by an entity after it has obtained legal rights to explore a specific area, but before technical feasibility and commercial viability of extracting the mineral ore are demonstrable (Cortese, 2013). However, determining when this is demonstrable, and the level of detail at which this assessment should be made, involves substantial judgement and necessitates communication and coordination between the finance and technical specialists of a company (KPMG, 2013). Examples of exploration and evaluation expenditures include:

- acquisition rights to explore;
- topographical, geological, geochemical and geophysical studies;
- exploratory drilling;
- sampling; trenching; and
- activities relating to evaluating the technical feasibility and commercial viability of extracting a mineral resource (IASB, 2004).

IFRS 6 requires entities transitioning to IFRS to continue applying their current accounting policy for E&E assets that complies with the IFRS *Framework*. SE and FC accounting are the two commonest accounting policies applied by IFRS companies (Chen *et al.,* 2018; KPMG, 2013:2). However, IFRS 6 does not include definitions of these two approaches, and its requirements are not fully consistent with either method. IFRS 6 requires relatively minor modifications to the SE method of accounting under SFAS 19. Under the SE method, the capitalisation of pre-discovery costs pending the outcome of the evaluation is consistent with IFRS 6, which treats E&E expenditures as an asset until technical feasibility and commercial viability of extracting the resources are demonstrable (Ernst & Young, 2009). On the other hand, IFRS 6 does not permit all aspects of the FC method. This is because the extent of capitalisation depends on whether the E&E expenditures can be associated with the finding of oil and gas reserves (Nichols, 2012). The FC method used under the IFRS is highly modified whereby most pre-licensing costs are expensed and cost pools are normally disaggregated into much smaller units than countries (Nichols, 2012:28-29). This result is similar to the SE accounting method.

IFRS 6 requires the recognition of E&E assets as a separate class of assets, measured initially at cost, and classified as tangible or intangible, depending on their nature. After initial recognition, an entity shall apply either the cost model (cost less impairment) or the revaluation model to its E&E assets, as described in IAS 16 and IAS 38 (Ernst & Young, 2009:2; Salendrez & Tang, 2016). IFRS 6 requires the reclassification of E&E assets to tangible or intangible development assets when the technical feasibility and commercial viability of production are demonstrable. At the same time, the assets should be tested for impairment in accordance with IAS 36 *Impairment of assets*, and any impairment loss recognised immediately before reclassification. This implies that, if no commercial reserves are discovered, the E&E assets capitalised should be expensed (Ernst & Young, 2009:2; IASB, 2004).

Pre-exploration costs, for example, the cost of acquisition of speculative seismic data and expenditure on subsequent G&G analysis of this data are excluded from the scope of IFRS 6 and are not addressed in other IFRSs either (KPMG, 2013:3). In this respect, an entity should choose an accounting policy on how to recognise and measure these costs, which policy should be

applied consistently. Moreover, once technical feasibility and commercial viability of extracting a mineral resource are demonstrable any expenditure related to the development of that mineral resource should not be recognised as E&E assets (IASB, 2004). Such costs are outside the scope of IFRS 6 and generally, IFRS do not prescribe the accounting for costs incurred on the development and extraction of resources (KPMG, 2013). Therefore, an entity should choose an appropriate accounting policy for accounting for its development expenditure and apply it consistently.

Upon reading IFRS 6, it is clear that, as mentioned earlier, this standard is merely an interim solution for entities applying IFRS. The standard contains fairly limited guidance, requires the application of significant judgement (e.g. determining when commercial viability of extracting a mineral resource are demonstrable) and does not address all related costs. By allowing certain choices of accounting method, it is questioned whether IFRS 6 promotes significant comparability between different enterprises. However, this standard does offer some useful guidance and sets the scene for a more comprehensive standard to follow at a later stage.

4.6 Accounting for oil and gas activities under UK GAAP

Accounting for oil and gas activities under UK GAAP was previously governed by the Statement of Recommended Practice (SORP), *Accounting for Oil and Gas Exploration, Development, Production and Decommissioning*, as issued by the Oil Industry Accounting Committee (OIAC). The OIAC was established in July 1984 to develop and promote agreement on accounting for the UK upstream oil and gas industry, in particular to develop SORPs for the oil and gas industry in accordance with the guidelines laid down by the Accounting Standards Board (ASB). The OIAC issued four SORPs and two guidance notes between 1986 and 1998. In January 2000, following a substantial increase in the number of FRSs issued by the ASB, the OIAC amended and consolidated its previous pronouncements into a single SORP, superseding all the earlier statements (Cortese, 2013; OIAC, 2001). The objective of the SORP was to promote consistency amongst companies reporting under the UK financial reporting standards as regards the effective application of these standards to their oil and gas E&P activities.

The SORP considered both the FC and SE methods as accepted accounting methods and companies were required to adopt that policy which they considered most suited to their operations (Cortese, 2013; OIAC, 2001). Generally, the application of the SE and FC methods under the SORP was similar with the US GAAP. However, the SORP was superseded by the new UK GAAP standards on upstream oil and gas companies that became effective from

1 January 2015. The new reporting standards were published by the Financial Reporting Council (FRC) to replace the previous UK GAAP, which allowed the SORP.

FRS 102, *The Financial Reporting Standard applicable in the UK and Republic of Ireland*, is the main new UK GAAP standard issued by the FRC in March 2013. The requirements in this standard are based on the IASB's IFRS for Small and Medium-sized Entities (SMEs) issued in 2009. In accounting for extractive activities, FRS 102 brings in all the requirements of IFRS 6 *Exploration for and Evaluation of Mineral Resources* by cross reference (FRC, 2015). The standard permits entities to apply a range of accounting policy choices, for example either the SE or FC methods as contained in the SORP. Therefore, the accounting treatment of exploration and evaluation expenditures in the UK is currently the same as in IFRS 6.

4.7 Comparison of FC and SE accounting methods to accounting for research and development costs under IAS 38 *Intangible Assets*

IAS 38 *Intangible Assets* requires an entity to classify its internally generated intangible assets into either a research phase or a development phase to assess whether the generation meets criteria for recognition as an asset. However, where an entity cannot distinguish the research phase from the development phase of an internal project, the entity should treat the expenditure as research phase expenditure only (André *et al.*, 2018; IASB, 2017).

Paragraph 56 of IAS 38 defines the research phase of a project to include activities such as:

- activities aimed at acquiring new knowledge;
- the search for, evaluation, and final selection of, applications of research findings or other knowledge;
- the search for alternatives for materials, devices, products, processes, systems or services; and
- the formulation, design, evaluation and final selection of possible alternatives for new or improved materials, devices, products, processes, systems or services (IASB, 2017).

Research activities of a project do not meet the criteria for recognition as an asset under IAS 38. This is because, at the research stage, the project is in its initial stages and it cannot be certain that future economic benefits will probably flow to the entity from the project. Therefore, research costs are written off as an expense as they are incurred. Research activities are similar to prospecting activities in the oil and gas industry. Under the SE accounting method, prospecting costs are expensed as incurred since, at this phase, it is not probable that the costs would provide

future economic benefits (Ernst & Young, 2009). However, these costs are capitalised under the FC method.

Under IAS 38, development costs of a project may qualify for recognition as intangible assets if an entity can demonstrate all of the following:

- the technical feasibility of completing the asset such that it will be available for use or sell;
- its intention to complete the intangible asset and use or sell it;
- its ability to use or sell the intangible asset;
- how the intangible asset will generate probable future economic benefits;
- availability of adequate technical, financial and other resources to complete and develop the asset; and
- its ability to reliably measure the expenditure attributed to the intangible asset (IASB, 2017; Tahat *et al.,* 2018).

All these factors are aimed at ensuring that any costs capitalised should be expected to provide future economic benefits, otherwise the costs should be written off to expenses. The SE method treats E&E costs like development costs of a project, where E&E costs that are expected to provide future economic benefits are capitalised. Otherwise, E&E costs that result in dry holes are expensed as incurred. On the other hand, the FC method capitalises all E&E costs, irrespective of the outcome.

In contrast with research costs, development costs are incurred at a later stage in a project, which increases the certainty about the likely success of the project and, consequently, the generation of future benefits to the entity. Examples of development costs include:

- the design, construction and testing or pre-production or pre-use prototypes and models;
- the design of tools, jigs, moulds and dies involving new technology;
- the design, construction and operation of a pilot plant that is not of a scale economically feasible for commercial production; and
- the design, construction and testing of a chosen alternative for new or improved materials, devices, products, processes, systems or services (IASB, 2017).

In contrast to E&E costs, both the SE and the FC methods capitalise development costs incurred by up-stream oil and gas companies. This is because at this stage, technical feasibility and commercial viability of producing the reserves are demonstrable.

4.8 Main differences between US GAAP and IFRS in accounting for upstream oil and gas activities

While the convergence of US GAAP and IFRS continues to be a high priority on the agendas of both the FASB and the IASB, there are still significant differences between the two GAAPs, most importantly in accounting for upstream oil and gas activities (Ernst & Young, 2009). Table 4.1 provides a summary description of the IFRS/US GAAP differences that are particularly relevant to upstream oil and gas activities.

Table 4.1: Significant differences between US GAAP and IFRS in respect of upstream oil and gas activities

Issue	US GAAP – FC	US GAAP – SE	IFRS
Unit of account/cost centre	Cost centres are established on a country-by-country basis.	Cost centre can be an individual lease, field, concession or production sharing agreement.	Current industry practice is generally similar to the SE method, since the standards do not give any specific guidance on determining the unit of account.
Pre-acquisition costs/ prospecting costs	Costs are capitalised at a lease or well level.	Costs are expensed as incurred.	No specific IFRS addresses the accounting for costs prior to the E&E phase. Typically, prospecting costs are expensed as incurred since at this phase it is not probable that the costs would provide future economic benefits.
E&E costs	Property acquisition costs, such as leasehold costs, are capitalised. E&E costs are initially capitalised at a lease or well level pending determination. On determination, both costs of dry hole and successful wells are transferred to the full cost centre (or pool) and amortised.	Property acquisition costs, such as leasehold costs, are capitalised. E&E costs are initially capitalised, typically at a lease or well level, with the exception of G&G costs, which are expensed as incurred. Exploratory dry hole costs are charged to expenses at the time that determination is made, while costs of successful wells are transferred to wells and equipment and amortised.	Property acquisition costs, such as leasehold costs, are capitalised. E&E costs are capitalisable, including G&G costs, or may be expensed subject to the entity's accounting policy. Once technical feasibility and commercial viability of production are demonstrable, E&E assets are tested for impairment and reclassified to property, plant and equipment or intangible assets.
Development and production cost	All development costs are capitalised at the full cost centre. Production costs are expensed as incurred.	All development costs are capitalised at the field level. Production costs are expensed as incurred.	IFRSs do not provide any specific guidance on accounting for costs following the E&E phase. Costs should be capitalised if they are expected to provide future economic benefits in accordance with IAS 16 and IAS 38.

Issue	US GAAP – FC	US GAAP – SE	IFRS
Impairment	Capitalised costs cannot exceed the full cost centre ceiling, which is assessed each reporting period at the full cost-centre level.	Capitalised costs are subject to the impairment provisions in ASC 360-10-35 and in ASC 932-360-35.	Under IFRS 6, cash generating units (CGUs) may be aggregated in evaluating E&E costs for impairment testing. Assets outside the E&E phase are tested at the CGU level as per IAS 36.
Depreciation, Depletion and Amortisation (DD&A)	Capitalised costs within a full cost centre are amortised on a unit of production basis over total proved oil and gas reserves.	The computation of DD&A is on a unit of production basis either for each individual property or properties aggregated, e.g. by field level. Proved property acquisition costs are depreciated over total proved reserves, while well costs and equipment are depreciated over proved developed reserves.	IAS 16 provides guidance on the depreciation of property, plant and equipment. A variety of depreciation methods can be used, including the units of production method. However, IFRSs do not provide any guidance on the selection of an appropriate reserves base or cost centre to be used in the unit of production method.
Reserves estimation for DD&A and disclosures	ASC 932-10-S99 requires the use of total proved oil and gas reserves when computing DD&A. The section also contains definitions of proved developed and proved undeveloped oil and gas reserves to be used for the DD&A calculation and disclosures.	ASC 932-360-35 prescribes the use of total proved oil and gas reserves in the DD&A calculation for proved property acquisition costs, and proved developed reserves in the DD&A calculation for costs of wells and equipment. The definitions of proved developed and proved undeveloped oil and gas reserves for the purpose of DD&A calculations and disclosures are also as per ASC 932-10-S99.	IFRS does not prescribe the method of computing DD&A nor does it define proved, probable or possible reserves for the purpose of computing DD&A or presenting disclosures.
Disclosure requirements	Detailed disclosures required by ASC 932-235 and SEC “Final Rule”.	Detailed disclosures required by ASC 932-235 and SEC “Final Rule”.	Disclosure requirements in respect of entities in E&E stage are laid down in IFRS 6. There are no specific requirements to disclose reserves and resources; however, IAS 1 requires the disclosure of additional information necessary for fair presentation.

(Sources: Deloitte, 2016a; Ernst & Young, 2009:3-4; FASB, 2011; PWC, 2011:135-138, summarised).

4.8.1 Implication of the differences in accounting practices

Differences in accounting for oil and gas under US GAAP and IFRS have been presented above. The US GAAP (which is known by encompassing standards that are rules based) and the IFRS (that are recognised as being principles based) in some cases account for upstream oil and gas

activities differently. This makes it difficult to compare financial statements of oil and gas companies in the two regimes. In contrast with IFRS, US GAAP has endeavoured to be more exhaustive in providing guidance for the extractives industry.

A number of standards have been issued by the FASB specific to the extractives industry. These standards give guidance in areas such as the accounting treatment for all the costs incurred in the different phases of an oil and gas project, required disclosures about oil and gas producing activities and specific definitions of the terms unique to the oil and gas industry. However, two accounting methods (FC and SE) are accepted for use under US GAAP. Although both approaches are historical cost based, the method that produces the most favourable results depends on whether the reporting entity is small and in its early stages of exploration, or larger and more able to absorb the cost of unsuccessful efforts (Katz, 1985; Misund, 2017; Van Riper, 1994).

In many cases, the effect on profits calculated under each method can be substantial, and results in financial statements that are not comparable among enterprises, as in the case of Conquest Petroleum (Nichols, 2012; Wolk *et al.,* 2000:578). In 1985, Conquest Petroleum reported in its financial statements a $3.7 million profit using the FC method of accounting. In 1986, the company switched to the SE method of accounting necessitating a restatement of its 1985 financial statements as if it had used the SE method all along. The restatement brought the 1985 net income for the company from a $3.7 million profit to a $17.1 million loss (Nichols, 2012:24). As a result, the investment community used this case as an example to suggest a need for one uniform method of accounting to be mandated for the oil and gas industry to ensure more comparability of the financial statements (Nichols, 2012).

Currently, IFRS does not provide sufficient guidance for entities in the extractive industry to report on a consistent and comparable manner. For example, IFRS 6, which is the only specific and interim standard issued by the IASB for the extractives industry, does not address the accounting for costs prior and subsequent to the E&E phase. In addition, the standard has no specific requirements to disclose reserves and resources. It also lacks definitions for the different reserves classifications and other terminologies that are unique to the extractives industry. IFRS 6 does not take any specific position on the SE versus FC issue; instead, it permits a continuation of a choice between the methods. IFRS entities are required to apply the *Conceptual Framework* and general IFRSs in developing relevant accounting policies without any relief from the general IFRS requirements.

Therefore, the existence of varying practices in accounting for extractive activities under IFRS and US GAAP provides for earnings management that impairs the quality of reported earnings

and thus creates a uniformity and comparability problem in the financial statements of oil and gas companies (Bryant, 2003; Misund, 2016; Misund *et al.,* 2015). Consequently, investors, lenders and creditors, and others who make capital allocation decisions are bound to make inappropriate decisions based on these financial statements.

4.9 Conclusion

This chapter explored the current accounting practices followed in the extractives industry in the US, UK and at the international level. Under US GAAP, the chapter reviewed the nature of SE and FC accounting methods as prescribed by ASC 932, the differences, similarities and theoretical arguments for and against the two methods, and the disclosure requirements about oil- and gas-producing activities as per SFAS 69 or ASC 932-235-50. What is quite evident from the analysis in this chapter is that US GAAP contains specific comprehensive guidance on accounting for extractive activities compared to IFRS.

At the international level, IFRS 6, which is the only standard specific to the extractives industry under IFRS, was explored in this chapter. IFRS 6 does not take any position on the SE versus FC issue; instead, it permits a continuation of a choice between the methods. However, most companies use the SE and modified FC accounting approaches. Since IFRS 6 was issued as an interim standard pending the development of a comprehensive standard for the industry, limited guidance is therefore provided. It is evident from the chapter that IFRS lacks specific comprehensive guidance for extractive activities; therefore, entities are required to apply the *Conceptual Framework* and general IFRSs in developing relevant accounting policies. This chapter also reviewed FRS 102, *The Financial Reporting Standard applicable in the UK and Republic of Ireland*. FRS 102 requires companies reporting under UK GAAP to apply the requirements of IFRS 6 in accounting for extractive activities. Therefore, there is no difference between UK GAAP and IFRS when it comes to accounting for extractive activities. The chapter concluded with a discussion of the differences between IFRS and US GAAP, specifically in accounting for extractive activities, and the implications emanating from the differences in these practices.

The financial statement impact of SE versus FC is dramatic and in some cases results in financial statements that are not comparable among enterprises (Wolk *et al.,* 2000:578). This is because the methods give very different results on earnings, return on equity and book values (Johnston & Johnston, 2006; Misund, 2016). Earnings for FC companies are usually considered inflated compared to SE companies (Johnston & Johnston, 2006:69; Obara & Nangih, 2017). As a result, investors, lenders and creditors, and others who make capital allocation decisions, are bound to

make inappropriate decisions based on these financial statements. This problem can likely be resolved by requiring upstream oil and gas companies to use one accounting method.

As further context to investigate the extent of this problem, the next chapter will attempt to explore the various earnings quality measures that will be applied empirically to evaluate the quality of earnings of these two accounting methods.

CHAPTER 5: EARNINGS MANAGEMENT AND EARNINGS QUALITY

5.1 Introduction

"Earnings" refer to the profits of a company that are represented by the bottom line in the Statement of profit or loss, and are a summary item in the financial statements (Rahman *et al*., 2013:22). The IFRS definition (IAS 33) of earnings reduces profits with preference dividends, i.e. earnings are only those profits attributed to ordinary shareholders (IASB, 2003). Earnings are an important item of the financial statements because it represents the extent to which an entity has engaged in value adding activities during the year; hence, triggering resource allocation decisions by investors in capital markets (Atrill & Mclaney, 2011; FASB, 2010; IASB, 2010b). Earnings are also useful to lenders and other creditors in making decisions about providing resources to an entity (FASB, 2010; IASB, 2010b). Analysts, investors, lenders and creditors use earnings in determining the attractiveness of a company's shares or value of the firm, which is measured as the present value of a company's future earnings (Arnold, 2005; Brealey *et al.,* 2006; Rahman *et al*., 2013). The ability of a company to generate profit in the future plays an important role in determining its share price (Rahman *et al*., 2013). This implies that companies with lower earnings prospects will typically have lower share prices compared to those with higher earnings prospects. Managers will therefore tend to behave opportunistically by making accounting choices that will most likely result in higher and target earnings in future and consequently higher share prices (Agrawal & Chatterjee, 2015:140). This is broadly referred to as earnings management. The management of earnings impairs the quality of reported earnings, which results in inappropriate decisions taken by investors and other financial statement users (Alipour *et al.,* 2014).

This chapter explores the concept of earnings management, earnings management incentives and techniques, the concept of earnings quality, as well as earnings quality measures. The earnings quality measures examined are classified as either accounting-based or market-based attributes. Accounting-based attributes are those estimated using accounting data and they include accruals quality, persistence, predictability, smoothness and correlation between operating cash flows and net profit, while market-based attributes rely on both accounting data and returns for their estimation, and they include timeliness, relevance and conservatism (Francis *et al.*, 2004:295; Huynh, 2018; Latif *et al.,* 2017). The chapter concludes with a review of previous empirical studies on earnings quality of the SE and FC accounting methods.

5.2 Meaning of earnings management

According to the agency theory, a firm is a 'legal fiction' that serves as a focus for a complex process in which the conflicting objectives of individuals (or organisations) are brought into equilibrium through a framework of contractual relations (Jensen & Meckling, 1976:9). Within the agency framework, management behaviour is more likely to be self-centred (Amat & Gowthorpe, 2004:3). Therefore, agency theory provides a solid framework and foundation for the understanding of earnings management and earnings quality.

Richardson (2000) has found a positive relationship between the levels of information asymmetry and earnings management; and hence provided empirical evidence suggesting that information asymmetry fosters earnings management. The information asymmetry that exists in complex corporate structures between management and the shareholders is a key element underpinning earnings management (Machdar *et al.,* 2017; Schipper, 1989). Managers are more privy to company information compared to shareholders. As a result, they may choose to exploit their privileged position for private gain through managing earnings in their own favour (Amat & Gowthorpe, 2004; Machdar *et al.,* 2017; Misund, 2017). Unfortunately, it may be difficult and sometimes impossible for the shareholders to determine the fact and the effect of earnings management due to a lack of the necessary resources, incentives, or access to the relevant information necessary to ensure effective monitoring of management actions (Rani *et al*., 2013:23).

Earnings management is referred to also as income smoothing, creative accounting, earnings smoothing, financial engineering and cosmetic accounting (Amat & Gowthorpe, 2004:4; Saidu *et al.,* 2017). The term 'earnings management' includes a number of accounting techniques used by management to achieve a specific profit target (Arar *et al.,* 2018; Marinakis, 2011:17). Although there exists no single agreed-upon definition of earnings management, accounting literature provides various meanings of the term. According to Healy and Wahlen (1999:368),

> earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports either to mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers.

Levitt (1998) defines earnings management as "a grey area where the accounting is being perverted, where managers are cutting corners; and, where earnings reports reflect the desires of management rather than the underlying financial performance of the company". Similarly, Schipper (1989:92) describes earnings management as the purposeful intervention in the external

financial reporting process with an aim of obtaining some private gain. Consistent in these three definitions is the issue of intentional smoothing of the reported earnings by management. However, there are two weaknesses with Healy and Wahlens' definition of earnings management. First, it does not set a clear boundary between earnings management and normal activities whose output is earnings, and secondly, not all earnings management is misleading, since investors, for example, prefer to separate persistent earnings from one-time shocks (Ronen & Yaari, 2008).

Earnings management occurs when managers exercise their discretion over the accounting numbers with or without restrictions, where such discretion can be either firm value maximising or opportunistic (Fields *et al.,* 2001:260; Liu & Skerratt, 2018). Earnings management is most likely to occur where there is flexibility in preparing financial statements, specifically arising from the vagueness and subjectivity in accounting standards. This gives financial managers some freedom to select among accounting policies and alternatives, exercise a certain level of judgement and, consequently, discretion in the determination of the reported earnings (Abdelghany, 2005:1001; Liu & Skerratt, 2018; Marinakis, 2011:18). This is referred to as accounting earnings management. Earnings management may also occur when a manager changes operating decisions, for example the delivery schedule or maintenance, to manage the underlying cash flows that will affect the reported earnings. This is described as structuring of transactions, and the method of earnings management is referred to as economic earnings management (Healy & Wahlen, 1999).

Oil and gas firms in the US currently have the option to select either the FC or SE accounting method for their E&P activities. This discretion allows managers to choose a particular accounting method depending on their different motivations. For example, managers may behave opportunistically by choosing the accounting method that is likely to increase their compensation in the next few years, instead of selecting a method that maximises the investors' value. On the other hand, managers may select an accounting method based on its ability to convey the firm's activities to the investors in a transparent manner (Bryant, 2003:5-6; Misund *et al.,* 2015). In addition, companies may choose different accounting methods depending on differences in levels of operations, financing structure, corporate governance structure, etc.

5.3 Earnings management incentives

Earnings management requires opportunity and motive. Prior studies and corporate collapses (Healy, 1985; DeFond & Jiambalvo, 1994; Nelson *et al.,* 2002; Rani *et al.,* 2013) have strongly suggested that earnings management is becoming a common business practice in most companies today; hence, justifying the importance of studying earnings management incentives

and practices. A number of research studies (Cahan, 1992; Beneish, 2001; Abdelghany, 2005; Rani *et al.,* 2013) have been conducted on the managerial incentives and motivations for earnings management. Dechow *et al.* (1995) suggest three main incentives for earnings management in their study, which include capital market incentives, meeting the expectations of analysts and investors, and contractual incentives. These incentives are discussed in detail below.

5.3.1 Capital market incentives

Research studies have documented the existence of earnings management in connection with seasoned equity offerings, initial public offerings, mergers and management buyouts and insider equity transactions (Dechow & Schrand, 2004:47; Kamel, 2012; Miloud, 2014; Rangan, 1998; Zhang, 2017). In all these incidences, the incentive is to affect the company's share price. The greater share price arising from the managed earnings reduces the company's cost of acquiring new capital or it increases the managers' personal wealth. Teoh *et al.* (1998a) and Rangan (1998) investigated earnings management and seasoned equity offerings, and Kabir (2002) and Teoh *et al.* (1998b) studied earnings management of initial public offerings. These studies found evidence that, prior to the offerings, both for seasoned equity and initial public offerings, firms on average had high positive earnings and abnormal accruals, followed by poor long-run earnings and negative abnormal accruals. However, Aharony *et al.* (1993) have found less evidence in their study that initial public offering issuers make unusual accounting choices that would be consistent with earnings management.

Mergers and management buyouts is another area that motivates companies to engage in earnings management. Evidence has shown that around the merger period, both the acquirer and the target company have incentives to manage earnings to increase stock prices (Dechow & Schrand, 2004:50). Erickson and Wang (1999) have found that, in the quarters preceding a merger, acquiring companies tend to manage earnings upwards in order to increase their stock prices. Similarly, takeover targets use discretionary accruals to inflate earnings during periods preceding the takeover (Easterwood, 1998). In contrast to a takeover, in a management buyout managers have incentives to minimise the purchase price through income-decreasing earnings management that will affect the company's share price negatively (Dechow & Schrand, 2004:50).

For insider equity transactions, insiders have incentives to increase earnings to inflate share prices artificially around the time they anticipate selling their shares (Dechow & Schrand, 2004). Beneish and Vargus (2002) in their study provided evidence that, when income-increasing accruals occurred contemporaneously with unusual insider trading activity, the accrual-related earnings had lower persistence to the one-year-ahead accounting period. The lower persistence was partly because of accruals management.

5.3.2 Meeting analysts' and investors' expectations

The desire by management to report upwardly trending earnings, presumably to meet the expectations of analysts and investors, is a motivation for engaging in earnings management (Dechow & Schrand, 2004:47; Iatridis & Kadorinis, 2009; Lee, 2007; Rahman *et al.,* 2013; Xin, 2016). Generally, analysts' and investors' expectations, as well as company predictions, tend to focus on two key components of financial performance: revenue and earnings from operations (Abdelghany, 2005:1003). It is common practice for companies to provide quarterly and annual earnings estimates or forecasts to analysts and investors. This in turn puts pressure on management to ensure their target estimates are met. The pressure is usually intense and is a key primary catalyst in leading managers to engage in earnings management practices that result in questionable earnings. The fact that the company consistently just meets the forecast earnings is a potential red flag that earnings quality could be low (Bratten *et al.,* 2016; Dechow & Schrand, 2004:53). This red flag is more relevant for high-growth companies, because the share prices of these companies are hard hit by investors when the companies fail to meet the forecast earnings (Skinner & Sloan, 2002). However, some companies like Coca-Cola and Gillette Company no longer provide quarterly and annual estimates to analysts, arguing that their focus is now on achieving their long-term strategies rather than meeting short-term earnings estimates (Abdelghany, 2005).

5.3.3 Contracting incentives

Contracting arrangements in the form of debt contracts, compensation contracts, tax regulations or other regulations, provide companies with a direct incentive to manage their earnings (Dechow & Schrand, 2004:57; Degeorge *et al.,* 2013). Such contracts may contain clauses, which affect the reported earnings, thus providing incentives for earnings management. Companies usually manipulate debt levels to create the impression of less debt by disguising debt as something else or by keeping it off the balance sheet. They might do this in order to reduce the cost of capital and/or to comply with debt covenants. If debt covenants are violated, the lender may raise the interest rate on the debt or demand immediate payment. Thus, companies are forced to use earnings management techniques to increase their earnings to avoid such covenant violations (Abdelghany, 2005; Bratten *et al.,* 2016; Sweeney, 1994). Jaggi and Lee (2002) found that firms that are financially distressed, and are failing to comply with debt covenants, use income increasing discretionary accruals to manage their earnings.

Managers also manipulate accruals to maximise earnings based bonuses. Healy (1985) provides evidence that earnings are managed in the direction that is consistent with maximising executives' earnings-based bonuses. If earnings are expected to fall below the minimum level required to

earn bonus, earnings are managed upwards to achieve the minimum level and thus earn a bonus. On the other hand, if earnings are expected to be above the maximum level for which there is no additional bonus paid, then earnings are managed downwards, and the extra bonus saved to be used to earn bonus in the future period. In case earnings are between the minimum and maximum levels, they are managed upwards to increase the current period bonus.

Managers may engage in creative accounting techniques to avoid government attention. For example, they may seek to conceal excessive profits fearing that the government may either impose further taxes on them and/or to avoid government regulating their practices (Xue & Hong, 2016). Companies manage the timing of earnings recognition to decrease current period taxes. Scholes *et al.* (1992) showed that companies timed revenue and expense recognition to defer income in anticipation of lower tax rates in the mid-1980s. However, earnings manipulation will not affect a company's tax obligation; instead, the company must manage real transactions like adjusting its investments, financing and operating decisions, so as to manage the taxable income (Dechow & Schrand, 2004:61).

5.4 Earnings management techniques

Earnings management involves presenting financial statements that comply with the letter of the law and accounting standards, but not with the spirit of the law and are thus misleading (Ghazali *et al,* 2015). Whereas they do not always contravene the law, such financial statements do not give a true and fair view of the company. Managers can manage earnings because they have flexibility in making accounting or operating choices (Misund *et al.,* 2015; Nia *et al.,* 2015; Rahman *et al.,* 2013:26). Even in a highly regulated accounting environment like the US, a great deal of flexibility is available, providing an opportunity for earnings management (Largay, 2002). The following are some of the most successful and widely used earnings management techniques.

5.4.1 "Cookie-jar-reserve" techniques

This technique deals with estimations of future events. US Generally Accepted Accounting Principles (GAAP) require management to estimate and record obligations that will be paid in the future because of events and transactions in the current fiscal period, based on the accrual basis (Rahman *et al.,* 2013). Since the future events cannot be known with certainty at the time of estimation, there is always substantial uncertainty in the entire estimation process, which leads to a range of reasonably possible answers, with no single correct one. The selection process provides room for earnings management since management is required to select a single estimate from the possible alternatives. With the cookie-jar-technique, companies manage earnings by trying to overestimate expenses during the current fiscal period (Cao *et al.,* 2018;

McKee, 2005). Overstating expenses in the current period may make it possible to understate expenses in future fiscal periods. Therefore, management creates a “cookie-jar-reserve” that they can tap into later to boost their earnings. Some of the common areas where cookie-jar-reserves are created include estimating sales returns and allowances, estimating the percentage of completion for the long-term contracts, estimating pension expenses, estimating warranty costs, estimating bad debt write-offs and estimating inventory write-downs (Nia *et al.,* 2015:15).

5.4.2 “Big-bath” techniques

According to Tokuga and Yamashita (2011), “big bath” is described as

> the attempt to increase reported earnings in subsequent periods by charging items that may have a negative future impact to expenses in the current period, further worsening current period business results in an accounting period in which results are bad.

Under rare circumstances, some companies may substantially restructure or eliminate operations or subsidiaries to remain competitive (Fatih, 2017; McKee, 2005). In these instances, US GAAP permits management to record an estimated charge against earnings for the cost of implementing the change, which affects the company’s earnings negatively and, consequently, the share price. However, the share price may go up rapidly if the charge for restructuring and related operational changes is viewed positively (Rahman *et al.,* 2013). “Big-bath” techniques rely on the belief that if a company must report bad news, i.e. a loss from substantial restructuring, it is better to report it all at once and get it out of the way (McKee, 2005). Big-bath techniques are commonly applied in circumstances like operational restructuring, operations disposal, troubled debt restructuring, asset impairment and write-downs (Fatih, 2017).

5.4.3 “Big-bet-on-the-future” techniques

When a company acquires another company, it may be said to have made a “big bet on the future.” This may be a sure way of increasing the earnings of the acquirer if the acquisition is properly planned. US GAAP requires an acquisition to be recorded as a purchase. This provides an opportunity for earnings management in two ways. Firstly, a company can write off in-process research and development costs of the company acquired against current earnings in the acquisition year, thereby protecting future earnings from these charges (McKee, 2005; Nia *et al.,* 2015). This boosts future earnings to higher levels than they would otherwise have been. Secondly, earnings can be managed by integrating the earnings of the acquired company into the

parent company earnings, thus providing automatic earnings boost if the acquired company was purchased on favourable terms (McKee, 2005; Saidu *et al.,* 2017).

5.4.4 "Throw out" a problem child

When the earnings of the parent company are reduced by a poorly performing subsidiary, and the reduction in earnings is expected to increase further in the future periods, the subsidiary (problem child) may be "thrown out" to get rid of the reduction in the consolidated earnings. Using this technique, earnings can be managed through:

- sale of the subsidiary so as to report a gain on disposal;
- creating a special purpose entity (SPE) where financial assets are transferred, thereby creating a gain or loss on disposal;
- spinning off the subsidiary, i.e. distributing or exchanging the shares of the subsidiary with the current shareholders, thus making them (and not the company) owners of the problem child; or
- swapping the stock in an equity method subsidiary without having any recordable gain or loss (McKee, 2005; Rahman *et al.,* 2013:27; Saidu *et al.,* 2017; Yiadom, 2015).

5.4.5 "Flushing" the investment portfolio

Companies usually buy stock in other companies either to achieve strategic alliance or to invest excess funds. Investments of less than 20% of stock of another company are passive investments, and thus a share of the net income arising from such investments is not included in the investor's financial statements (Rahman *et al.,* 2013). US GAAP requires such investments to be classified as either:

- "trading securities", under which any changes in the market value of these securities during the year, or actual gains or losses from sales, are reported as operating income; or
- "available for sale securities", where any changes in market value during a year is reported in "other comprehensive income", not in operating income, until these securities are sold.

GAAP requirements therefore offer an opportunity for earnings management through:

- timing sales of securities that have gained value (i.e. selling a portfolio security that has an unrealised gain so as to boost earnings);
- timing sales of securities that have lost value (i.e. selling a security that has an unrealised loss so as to report lower earnings); and

- write down of impaired securities and change of holding intent (i.e. changing its investment from an available for sale asset to a trading security or vice versa, thereby moving the unrealised gain or loss to or from the statement of profit or loss) (Nia *et al.,* 2015; Rahman *et al.,* 2013).

5.4.6 Timing of adoption of new accounting standards

Accounting standards are enacted within a two- to three-year transition accounting period prior to mandatory adoption, but encouraging early adoption (Abdelghany, 2005; Stent *et al.,* 2017). Whereas not all firms are affected by each standard issued, the long adoption window provides an opportunity for earnings management by managers selecting an adoption year, which is most favourable to the firm's financial performance and position (Ayres, 1994).

5.4.7 Sale/leaseback and asset exchange techniques

A company may enhance its earnings in the financial statements by disposing of its long term productive assets resulting in the recording of unrealised gains. This can be done through an outright sale of the asset, either in the year when the sale will enhance the company's earnings the best, or through a sale and leaseback of fixed assets to record a gain (McKee, 2005; Saidu *et al.,* 2017). A sale and leaseback constitutes an arrangement where the seller of an asset leases back the same asset from the purchaser (lessor). Most companies often enter into sale-leaseback transactions in order to obtain cash financing and to enable the seller/lessee to borrow money without classifying it as a debt on the balance sheet (Tariverdi & Teimoory, 2013; Whittaker, 2008).

5.4.8 Write-off of long-term operating assets

The cost of long-term operating assets used or consumed is normally written off in three ways: as an amortisation (for intangible assets), depreciation (for tangible assets), or a depletion expense (for natural resources that are being extracted). The cost is written off over the period that benefits are expected, and the writing off requires a variety of judgements, most of which offer an opportunity for earnings management. Management therefore has discretionary power to make judgements in selecting the write-off method, write-off period, estimation of salvage value and changing the asset to non-operating use (McKee, 2005; Nia *et al.,* 2015; Rahman *et al.,* 2013).

5.4.9 Voluntary accounting changes

Another technique of managing earnings is to switch from one GAAP accounting choice or method to another. For example, an upstream oil and gas company may switch from the use of the SE to FC accounting method and vice versa in a bid to boost its earnings. However, although a firm can make several different types of accounting changes, either together or individually over several periods, it cannot make the same type of accounting changes too frequently (Abdelghany, 2005:1006; Chen *et al.,* 2015; Keune *et al.,* 2017).

5.4.10 Operating versus non-operating income

The US GAAP requires earnings to be classified in the Income Statement as either operating or non-operating income. Operating or "core" earnings are those that are expected to continue into the future, whereas non-operating earnings are not expected to affect future earnings. Non-operating income includes special or unusual charges, discontinued operations, and the cumulative effect of changes in accounting principles. Analysts use projected operating income to determine the present value of a company's value. Therefore, executives can manage earnings by including non-operating income items under operating income to boost the value of the company's shares (Fan & Liu, 2017; Malikov *et al.,* 2017; McKee, 2005; Rahman *et al.,* 2013; Zalata & Roberts, 2017).

5.5 Meaning of earnings quality

Earnings quality is a key characteristic of financial reporting, which emphasises that financial reports should be useful to investors, lenders and other creditors in making their resource allocation decisions (Perotti & Wagenhofer, 2014:548). High-quality financial reports should improve decision-making and thus capital-market efficiency. Whereas the phrase "earnings quality" is widely used, there is neither an agreed-upon meaning assigned to the phrase nor a generally accepted approach to its measurement (Abdelghany, 2005:1007; Givoly *et al.,* 2010; Huynh, 2018). Therefore, a variety of earnings quality definitions exists.

Earnings quality is a broad concept that reports the stability, sustainability or persistence and non-fluctuation of reported earnings (Bellovary *et al.,* 2005:32; Huynh, 2018; Ranjbar *et al.,* 2013:353). According to Schipper and Vincent (2003:98), earnings quality refers to "the extent to which reported earnings faithfully represent Hicksian income," where Hicksian income "corresponds to the change in net economic assets other than from transactions with owners." Richardson *et al.* (2001) describe earnings quality as the degree of stability of earnings performance in the future period. Similarly, Beneish and Vargus (2002) look at earnings quality as the possibility of

sustainability of current earnings in the future. Pratt (2000:750) defines earnings quality as “the extent to which net income reported in the statement of profit or loss differs from the “true” (unbiased and accurate) earnings”.

Quality of earnings is also viewed as the relationship between past income of a firm and its current and future cash flows (Mikhail *et al.,* 2003). Earnings that accurately annuitise the intrinsic value of the firm are considered to be of high quality. Such earnings are referred to as “permanent earnings” (Dechow & Schrand, 2004:5). An earnings number that represents the annuity of expected future cash flows is likely to be persistent and predicted. However, persistence and predictability alone are not sufficient to determining high quality earnings; the earnings should be highly persistent and highly predictable to annuitise the intrinsic value of the firm and thus improve the overall reputation between the managers and the analysts and investors (Dechow & Schrand, 2004).

5.6 Measures of earnings quality

Earnings consist of two different parts: cash flow and accruals. Whereas the cash part is objective and cannot be manipulated, the accrual part is very discretionary and susceptible to manipulation by managers for their own interests, thus reducing the quality of earnings (Alipour *et al.,* 2014:37). Additionally, it can confuse other stakeholders when evaluating the firm’s performance. It is therefore important to measure the quality of earnings reported by businesses (Dechow, 1994). Since there are different definitions of earnings quality, there are also different measures or attributes of earnings quality. However, Francis *et al.* (2004) have provided two broad classifications of earnings quality attributes that have been widely used in accounting research. These are ‘accounting-based’ and ‘market-based’ attributes. The accounting-based earnings quality measures, which are estimated using accounting data, are accruals quality, persistence, predictability and smoothness. These attributes rely on accounting data for their estimation, and assume that the function of earnings is to allocate cash flows to reporting periods via accruals. The market-based earnings quality measures include value relevance, timeliness and conservatism. These attributes rely on both accounting data and returns for their estimation, and they assume that the function of earnings is to reflect economic income as represented by stock returns.

The remainder of this section describes the earnings quality measures that are commonly used as attributes for earnings quality in empirical studies. These attributes will later be used to operationalise the concept of earnings quality in this research study.

5.6.1 Predictability

According to FASB (2010:17), financial information has predictive value if it can be used as an input to processes employed by users to predict future outcomes. Information that has predictive value often has confirmatory value, thus capable of making a difference in the decisions made by users. Earnings predictability is based on the notion that high quality earnings are more useful to predict future earnings (Perotti & Wagenhofer, 2014:548). Similarly, Dechow and Schrand (2004) describe high quality earnings as a high-quality number that is representative and therefore a good predictor of future earnings. Predictability is an important earnings quality attribute, because it increases the precision of earnings forecasts. One common measure of earnings predictability is derived from the same firm-specific models used in the estimation of earnings persistence (Francis *et al.*, 2006).

This measure (predictability) is the R^2 from the regression of future profit and reported historical profit.

$$PROF_{k,t} = \beta_{0,k} + \beta_{1,k} PROF_{k,t-1} + v_{k,t}, \qquad \text{Model 1}$$

where $PROF_{k,t}$ is the net profit after tax for time t, and $PROF_{k,t-1}$ is the net profit after tax for time $t-1$. The higher the R^2, the more will be the earnings predictability and consequently higher earnings quality, and vice versa (Alipour *et al.,* 2014:38). In addition, predictability can be estimated as the standard error or square root of the error variance from the above regression equation, where large (small) values imply lower (higher)-quality earnings (Francis *et al.,* 2006:301; Latif *et al.,* 2017).

Earnings predictability can also be measured based on analysts' forecast errors. This measure is estimated as the average absolute forecast error of analysts' annual earnings forecasts, where forecast error is computed as the analysts' forecast of Earnings per share (EPS) less reported EPS, scaled by share price 10 days before the forecast date (Francis *et al.* 2006:301). However, compared with the time-series based measure of predictability, the analyst-based measure is criticised for containing two additional behavioural influences that do no impact on earnings quality. The first influence reflects analyst biases that affect their earnings forecasts; they include self-selection; are cognitive or incentive based; and the second reflects management's earnings guidance (Francis *et al.,* 2006).

5.6.2 Persistence

Persistence as a measure of earnings quality measures the extent that current earnings persist or recur in the future (Latif *et al.,* 2017; Perotti & Wagenhofer, 2014:548). Investors value high

persistence, and therefore a proxy of high quality earnings since it indicates more sustainable, stable, and less volatile earnings. According to Francis *et al.* (2006), earnings persistence is measured as the slope coefficient estimate, $\beta_{1,k}$, from an auto regression model of first order for annual split-adjusted earnings per share $X_{k,t}$, as represented below:

$$X_{k,t} = \beta_{0,k} + \beta_{1,k} X_{k,t-1} + v_{k,t}, \qquad \text{Model 2}$$

where, $X_{k,t}$ is measured as firm $k's$ net income before extraordinary items in the current year t divided by the weighted average number of outstanding shares during year t; $X_{k,t-1}$ is firm $k's$ net income before extraordinary items in the previous year $t-1$ divided by the weighted average number of outstanding shares during last year. $\beta_{1,k}$ is the slope coefficient from the above equation, which shows firm $k's$ persistence of earnings, where values close to one suggest high-persistent (high-quality) earnings, while values close to zero imply high-transitory (low-quality) earnings. Earnings persistence can also be measured as the slope coefficient $\beta_{1,k}$ from the regression of future profit and reported historical profit (see 5.6.1). This approach was proposed by Sloan (1996).

5.6.3 Smoothness

Earnings smoothness can be interpreted as a favourable or unfavourable earnings attribute. Similar to predictability and persistence, smoother earnings are less volatile and they enhance better forecasting (Ewert & Wagenhofer, 2015:327). As an attribute of earnings quality, smoothness reflects the idea that managers can use their private information to smooth out non-recurring effects and thereby achieve a more representative or normalised reported earnings number (Francis *et al.* 2006:301; Gaio & Raposo, 2014). Francis *et al.* (2004) suggest that capital market participants often reward smoother earnings streams with reduced costs of equity and debt capital. This implies that in the eyes of the investors, earnings smoothness is desirable, because it reflects quality financial reporting decisions. Therefore, to the extent that current earnings, which are more representative of future earnings, are of higher quality, smoother earnings indicate higher quality earnings.

On the other hand, not all researchers agree that managers use their private information about the future to manipulate accruals with an aim of achieving a more representative earnings number. Leuz *et al.* (2003) express the view that smoothness reflects the extent to which accounting standards provide room for managers to reduce variability in earnings artificially, most likely to obtain capital market benefits associated with smooth earnings. Therefore, based on this view, smoother earnings would indicate poorer earnings quality.

There are several ways of measuring smoothness, all of which are similar. Smoothness can be measured as the ratio of firm $k's$ standard deviation of net income before extraordinary items divided (scaled) by the opening total assets to its standard deviation of cash flows from operations also divided (scaled) by opening total assets (Francis *et al.,* 2004). Secondly, it can be measured as the ratio of the firm's standard deviation of operating income scaled by assets, to the standard deviation of cash flows from operations scaled by assets (Leuz *et al.,* 2003). Lastly, it can be measured as the ratio of the standard deviation of non-discretionary net income, estimated as operating cash flows plus non-discretionary accruals, to the standard deviation of cash flows from operations (Hunt *et al.,* 2000).

5.6.4 Accruals quality

Accruals quality as a measure of earnings quality is based on the view that earnings that map more closely into cash flows are of a better quality (Dechow & Dichev, 2002; Latif, 2017). In this research, accruals quality is based on the residuals of the regression of current accruals on cash flow from operations. This measure, proposed by Dechow & Dichev (2002), captures the mapping of working capital accruals into last-period, current, and next-period cash flows from operations as shown below:

$$\frac{TCA_{k,t}}{Assets_{k,t}} = \beta_{0,k} + \beta_{1,k}\frac{CFO_{k,t-1}}{Assets_{k,t}} + \beta_{2,k}\frac{CFO_{k,t}}{Assets_{k,t}} + \beta_{3,k}\frac{CFO_{k,t+1}}{Assets_{k,t}} + v_{k,t} \qquad \text{Model 3}$$

where:

(1) $TCA_{k,t}$ = firm $k's$ total current accruals in year t = $(\Delta CA_{k,t} - \Delta CL_{k,t} - \Delta Cash_{k,t} + \Delta STDEBT_{k,t})$;

(2) $Assets_{k,t}$ = firm $k's$ average total assets in year t and $t-1$;

(3) $CFO_{k,t}$ = cash flow from operations in the current year t, calculated as net income before extraordinary items $(NIBE)$ less total accruals (TA),
where $TA_{k,t} = \Delta CA_{k,t} - \Delta CL_{k,t} - \Delta Cash_{k,t} + \Delta STDEBT_{k,t} - DEPN_{k,t}$, and $\Delta CA_{k,t}$ = firm $k's$ change in current assets between year $t-1$ and year t, $\Delta CL_{k,t}$ = firm $k's$ change in current liabilities between year $t-1$ and year t, $\Delta Cash_{k,t}$ = firm $k's$ change in cash between year $t-1$ and year t, $\Delta STDEBT_{k,t}$ = firm $k's$ change in debt in current liabilities between year $t-1$ and year t, $DEPN_{k,t}$ = firm $k's$ depreciation and amortisation expense in year t;

(4) $CFO_{k,t-1}$ = cash flow from operations in the last period;

(5) $CFO_{k,t+1}$ = cash flow from operations in the next period.

In order to obtain a firm-specific time-series measure of accruals quality, the above equation is estimated over some interval, say 10 years, with each estimation yielding firm and year-specific residuals, $v_{k,t}$. For a firm-specific, cross-sectional measure of accruals quality, the above equation is estimated at the industrial level each year, with each estimation yielding firm and year-specific residuals, $v_{k,t}$. In both cases, time-series and industrial cross-sectional estimation, the regression residuals are used to calculate the accruals quality metric, where $Accrual\ quality_{k,t} = \delta(v_{k,t})$, i.e. the standard deviation of firm $k's$ estimated residuals. The large (small) values of $\delta(v_{k,t})$ correspond to poor (good) accruals quality because there is less (more) precision about the mapping of current accruals into last-period, current, and next-period cash flows. Therefore, the lower the standard deviation of firm $k's$ estimated residuals, the higher the earnings quality and vice versa.

One limitation with the accruals quality earnings attribute is that the measure does not capture the effects of larger, more numerous and arguably, more complicated accruals like pensions, depreciation, asset retirement obligations, and deferred tax assets and liabilities (Francis *et al.,* 2006).

5.6.5 Value relevance

Value relevance as a measure of earnings quality is based on the notion that earnings are of high quality if they are capable of explaining the firm's market price and/or market returns (Ewert & Wagenhofer, 2015:325; Garcia *et al.,* 2017). Earnings with greater explanatory power; that is, earnings that explain greater variation in stock returns, are considered more desirable, and thus are of higher quality (Erin *et al.,* 2017; Francis *et al.,* 2006).

According to Francis and Schipper (1999), value relevance is based on the explanatory power (the adjusted R^2) of the following regression of returns on the level and change in earnings, where small (large) values of the adjusted R^2 imply less (more) value-relevant earnings and thus lower (higher) earnings quality:

$$RET_{k,t} = \gamma_{0,k} + \gamma_{1,k}\, EARN_{k,t} + \gamma_{2,k}\, \Delta EARN_{k,t} + \delta_{k,t} \qquad \text{Model 4}$$

In estimating the regression, the researcher must choose earnings metric and estimation periods, like annual or quarterly. For example, $RET_{k,t}$ can be firm $k's$ 15-month return ending three months after the end of fiscal year t; $EARN_{k,t}$ is the firm's income before extraordinary items in year t ($NIBE$), scaled by market value at the end of year $t-1$; $\Delta EARN_{k,t}$ is the change in the firm's $NIBE$ in year t, scaled by market value at the end of year $t-1$. The regression can be estimated in time series, in cross section, and in pooled, time-series cross sections (Francis *et al.,* 2006).

5.6.6 Timeliness

Ball *et al.* (2000:1) define timeliness as the extent to which current-period accounting income incorporates current-period economic income, based on change in market value of stockholders' equity as the proxy. Similar to value-relevance, timeliness as a measure of earnings quality is estimated using stock returns and the measure itself is based on explanatory power. The measure is based on the same assumptions that support value relevance as an earnings-quality metric. Timeliness is measured as the explanatory power of a reverse regression of earnings and returns, and it reflects the ability of earnings to reflect good news and bad news that is impounded in returns (Francis *et al.,* 2006; Garcia *et al.,* 2017). Ball *et al.* (2000) measures timelines based on the adjusted R^2 from the equation below, where smaller values of R^2 imply less timely (i.e. lower quality) earnings and vice versa. The regression is usually estimated on a firm-specific basis as represented below:

$$EARN_{k,t} = \beta_{0,k} + \beta_{1,k}NEG_{k,t} + \beta_{2,k}\,RET_{k,t} + \beta_{3,k}\,NEG_{k,t}\,.\,RET_{k,t} + \varepsilon_{k,t} \qquad \text{Model 5}$$

where $NEG_{k,t} = 1$ if $RET_{k,t} < 0$, and zero otherwise; all other variables are as previously defined.

5.6.7 Conservatism

Conservatism is the extent to which current-period accounting income asymmetrically incorporates economic losses and gains (Ball *et al.,* 2000:1; Kim & Zhang, 2016). Income conservatism is illustrated by the timing of recognition of new information about future cash flows from long-term assets. The accounting recognition principles normally require such income to be recognised only when the actual cash flow realisations occur. However, most accounting rules require the immediate write-offs against income when expected future cash flows decrease, without waiting for the cash flow decreases to be realised (Ball *et al.,* 2000:6; Banker *et al.,* 2016; Lara *et al.,* 2016). In addition, unrealised increases in asset values are generally not recognised as income until approximately when the underlying cash flow increases occur, but unrealised decreases are more likely to be recognised immediately. Another example of this asymmetry is the "lower of cost and net realisable value" inventory rule, which recognises inventory losses more quickly in income than gains (Kabir & Laswad, 2014).

According to Watts (2003), conservatism is a desirable attribute of earnings quality since conservative accounting limits overpayments to shareholders. This approach is based largely on the contracting/stewardship approach to earnings quality rather than the capital allocation approach (Francis *et al.,* 2006:306; Zhong & Li, 2017). Ball *et al.* (2000:6-7) incorporate conservative asymmetry in accounting income timeliness by looking at conservatism as the

differential ability of accounting earnings to reflect economic losses (estimated as negative stock returns) versus economic gains (estimated as positive stock returns).

Conservatism is measured as the difference of the slope coefficients on negative returns ($\beta_{3,k}$) to the slope coefficients on positive returns ($\beta_{2,k}$) in a reverse regression of earnings on returns as shown in model 5 above (Ball *et al.,* 2000; Basu, 1997; Delkhosh & Sadeghi, 2017:159). The higher the difference, the more conservative are the earnings and consequently higher earnings quality, and vice versa.

$\beta_{2,k}$ and ($\beta_{2,k}$ + $\beta_{3,k}$) in model 5 above capture the incorporation of positive and negative economic income into current-year accounting income, under the accounting rules and practices firm k applies (Delkhosh & Sadeghi, 2017).

5.6.8 Earnings quality measured by the relationship between operating cash flows and net profit

Previous studies on earnings and cash flows have shown that there is a significant relationship between earnings and future cash flows (Barragato & Markelevich, 2008; Barth *et al.,* 2001). According to Barragato and Markelevich (2008:305), high-quality earnings are an earnings stream more closely associated with future operating cash flows. This idea is also consistent with prior research documenting the superiority of earnings in predicting future cash flows and is related to various researchers, which describe accrual quality as the extent to which accruals map into cash flow realisation (Dechow & Dichev, 2002; Latif *et al.,* 2017; Sloan, 1996). Penman (2001) states that the focus of an accounting quality analysis is on distinguishing “hard” numbers which result from cash flows, from “soft” numbers in the accruals, which are subject to estimates. According to Alipour *et al.* (2014:37-38), the R^2 from the regression of operating cash flows and earnings is taken as the measure of earnings quality.

$$OCF_{k,t} = \beta_{0,k} + \beta_1 PROF_{k,t-1} + \varepsilon_{k,t}, \qquad \text{Model 6}$$

where $OCF_{k,t}$ is the operating cash flow for firm k at time t; estimated as operating income before depreciation less interest, taxes and changes in non-cash working capital; and $PROF_{k,t-1}$ is the net profit after tax for time $t-1$. The higher the R^2 is from the above regression, the more will be the relationship between operating cash flows and net profit and, as a result, higher earnings quality.

5.7 Empirical studies of earnings quality of SE and FC upstream oil and gas companies

Although much of the early research into the SE and FC methods is related to the FASB's and the SEC's attempts to narrow the choice of accounting methods used by upstream oil and gas companies, some empirical studies have also been conducted on the earnings quality of SE and FC accounting methods (Murdoch & Krause, 2009; Umobong, 2015).

Sunder (1976) studied the properties of accounting numbers under full costing and successful efforts costing in the petroleum industry. He developed a simple mathematical model to examine the effects of the SE and FC accounting methods on income, cash flows, capitalised assets and return on assets. Pertinent to this research, Sunder's analysis concluded that FC income is more highly correlated with contemporaneous cash flows than SE income is, and the correlation between SE income and future cash flows is higher than it is between FC income and future cash flows.

Harris and Ohlson (1987), in their study, examined the relationship between accounting disclosures and the market's valuation of oil and gas properties. Using a cross-firm design, they found SE book value to have greater explanatory power than FC book value when regressed in the implied market value of oil and gas properties. Thus, SE firms exhibit higher market-to-book coefficients than FC firms, a result consistent with Sunder's (1976) finding that the SE method produces more conservative net assets and income numbers than the FC method. Overall, their results suggested that the SE method is more value relevant than the FC method; hence, resulting in higher earnings quality.

Bandyopadhyay (1994) examined whether the market distinguishes between the SE and FC method when it reacts to earnings announcements of oil and gas firms. He investigated the association between earnings and security prices by comparing the Earnings Response Coefficients (ERCs) of SE and FC firms around their quarterly earnings announcements. Also using a cross-firm design, he found SE firms to have larger ERCs compared to FC firms, suggesting that SE earnings are of higher quality than FC earnings because the FC method imparts considerable price-irrelevant elements to earnings.

Bryant (2003) studied the relative value relevance of the SE and FC accounting methods in the oil and gas industry. His results showed that, in a sample of 112 SE and FC firms, FC earnings and book values have higher explanatory power than SE earnings and book value. Different from Bandyopadhyay (1994) and Harris and Ohlson (1987), he suggests that the FC method of accounting for E&P expenditures is more value-relevant than the SE method, which means that capitalising all E&P expenditures provides more useful information to investors.

More recently, Murdoch and Krause (2009) have evaluated the earnings quality of SE and FC firms, focusing on two earnings quality definitions: firstly, the association of contemporaneous earnings and cash flows, and secondly, the association of earnings and future cash flows. Similar to Sunder (1976), Murdoch and Krause (2009) conclude that SE earnings are more highly correlated with future cash flows than FC earnings. They have also found the SE earnings more highly correlated with contemporaneous cash flows than FC earnings, a conclusion that differed from Sunder's findings. Overall, Murdoch and Krause conclude that the SE method of accounting provides earnings quality superior to the FC method. As noted earlier in this research, there are various definitions of earnings quality, and thus various earnings quality measures. However, Murdoch and Krause's research focuses on only two measures. In addition, in relation to their conclusion that SE earnings is more highly correlated with future cash flows than FC earnings, the analysis only investigated the correlation between earnings and one year ahead operating cash flows. Results could possibly differ if the relationship was extended to longer time horizons, and if other earnings metrics were considered.

Misund *et al.* (2014) studied financial data of the 50 largest international oil and gas companies for the period 1992 to 2011, and evaluated their relation to market values. Specifically, they examined how this relationship is affected by accounting method choice (SE or FC) and vertical integration. They found that net income is more value relevant for FC firms compared to SE firms. Further, the value relevance of oil and gas reserves was found to be different among SE and FC firms and different for upstream and integrated companies.

Umobong (2015), in a study, examined the choice of accounting method and reported earnings by oil and gas producing firms in Nigeria. He concluded that the SE method discloses internal flaws and supports the investor in reaching reasonable investment decisions. He further explained that the SE method meets the underlying principles of the matching concept, upholds the concept of conservatism, and it removes the risk of manipulated earnings; hence, it is a transparent method.

Misund (2016) empirically examined the relationship between vertical integration and value relevance in the oil and gas industry. The results suggested that the value relevance of earnings is higher for E&P companies, as compared to the integrated oil and gas companies. This indicated that investors have more confidence in the E&P companies' earnings than for the integrated oil and gas firms' earnings. Since most FC firms are E&P firms while a number of SE firms are integrated oil and gas firms, it could be concluded that earnings of FC firms might be more value relevant than those of SE firms.

In another study, Misund (2017) investigated the effect that accounting method choice can have on the valuation of oil and gas companies. Using panel data econometric methods and data from oil and gas companies (more than 3,500 firm-year observations), his results suggest that there is a closer association between market valuation and cash flows, than with accounting earnings. The findings indicated that, irrespective of the accounting method used, the financial markets do not have confidence in oil company earnings, and therefore investors prefer to use cash flows as measures of underlying financial performance. Their findings further found a positive association for both short-term and long-term cash flow measures with returns for oil and gas firms using the SE accounting method. The findings are broadly in line with the results of other researchers including Cormier and Magnan (2002), Misund and Osmundsen (2015) and Quirin *et al.* (2001), who conclude that investors have more confidence in profits before depreciation and cash flows, than they have in net income.

Delkhosh and Sadeghi (2017) investigated the role of conservatism and earnings management in earnings quality considering a statistical population of 123 companies listed on the Tehran Stock Exchange between 2009 and 2014. Consistent to the research findings of Ismail and Elbolok (2011) the results of this study indicated a significant negative relationship between accounting conservatism and earnings management on the quality of earnings. Since the SE method of accounting upholds the concept of conservatism by recognising losses as they occur (Umobong, 2015), it may be concluded that the SE method has lower earnings quality than the FC method.

Considering that most of the above studies only covered a limited number of earnings quality measures and/or a limited timeframe, or looked at the issue from a specific angle, there are still gaps in the literature; hence, a need for further research. In addition, the above studies show contradicting results, which need further investigation.

5.8 Conclusion

This chapter explored the concept of earnings management, earnings management incentives and techniques, the concept of earnings quality, and earnings quality measures. Various earnings quality measures, classified as either accounting-based or market-based attributes, were examined. The accounting-based attributes included accruals quality, persistence, predictability, smoothness and correlation between operating cash flows and net profit, while the market-based attributes included timeliness, relevance and conservatism. Some of these attributes will be used in the next chapters to operationalise the concept of earnings quality in this research.

The chapter concluded with a review of previous empirical studies on earnings quality of the SE and FC accounting methods. What is quite clear from these studies is that there were contrasting conclusions regarding the superiority of earnings of SE and FC firms. While some researchers like Bandyopadhyay (1994), Murdoch and Krause (2009) and Umobong (2015) agree about the superiority of earnings of SE firms, others such as Bryant (2003), Misund (2014, 2016) and Delkhosh and Sadeghi (2017) seem to support the FC method as more value relevant than the SE method. These contrasting findings are one of the reasons for further research in this area.

The chapter that follows provides a detailed description of the empirical methodology that was followed in this study to investigate the earnings quality of SE and FC methods with reference to seven earnings quality measures, offering broader insights than existing literature that employed fewer measures.

CHAPTER 6: RESEARCH METHODOLOGY

6.1 Introduction

The “research methodology” refers to the overall general plan of how a researcher integrates the different components of the study in a coherent and logical way, in order to effectively answer the research questions and consequently address the research problem (De Vaus, 2001:8-9; Saunders *et al.,* 2016:163). It includes the plan for the collection, measurement and analysis of data, and discusses the ethical issues and limitations the researcher will encounter during the research study.

In Chapter 2 of this study, the researcher reviewed the different philosophical assumptions in research categorised as epistemological, ontological and axiological assumptions. Also, a review of a number of research philosophies (positivism, critical realism, interpretivism, postmodernism and pragmatism), that are widely used in business and management research, was conducted in the same chapter. Philosophical assumptions shape the type of research philosophy, which in turn underpins the researcher’s methodological choice, research strategy, data-collection techniques and analysis procedures. As discussed earlier in Chapter 2, the research philosophy underlying this research study relates mainly to positivism. However, the study also has footprints of the pragmatism research philosophy. Saunders *et al*. (2006) argue that a positivist researcher has greater independence to undertake research in a value-free way and from an objective stance. Positivists use existing theory to develop hypotheses that would be tested and confirmed partially, wholly, or refuted, resulting in further development of theory that can be tested through further research.

This chapter builds on Chapter 2 of this study. Based on the research philosophy chosen for the study, this chapter explores the three research methodological choices, i.e. quantitative, qualitative or a mixed-methods research design, with a view to identifying the appropriate research design and strategies for this study. It proceeds with sections describing the data types, sample selection, and earnings quality measures used in this study. The chapter concludes by explicating the analysis approach for the empirical data, the reliability and validity of the data and analysis thereof, the limitations and mitigations in the research methodology, and ethical considerations.

6.2 Research methodological choice

Research can be conducted by following either a quantitative, qualitative, or mixed-methods research design (Bhattacherjee, 2012:35; Creswell, 2003:4; Saunders *et al.*, 2016:164). Each of these options requires a different mix of elements to achieve a coherent research design.

6.2.1 Quantitative research design

Quantitative research involves the statistical, mathematical, or numerical analysis of data collected through questionnaires, surveys, polls, or by manipulating pre-existing statistical data using computational techniques. It focuses on the use of objective measurements by gathering numerical data and generalising it across groups of people or, alternatively, to explain a particular phenomenon (Babbie, 2010; Claydon, 2015; Muijs, 2010).

Quantitative research is generally associated with the positivism research philosophy, especially when used with predetermined and highly structured data-collection techniques. It can also be used within the realist and pragmatist philosophies under the mixed-methods research design. Quantitative research focuses on using data to test theory; hence, it is associated with the deductive approach to theory development. However, in circumstances where data are used to develop theory, the inductive approach can be applied (Creswell, 2003; Kumar, 2011; Saunders *et al.*, 2016; Watson, 2015). Quantitative research examines relationships between variables, which are measured numerically and analysed by applying various statistical and graphical techniques, like probability sampling, thus ensuring generalisability of the results (Bhattacherjee, 2012; Kumar, 2011). A quantitative research design may either be a “mono-method quantitative study”, i.e. uses a single data-collection technique like a questionnaire, and corresponding quantitative analytical procedure, or a “multi-method quantitative study”, which uses more than one data-collection technique and corresponding analytical procedure (Kultar, 2007; McCusker & Gunaydin, 2015; Saunders *et al.*, 2016). However, the use of multiple data-collection techniques is preferred since it mitigates the risks of using only a single method, and provides a better approach to data collection, analysis and interpretation (Bryman, 2006).

The advantage of using the quantitative research methodology is that it tries to recognise and isolate specific variables contained within the study framework, seek correlation, relationships and causality, and attempt to control the environment in which the data are collected to avoid the risk of variables, other than the ones being studied (Kumar, 2011; Kultar, 2007; Manheim & Brians, 2011; Watson, 2015). However, quantitative methods presume to have an objective approach to studying research problems, where data are controlled and measured in order to accumulate facts and to determine causes of behaviour. Consequently, the results of quantitative

research may be statistically significant, but more often humanly insignificant (Babbie, 2010; Manheim & Brians, 2011).

6.2.2 Qualitative research design

The previous section offered some insight into quantitative research. Qualitative research on the other hand is often subjective and is associated with an interpretive philosophy, since researchers usually have to make sense of the subjective and socially constructed meanings expressed on the research phenomenon (Denzin & Lincoln, 2011; Roulston & Shelton, 2015; Saunders *et al.*, 2016). It attempts to get an in-depth opinion from research participants by exploring their attitudes, behaviour and experiences through such methods like interviews, observation, focus groups, or content analysis of relevant literature (Dawson, 2002:14; Hussey & Hussey, 1997). Qualitative researchers emphasise the socially constructed nature of reality, the intimate relationship between the researcher and the study phenomenon, as well as the situational constraints that shape inquiry (Claydon, 2015; Denzin & Lincoln, 2000; Mack *et al.,* 2005). Researchers attempt to uncover trends in thoughts, opinions and feelings, thus extensively investigating the problem. Similar to quantitative research, qualitative research may also be used within the realist and pragmatist philosophies (Saunders *et al.*, 2016; Yin, 2011).

Most qualitative research commences with an inductive approach to theory development, where a naturalistic, emergent and purposeful research design is used to build theory or to expand and develop the already existing literature (Berg, 2012; Gelling, 2015; Saunders *et al.*, 2016). However, some qualitative research strategies commence with a deductive approach, which involves testing an existing theory using qualitative research procedures (Yin, 2014). In practice, the deductive approach to theory development is used in much of the qualitative research, where inductive conclusions are developed and deductive ones are tested iteratively throughout the research (Claydon, 2015; Kumar, 2011; Saunders *et al.*, 2016; Yin, 2011). A qualitative research design may either be a “mono-method qualitative study”, i.e. uses a single data-collection technique like semi-structured interviews, and a corresponding qualitative analytical procedure, or a “multi-method qualitative study”, which uses more than one data-collection technique and corresponding analytical procedures (Creswell, 2003; Roulston & Shelton, 2015; Saunders *et al.*, 2016). Qualitative research is associated with a variety of research strategies, some of which include action research, case study research, ethnography, grounded theory and narrative research (Mack *et al.,* 2005).

Supporters of the qualitative research design argue that qualitative methods generate rich and detailed data that leave the participants’ perspectives intact and provide multiple contexts for understanding the research phenomena. Thus, qualitative research can be used to demonstrate

phenomena vividly or to conduct cross-case comparisons and analysis of individuals or groups (Denzin & Lincoln, 2000; Leung, 2015; Merriam, 2009). However, qualitative research is criticised for being purely descriptive, lacking validity, and not robust enough, compared to statistical approaches (Goulding, 2002).

6.2.3 Mixed-methods research design

A mixed-methods research design combines the use of quantitative and qualitative data-collection techniques and analytical procedures. Mixed-methods research design can be associated with the critical realism research philosophy. Critical realists believe that the way in which each individual interprets and understands the world they live in will be affected by their particular social conditioning. To achieve this, researchers may use, for example, quantitative analysis of officially published data, followed by qualitative research methods to explore perceptions (Mayoh & Onwuegbuzie, 2015; Saunders *et al.*, 2016; Tashakkori & Teddlie, 2010; Teddlie & Tashakkori, 2009). Pragmatists are also likely to be influenced by a mixed-methods research design (Tashakkori & Teddlie, 2010). Pragmatist researchers value both qualitative and quantitative research, whereby the nature of the research question, research context and likely research consequences influence the most appropriate methodological choice (Nastasi *et al.,* 2010).

A mixed-methods research design may use a deductive, inductive, or abductive approach to theory development. For example, a theoretical proposition or propositions may be tested by quantitative or qualitative research, followed by developing a richer theoretical understanding using further quantitative or qualitative research designs (Creswell, 2003; McCusker & Gunaydin, 2015; Saunders *et al.*, 2016; Tashakkori & Teddlie, 2010). The mixed-methods research design combines qualitative and quantitative techniques in a variety of ways ranging from simple, concurrent forms to more complex and sequential forms. The principal mixed-methods research designs therefore include concurrent mixed-methods design, sequential exploratory design, sequential explanatory design, and sequential multi-phase design (Creswell, 2009; Creswell & Plano, 2011).

Concurrent mixed-methods research involves the separate use of quantitative and qualitative methods within a single phase of data collection and analysis. This allows both sets of results to be interpreted together, which provides a richer and more comprehensive response to the research question compared to the use of a mono method design. Sequential mixed-methods research involves more than one phase of data collection and analysis, where the researcher will follow the use of one method with another in order to expand or elaborate on the initial findings. Sequential mixed methods can be a “sequential exploratory research design” (qualitative followed by quantitative), a “sequential explanatory research design” (quantitative followed by qualitative),

or a “sequential multi-design” (e.g. qualitative followed by quantitative, then by a further phase of qualitative, and vice versa) (Greene, 2007; Halcomb & Hickman, 2015; Ridenour & Newman, 2008; Saunders *et al.*, 2016; Teddlie & Tashakkori, 2009).

The use of a mixed-methods research design helps to establish the generalisability of a study or its relative importance. This is because mixed methods may allow meanings and findings to be elaborated, enhanced, clarified, confirmed, illustrated or linked, which ensures credibility of a study and production of more complete knowledge. Mixed methods design also encourages triangulation, i.e. the use of several means (methods, data sources and researchers) to examine the same phenomenon. This helps to ascertain if the findings from one method corroborate the findings from the other method (Bryman, 2006; Creswell, 2003; Greene *et al.,* 1989; Guetterman *et al.,* 2015). However, a mixed-methods design has some limitations, namely it can be very complex; takes much more time to plan and implement; and it may be unclear how to resolve discrepancies that arise in the interpretation of the findings (Greene, 2007; Ridenour & Newman, 2008).

6.2.4 Research design for this study

The research design for this study is a quantitative research design. The purpose of this research design is in keeping with explanatory studies or causal study, adapting a deductive approach to theory development. Quantitative research examines relationships between variables, which are measured numerically and analysed using a range of graphical and statistical techniques. This methodology mostly uses probability-sampling techniques to ensure generalisability of results (Sekaran & Bougie, 2013; Watson, 2015). Considering the objectives of this study, the first and second objectives are addressed by a critical review of various literature on SE and FC accounting methods, earnings management and earnings quality measures. The third and fourth objectives of the study are addressed through an empirical study. A longitudinal design is used to evaluate the issue of earnings quality of SE and FC firms. The reason for using a longitudinal design rather than a cross-sectional design is that a longitudinal design allows the researcher to assess the impact of a treatment over time, say years, which results in less generalisation of conclusions (Sekaran & Bougie, 2013; University of Southern California, 2018). Therefore, the positivism research philosophy was adapted in this research to address the main objective of the study.

6.3 Data types

The two major types of data for research are primary and secondary data. Primary data refers to data collected by the researcher himself/herself through surveys, questionnaires, interviews, case study and observation. Such data have never been gathered before, whether in a particular way

or at a certain period. Secondary data on the other hand, are data that already exist, i.e. the data have not been collected or originated by the researcher or user. Some of the secondary data sources include newspaper articles, company annual reports, journal articles, financial and statistical databases, book reviews, etc.

To achieve the objectives of the study, this research relied entirely on secondary data from various sources including company annual reports, an online financial database, textbooks and peer-reviewed journal articles, among others. Company annual reports, which are the major source of information about a company's activities and financial performance, were downloaded from EDGAR (Electronic Data Gathering, Analysis and Retrieval), a database freely available to the public via the internet. It is a requirement for all public companies in the US to file their annual reports (Form 10-K) with the SEC on the EDGAR online database (Securities Exchange Act, 1934). The annual reports were reviewed to identify the accounting method (SE or FC) used by the companies. The Osiris Financial Database for public listed companies worldwide, accessed through Baker Library of Harvard Business School was used as a source of company accounts and other financial data over various years. This database includes accounts/reports as they were originally filed or presented in companies' annual reports. The reports range from summaries, to standardised reports, to raw data. It is generally considered to be a highly credible source of financial data, due to the accuracy and comprehensiveness of the data contained (Bureau van Dijk, 2007). Peer-reviewed journal articles, textbooks, theses and dissertations, as well as other relevant documents were a source of literature and information that formed the greatest part of the literature review of this study.

6.3.1 Merits of using secondary data

Using secondary data for research offers savings in resources, specifically in terms of time and money. It is generally much less expensive and time saving to use secondary data than to collect the data by the researcher him/herself, especially where the data downloaded are compatible with the software to be used in data analysis. The researcher can therefore spend more time focusing on analysis and interpretation of the data. Besides, secondary data are also considered to be of higher quality than primary data, especially if the data are obtained from credible sources like peer-reviewed journals, textbooks and recognised databases, among others. Secondary data also generally provide a source of data that are often permanent and available in a form that may be checked relatively easily by other researchers (Denscombe, 2007; Smith, 2006; Vartanian, 2011).

Secondary data provide a possibility for undertaking longitudinal studies due to the ease of accessing data; hence, overcoming the time constraint challenge, which is common in many

research projects. Comparative research may also be possible if comparable data are available. For example, sometimes the researcher might find it useful to compare data collected by him/herself with secondary data, or reanalysing the secondary data to compare the findings. This could result into unforeseen or unexpected new discoveries (Frankfort-Nachmias & Nachmias, 1996:305-307; Saunders *et al.*, 2016:331; Walliman, 2011).

6.3.2 Demerits of using secondary data

In some cases, accessing secondary data may be difficult or costly, especially where the data were collected for commercial reasons or in circumstances where the electronic database required by the researcher is not available via the researcher's university library. Besides, even with the availability of the secondary data, it may have been collected for a purpose that does not match the needs of the current researcher. The data being considered may not be appropriate to the research questions or may only address the research objectives partially. This could arise where the data were collected a few years earlier and thus not be current, or when the methods of collection differ from the original data sources that have been integrated subsequently to form the secondary dataset that the researcher intends to use. Therefore, the researcher may have to find an alternative source, or collect the data him/herself. In addition, secondary data obtained from unreliable sources can affect the quality of the research results, since the researcher has no real control over the quality of the secondary data (Denscombe, 2007; Frankfort-Nachmias & Nachmias, 1996:308; Saunders *et al.*, 2016:332-333).

In this study, all the above demerits were mitigated by ensuring that the secondary data used in the study were obtained from reliable and credible sources, including various peer-reviewed journals, the Osiris Financial Database and EDGAR, among others.

6.4 Sample selection

The sample selected for the empirical research consists of 84 public-listed oil and gas firms in the US (41 FC firms and 43 SE firms) with data for the years 2007 to 2015. These firms are engaged primarily in the exploration and production of crude oil and natural gas. The initial set consisted of 119 firms, drawn from Standard Industrial Classification (SIC) code 1311 (Crude Petroleum and Natural Gas) under the Osiris Financial Database. This list consists of firms whose primary business involves exploration, development and production of crude oil and natural gas; therefore, the choice of accounting method would influence their financial statements significantly. Table 6.1 below shows the search strategy applied in Osiris to arrive at the initial set of firms. To arrive at the sample size of 84 firms, the following constraints were considered: 23 firms were deleted because they had been wrongly classified under SIC code 1311 as they are not engaged

in oil and gas exploration and production; and 12 firms were deleted because necessary Osiris data over the study period were missing. Table 6.2 below shows the list of firms that were excluded from the initial set of firms. The sample size selected for the study is considered sufficient since it is comparable to sample sizes used in other similar research studies. For example: Alipour *et al.* (2014) used a sample size of 81 firms in their study of earnings quality of Iranian public and private firms, while Abdelghany (2005) selected 90 firms in a study measuring the quality of earnings on companies listed on the New York Stock Exchange.

Table 6.1: Osiris initial search strategy

Product name		Osiris	
Update number		191	
Software version		191.00	
Data update		18/11/2016 (n° 2382)	
Username		HarvardUniversity-37346	
Export date		21/11/2016	
Cut-off date		31/03	
		Step result	Search result
1.	Listed/Unlisted companies: Publicly listed companies	55,047	55,047
2.	World region/Country: United States	17,563	9,335
3.	US SIC (Primary codes only): 1311 - Crude petroleum and natural gas	1,268	294
4.	Accounting practice: US GAAP (Generally Accepted Accounting Principles)	17,782	293
5.	Years with available accounts: 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007	28,843	119
	Boolean search : 1 And 2 And 3 And 4 And 5		
		TOTAL	**119**

(Source: Osiris Financial Database)

The researcher chose to focus on US companies because the FC and SE accounting methods have their origin in the US, and therefore it is more practical to identify categories of E&P firms using either of the two accounting methods. Besides, the US is one of the major oil and gas producing nations globally (Inkpen & Moffett, 2011:8-9). In addition, the study focused on firms that report under the US SEC regulation to avoid disparities in comparing firms who report under different regulations. Because of the time constraint, the study covered a nine-year period, from 2007 to 2015.

Table 6.2: Firms excluded from the initial sample

No.	Company name	Comments
1	Trans-Pacific Aerospace Company, Inc.	Aerospace company
2	Cannabis Science, Inc.	Bio-tech company
3	BMB Munai, Inc.	Brokerage and financial services firm
4	Clean Coal Technologies, Inc.	Coal processing
5	Synthesis Energy Systems, Inc.	Energy company
6	Oha Investment Corporation	Finance company
7	Enservco Corporation	Logistics and management services
8	CKX Lands, Inc.	Management of land
9	Caspian Services, Inc.	Marine
10	Zonzia Media, Inc.	Media
11	Growblox Sciences, Inc.	Medical company
12	Sanchez Production Partners LP	Mid-stream company
13	Royal Energy Resources, Inc.	Mining - coal, copper and others
14	Tetra Technologies Inc.	Oil and gas services
15	MV Oil Trust	Oil trust
16	Cannabics Pharmaceuticals Inc.	Pharmaceuticals
17	Dynegy Inc.	Power generation
18	Par Pacific Holdings, Inc.	Refinery and marketing
19	Bakken Energy Corp.	Service company/oil and gas property
20	Petrolia Energy Corporation	Service company
21	Advanced Voice Recognition Systems, Inc.	Software development company
22	Quest Solution, Inc.	Supply chain and inventory management
23	Enbridge Energy Management, LLC	Transport and distribute energy
24	Bonanza Creek Energy, Inc.	Missing data
25	Discovery Energy Corp.	Missing data
26	Empire Petroleum Corp	Missing data
27	Eurasia Energy Ltd	Missing data
28	Gulfslope Energy, Inc.	Missing data
29	Laredo Petroleum, Inc.	Missing data
30	Matador Resources Company	Missing data
31	Midstates Petroleum Company, Inc.	Missing data
32	Oasis Petroleum Inc.	Missing data
33	Park Place Energy Inc.	Missing data
34	Ring Energy, Inc.	Missing data
35	Victory Energy Corporation	Missing data

(Source: Osiris Financial Database; Company Annual Reports; Company websites)

As stated earlier, annual company reports were downloaded from a public online database called EDGAR (Electronic Data Gathering, Analysis and Retrieval), which is maintained by the SEC. It is a requirement for all public companies in the US to file their annual reports with the SEC (Securities Exchange Act, 1934). These reports were used to identify the accounting method (SE or FC) used by each of the selected companies. The sample firms using either SE or FC accounting methods are listed in Table 6.3 below. The annual sample data required for the empirical study were derived from the Osiris Financial Database.

Table 6.3: Sampled FC and SE firms

No.	SE Firms	FC Firms
1	Allied Resources, Inc.	Abraxas Petroleum Corp
2	Altex Industries, Inc.	American Energy Group, Ltd. (The)
3	Anadarko Petroleum Corp	Apache Corp
4	Approach Resources Inc.	Arkanova Energy Corporation
5	Arete Industries, Inc.	Barnwell Industries, Inc.
6	Bill Barrett Corporation	Blue DoL.P.hin Energy Co
7	Breitburn Energy Partners L.P.	Callon Petroleum Co
8	Cabot Oil & Gas Corporation	Carrizo Oil & Gas, Inc.
9	Central Natural Resources, Inc.	Chesapeake Energy Corp
10	Clayton Williams Energy Inc.	Cimarex Energy Co.
11	Cobalt International Energy, Inc.	Delta International Oil & Gas Inc.
12	Comstock Resources Inc.	Denbury Resources Inc.
13	Concho Resources Inc.	Devon Energy Corp
14	Contango Oil & Gas Co	Dorchester Minerals L.P.
15	Continental Resources, Inc.	Enerjex Resources, Inc.
16	Daybreak Oil & Gas Inc.	Evolution Petroleum Corporation
17	Earth stone Energy, Inc.	Exco Resources, Inc.
18	Eog Resources, Inc.	Gran Tierra Energy Inc.
19	Erin Energy Corporation	Gulfport Energy Corp.
20	EV Energy Partners, L.P.	Halcon Resources Corporation
21	Fieldpoint Petroleum Corp.	Houston American Energy Corporation
22	Harvest Natural Resources, Inc.	Hydrocarb Energy Corporation
23	Isramco Inc	Hyperdynamics Corporation
24	Jayhawk Energy, Inc.	Lucas Energy, Inc.
25	Legacy Reserves L.P.	Mexco Energy Corporation
26	Linn Energy, L.L.C.	New Concept Energy, Inc.
27	Magellan Petroleum Corp	Newfield Exploration Co

No.	SE Firms	FC Firms
28	Noble Energy, Inc.	Northern Oil & Gas, Inc.
29	Occidental Petroleum Corp	Petro River Oil Corp.
30	Panhandle Oil And Gas Inc.	Petroquest Energy, Inc.
31	PDC Energy, Inc.	Resolute Energy Corporation
32	Pioneer Natural Resources Co	Sandridge Energy, Inc.
33	Prime Energy Corp	Spindletop Oil & Gas Co.
34	QEP Resources, Inc.	Stone Energy Corp
35	Range Resources Corp	Swift Energy Co
36	Reserve Petroleum Company, The	Tengasco, Inc
37	Rex Energy Corporation	Triangle Petroleum Corporation
38	Royale Energy Inc.	Unit Corp.
39	Sm Energy Company	Vanguard Natural Resources, L.L.C.
40	Trans Energy, Inc.	W&T Offshore, Inc.
41	T-Rex Oil, Inc.	Yuma Energy, Inc.
42	Vaalco Energy, Inc.	
43	Whiting Petroleum Corporation	

(Source: Annual Reports/10-K Reports downloaded for the study)

6.5 Earnings quality measures used in this research

It is important to measure the quality of earnings reported by businesses since earnings consist of two different parts, being cash flow and accruals (Dechow, 1994). The cash part is objective and cannot be manipulated by the managers. By contrast, the accrual part is discretionary and can thus be manipulated by management. Managers can manipulate accrual items for their personal interests thereby reducing the quality of earnings, and consequently resulting in stakeholders making inappropriate decisions based on the company's performance (Alipour *et al.,* 2014; Dechow & Dichev, 2002; Huynh, 2018).

Since there are different definitions of earnings quality, there are also various measures of earnings quality that have commonly been used in accounting research (Bradshaw *et al.,* 1999). However, Francis *et al.* (2004) identify seven measures of earnings quality, broadly classified as either 'accounting-based' or 'market-based' attributes. The accounting-based attributes, which rely on accounting data for their estimation, include (1) accruals quality, (2) persistence, (3) predictability and (4) smoothness. These attributes assume that the function of earnings is to allocate cash flows to reporting periods via accruals. On the other hand, the market-based attributes are (5) value relevance, (6) timeliness, and (7) conservatism. These assume that the function of earnings is to reflect economic income as represented by stock returns (Gaio &

Raposo, 2011). In the present research, all the seven measures are used to estimate earnings quality of SE and FC firms, which are discussed below.

6.5.1 Earnings predictability

The first measure of earnings quality used in this research is predictability. This measure is the R^2 from the regression of future profit and reported historical profit (see Subsection 5.6.1). The higher the R^2, the more the earnings predictability and consequently the higher earnings quality will be.

6.5.2 Earnings persistence

In this research, earnings persistence is measured using Sloan's (1996) approach, as the slope coefficient $\beta_{1,k}$ of the regression of future profit and reported historical profit (Model 1) (see Subsections 5.6.1 & 5.6.2). The closer $\beta_{1,k}$ is to one, the more persistent will be the earnings and consequently the higher the quality of earnings. On the other hand, values of $\beta_{1,k}$ close to zero imply high transitory (low quality) earnings.

6.5.3 Earnings smoothness

In this study, earnings smoothness is measured as the ratio of the firms' standard deviation of operating income (earnings before interest and taxes) scaled by total assets, to the standard deviation of cash flows from operations scaled by total assets (see Subsection 5.6.3). Greater values of the ratio indicate lower smoothness, thus higher quality earnings, while smaller values of the ratio are associated with higher smoothness of earnings, thus lower earnings quality.

6.5.4 Accruals quality

In this study, the regression residuals from the regression of working capital accruals into last-period, current, and next-period cash flows from operations are used to calculate the accrual quality metric, where accrual quality metric is the standard deviation of a firm's estimated residuals (see Subsection 5.6.4). The large (small) values of the accrual quality metric correspond to poor (good) accruals quality, because there is less (more) precision about the mapping of current accruals into last-period, current, and next-period cash flows.

6.5.5 Value relevance

In this research, value relevance is measured as the R^2 from the regression of returns on the level and change in earnings, where small (large) values of the R^2 imply less (more) value relevant earnings and thus lower (higher) earnings quality (see Subsection 5.6.5).

6.5.6 Timeliness

Timeliness reflects the ability of earnings to reflect good news and bad news that is impounded in returns. In this research, timeliness is measured as the adjusted R^2 or explanatory power of a reverse regression of earnings and returns, where smaller values of R^2 imply less timely (i.e. lower quality) earnings and vice versa (see Subsection 5.6.6).

6.5.7 Conservatism

In this research, conservatism is measured as the difference of the slope coefficients on negative returns ($\beta_{3,k}$) to the slope coefficients on positive returns ($\beta_{2,k}$) in a reverse regression of earnings on returns (see Subsections 5.6.6 & 5.6.7). The higher the difference, the more conservative are the earnings and consequently higher earnings quality, and vice versa.

6.6 Hypotheses of the study

To compare the earnings quality of SE and FC firms based on the seven earnings quality metrics identified above, the hypotheses were formulated as shown in Table 6.4 below:

Table 6.4: Hypotheses for the study

No.	Null hypothesis	Alternative hypothesis
1	There is no difference in the earnings quality of FC and SE firms based on earnings predictability.	There is a significant difference in the earnings quality of FC and SE firms based on earnings predictability.
2	There is no difference in the earnings quality of FC and SE firms based on earnings persistence.	There is a significant difference in the earnings quality of FC and SE firms based on earnings persistence.
3	There is no difference in the earnings quality of FC and SE firms based on earnings smoothness.	There is a significant difference in the earnings quality of FC and SE firms based on earnings smoothness.
4	There is no difference in the earnings quality of FC and SE firms based on accrual quality.	There is a significant difference in the earnings quality of FC and SE firms based on accrual quality.
5	There is no difference in the earnings quality of FC and SE firms based on value relevance.	There is a significant difference in the earnings quality of FC and SE firms based on value relevance.
6	There is no difference in the earnings quality of FC and SE firms based on timeliness.	There is a significant difference in the earnings quality of FC and SE firms based on timeliness.
7	There is no difference in the earnings quality of FC and SE firms based on conservatism.	There is a significant difference in the earnings quality of FC and SE firms based on conservatism.

(Source: Author's construct)

6.7 Data analysis and interpretations

Data that are in a raw form, that is, data not processed and analysed, have little meaning for most people. It is therefore important to process these data into information that will address the research problem (Malhotra, 2010:465). Quantitative data refer to all such primary and secondary data, and for these to be useful, the data need to be analysed and interpreted. Statistical techniques can assist the researcher in this process. Statistical analysis techniques can be categorised as univariate, bivariate and multivariate, depending on the number of variables involved. Univariate techniques analyse the qualities of one variable at a time, for example descriptive tests. Bivariate analysis considers the properties of two variables in relation to each other, while multivariate analysis considers relationships between more than two variables. In both bivariate and multivariate analyses, inferences can be drawn from these types of analyses (Greener, 2008:59; Walliman, 2011:117). In this study, bivariate and multivariate approaches were adopted to analyse the earnings quality of SE and FC firms (see Section 7.7). A univariate approach was also adapted by examining one variable at a time using graphs and descriptive statistics (see Section 7.4). Microsoft Excel 2016 and the Statistical Package for Social Science (IBM SPSS Statistics 20) were used to analyse the data.

6.7.1 Exploring and presenting data

Once the data have been entered in the analysis software and checked for errors, they will be ready for analysis. The use of graphs, pie charts, frequencies and tables helps in exploring and presenting the individual variables of the data. The key aspects to consider in this depend on the research question(s) and objectives of the research. Data for individual variables can be summarised by use of a table (frequency distribution). However, tables attach no visual significance to highest and lowest data values, unlike bar graphs and histograms. Therefore, bar graphs and histograms can be used to provide a more accurate representation of data in research reports (Frankfort-Nachmias & Nachmias, 1996; Saunders et *al.,* 2016). The trend line is the most suitable diagram for presenting variables containing numerical and longitudinal data (Kosslyn, 2006). To show proportions, pie charts are the most frequently used diagram, although bar charts can equally give good results (Anderson et *al.,* 2014). A frequency polygon, bar graph or histogram can be used to show the distribution of values for variables contained in numerical data. The data could either be positively skewed, negatively skewed, or symmetrically distributed (Dancey & Reidy, 2011).

In addition, various methods can be used to compare research variables. These include cross tabulations, multiple bar graph, compound bar chart, multiple line graph, stacked bar chart, comparative proportional pie charts and scatter graphs, among others (Saunders et *al.,* 2016). In

this study, data about the research variables were presented by use of tables, bar graphs and line graphs, comparing financial data for both SE and FC firms (see Section 7.4).

6.7.2 Descriptive statistics

Descriptive statistics are used to describe the basic features of the data in the study by providing simple summaries about the sample and the measures (Trochim, 2006). They enable the researcher to describe and compare variables numerically, focusing on two aspects – the central tendency and the dispersion (Saunders et *al.,* 2016:527). The three main ways of measuring the central tendency are mode (value that occurs most frequently), median (mid-point value in a ranked list) and mean (simple average of all the values in the distribution) (Bhattacherjee, 2012:121-122). Besides describing the central tendency for a variable, it is important to describe how the data values are dispersed around the central tendency. This can be done through various ways collectively referred to as measures of dispersion. They include range (difference between the highest and lowest values), interquartile range (difference within the middle 50% of values), variance (extent to which data values differ from the mean) and coefficient of variation (compares the extent to which data values differ from the mean between variables) (Greener, 2008:59-58; Kothari, 2004; Saunders *et al.,* 2016:528). In this study, the descriptive statistics estimated for the research variables were minimum, maximum, range, mean and standard deviation (see Table 7.13).

6.7.3 Relationship between variables

In a research project that includes several variables, besides knowing the descriptive statistics of the variables, it is important for the researcher also to know how one variable is related to another. This would help the researcher to see the nature, direction, and significance of the "bivariate" relationships of the variables used in the study (Sekaran & Bougie, 2013:288). A more widely used measure of the degree of association between two variables is the correlation coefficient. A correlation coefficient enables the researcher to quantify the strength of the relationship between two ranked or numerical variables. This coefficient lies between -1 for a perfectly negative relationship, through zero where the two variables are independent of each other, to +1 for a perfectly positive correlation between the variables (Watsham & Parramore, 1997:66-67). The correlation lambda (λ), also referred to as the Guttman coefficient of predictability, is suitable for assessing the relationship between variables that are measured on a nominal scale. Spearman's rank correlation and Kendall's rank correlation are used to examine relationships between two ordinal variables, while the Pearson's Product Moment Correlation (PMCC) is used to examine relationships between interval and or ratio variables (Frankfort-Nachmias & Nachmias, 1996; Sekaran & Bougie, 2013). In this study, the Spearman's rank correlation coefficient was used as

a measure of the strength and direction of linear relationship between variables based on the earnings quality measures (see Section 7.7). Field (2005:111) and Pallant (2007:132) provide the following guidelines for interpreting the strength of correlation coefficients: small (weak) effect: *r* = .10 to .29; medium (moderate) effect: *r* = .30 to .49 and large (strong) effect: *r* = .50 to 1.00. This study used the same interpretations for the correlation coefficient.

Although there can be a relationship between variables, it is also important for the researcher to know if any correlation found between the two variables is significant or not, i.e. if it has occurred solely by chance or if there is a high probability of its existence. The *p*-value, *p* = .05 is generally used as the significance level in most social-science research. This implies that 95 times out of 100, the researcher can be sure that there is a true or significant correlation between two variables, and there is only a 5% chance that the relationship does not truly exist (Greener, 2008; Saunders *et al.,* 2016; Sekaran & Bougie, 2013:290). The *p*-value was used in this study to evaluate the significance of the relationship between two variables, considering a significance level of 10% (see Chapter 7). The reason for choosing a 10% significance level is because the analysis was done for each year separately and not for the total period of nine years. Therefore, as the number of data repetitions per year is smaller than for the total period, a higher significance level is justified.

6.7.4 Hypothesis testing

Hypothesis testing has two broad approaches, the *p*-value approach and the classical approach, which is the older of the two. The *p*-value approach has become more popular with the advent of more sophisticated software packages (Watsham & Parramore, 1997:170). When testing a hypothesis, two hypotheses are established, the "null hypothesis" and the "alternative hypothesis". The null hypothesis, usually denoted as H_0, is the assumption that will be accepted pending evidence against it from a statistical test procedure. It states that there is no statistical difference between two or more parameters. On the other hand, the alternative hypothesis, denoted as H_1, is the assumption which will be accepted if the statistical test leads to the rejection of the null hypothesis. It states that there is a difference between two or more parameters (Kumar, 2011; Saunders *et al.,* 2016; Watsham & Parramore, 1997).

The rejection or acceptance of a null hypothesis is based on some level of significance criterion (Kumar, 2011:235). The significance level of a test, commonly 5%, is the probability that the test statistic lies in the critical region when the null hypothesis is true. If a test at a significance level of 5% leads to the rejection of the null hypothesis, then the value of the test statistic is said to be "significant" (Watsham & Parramore, 1997:171).

6.7.4.1 The *p*-value method of hypothesis testing

As mentioned earlier, the *p*-value approach has become more popular with the advent of more sophisticated software packages. Most statistical software like SPSS and STATA use the *p*-value method in testing for a hypothesis. The *p*-value is the value, which if the null hypothesis is correct, represents the probability of getting a value for the standardised test statistic that is more extreme than the one observed. For a one-tailed test, this is equal to the area in the tail to the right (right-tailed test) or to the left (left-tailed test) of the value of the test statistic. For a two-tailed test, it is equal to double the area in the tail to the right or left of the test statistic (Frankfort-Nachmias & Nachmias, 1996; Sekaran & Bougie, 2013; Watsham & Parramore, 1997:177). The decision rule under the *p*-value method is the same for left-tailed, right-tailed and two-tailed test whereby; for a given degree of significance of the test, say α, the null hypothesis is accepted if the *p*-value is greater or equal to α, and rejected if otherwise. However, in case of a two-tailed test, the *p*-value as displayed by a computer statistical software package may have to be doubled in order to find the probability of getting a test statistic more extreme than the one observed (Saunders et *al.,* 2016; Watsham & Parramore, 1997). This study used the *p*-value method in hypothesis testing, considering a significance level of 10% and the results thereof are presented in the next chapter.

6.7.4.2 The independent samples *t*-tests

The independent samples *t*-test compares the means of two independent groups on the same continuous dependent variable in order to determine whether there is statistical evidence that the associated population means are significantly different (Kent State University, 2016; Laerd Statistics, 2013; Sekaran & Bougie, 2013:313). If the likelihood of any difference between these two groups occurring by chance alone is low, as represented by a large *t* statistic, with a probability less than .05, then this is termed as statistically significant (Saunders *et al.,* 2016:543). Although the *t*-test assumes that the data are normally distributed, this assumption can be ignored without causing too many problems even though the sample sizes are less than 30 (Hays, 1994). In addition, the assumption that the data for the two groups have the same variance can also be ignored as long as the samples are of similar size (Hays, 1994). However, in case the data are skewed or the sample size is small, a non-parametric test, the Mann-Whitney *U* Test, is the most appropriate and equivalent test to the independent groups *t*-test (Dancey & Reidy, 2011). In this study, the independent samples *t*-test was used to test if there is a statistically significant difference in the samples for the research variables for SE and FC firms. The results thereof will be presented in the next chapter.

6.7.4.3 Analysis of variance (ANOVA)

Whereas the independent samples *t*-test shows whether or not there is a significant difference in the mean between two independent groups, an ANOVA helps to examine the significant mean differences between more than two groups on an interval- or ratio-scaled dependent variable (Sekaran & Bougie, 2013:314). ANOVA analyses the variance, i.e. the spread of data values within and between groups of data by comparing means. These differences are represented by the F ratio or F statistic. If the likelihood of any difference between groups occurring by chance alone is low, the F ratio will be large, with a probability of less than .05. This is also termed statistically significant (Saunders et *al.,* 2016:544).

6.7.5 Regression analysis

Regression analysis constructs and tests a mathematical model of the relationship between one dependent variable and one or more independent variables. The dependent variable is usually referred to as the *Y* variable, and the independent variable(s), the regressors, are depicted as the *X* variable(s) (Watsham & Parramore, 1997:187). The regression analysis tests the statistical strength of the model as hypothesised. A regression analysis can either be a cross-section regression (tests relationship between variables at a single point in time), or time-series regression (tests the average relationship over a sequence of points in time) (Wooldridge, 2009). Regression analysis can also be categorised as simple regression analysis and multiple regression analysis. Simple linear regression analysis models a situation where one independent variable is hypothesised to affect one dependent variable, while a multiple regression analysis is used in the case where more than one independent variable explains variance in the dependent variable (Sekaran & Bougie, 2013). Multiple regression is also a broader class of regressions that encompasses linear and nonlinear regressions with multiple explanatory variables. Linear regression endeavours to draw a line that comes closest to the data by finding the intercept and slope that define the line and minimise regression errors (Williams *et al*., 2013). Multiple linear regression analysis was applied in this study in modelling most of the measures of earnings quality. The results thereof are presented in the next chapter under Section 7.7.

Certain assumptions about the data underpin the use of multiple linear regression analysis. Four key assumptions are linearity, normality, no multicollinearity, and homoscedasticity (Ernst & Albers, 2017; Osborne & Waters, 2002). A serious violation of these assumptions may cast doubt over the trustworthiness of the statistical analysis. In this study, these four key assumptions were tested and found not to be violated, as reported in the next chapter under Subsection 7.7.1.

6.7.5.1 Significance tests of regression coefficients

Regression coefficients represent the intercept and slope of the line along which the scatter of data observations lies. It is important therefore to test how representative these estimates are of the true coefficients, achieved through testing the statistical significance of the unstandardised regression coefficients (Watsham & Parramore, 1997). When a regression model is computed, two categories of coefficients are generated, i.e. the unstandardised coefficients (b) and the standardised coefficients (beta). The unstandardised coefficient indicates the average change in dependent variable associated with a one-unit change in the independent variable, statistically controlled for the other independent variables. On the other hand, the standardised coefficient is used to compare the strength of the effect of each independent variable, whereby the independent variable with the largest standardised beta (ignoring the sign) has the strongest effect (Bhattacherjee, 2012; Sekaran & Bougie, 2013). The *t*-test for regression coefficient tests the null hypothesis that an independent variable has no effect on the dependent variable in the larger study population. In this study, the *p*-value method was used to determine the significance of each unstandardised coefficient (see Chapter 7).

6.7.5.2 The coefficient of determination

The coefficient of determination R^2 enables the researcher to assess the strength of the relationship between a numerical dependent variable and one or more independent variables. It is a statistical measure of how well the regression line approximates the real data points. It therefore provides information about the goodness of fit of the regression model (Sekaran & Bougie, 2013:316). R^2 is the percentage of variance in the dependent variable that is explained by the independent variable (Watsham & Parramore, 1997). The coefficient of determination can be used to measure how good a predictor a regression model is likely to be. If R^2 is one, the regression model fits the data perfectly and therefore is a perfect predictor. On the other hand, if R^2 is zero, then the regression predicts none of the variation. If the regression can predict only 50% of the variation, then the R^2 will be .5 (Bryman & Cramer, 1999; Saunders *et al.,* 2016). Some researchers prefer to use the adjusted R^2 statistic. This is because it takes into account the number of independent variables in a regression model, and thus helps avoid overestimating the impact of adding an independent variable on the amount of variability explained by the estimated regression model (Saunders *et al*., 2016:550). In this study, the R^2 and the adjusted R^2 were used as a measure of earnings quality and the results thereof are presented in the next chapter under Section 7.7.

6.8 Reliability and validity of the data

Reliability and validity are important in determining the quality of research in quantitative studies in the social sciences (Saunders *et al.,* 2016:202).

6.8.1 Reliability

Reliability refers to the extent to which a data-collection or measurement technique yields the same results on different occasions (Lancaster, 2005:78). It is the degree to which the measure of a construct is consistent or dependable (Bhattacherjee, 2012:56). According to Moser and Kalton (1989:353), a research instrument is considered reliable, to the extent that repeat measurements made by it under constant conditions will yield the same results. Therefore, reliability is about replication and consistency, i.e. If a researcher can replicate an earlier research design and achieve similar findings, then that research would be considered reliable (Greener, 2008:37; Saunders *et al.,* 2016:202).

Reliability can be categorised as internal and external reliability, where internal reliability is concerned with ensuring consistency during the research project, while external reliability looks at whether the data-collection techniques and analytic procedures of the researcher would produce consistent findings if repeated by the same researcher or a different researcher (Saunders *et al*., 2016:202). There are a number of ways of testing for reliability in research, namely test-retest reliability, split-half reliability, interrater reliability and interim consistency reliability. Bhattacherjee (2012:57), Kumar (2011) and Sekaran and Bougie (2013:229) explain these types of reliability as summarised below:

Test-retest reliability: a measure of consistency between two measurements (tests) of the same construct and administered to the same sample at two different points in time. The ratio of the first test with the subsequent test is an estimate of test-retest reliability, whereby the greater the ratio, the higher the reliability of the test (measurement).

Split-half reliability: is a measure designed to correlate half of the items with the other half of the items making up the instrument. The grouping is done by randomly assigning even-numbered and odd-numbered items to form two separate instruments. Reliability is calculated by the product moment correlation between scores obtained from the two halves.

Interrater reliability: is a measure of consistency between two or more independent observers (raters) of the same construct. The correlation between the measures from the two raters can serve as an estimate of the interrater reliability.

Interim consistency reliability: is a test of consistency between different items of the same construct. Items can be correlated with one another to the extent that they are independent measures of the same concept. The most common test of interim consistency reliability is Cronbach's coefficient alpha (Cronbach, 1946), used for multi-point scaled items, and the Kuder-Richardson formulas (Kuder & Richardson, 1937), used for dichotomous items. Higher coefficients indicate a better measurement instrument.

This research entirely relied on secondary data sources. Evaluation of secondary data sources is important to be sure that (1) the data will enable the researcher to answer the research questions and to meet the objectives; (2) the benefits associated with their use outweigh the costs; and (3) accessibility to the data will be possible (Saunders *et al.,* 2016). In this research, all data required in the empirical study was downloaded from the Osiris Financial Database. This database provides financials, ownership, news, ratings, earnings and stock data for the world's publicly traded companies, including banks and insurance companies from over 130 countries (Bureau van Dijk, 2007:1). Osiris maintains only the highest degree of data quality, with each data provider implementing its own rigorous combination of quality control measures. Each data provider employs expert analysts to enter, review and crosscheck data manually with senior analysts, who often perform random audits. In addition, customised software programs scrutinise accounts at all levels for inconsistencies and errors. Finally, before each Osiris update is released to the clients, Bureau van Dijk Electronic Publishing also implements a series of quality control measures to check the software and the data (Bureau van Dijk, 2007). These quality-control processes are a clear indication of the quality and reputation of data in Osiris; hence, its reliability and validity.

6.8.2 Validity

Validity refers to the degree to which the researcher has measured what he has set out to measure (Smith, 1991:106). According to Saunders *et al.* (2016:202), validity refers to the appropriateness of the measures used, accuracy of the analysis of the results and generalisability of the findings. Babbie (1989:133) refers to validity as the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. To achieve validity, there should be no mistakes regarding the measurement of the construct. Validity can be categorised as either internal or external validity. Internal validity is achieved when the research demonstrates the casual relationship between two variables accurately, while external validity is concerned about the extent to which a study's research findings can be generalised to other relevant settings or groups (Sekaran & Bougie, 2013:225).

There are three broad measures of validity namely; content validity, criterion-related validity and construct validity. Bhattacherjee (2012:57), Kumar (2011), Saunders et *al.* (2016:450-451) and Sekaran and Bougie (2013:229) explain these types of validity as summarised below:

Content validity: refers to the extent to which the measurement device, like questions in a questionnaire, provides adequate coverage of the investigative questions. Content validity can be done by use of a panel of individuals to assess whether each question in the questionnaire is "essential", "useful but not essential" or "not necessary".

Criterion-related validity: is the ability of the measures (questions) to make accurate predictions. Assessing criterion-related validity can be undertaken using statistical analysis such as correlation, involving comparing the data from the researcher's questionnaire with that specified in the criterion.

Construct validity: measures how well the results obtained from the use of the measure fit the theories around which the test is designed. This can be done through convergent validity and discriminant validity.

These forms of validity can be established through correlation analysis and factor analysis, among others. In this research, correlation analysis was used in establishing validity of the research variables based on the earnings quality measures. The results thereof are presented in Chapter 7.

6.9 Limitations and mitigations

Differences in the scope of activities and operations among the petroleum oil and gas companies could hinder effective comparison. For example, some firms are independent oil and gas companies, engaged primarily in E&P (upstream) activities, while others are integrated oil and gas companies involved in upstream and at least one downstream activity such as refining, processing, marketing or distribution. To address this limitation, the researcher selected companies with key similarities in terms of operations and regarded as peers. This research focused on independent oil and gas firms in the US engaged primarily in upstream activities. Integrated oil and gas firms were excluded from the initial sample to avoid significant distortion in the data and consequently the research findings. Such firms derive revenue from both upstream and downstream activities, and therefore comparing them with firms that derive their income from only upstream activities could distort the research findings. In addition, a number of companies were deleted from the initial set of companies generated from Osiris due to missing data over the study period. The remaining sample of 84 firms was considered sufficient to address the research

objectives and consequently the overall aim of the study. However, the results are not entirely generalisable because the sample was not randomly selected.

6.10 Ethical considerations

The researcher familiarised himself with the guidelines for research ethics contained in the North-West University's (NWU) Manual for Postgraduate Studies, and the NWU Policy on Plagiarism and Academic Misconduct. Consequently, the Ethics form "Student Statement on Research Ethics" was filled in and submitted to the University. The eleven questions in the form were all answered "No", implying that ethical problems were highly unlikely to occur. This research considered issues related to conforming to accepted standards of social and ethical behaviour. It observed the interests of the University and its reputation, as well as its partners. Ethical problems like anonymity, confidentiality and informed consent were unlikely to occur since this research relied on financial information that is available and easily accessible to the public. For example, the Osiris Financial Database was accessed through Baker Library of Harvard Business School, after obtaining permission from the library authorities of that university.

6.11 Conclusion

This chapter has presented a detailed account of the research designs and strategies used in the study, including procedures, data-collection tools, data-collection and analysis methods, and data reliability and validity issues. All these were linked to the research philosophy of the study, which was explained in Chapter 2. This research is mainly placed on the positivist philosophical position, with footprints of both the pragmatist and interpretivist positions. The study adapts a quantitative research methodology, adapting a deductive approach to theory development. A longitudinal design is used to evaluate the issue of earnings quality of SE and FC firms, with the unit of analysis being at firm level. The chapter also presented the limitations and mitigations of the study, plus the ethical considerations while conducting the research.

The study utilises a mixture of survey, archival and documentary research strategies, relying entirely on secondary data from various sources, including company annual reports, the Osiris Financial Database, textbooks and peer-reviewed journal articles, among others. The study covered a sample of 84 public-listed oil and gas companies in the US (41 FC firms and 43 SE firms) engaged primarily in the exploration and production of crude oil and natural gas, with data for the years 2007 to 2015. Seven earnings-quality metrics are used to estimate earnings quality, and a longitudinal design is used to evaluate the issue of earnings quality for SE and FC firms. The *p*-value method is used to test the hypotheses for the study.

The next chapter, Analysis and Results, attempts to present the results of the empirical study and consequently addresses the overall aim of the study.

CHAPTER 7: ANALYSIS AND RESULTS

7.1 Introduction

The main objective of this study is to ascertain which, if any, of the two accounting methods (SE and FC) provides superior earnings quality using various earnings quality measures (see Subsection 1.3.1). The relevance of this study is that investors would be misled in making decisions based on financial information if one method leads to significantly lower earnings quality; hence the hypotheses to be tested (see Section 1.4). Therefore, the distinct contribution of the study is to provide empirical evidence as to whether there is a significant difference between earnings quality of SE and FC firms. The main objective would be achieved by the secondary objectives as listed below (see Subsection 1.3.2):

- Reviewing the literature on the SE and FC accounting methods.
- Reviewing the literature on earnings management and the various earnings quality measures.
- Comparing financial data and financial ratios for SE and FC firms.
- Empirically comparing the quality of earnings of SE and FC firms using various earnings quality measures.

The previous chapter presented the research methodology used in this study. This chapter reports on the results from the data analysis and interpretation thereof. The analysis is structured on a comparative basis by accounting method, incorporating descriptive, correlation and inferential statistics. This chapter starts by discussing how the data generated from the Osiris Financial Database were prepared for analysis. This is followed by a comparison of the key financial data and financial ratios for SE and FC firms presented in the form of tables and graphs. This is followed by descriptive statistics on the study variables and relationships between the variables. The chapter concludes by discussing the results of the comparisons of the earnings quality of SE and FC firms using the seven earnings quality measures. The results from the analysis will be interlinked and contrasted to existing literature in the next chapter.

7.2 Data preparation

All the data required for the empirical study were downloaded from the Osiris Financial Database. This database provides financial and ownership information, news, ratings, earnings and stock data for the world's publicly traded companies, including banks and insurance companies from over 130 countries (Bureau van Dijk, 2011:1). Annual reports for each of the selected E&P

companies were downloaded from EDGAR (Electronic Data Gathering, Analysis and Retrieval) to ascertain the accounting method used by each of the firms, but also to confirm the accuracy of the data reported in the database. This was done for selected firms by randomly reconciling the data obtained from the database with those in the published annual reports. It is important to note that no inconsistencies were found during this process; hence, reliability could be placed on the data. The data were then aggregated in Microsoft Excel and adequate checks performed to identify any missing, incomplete or improper data with the intention to remove such firms/items from the dataset. The necessary research variables, based on the earnings-quality measures specified in the previous chapter, were computed and sorted through Microsoft Excel to ensure data compatibility with statistical analysis software. The variables were then migrated to the IBM SPSS version 20 software for detailed analysis.

7.3 Composition of SE and FC firms in the sample

Current accounting rules allow oil and gas firms to account for E&P expenditures using either the SE or FC accounting methods (Bryant, 2003:12; Misund, 2017). The sample for this study consisted of 84 oil and gas firms engaged primarily in E&P activities, with financial data for the years 2007 to 2015.

Table 7.1: Composition of SE and FC firms

Companies	Number of firms	Percentage
SE firms	43	51
FC firms	41	49
Total	**84**	**100**

(Source: Author's construct)

Table 7.1 above shows the composition of SE and FC firms from the sample of 84 oil and gas firms. Fifty-one percent (51%) of the firms were found to be using the SE method, while 49% were using the FC method of accounting. It is evident from the above analysis that neither of the two methods dominates accounting for E&P activities in the US, since oil and gas companies appear to have equal preference for the two methods.

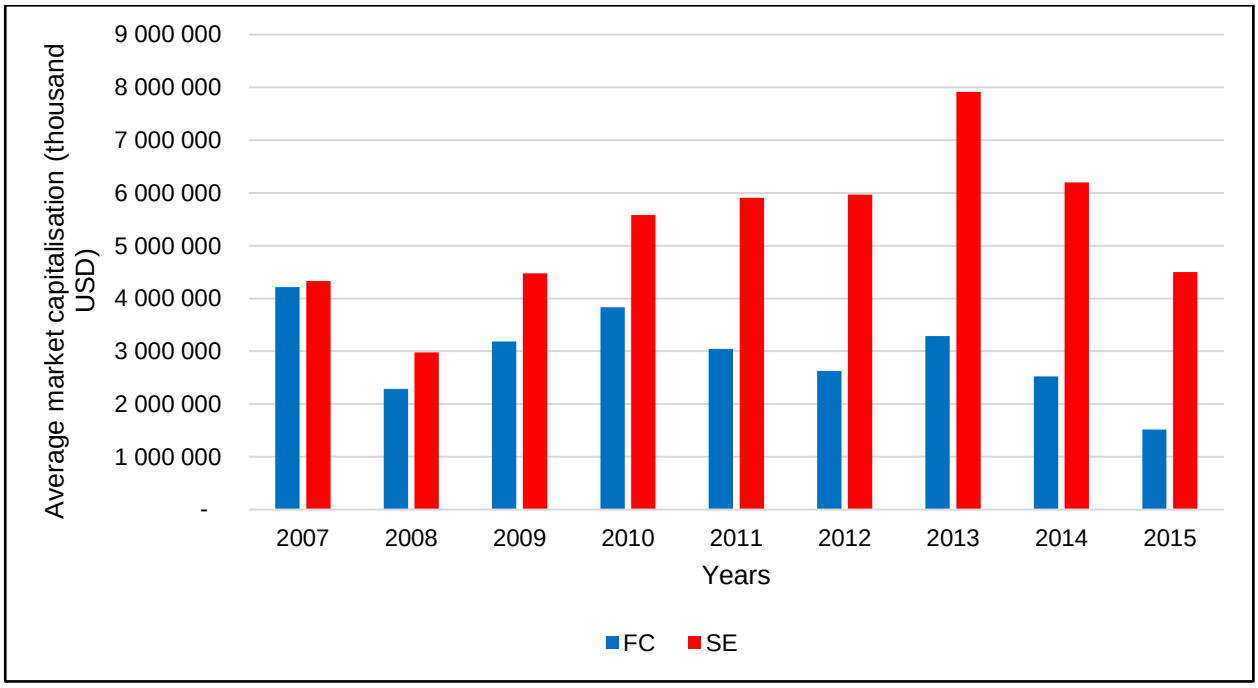
7.4 Comparison of financial data for SE and FC firms

Since prior research suggests that there are fundamental differences between SE and FC firms (Bryant, 2003; Murdoch & Krause, 2009; Misund, 2017; Sunder, 1976), a comparison of the two methods was carried out using the key financial data generated from the Osiris Financial Database, to confirm some of the suggested differences. This comparison was based on data

pertaining to current market capitalisation, enterprise value, number of employees, total assets, turnover, depreciation, depletion and amortisation (DD&A), cash flow from operations, net profit after tax, year-end market price, equity, long-term debt and key financial ratios. For each of these variables, yearly averages were obtained for SE and FC firms, based on which, a comparison was made.

7.4.1 Market capitalisation

Market capitalisation (market cap) refers to the market value at a point in time of the shares outstanding of a publicly listed company, determined as the product of the share price at that point in time and the number of shares outstanding (Brealey et *al.*, 2006; Srivastava & Ugrasen, 2017; *The Economic Times*, 2017). Market capitalisation is used in ranking the relative size of stock exchanges, being a measure of the sum of the market capitalisations of all companies listed on each stock exchange. It is also preferred by investors in ranking the size of companies, as opposed to sales or total assets (*Financial Times*, 2017; Mjomba, 2017). Using the data generated from the Osiris Financial Database, the average market capitalisation for SE firms from 2007 to 2015 was compared with that of FC firms in each of the years as shown in Figure 7.1 below.



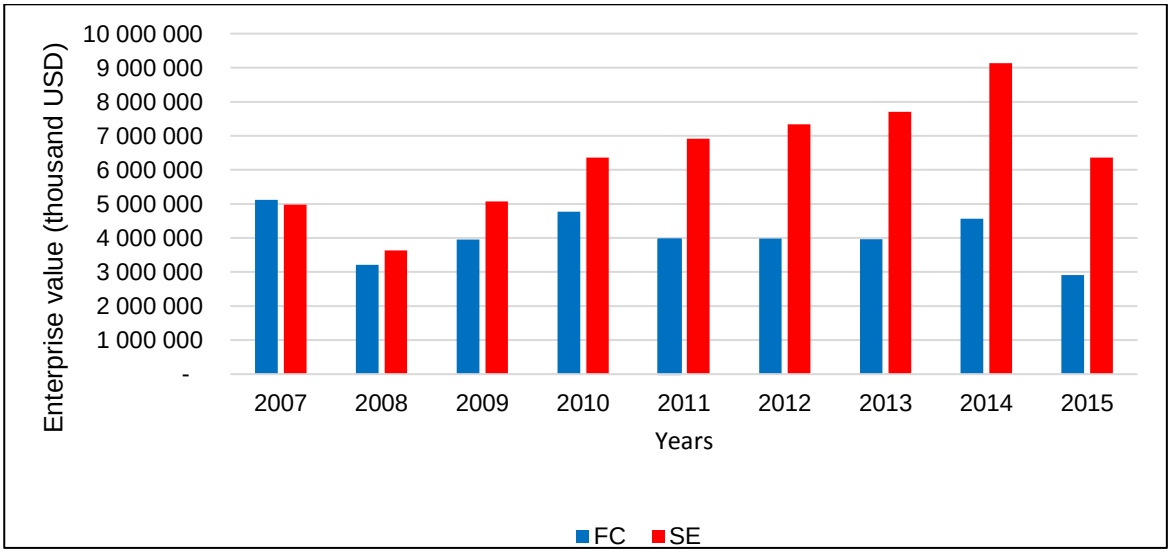
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.1: Average market capitalisation for SE and FC firms

From Figure 7.1 above, the average market capitalisation for SE firms was higher than that of FC firms for all the nine years. This is because most of the SE firms are large firms with a larger number of outstanding ordinary shares and possibly a higher market price per share. From 2007 to 2008, there was a decline in the average market capitalisation for both FC and SE firms by 46% and 31%, respectively. However, between 2008 and 2013, the average market capitalisation for SE firms was on an upward trend, resulting in an increase of 166% during this period, but later declined by 43% between the period between 2013 and 2015. On the other hand, the average market capitalisation for FC firms increased by 67% between 2008 and 2010; declined by 31% between 2010 and 2012; increased by 25% in 2013; and was then reduced again by 54% in the period between 2013 and 2015.

7.4.2 Enterprise value

Enterprise value (EV), also referred to as 'firm value', is a metric that reflects the market value of a business. Enterprise value is calculated as the market capitalisation plus debt, minority interest and preferred shares, less total cash and cash equivalents (*Wall Street Oasis*, 2015). Therefore, compared to market capitalisation, enterprise value is a far more realistic measure of valuation in mergers and acquisitions, since it provides a better valuation of a company by taking into consideration more factors such as debt (Bajkowski, 2008; Liu & Zhang, 2017; *Wall Street Oasis*, 2015). The enterprise value for each of the SE and FC firms was obtained directly from Osiris. Using this data, the average enterprise value for SE firms in 2007 to 2015 was compared with that of FC firms in the same years, as shown in Figure 7.2 below.



(Source: Author's construct; utilising data from the Osiris Financial Database)

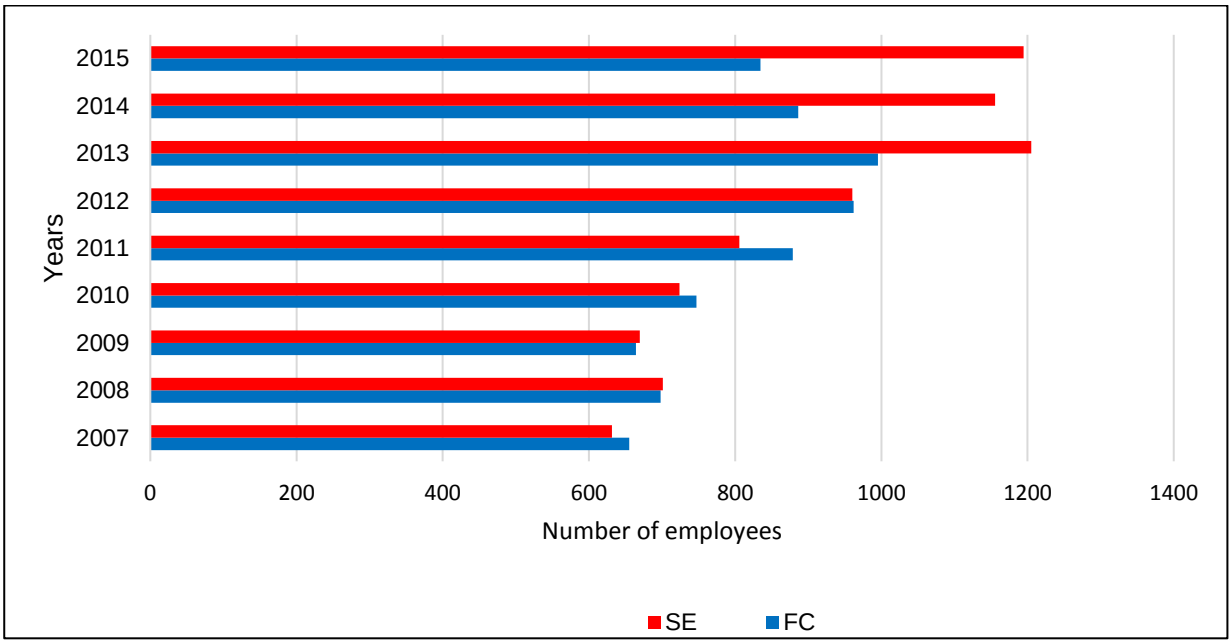
Figure 7.2: Average enterprise value for SE and FC firms

From Figure 7.2 above, it can be seen that the average enterprise value for SE firms was much higher than that of FC firms for all the years apart from 2007. This was attributed to the fact that most SE firms are large firms with a higher market capitalisation compared to FC firms. From 2007 to 2008, there was a decline in the average enterprise value for SE and FC firms. However, the average enterprise value for SE firms was on an upward trend between 2008 and 2014, increasing by 151% during this period, but then fell by 30% in 2015. On the other hand, average enterprise value of FC firms increased by 49% in 2010, declined by 17% in 2011, and was on an upward trend between 2011 and 2014 (increasing by 15% during this period), but later declined again by 36% in 2015.

From Subsections 7.4.1 and 7.4.2 above, it appears that SE firms generally experienced more stability in value growth over longer periods, whereas growth in value of FC firms were more irregular. An abundance of factors can probably explain this observation, though the possible influence of the chosen accounting method (FC or SE) on reported earnings cannot be disregarded.

7.4.3 Number of employees

Figure 7.3 below shows a comparison of the average number of employees for SE and FC firms for each of the years from 2007 to 2015.



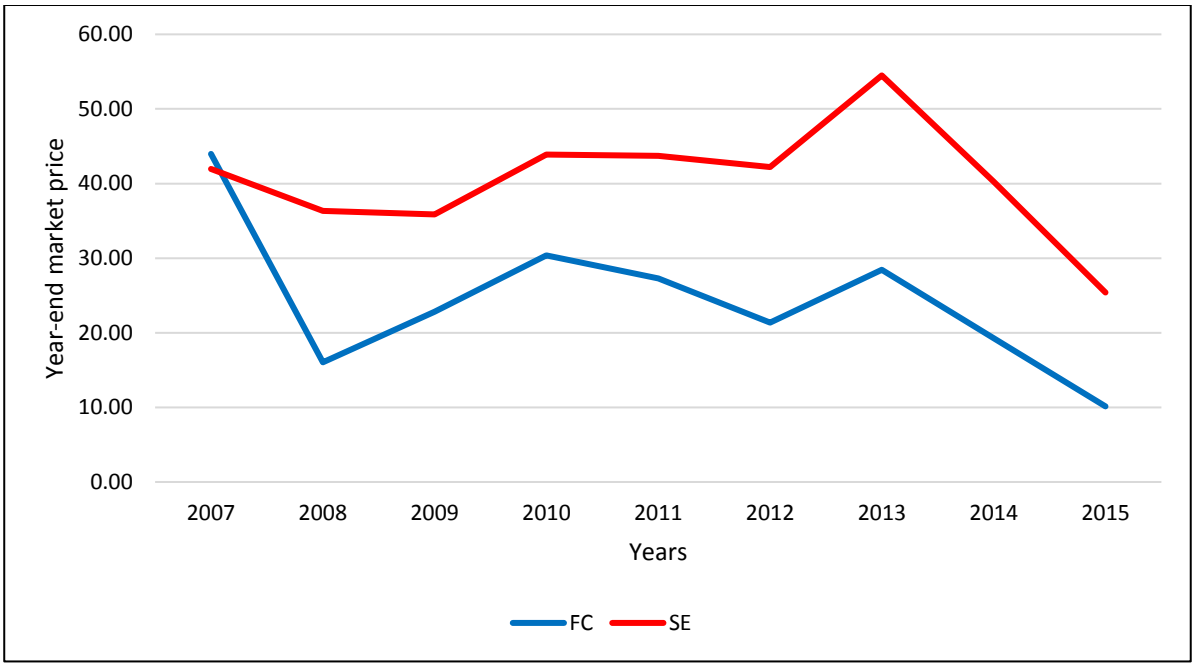
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.3: Number of employees for SE and FC firms

From Figure 7.3 above, it is evident that SE and FC firms had almost the same number of employees between the years 2007 and 2012. It is interesting that SE firms managed to achieve much higher market capitalisation with a similar number of employees (compare to Figure 7.1). However, from 2013 to 2015, SE firms had a higher number of employees in each of the years compared to FC firms.

7.4.4 Year-end market price

Figure 7.4 below compares the average year-end market price for SE firms with those of FC firms within the sample for the nine-year study period from 2007 to 2015.



(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.4: Average year-end market price for SE and FC firms

From the figure above, the average year-end market price for SE firms was higher than that of FC firms in all nine years except for 2007. Similar to the trend observed in Sections 7.4.1 and 7.4.2 earlier, this is majorly attributed to the fact that most SE firms are larger than FC firms are. Both SE and FC firms had a fluctuating trend in their average market prices, with the highest average market price achieved in 2013 at USD 54.49 for SE firms and the lowest in 2015 at USD 10.13 for FC firms.

7.4.5 Depreciation, Depletion and Amortisation (DD&A)

The distinction between these three terms can be summarised as follows:

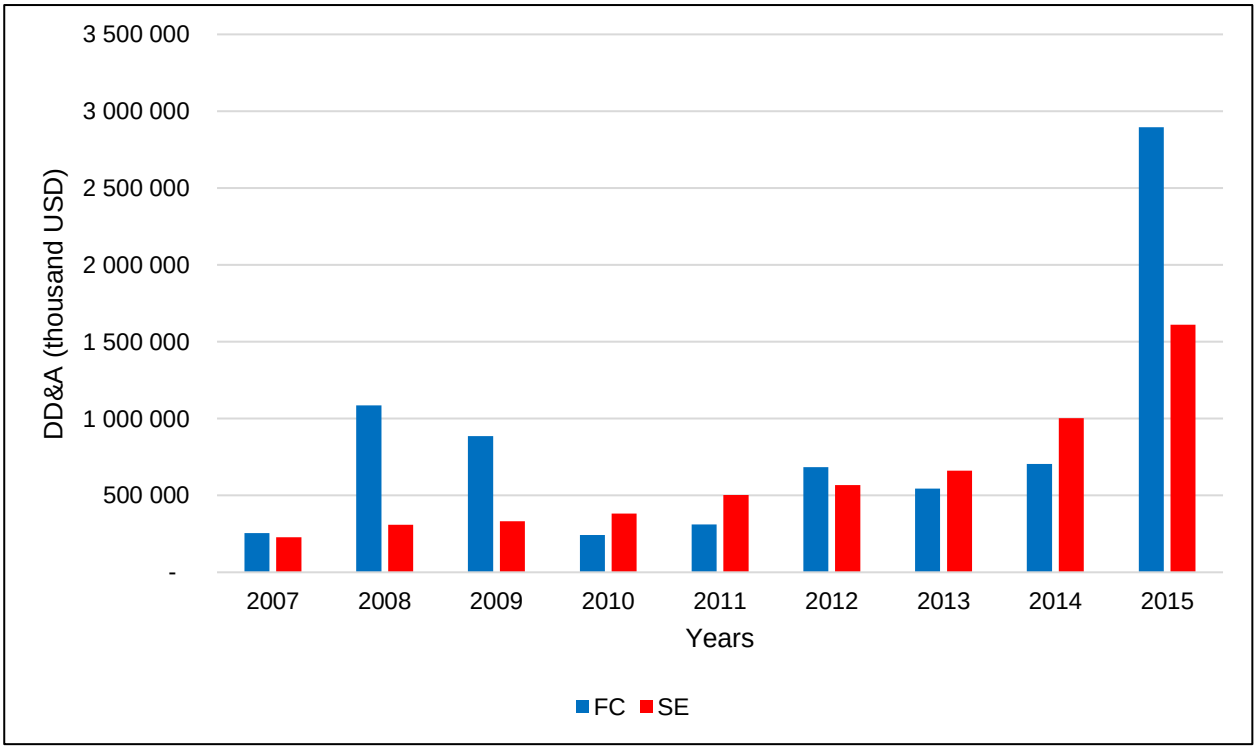
(1) Depreciation refers to the reduction in value of tangible assets such as plant, buildings, etc.;

(2) Depletion refers to the reduction in value of a "wasting asset", that is an asset which reduces in value because of being exploited such as oil and gas reserves; and

(3) Amortisation refers to the reduction in value of an intangible asset, such as intellectual property.

These three terms are collectively referred to as DD&A (Wright & Gallun, 2008). DD&A is concerned with the matching of capitalised exploration and development costs with the revenues generated from production. Since FC firms capitalise exploration costs for both successful and unsuccessful wells (thus leading to higher book values), the expectation is that their DD&A costs in the statement of profit or loss would be greater than those of SE firms are (Collins & Dent, 1979; Cortese *et al.*, 2009; Misund, 2017).

Figure 7.5 below compares the average DD&A for SE and FC firms, as reported in their financial statements for the nine-year period from 2007 to 2015.



(Source: Author's construct; utilising data from the Osiris Financial Database)

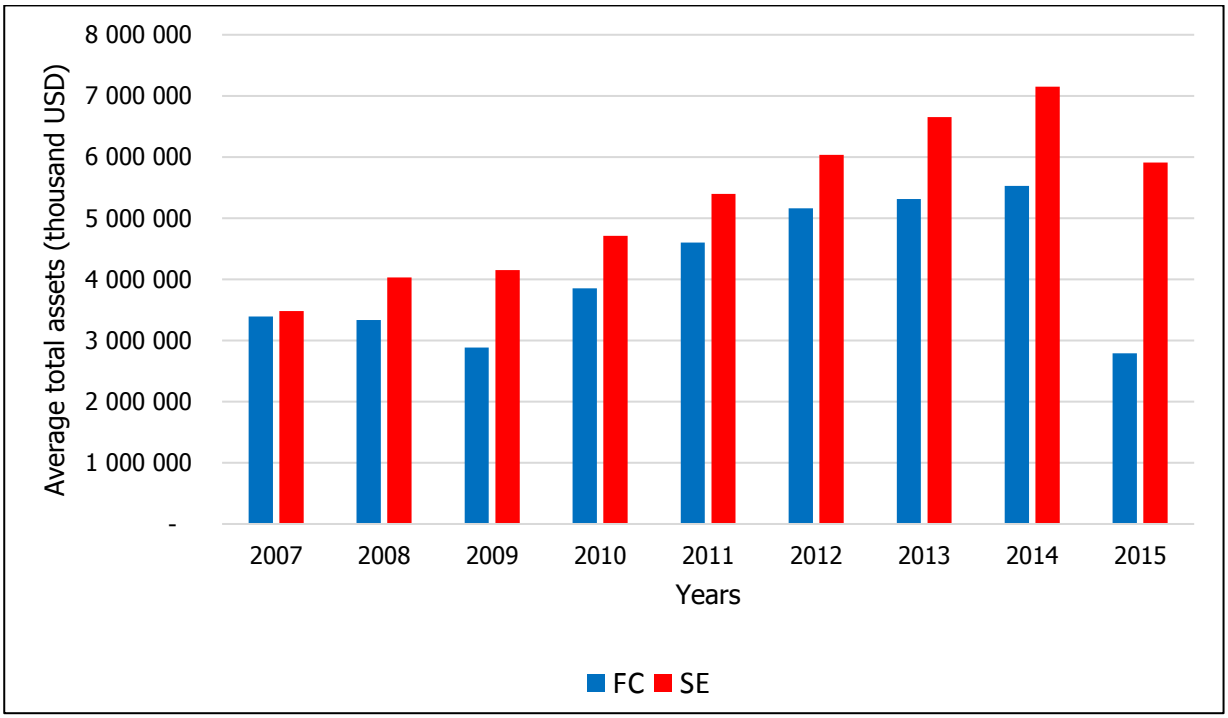
Figure 7.5: Average DD&A for SE and FC firms

From the figure above, it is observed that the average DD&A costs for FC firms were generally much higher than those of SE firms are in the years 2007, 2008, 2009, 2012 and 2015, with the

highest difference being in 2015 at USD 1,286,127. This is largely attributed to the fact that FC firms capitalise both successful and unsuccessful E&P costs and, as a result, their DD&A costs are expected to be higher than for SE firms. In addition, the DD&A costs for FC firms in 2015 were almost 5 times as much as in 2014. This was largely attributed to the impairment of oil and natural gas properties arising from the fall in commodity prices. For the years where the DD&A costs for SE firms exceeded those of FC firms, 2010, 2011, 2013 and 2014, it was by a relatively smaller magnitude. This could possibly be explained by the fact that SE firms are generally larger than FC firms are, thus having a larger asset base on which DD&A is calculated (also see Section 7.4.6 below).

7.4.6 Total assets

Figure 7.6 below compares the average total assets for FC firms with those of SE firms within the sample for the nine-year period from 2007 to 2015.



(Source: Author's construct; utilising data from the Osiris Financial Database)

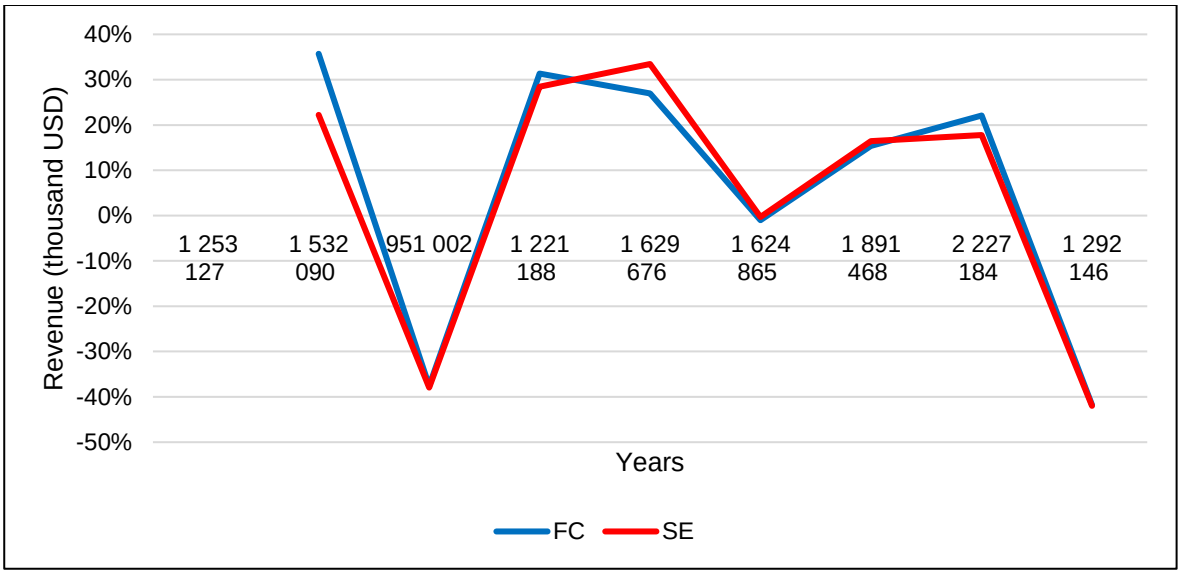
Figure 7.6: Average total assets for SE and FC firms

From the figure above, despite the practice of not capitalising unsuccessful exploration costs, SE firms had higher average total assets in all nine years studied. However, the average asset values for SE firms were fairly close to those of FC firms, except for 2015. This is because most SE firms are large companies with higher asset book values whereby the non-capitalisation of

unsuccessful exploration costs may not cause a material difference in the asset book values for SE and FC firms. In addition, the average total assets for both SE and FC firms were generally on an upward trend throughout the period, except for 2015 where there was a decline, and quite significantly so for FC firms (which seems to correspond to the DD&A trend for FC firms for 2015: see Figure 7.5).

7.4.7 Total revenue

In Figure 7.7 below, the average revenue for FC firms is compared with that of SE firms within the sample for the nine-year period from 2007 to 2015.



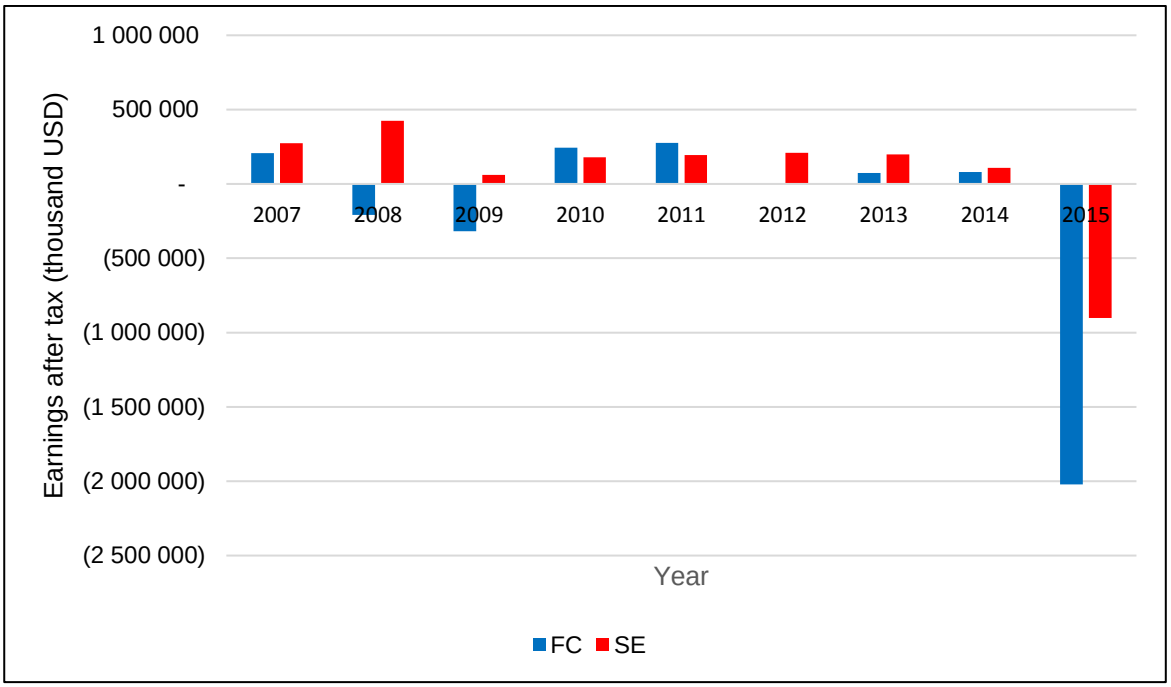
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.7: Average Revenue for SE and FC firms

From the figure above, it is observed that the average revenue for SE firms exceeded that of FC firms in all the nine years, with the greatest difference having occurred between 2011 and 2014, and the lowest in 2009 and 2015. This could be attributed to the aggressiveness of SE firms compared to FC firms in finding oil and gas reserves, in addition to SE firms being larger than FC firms on average. In addition, the average revenues for both SE and FC firms were moving in the same direction for all the years. This seems to indicate that revenue alone does not explain the more erratic value growth of FC firms compared to SE firms (see Subsection 7.4.2). Earnings may be a more indicative measure, thus further highlighting the importance of this study that investigates differences in earnings quality between the two types of firms. The correlation between earnings and value will become clearer in the next section (see Subsection 7.4.8 below).

7.4.8 Earnings after tax (EAT)

Figure 7.8 compares the average earnings after tax of FC and SE firms within the sample for the nine-year period starting in 2007, until 2015.



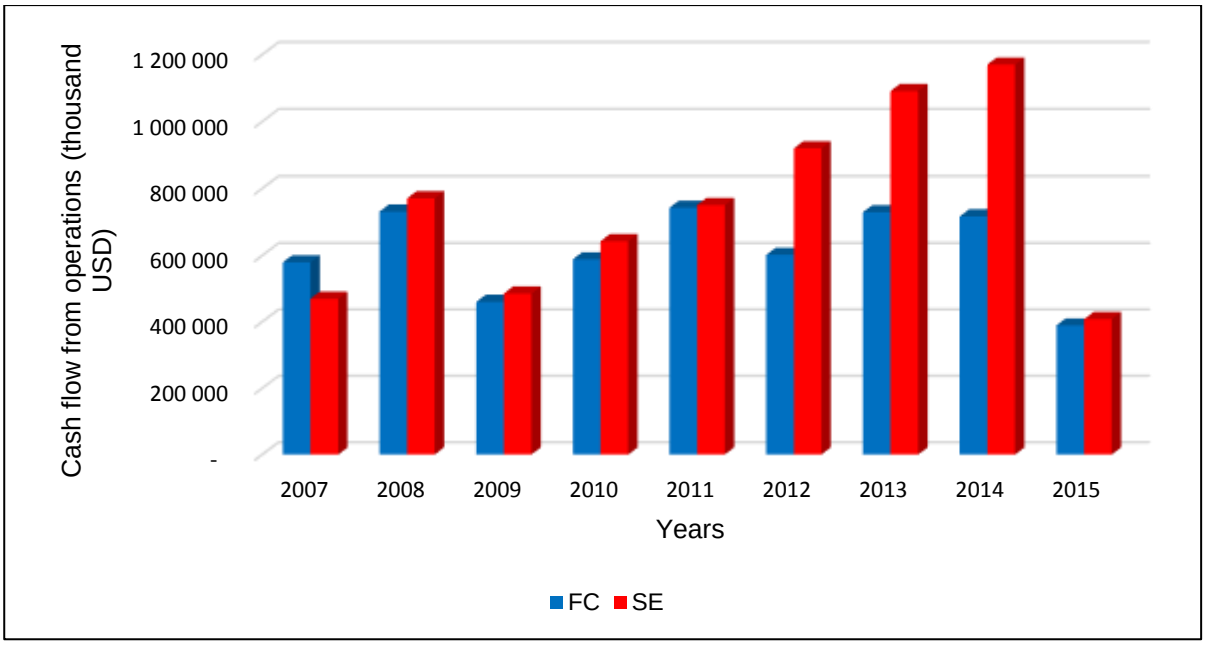
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.8: Average earnings after tax for SE and FC firms

From the figure above, it is observed that the average earnings after tax for SE firms exceeded that of FC firms in all nine years, except for 2010 and 2011, with the greatest difference having occurred in 2015. This could be attributed to a variety of factors, possibly including the higher revenues associated with SE firms compared to FC firms in all the years (see Figure 7.7). The average earnings after tax for both SE and FC firms were also fluctuating during the study period, though earnings for FC firms were more erratic than for SE firms, as is evidenced by the earnings of FC firms regularly moving from positive to negative and back again. This corroborates earlier observations (see Subsections 7.4.2 & 7.4.7) and highlights the importance of earnings as a value driver. Naturally, the chosen accounting method affects the amounts of expenditure charged against revenues in the statement of profit or loss, which in turn influences reported earnings.

7.4.9 Cash flows from operations (CFO)

Figure 7.9 compares the average cash flows from operations of FC and SE firms within the sample for the nine-year period from 2007 to 2015.



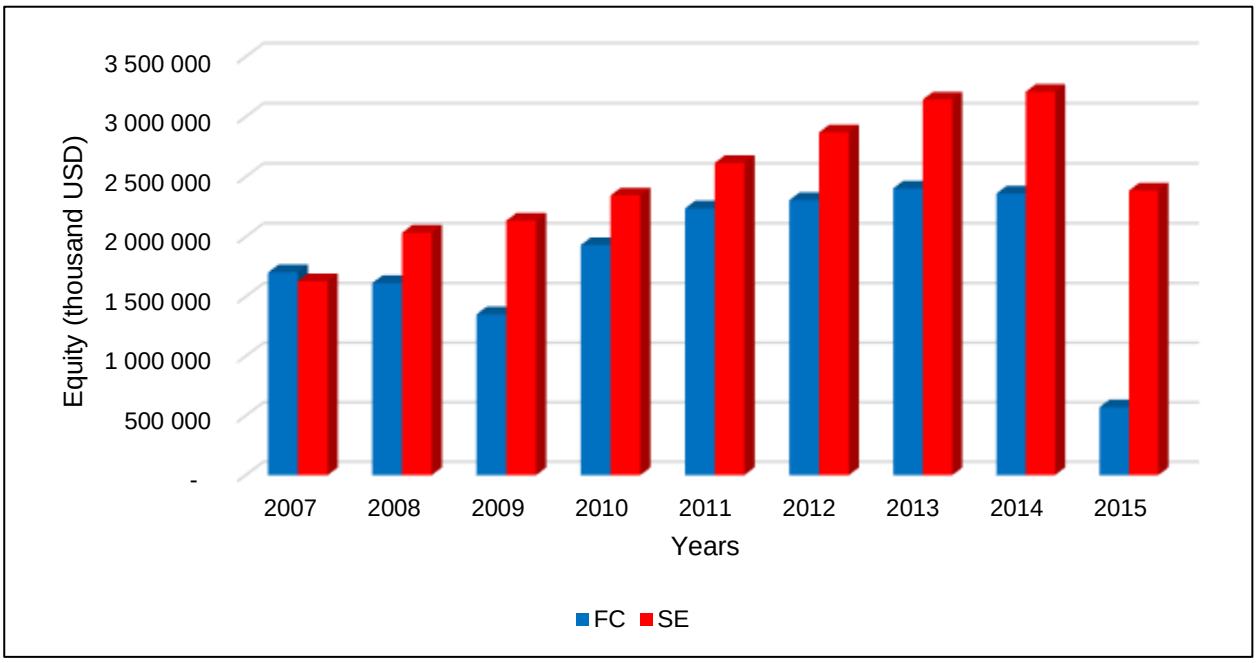
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.9: Average cash flows from operations for SE and FC firms

Figure 7.9 above shows that the average cash flows from operations for SE firms exceeded that for FC firms in all nine years except for 2007, with the greatest differences observed between 2012 and 2014. This can predominantly be attributed to the higher revenues and earnings after tax associated with the SE firms compared to the FC firms. The average cash flows from operations for SE firms increased by 64% in 2008, then declined by 37% in 2009, increased by 141% between 2009 and 2014 and declined again by 65% in 2015. On the other hand, the average cash flows from operations for FC firms generally showed a more fluctuating trend during the study period.

7.4.10 Equity

The amounts on a company's balance sheet contributed by the owners (the shareholders) plus the retained earnings are referred to as shareholders' equity. The amount of shareholders' equity is a company's total assets less its total liabilities, representing the company's net worth (as measured using the applicable accounting standards). A steady growth in a company's shareholders' equity through increasing retained earnings, as opposed to increasing the shareholder base, means increasing the investment returns for current equity shareholders (Brealey *et al.,* 2006). Figure 7.10 below compares the average equity for SE and FC firms for the period 2007 to 2015.



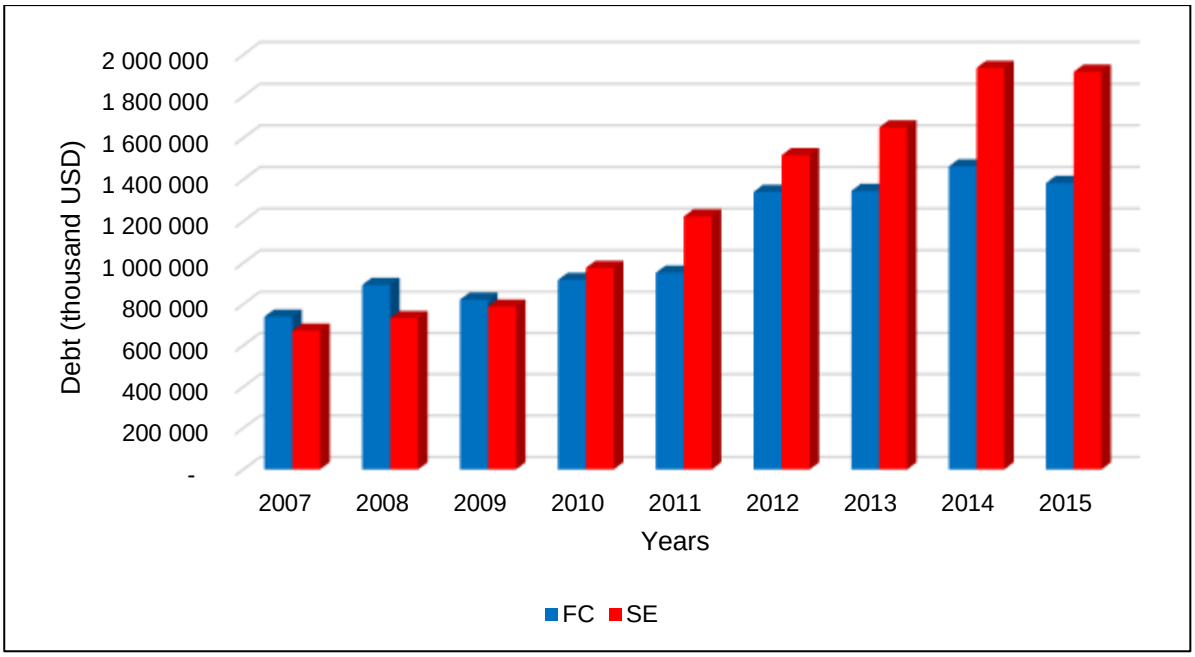
(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.10: Average equity for SE and FC firms

From Figure 7.10 above, the average equity for SE firms, except for 2007, exceeded that of FC firms for all the years studied. This means, consistent with earlier observations e.g. in Subsection 7.4.1, that SE firms had a higher net worth than the FC firms did. In addition, the average equity for SE firms was on an upward trend throughout the period, increasing by 97% between 2007 and 2014. However, it declined by 26% in 2015. On the other hand, the average equity for FC firms were more irregular and declined by 21% between 2007 and 2009, increased by 75% between 2009 and 2014, and sharply declined by 76% in 2015.

7.4.11 Long-term debt

For a company, long-term debt consists of loans and financial obligations lasting beyond one year. A company usually takes on a long-term debt in order to acquire immediate funds to finance long-term investments and operations. However, companies with too much long-term debt might find it difficult to pay off these debts and continue to operate, since much of their capital is dedicated to interest payments and it can be difficult to allocate sufficient funds to other areas. Figure 7.11 below compares the average long-term debt for SE and FC firms for the period from 2007 to 2015.



(Source: Author's construct; utilising data from the Osiris Financial Database)

Figure 7.11: Long-term debt for SE and FC firms

It can be seen from Figure 7.11 above that the average long-term debt for FC firms exceeded that of SE firms in each of the years from 2007 to 2009. However, from 2010 to 2015, the average debt for SE firms was higher than that of FC firms in each of the years. Generally, SE firms had higher debt than FC firms had, with the highest level in 2014. The average debt for SE firms was on an upward trend throughout the period, increasing by 186% between 2007 and 2015. On the other hand, the average debt for FC firms increased by 21% in 2008, declined by 8% in 2009, increased by 78% between 2009 and 2014 and then declined again by 5% in 2015. The higher levels of debt for SE firms can be attributed to them being larger firms, requiring higher levels of capital to finance operations and capital expansion.

7.5 Comparison of financial ratios for SE and FC firms

Ratios simply mean one number expressed in terms of another. It is a yardstick by which the relationship between two or more numbers can be measured or compared. Ratio analysis is a means of assessing the financial health of a business, and it is the most powerful tool for quantitative analysis of information in a company's financial statements. Financial ratios help to summarise and present financial information in a more understandable form to the users. They assist in assessing a business's performance by identifying significant relationships between different figures. However, ratios need to be interpreted and do not provide answers in itself; they just focus attention to important areas. Financial ratios can be categorised into five main areas,

which include profitability, efficiency, liquidity, gearing and investment ratios (Arkan, 2016; Atrill & McLaney, 2011; Attefah & Darko, 2016).

To compare financial ratios for SE and FC firms, industrial company ratios for the sampled SE and FC firms were downloaded directly from the Osiris Financial Database, covering the entire period from 2007 to 2015. Average ratios were then computed for SE and FC firms for each year, based on which a comparative analysis of the two accounting methods was performed.

7.5.1 Profitability ratios

Profitability ratios measure the company's financial performance and its ability to increase its shareholders value and generate profits. These ratios are used to assess management's effectiveness in utilising the resources under their control (Alnaa *et al.,* 2016; Atrill & McLaney, 2011). Table 7.2 below compares the average profitability ratios for SE and FC firms for the period from 2007 to 2015.

Table 7.2: Average profitability ratios for SE and FE firms

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Return on Equity (%)									
FC	-17	-47	-68	6	5	-43	-7	-7	-157
SE	5	7	-24	3	4	2	5	-7	-85
Return on Capital Employed (%)									
FC	2	-24	-28	2	-7	-3	2	-25	-143
SE	3	0	-14	-4	3	4	5	-5	-79
Profit margin (%)									
FC	22	-15	-29	14	25	-2	14	14	-9
SE	12	31	-12	22	21	13	3	4	-39
Gross profit margin (%)									
FC	68	73	64	64	65	69	68	68	55
SE	72	71	67	71	73	71	69	68	52
Return on Assets (%)									
FC	0.2	-17.2	-18.9	0.8	-2.4	-2.1	0.3	-0.3	-42.1
SE	1.7	8.0	-6.8	-0.6	0.5	-0.2	0.9	-1.3	-24.2

(Source: Author's construct; utilising data from the Osiris Financial Database)

The Return on Equity (ROE) ratio measures how efficiently a company is employing shareholders' funds to generate profits. It is used by investors to measure the profit for the period available to the owners of the company. From the above, it transpires that the average ROE for SE firms was

higher than that of FC firms in the years 2007 to 2009, 2012 to 2013 and 2015. Overall, SE firms were more efficient in utilising shareholders' funds than FC firms.

The Return on Capital Employed (ROCE) ratio measures overall efficiency of the company in employing resources available to it. These resources are from lenders and shareholders. From Table 7.2 above, it is evident that, except for 2010, SE firms had a higher average ROCE in each of the years than FC firms did. This implies that SE firms were more efficient in employing resources available to them than the FC firms.

The profit margin ratio indicates how the company is performing in achieving maximum sales possible while keeping costs to the minimum. However, this ratio ignores the assets or capital used to achieve the profit margin. Table 7.2 shows that the average profit margin for SE firms was higher than that of FC firms in 2008 to 2010 and in 2012. On the other hand, FC firms showed a higher average profit margin in 2007, 2011 and in 2013 to 2015.

The gross profit margin measures the margin earned by a company on its sales, ignoring operating expenses. It is a measure of the profitability in buying (or producing) and selling goods. Table 7.2 shows that, except for 2008 and 2015, the average gross profit margin for SE firms was equal or higher than that of FC firms. Therefore, SE firms earned a higher margin on sales than FC firms did. However, the variance between the average gross profit margin for SE and FC firms was small, with the highest difference observed in 2011 at 8%.

The Return on Assets (ROA) ratio measures how effectively a company is using its assets to generate earnings before contractual obligations must be paid. This ratio is also important for companies that decide whether to initiate a new project or not. From Table 7.2 above, SE firms had a higher average ROA than FC firms did in each of the years, except for 2010 and 2014.

7.5.1.1 Hypothesis tests of the profitability ratios for SE and FC firms

To test whether there is a statistically significant difference in the profitability ratios for SE and FC firms, tests for the difference between the SE and FC sample means of each profitability ratio were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between profitability ratios for SE and FC firms.

Alternative hypothesis: There is a difference between profitability ratios for SE and FC firms.

Table 7.3: Independent samples test of the profitability ratios for SE and FC firms

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2007	ROE	Equal variances assumed	6.481	.013	-1.459	80	.149	-21.6441463	14.8392523
		Equal variances not assumed			-1.459	51.062	.151	-21.6441463	14.8392523
	ROCE	Equal variances assumed	.001	.976	-.189	66	.851	-1.2917647	6.8314559
		Equal variances not assumed			-.189	65.705	.851	-1.2917647	6.8314559
	Profit margin	Equal variances assumed	3.766	.057	1.257	60	.213	10.0338976	7.9801311
		Equal variances not assumed			1.294	54.522	.201	10.0338976	7.7548506
	Gross profit margin	Equal variances assumed	.024	.877	-.714	71	.477	-3.9549549	5.5382757
		Equal variances not assumed			-.717	70.935	.475	-3.9549549	5.5121975
	ROA	Equal variances assumed	.116	.734	-.302	79	.764	-1.4878022	4.9340699
		Equal variances not assumed			-.301	77.101	.765	-1.4878022	4.9493038
2008	ROE	Equal variances assumed	6.338	.014	-3.099	76	.003	-53.4442914	17.2436189
		Equal variances not assumed			-3.032	59.809	.004	-53.4442914	17.6295947
	ROCE	Equal variances assumed	.071	.791	-1.905	64	.061	-24.2330303	12.7210619
		Equal variances not assumed			-1.905	63.857	.061	-24.2330303	12.7210619
	Profit margin	Equal variances assumed	8.364	.005	-4.349	57	.000	-46.0838928	10.5960415
		Equal variances not assumed			-4.194	44.429	.000	-46.0838928	10.9884592

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	Gross profit margin	Equal variances assumed	1.607	.209	.375	74	.709	1.9760833	5.2693777
		Equal variances not assumed			.384	65.553	.702	1.9760833	5.1429744
	ROA	Equal variances assumed	12.189	.001	-4.088	77	.000	-25.2608269	6.1792020
		Equal variances not assumed			-4.063	61.570	.000	-25.2608269	6.2171852
2009	ROE	Equal variances assumed	8.859	.004	-2.016	75	.047	-43.9888753	21.8173358
		Equal variances not assumed			-1.931	47.720	.059	-43.9888753	22.7747392
	ROCE	Equal variances assumed	2.500	.119	-.797	64	.428	-13.8603030	17.3876640
		Equal variances not assumed			-.797	47.506	.429	-13.8603030	17.3876640
	Profit margin	Equal variances assumed	2.518	.118	-1.812	59	.075	-17.2184096	9.5037785
		Equal variances not assumed			-1.764	48.906	.084	-17.2184096	9.7583209
	Gross profit margin	Equal variances assumed	.511	.477	-.570	75	.570	-3.5801215	6.2760339
		Equal variances not assumed			-.570	74.539	.570	-3.5801215	6.2803626
	ROA	Equal variances assumed	8.020	.006	-2.266	79	.026	-12.1726740	5.3707060
		Equal variances not assumed			-2.232	64.260	.029	-12.1726740	5.4540112
2010	ROE	Equal variances assumed	.041	.841	.314	77	.754	2.6205392	8.3438042
		Equal variances not assumed			.316	75.956	.753	2.6205392	8.2821137

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	ROCE	Equal variances assumed	2.790	.100	.535	63	.594	5.3154735	9.9341230
		Equal variances not assumed			.530	45.975	.599	5.3154735	10.0249901
	Profit margin	Equal variances assumed	1.212	.275	-1.352	63	.181	-7.8946300	5.8409381
		Equal variances not assumed			-1.332	54.333	.188	-7.8946300	5.9265396
	Gross profit margin	Equal variances assumed	.223	.638	-1.023	72	.310	-6.8707456	6.7130191
		Equal variances not assumed			-1.027	71.516	.308	-6.8707456	6.6879264
	ROA	Equal variances assumed	.326	.569	.273	79	.786	1.3530952	4.9564888
		Equal variances not assumed			.276	74.230	.783	1.3530952	4.8964796
2011	ROE	Equal variances assumed	.984	.324	.090	79	.929	1.1153846	12.4245665
		Equal variances not assumed			.088	57.090	.930	1.1153846	12.6864931
	ROCE	Equal variances assumed	1.878	.176	-1.061	62	.293	-10.1378125	9.5519036
		Equal variances not assumed			-1.061	57.798	.293	-10.1378125	9.5519036
	Profit margin	Equal variances assumed	2.450	.122	.695	65	.489	4.0289875	5.7934986
		Equal variances not assumed			.716	61.366	.477	4.0289875	5.6269460
	Gross profit margin	Equal variances assumed	2.862	.095	-1.658	74	.101	-8.2108333	4.9509238
		Equal variances not assumed			-1.630	62.623	.108	-8.2108333	5.0376085

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	ROA	Equal variances assumed	.736	.393	-.601	81	.550	-2.9407616	4.8932861
		Equal variances not assumed			-.597	76.554	.552	-2.9407616	4.9236223
2012	ROE	Equal variances assumed	6.842	.011	-1.660	77	.101	-45.1544423	27.2031951
		Equal variances not assumed			-1.642	43.716	.108	-45.1544423	27.5035382
	ROCE	Equal variances assumed	6.162	.016	-1.250	64	.216	-6.4609091	5.1705658
		Equal variances not assumed			-1.250	39.181	.219	-6.4609091	5.1705658
	Profit margin	Equal variances assumed	3.977	.050	-1.848	67	.069	-15.0048992	8.1179538
		Equal variances not assumed			-1.860	58.373	.068	-15.0048992	8.0689770
	Gross profit margin	Equal variances assumed	.362	.549	-.404	75	.687	-1.8626351	4.6081709
		Equal variances not assumed			-.402	70.778	.689	-1.8626351	4.6385481
	ROA	Equal variances assumed	1.101	.297	-.381	77	.704	-1.8419048	4.8305930
		Equal variances not assumed			-.374	65.545	.710	-1.8419048	4.9230269
2013	ROE	Equal variances assumed	1.690	.197	-1.207	77	.231	-11.8505577	9.8217731
		Equal variances not assumed			-1.198	56.568	.236	-11.8505577	9.8950507
	ROCE	Equal variances assumed	.281	.598	-.868	65	.389	-2.5103943	2.8937188
		Equal variances not assumed			-.853	57.027	.397	-2.5103943	2.9437750

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	Profit margin	Equal variances assumed	.928	.339	1.296	68	.199	10.8982146	8.4114828
		Equal variances not assumed			1.301	67.856	.198	10.8982146	8.3774619
	Gross profit margin	Equal variances assumed	1.132	.291	-.244	76	.808	-1.2258684	5.0191895
		Equal variances not assumed			-.243	72.564	.809	-1.2258684	5.0409340
	ROA	Equal variances assumed	1.059	.307	-.207	79	.836	-.5637912	2.7222415
		Equal variances not assumed			-.204	67.482	.839	-.5637912	2.7574525
2014	ROE	Equal variances assumed	.031	.861	.009	77	.993	.1287436	14.9010135
		Equal variances not assumed			.009	75.986	.993	.1287436	14.9182149
	ROCE	Equal variances assumed	2.545	.115	-.899	65	.372	-19.5248839	21.7194932
		Equal variances not assumed			-.871	41.441	.389	-19.5248839	22.4059886
	Profit margin	Equal variances assumed	.024	.877	1.268	67	.209	9.4716162	7.4711759
		Equal variances not assumed			1.264	65.308	.211	9.4716162	7.4952576
	Gross profit margin	Equal variances assumed	.176	.676	.056	75	.955	.3468176	6.1583385
		Equal variances not assumed			.057	74.826	.955	.3468176	6.1276036
	ROA	Equal variances assumed	1.006	.319	.290	78	.772	1.0176673	3.5073217
		Equal variances not assumed			.289	74.905	.773	1.0176673	3.5209581

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2015	ROE	Equal variances assumed	3.573	.064	-1.582	55	.119	-71.9653875	45.4764607
		Equal variances not assumed			-1.505	39.267	.140	-71.9653875	47.8280570
	ROCE	Equal variances assumed	.033	.857	-1.494	61	.140	-64.3025455	43.0517993
		Equal variances not assumed			-1.483	57.525	.144	-64.3025455	43.3657365
	Profit margin	Equal variances assumed	2.962	.100	1.637	21	.117	30.0256863	18.3415163
		Equal variances not assumed			1.331	6.564	.228	30.0256863	22.5661041
	Gross profit margin	Equal variances assumed	.192	.662	.521	73	.604	3.7164530	7.1309260
		Equal variances not assumed			.525	72.424	.601	3.7164530	7.0821413
	ROA	Equal variances assumed	3.678	.060	-2.563	59	.013	-17.8628000	6.9700260
		Equal variances not assumed			-2.413	40.403	.020	-17.8628000	7.4034009

(Source: Author's construct from SPSS output)

- Return on Equity

  From Table 7.3 above, the *p*-values for return on equity in 2008 and 2009 are .004 and .059, respectively. These values are less than the chosen significance level of 10% ($p < .1$). Because of this, it is concluded that there is a statistically significant difference between the mean return on equity for SE and FC firms in these two years. For both years, the mean return on equity for SE firms was significantly greater than that of FC firms (see Table 7.2 above). However, for the rest of the years, the *p*-values for return on equity were greater than the significance level of 10%. This implies that for all these years, there is no statistically significant difference between the mean return on equity for SE and FC firms. Broadly (i.e. for most years), the results suggest that the differences in the mean return on equity for SE and FC firms (see Table 7.2 above) are not statistically significant.

- Return on Capital Employed

  Table 7.3 above shows that the *p*-value for ROCE in 2008 was small ($p<.1$), less than the significance level of 10%. This implies that there is a significant difference in the mean ROCE for FC and SE firms in the year 2008. However, for the remaining years, the *p*-values for ROCE were greater than the chosen significance level of 10%. Because of this, it can be concluded that, except for the year 2008, the difference between the mean ROCE for SE and FC firms (see Table 7.2 above) was not statistically significant for all the years. Overall, there is no statistically significant difference between ROCE for SE and FC firms.

- Profit margin

  The *p*-values for profit margin in 2008, 2009 and 2012 are .000, .075 and .068, respectively (see Table 7.3 above). These values are less than the chosen significance level of 10%. Because of this, we can conclude that there is a statistically significant difference between the profit margin for SE and FC firms in the years 2008, 2009 and 2012. In all these years, the mean profit margin for SE firms was significantly greater than that of FC firms (see Table 7.2 above). However, for the rest of the years, the *p*-values for differences in profit margin were greater than the significance level of 10%. This implies that for all these years, there is no statistically significant difference between the mean profit margin for SE and FC firms. Overall, the results suggest that the differences in the profit margins for SE and FC firms (see Table 7.2 above) are not statistically significant.

- Gross profit margin

  Table 7.3 above shows that the *p*-values for the mean gross profit margin are greater than the chosen significance level of 10% for all the years. This implies that, despite the differences in the mean gross profit margins for SE and FC firms (see Table 7.2 above) these differences are not statistically significant. Overall, it can be concluded that there is no statistically significant difference between the gross profit margins for SE and FC firms.

- Return on Assets

  Table 7.3 above shows that the *p*-values for the mean ROA were very low in the years 2008, 2009 and 2015, less than the significance level of 10%. This implies that there was a statistically significant difference in the mean ROA for SE and FC firms. However, for the remaining years, the *p*-values for the mean ROA were greater than the chosen significance level of 10%, implying that the differences in the mean ROA as shown in

Table 7.2 above were not significant. Broadly, the conclusion can be drawn that there is no statistically significant difference between Return on Assets for SE and FC firms.

From the above analysis, since the individual profitability ratios broadly (for most years) indicate that there is no statistically significant difference between SE and FC firms, the null hypothesis is accepted for most of the years studied and it is concluded generally that the differences in the profitability ratios for SE and FC firms are not statistically significantly.

7.5.2 Efficiency ratios

Efficiency ratios are used to assess how well a company uses its assets and liabilities internally. They are an important indicator of management's effectiveness in running the business efficiently (Atrill & McLaney, 2011; Attefah & Darko, 2016). Some of the common efficiency ratios are net asset turnover, inventory turnover, collection period and credit period. Table 7.4 below compares the average efficiency ratios for SE and FC firms for the period from 2007 to 2015.

Table 7.4: Average efficiency ratios for SE and FC firms

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net asset turnover (Ratio)									
FC	0.27	0.42	0.30	0.32	0.28	0.60	0.64	0.56	0.47
SE	0.31	0.40	0.25	0.32	0.33	0.28	0.30	0.38	0.47
Inventory turnover period (Days)									
FC	80	83	66	68	74	92	90	99	76
SE	46	93	41	61	91	80	96	105	64
Collection period (Days)									
FC	59	47	66	60	68	75	59	48	48
SE	90	57	97	71	64	72	57	48	50
Credit period (Days)									
FC	73	57	63	96	110	69	67	78	101
SE	116	54	85	94	99	74	69	83	77

(Source: Author's construct; utilising data from the Osiris Financial Database)

The net assets turnover ratio indicates the ability of a company to generate sales from the capital employed. It is a measure of the utilisation of total assets. It indicates the sales that will be generated for each dollar invested by the company. Table 7.4 shows that, except for 2007 and 2011, FC firms had a higher average net assets turnover ratio than SE firms. This implies that FC firms are utilising their total assets better than SE firms to generate sales are.

Inventory turnover period indicates how long it takes a company to turn over (sell completely) an item of inventory each year. The smaller the number of days, the better for the company, as it signals faster generation of revenues. However, the company may risk stock outs if this position is not well managed. On the other hand, larger days are an indicator of inefficient use of resources and could result in inventory obsolescence. From Table 7.4 above, SE firms had a lower average inventory period for the years 2007, 2009, 2010, 2012 and 2015, signalling faster generation of revenue than FC firms, in those years. On the other hand, FC firms' average inventory period for the years 2008, 2011, 2013 and 2014 was lower than that of SE firms in those years.

Collection period measures how long it takes credit customers of a company to pay their invoices. The shorter the period, the better, since the company is paid for its sales earlier. From Table 7.4 above, FC firms had a lower average collection period for the years 2007 to 2010 and for 2015, while SE firms exhibited lower collection periods in the years 2011 to 2013. Overall, the collection period for FC firms is generally lower than for SE firms.

Credit period indicates how long it takes a company to pay its credit suppliers' invoices. This should be broadly consistent with the collection period. From Table 7.4 above, the credit period for SE firms was higher than that of FC firms in the years 2007, 2009, 2012, 2013 and 2014, while for the years 2008, 2010, 2011 and 2015, FC firms had a higher credit period than SE firms had. Longer credit periods (the ability to defer payment) can be beneficial to a company, especially if the supplier does not charge interest before amounts become due.

7.5.2.1 Hypothesis tests of the efficiency ratios for SE and FC firms

To test whether there is a statistically significant difference in the efficiency ratios for SE and FC firms, tests for the difference between the SE and FC sample means of each efficiency ratio were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between efficiency ratios for SE and FC firms.

Alternative hypothesis: There is a difference between efficiency ratios for SE and FC firms.

Table 7.5: Independent samples test of the efficiency ratios for SE and FC firms

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2007	Net assets turnover	Equal variances assumed	2.156	.146	-.888	80	.377	-.0395122	.0444792
		Equal variances not assumed			-.888	76.329	.377	-.0395122	.0444792
	Collection period days	Equal variances assumed	6.508	.013	-2.104	70	.039	-31.5284556	14.9845991
		Equal variances not assumed			-2.150	45.706	.037	-31.5284556	14.6635005
	Credit period	Equal variances assumed	3.694	.060	-1.171	57	.246	-43.0684266	36.7658775
		Equal variances not assumed			-1.247	52.120	.218	-43.0684266	34.5330027
	Inventory Turnover period	Equal variances assumed	5.981	.021	1.875	28	.071	33.4733014	17.8546333
		Equal variances not assumed			1.534	11.977	.151	33.4733014	21.8234370
2008	Net assets turnover	Equal variances assumed	.213	.646	.312	80	.756	.0215000	.0689182
		Equal variances not assumed			.313	79.839	.755	.0215000	.0687582
	Collection period days	Equal variances assumed	.755	.388	-.935	71	.353	-9.8115489	10.4943600
		Equal variances not assumed			-.944	69.531	.349	-9.8115489	10.3956413
	Credit period	Equal variances assumed	.165	.686	.227	58	.821	2.8794949	12.6726981
		Equal variances not assumed			.226	54.321	.822	2.8794949	12.7454478

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	Inventory turnover period	Equal variances assumed	.248	.622	-.236	33	.815	-10.2816667	43.4834197
		Equal variances not assumed			-.260	32.798	.796	-10.2816667	39.5326691
2009	Net assets turnover	Equal variances assumed	.915	.342	1.229	79	.223	.0564512	.0459489
		Equal variances not assumed			1.223	67.930	.226	.0564512	.0461680
	Collection period days	Equal variances assumed	2.222	.140	-1.732	74	.088	-31.4250728	18.1483446
		Equal variances not assumed			-1.761	55.216	.084	-31.4250728	17.8477320
	Credit period	Equal variances assumed	.710	.403	-.661	59	.511	-22.0314547	33.3138300
		Equal variances not assumed			-.686	41.182	.497	-22.0314547	32.1172897
	Inventory turnover period	Equal variances assumed	1.473	.234	1.069	32	.293	25.7806429	24.1247921
		Equal variances not assumed			1.010	22.341	.323	25.7806429	25.5134577
2010	Net assets turnover	Equal variances assumed	.008	.929	.028	80	.978	.0016905	.0604212
		Equal variances not assumed			.028	79.999	.978	.0016905	.0603531
	Collection period days	Equal variances assumed	.635	.428	-1.286	75	.202	-11.3738716	8.8415635
		Equal variances not assumed			-1.296	74.244	.199	-11.3738716	8.7793626
	Credit period	Equal variances assumed	.852	.360	.068	58	.946	2.3025695	33.6640988

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
		Equal variances not assumed			.069	56.137	.945	2.3025695	33.3821229
	Inventory turnover period	Equal variances assumed	.494	.487	.275	31	.785	7.1338846	25.9814990
		Equal variances not assumed			.288	29.571	.775	7.1338846	24.7430390
2011	Net assets turnover	Equal variances assumed	1.242	.268	-.917	80	.362	-.0405000	.0441446
		Equal variances not assumed			-.926	72.778	.358	-.0405000	.0437525
	Collection period days	Equal variances assumed	1.501	.224	.313	74	.755	3.7488080	11.9788785
		Equal variances not assumed			.308	53.091	.759	3.7488080	12.1667166
	Credit period	Equal variances assumed	.758	.387	.269	61	.788	10.9081552	40.4819276
		Equal variances not assumed			.271	54.547	.787	10.9081552	40.2384006
	Inventory turnover period	Equal variances assumed	1.368	.251	-.484	32	.632	-17.2212982	35.5920624
		Equal variances not assumed			-.519	28.042	.608	-17.2212982	33.1693413
2012	Net assets turnover	Equal variances assumed	3.400	.069	1.173	77	.245	.3189038	.2719729
		Equal variances not assumed			1.158	38.708	.254	.3189038	.2754167
	Collection period days	Equal variances assumed	.242	.624	.166	75	.869	3.0364035	18.2791505
		Equal variances not assumed			.167	70.261	.868	3.0364035	18.2107210

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	Credit period	Equal variances assumed	.391	.534	-.261	63	.795	-4.8065275	18.4378076
		Equal variances not assumed			-.261	62.942	.795	-4.8065275	18.3830852
	Inventory turnover period	Equal variances assumed	.001	.980	.370	30	.714	12.3015079	33.2502631
		Equal variances not assumed			.379	29.820	.708	12.3015079	32.4865666
2013	Net assets turnover	Equal variances assumed	2.833	.096	.991	80	.325	.3333571	.3362654
		Equal variances not assumed			.967	39.478	.339	.3333571	.3445682
	Collection period days	Equal variances assumed	5.729	.019	.252	75	.801	1.8119703	7.1769407
		Equal variances not assumed			.254	67.090	.801	1.8119703	7.1422744
	Credit period	Equal variances assumed	.005	.943	-.105	61	.917	-2.1820363	20.7499137
		Equal variances not assumed			-.105	56.811	.917	-2.1820363	20.8304921
	Inventory turnover period	Equal variances assumed	.026	.873	-.163	30	.871	-5.5111667	33.7748572
		Equal variances not assumed			-.168	25.342	.868	-5.5111667	32.8511942
2014	Net assets turnover	Equal variances assumed	1.981	.163	.793	81	.430	.1808943	.2281345
		Equal variances not assumed			.785	47.585	.436	.1808943	.2304327
	Collection period days	Equal variances assumed	.073	.787	.031	73	.976	.1851067	6.0400010

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
		Equal variances not assumed			.031	70.293	.976	.1851067	6.0218554
	Credit period	Equal variances assumed	.056	.814	-.205	62	.838	-5.5615625	27.1320905
		Equal variances not assumed			-.205	50.915	.838	-5.5615625	27.1320905
	Inventory turnover period	Equal variances assumed	.093	.763	-.139	29	.890	-5.6695175	40.7664453
		Equal variances not assumed			-.146	27.113	.885	-5.6695175	38.7993065
2015	Net assets turnover	Equal variances assumed	.972	.327	.014	79	.989	.0024085	.1778215
		Equal variances not assumed			.013	62.681	.989	.0024085	.1789103
	Collection period days	Equal variances assumed	.019	.890	-.255	73	.799	-1.8367781	7.1976737
		Equal variances not assumed			-.255	72.588	.799	-1.8367781	7.2023769
	Credit period	Equal variances assumed	2.685	.107	.709	57	.481	24.3252414	34.2910531
		Equal variances not assumed			.718	38.298	.477	24.3252414	33.8653780
	Inventory turnover period	Equal variances assumed	1.629	.213	.378	27	.708	12.2676961	32.4192575
		Equal variances not assumed			.351	17.287	.730	12.2676961	34.9521119

(Source: Author's construct from SPSS output)

- Net assets turnover

  Table 7.5 above shows that, for all the years, the *p*-values for net assets turnover are greater than the significance level of 10%. Despite the differences in the mean net assets turnover for SE and FC firms (see Table 7.4 above), these differences are not significant. It can therefore be concluded that for most of the years studied, there is no statistically significant difference between net assets turnover for SE and FC firms.

- Collection period days

  From Table 7.5 above, the *p*-values for collection period days in 2007 and 2009 are .037 and .088 respectively. These values are less than the chosen significance level of 10%, implying that, in both years, there was a statistically significant difference between the mean collection period days for SE and FC firms. However, for the rest of the years, the *p*-values for the collection period days were greater than the significance level of 10%. This implies that for all these years, there is no statistically significant difference between the mean collection period days for SE and FC firms. Broadly, the results therefore suggest that the differences in the mean collection period days for SE and FC firms (see Table 7.4 above) are not statistically significant.

- Credit period

  Table 7.5 above shows that for all the years, the *p*-values for the credit period are greater than the significance level of 10%. Despite the differences in the mean credit periods for SE and FC firms (see Table 7.4 above), these differences are not significant. Therefore, the conclusion can be made that there is no statistically significant difference between the credit period for SE and FC firms.

- Inventory turnover period

  From Table 7.5 above, it is evident that for all the years, the *p*-values for the inventory turnover period are greater than the significance level of 10%. Notwithstanding the differences in the mean inventory turnover periods for SE and FC firms (see Table 7.4 above), these differences are not significant. Therefore, it is concluded that there is no statistically significant difference between the inventory turnover period for SE and FC firms.

From the analysis above, since all the individual efficiency ratios broadly indicate that there is no statistically significant difference between SE and FC firms, the null hypothesis is accepted for

most of the years studied and it is concluded that the efficiency ratios for SE and FC firms are not statistically significantly different.

7.5.3 Liquidity ratios

Liquidity ratios assess the company's ability to raise cash to meet its short-term obligations as they become due (Arkan, 2016; Attefah & Darko, 2016). Liquidity ratios mainly include the current ratio and quick ratio (acid test). Table 7.6 below compares the average liquidity for SE and FC firms for the period 2007 to 2015, expressed in terms of the current ratio.

Table 7.6: Average liquidity ratios for SE and FC firms

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Current ratio									
FC	7.52	3.55	3.82	2.83	5.19	2.84	3.48	2.42	4.35
SE	5.93	6.73	4.55	5.94	4.60	3.62	3.08	4.41	7.12

(Source: Author's construct; utilising data from the Osiris Financial Database)

The current ratio measures the adequacy of current assets to cover current liabilities. It is an indicator of how readily cash will be available to meet short-term liabilities as they fall due. Normally, the higher the ratio, the more liquid the company is considered to be. From Table 7.6 above, the current ratio for SE firms was higher than those of FC firms in the years 2008 to 2010, 2012, 2014 and 2015, while for the years 2007, 2011 and 2013, FC firms had a higher current ratio than SE firms. Therefore, SE firms were often in a better position to meet their short-term obligations as they fall due more, compared to FC firms.

7.5.3.1 Hypothesis tests of the liquidity ratios for SE and FC firms

To test whether there is a statistically significant difference in the liquidity ratio for SE and FC firms, tests for the difference between the SE and FC sample means of the current ratio were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between the current ratios for SE and FC firms.

Alternative hypothesis: There is a difference between the current ratios for SE and FC firms.

Table 7.7: Independent samples test of the current ratio for SE and FC firms

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2007	Current ratio	Equal variances assumed	.168	.683	.510	81	.611	1.5903426	3.1174822
		Equal variances not assumed			.512	77.923	.610	1.5903426	3.1090330
2008	Current ratio	Equal variances assumed	4.719	.033	-1.091	82	.278	-3.1834033	2.9176007
		Equal variances not assumed			-1.111	54.377	.271	-3.1834033	2.8655102
2009	Current ratio	Equal variances assumed	.291	.591	-.321	81	.749	-.7306794	2.2755065
		Equal variances not assumed			-.323	69.623	.748	-.7306794	2.2637020
2010	Current ratio	Equal variances assumed	6.000	.016	-1.388	82	.169	-3.1098242	2.2407817
		Equal variances not assumed			-1.411	58.036	.164	-3.1098242	2.2043738
2011	Current ratio	Equal variances assumed	.442	.508	.205	82	.838	.5884855	2.8684599
		Equal variances not assumed			.204	78.829	.839	.5884855	2.8790521
2012	Current ratio	Equal variances assumed	.752	.388	-.445	81	.657	-.7757143	1.7426851
		Equal variances not assumed			-.445	80.068	.658	-.7757143	1.7444623
2013	Current ratio	Equal variances assumed	.312	.578	.246	81	.806	.4019803	1.6307701
		Equal variances not assumed			.246	77.483	.806	.4019803	1.6345358
2014	Current ratio	Equal variances assumed	2.006	.160	-.798	82	.427	-1.9949972	2.5010847
		Equal variances not assumed			-.814	49.746	.420	-1.9949972	2.4511650

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2015	Current ratio	Equal variances assumed	2.528	.116	-.723	82	.471	-2.7745661	3.8353959
		Equal variances not assumed			-.734	63.127	.466	-2.7745661	3.7815406

(Source: Author's construct from SPSS output)

Table 7.7 above shows that for all the years, the *p*-values for the current ratio were greater than the chosen significance level of 10%, implying that the differences in the mean current ratios for SE and FC firms as shown in Table 7.6 above are not statistically significant. Because of this, the null hypothesis is accepted for most of the years studied and it is concluded that there is no statistically significant difference between the current ratios for SE and FC firms.

7.5.4 Gearing ratio

The gearing ratio (debt to equity ratio) examines the financing structure of a company. It indicates to the shareholders the degree of risk attached to the company and the sensitivity of profits and dividends to changes in profitability and activity levels (Abrar & Javaid, 2016). A company with a high gearing or leverage is more vulnerable to downturns in the business cycle since it must continue to service its debt obligations, irrespective of the sales levels. On the other hand, high equity proportions act as a cushion and is an indicator of financial strength of a company (Situm, 2014). Table 7.8 below compares the average gearing for SE and FC firms for the period 2007 to 2015.

Table 7.8: Average gearing for SE and FC firms

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gearing ratio (%)									
FC	116	111	118	86	81	85	90	101	185
SE	126	149	142	205	121	160	194	155	226

(Source: Author's construct; utilising data from the Osiris Financial Database)

From Table 7.8 above, the gearing ratio for SE firms was higher than of FC firms in each of the years for the full study period from 2007 to 2015. SE firms have a substantial proportion of their capital in the form of preference shares, debentures and loan stock (debt instruments). This implies that SE firms are more highly geared, i.e. at a higher total risk compared to FC firms.

However, higher levels of risk are generally associated with higher potential for returns. The fact that the SE firms are larger and more resourceful on average may cushion them somewhat against financial risks.

7.5.4.1 Hypothesis tests of the gearing ratio for SE and FC firms

To test whether there is a statistically significant difference in the gearing ratio for SE and FC firms, tests for the difference between the SE and FC sample means of the gearing ratio were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between the gearing ratios for SE and FC firms.

Alternative hypothesis: There is a difference between the gearing ratios for SE and FC firms.

Table 7.9: Independent samples test of the gearing ratios for SE and FC firms

			Levene's Test for Equality of Variances		t-test for Equality of Means				
Year			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2007	Gearing ratio	Equal variances assumed	.215	.646	-.186	28	.854	-9.9536199	53.6398778
		Equal variances not assumed			-.187	26.845	.853	-9.9536199	53.1133426
2008	Gearing ratio	Equal variances assumed	.896	.353	-.597	24	.556	-37.7480000	63.2245231
		Equal variances not assumed			-.563	16.650	.581	-37.7480000	67.0119836
2009	Gearing ratio	Equal variances assumed	.367	.551	-.345	20	.734	-24.1820000	70.1587278
		Equal variances not assumed			-.332	15.298	.744	-24.1820000	72.7290394
2010	Gearing ratio	Equal variances assumed	7.913	.010	-1.593	21	.126	-119.1723016	74.8103168
		Equal variances not assumed			-1.343	9.576	.210	-119.1723016	88.7455202
2011	Gearing ratio	Equal variances assumed	1.030	.320	-.996	25	.329	-40.0644886	40.2155410

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
		Equal variances not assumed			-.885	13.382	.392	-40.0644886	45.2604047
2012	Gearing ratio	Equal variances assumed	2.146	.157	-1.437	22	.165	-74.9813333	52.1846907
		Equal variances not assumed			-1.182	9.505	.266	-74.9813333	63.4505244
2013	Gearing ratio	Equal variances assumed	3.632	.068	-1.557	26	.132	-103.6978571	66.5910122
		Equal variances not assumed			-1.557	14.521	.141	-103.6978571	66.5910122
2014	Gearing ratio	Equal variances assumed	2.492	.128	-1.325	24	.198	-54.3539286	41.0103214
		Equal variances not assumed			-1.263	15.643	.225	-54.3539286	43.0279052
2015	Gearing ratio	Equal variances assumed	.263	.613	-.459	21	.651	-41.0700769	89.5348099
		Equal variances not assumed			-.482	20.753	.635	-41.0700769	85.1352632

(Source: Author's construct from SPSS output)

Table 7.9 above shows that for all the years, the *p*-values for the gearing ratio were greater than the significance level of 10%, implying that the differences in the mean gearing ratios for SE and FC firms as shown in Table 7.8 above are not statistically significant. Because of this, the null hypothesis is accepted for most of the years studied and the conclusion made that there is no statistically significant difference between the gearing ratios for SE and FC firms.

7.5.5 Investment ratios

These ratios are used to assess the performance of a company's shares. Some of the investment ratios include price earnings ratio, dividend yield, dividend cover and earnings per share. The ratios are of interest not only to the existing ordinary shareholders, but also to potential investors, analysts and competitors (Arkan, 2016). Table 7.10 below compares the available average investment ratios for SE and FC firms for the period 2007 to 2015.

Table 7.10: Average investment ratios for SE and FC firms

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earnings per share (USD)									
FC	2.48	-10.98	-3.39	1.39	2.05	-0.03	0.60	-0.39	-15.69
SE	1.11	1.65	-2.14	1.30	2.00	1.13	1.18	1.75	-7.38
Dividends per share (USD)									
FC	0.14	0.20	0.14	0.17	0.19	0.22	0.23	0.29	0.22
SE	0.65	1.40	0.55	1.27	0.58	0.83	0.75	1.10	0.34
Price Earnings ratio									
FC	75.21	4.23	2.07	9.55	-25.54	-0.50	-46.79	5.73	1.70
SE	16.92	8.99	-14.72	17.87	19.33	84.45	-14.20	14.99	-2.27

(Source: Author's construct; utilising data from the Osiris Financial Database)

Earnings per share (EPS) is the portion of a company's profit allocated to each outstanding ordinary share. EPS is an indicator of a company's profitability and it shows the trend of earnings performance for a company over years. Table 7.10 shows that SE firms had a higher average EPS than FC firms in the years 2008 to 2009 and 2012 to 2015, while that of FC firms were higher in the years 2007 as well as for the period 2010 to 2011. Overall, SE firms were more profitable in terms of earnings generated per share invested compared to FC firms during the period 2007 to 2015.

Dividends per share (DPS) are the sum of declared dividends by a company for every outstanding ordinary share. DPS is the sum of total dividends paid out by a company divided by the number of outstanding ordinary shares issued. DPS are an indicator of the value the company returns to its shareholders. Table 7.10 shows that the average DPS for SE firms were higher than those of FC firms are in each of the years for the period 2007 to 2015. This implies that shareholders of SE firms received more returns (in the form of dividend payments) than shareholders of FC firms for each share invested during the period.

The price earnings ratio is the ratio for valuing a company that measures its current share price relative to its earnings per share. It combines the expectations of the market with the earnings available for equity. A high price earnings ratio indicates that investors are expecting higher earnings growth in the future compared to companies with a lower ratio. The price earnings ratio shows how much investors are willing to pay per dollar of earnings. (Atrill & McLaney, 2011). Table 7.10 shows that SE firms had a higher average price earnings ratio than FC firms in the years 2008 and 2010 to 2014, while that of FC firms was higher in the years 2007, 2009 and 2015. Overall, SE firms had a higher price earnings ratio than FC firms during the period 2007 to

2015 (which corroborates observations made in Section 7.4 earlier in this chapter). This implies that investors are willing to pay more per dollar of earnings in SE firms compared to FC firms.

7.5.5.1 Hypothesis tests of the investment ratios for SE and FC firms

To test whether there is a statistically significant difference in the investment ratios for SE and FC firms, tests for the difference between the SE and FC sample means of the investment ratios were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between the investment ratios for SE and FC firms.

Alternative hypothesis: There is a difference between the investment ratios for SE and FC firms.

Table 7.11: Independent samples test of the investment ratios for SE and FC firms

			Levene's Test for Equality of Variances		t-test for Equality of Means				
Year			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2007	EPS	Equal variances assumed	.084	.772	.525	71	.601	1.3694661	2.6061700
		Equal variances not assumed			.518	63.965	.606	1.3694661	2.6415464
	DPS	Equal variances assumed	10.627	.002	-1.747	70	.085	-.5093750	.2915071
		Equal variances not assumed			-1.932	44.524	.060	-.5093750	.2636010
	Price earnings ratio	Equal variances assumed	5.142	.026	1.088	71	.280	58.2873723	53.5524666
		Equal variances not assumed			.991	33.173	.329	58.2873723	58.7960067
2008	EPS	Equal variances assumed	.937	.336	-1.446	73	.153	-12.6220199	8.7310752
		Equal variances not assumed			-1.390	49.110	.171	-12.6220199	9.0836359
	DPS	Equal variances assumed	3.580	.062	-1.113	73	.269	-1.1952464	1.0735440
		Equal variances not assumed			-1.190	39.715	.241	-1.1952464	1.0044326

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	Price earnings ratio	Equal variances assumed	.001	.981	-.424	73	.673	-4.7604540	11.2339804
		Equal variances not assumed			-.430	72.301	.668	-4.7604540	11.0602381
2009	EPS	Equal variances assumed	.000	.996	-.619	75	.538	-1.2478748	2.0154657
		Equal variances not assumed			-.628	74.429	.532	-1.2478748	1.9869195
	DPS	Equal variances assumed	5.653	.020	-1.437	75	.155	-.4119871	.2866950
		Equal variances not assumed			-1.525	44.822	.134	-.4119871	.2702273
	Price earnings ratio	Equal variances assumed	.729	.396	.731	74	.467	16.7847419	22.9768466
		Equal variances not assumed			.740	72.839	.462	16.7847419	22.6960181
2010	EPS	Equal variances assumed	.018	.895	.078	77	.938	.0932454	1.1913918
		Equal variances not assumed			.080	75.056	.937	.0932454	1.1698410
	DPS	Equal variances assumed	3.471	.066	-1.080	77	.284	-1.0981918	1.0168659
		Equal variances not assumed			-1.151	41.445	.256	-1.0981918	.9542669
	Price earnings ratio	Equal variances assumed	1.021	.316	-.390	77	.698	-8.3163692	21.3177314
		Equal variances not assumed			-.371	44.417	.712	-8.3163692	22.3904676
2011	EPS	Equal variances assumed	.137	.713	.032	77	.975	.0470410	1.4865990
		Equal variances not assumed			.031	68.466	.975	.0470410	1.5085168
	DPS	Equal variances assumed	5.674	.020	-1.385	77	.170	-.3978095	.2871382

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
		Equal variances not assumed			-1.462	48.801	.150	-.3978095	.2720296
	Price earnings ratio	Equal variances assumed	5.306	.024	-1.947	77	.055	-44.8718216	23.0465008
		Equal variances not assumed			-1.840	40.148	.073	-44.8718216	24.3823982
2012	EPS	Equal variances assumed	.000	.989	-.927	77	.357	-1.1644516	1.2555140
		Equal variances not assumed			-.920	72.287	.361	-1.1644516	1.2658715
	DPS	Equal variances assumed	3.916	.051	-1.181	77	.241	-.6160463	.5216955
		Equal variances not assumed			-1.254	43.932	.216	-.6160463	.4912119
	Price earnings ratio	Equal variances assumed	8.111	.006	-1.819	77	.073	-84.9489117	46.7043081
		Equal variances not assumed			-1.934	43.209	.060	-84.9489117	43.9334045
2013	EPS	Equal variances assumed	.703	.404	-.428	76	.670	-.5769633	1.3484822
		Equal variances not assumed			-.434	73.913	.666	-.5769633	1.3297916
	DPS	Equal variances assumed	7.048	.010	-1.600	67	.114	-.5235176	.3272633
		Equal variances not assumed			-1.620	39.900	.113	-.5235176	.3232299
	Price earnings ratio	Equal variances assumed	3.918	.051	-.768	76	.445	-32.5921405	42.4124954
		Equal variances not assumed			-.738	44.239	.464	-32.5921405	44.1541021
2014	EPS	Equal variances assumed	.410	.524	-1.316	78	.192	-2.1413468	1.6275872
		Equal variances not assumed			-1.332	77.985	.187	-2.1413468	1.6073878

Year			Levene's Test for Equality of Variances		t-test for Equality of Means				
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
	DPS	Equal variances assumed	4.362	.041	-1.251	62	.216	-.8099882	.6476720
		Equal variances not assumed			-1.368	36.554	.180	-.8099882	.5921690
	Price earnings ratio	Equal variances assumed	4.244	.043	-1.189	78	.238	-9.2574272	7.7869868
		Equal variances not assumed			-1.235	68.877	.221	-9.2574272	7.4977217
2015	EPS	Equal variances assumed	3.403	.069	-1.487	79	.141	-8.3141856	5.5924153
		Equal variances not assumed			-1.434	53.989	.157	-8.3141856	5.7976845
	DPS	Equal variances assumed	2.410	.126	-.766	56	.447	-.1172727	.1530580
		Equal variances not assumed			-.822	52.830	.415	-.1172727	.1427419
	Price earnings ratio	Equal variances assumed	2.014	.160	.717	79	.476	3.9630148	5.5304695
		Equal variances not assumed			.756	49.719	.453	3.9630148	5.2450240

(Source: Author's construct from SPSS output)

- Earnings per share

  Table 7.11 above shows that, for all the years, the *p*-values for EPS were greater than the significance level of 10%, implying that the differences in the mean EPS for SE and FC firms as shown in Table 7.10 above are not statistically significant. As a result, it is concluded that for most of the years studied, there is no statistically significant difference between EPS for SE and FC firms.

- Dividends per share

  Table 7.11 above shows that, except for 2007 ($p = .06$), the *p*-values for DPS were greater than the significance level of 10% for all the years. This implies that the differences in the mean DPS for SE and FC firms as shown in Table 7.10 above are not statistically

significant for most of the years studied. Because of this, it can broadly be concluded that there is no statistically significant difference between DPS for SE and FC firms.

- Price earnings ratio

  Table 7.11 above shows that the *p*-values for the price earnings ratio were greater than the 10% significance level for all the years, except for 2011 and 2012 where the *p*-values were low (.073 and .060, respectively). This broadly implies that the differences in the mean price earnings ratio for SE and FC firms as shown in Table 7.10 above are not significant. Because of this, the conclusion is drawn that there is no statistically significant difference between the price earnings ratios of SE and FC firms.

From the analysis above, since all the individual investment ratios broadly indicate that there is no statistically significant difference between SE and FC firms, the null hypothesis can therefore be accepted and it is concluded that the investment ratios for SE and FC firms are not statistically significantly different, broadly speaking.

7.6 Research variables used in the empirical study

To address the research objective of which of the SE or FC methods provides superior earnings quality, research variables for each earnings quality measure were either downloaded directly from the Osiris Financial Database, or meticulously computed in Microsoft Excel as defined earlier in Chapter 5 and 6. Table 7.12 below shows the research variables for each earnings quality measure.

Table 7.12: Research variables

Earnings quality measures	**Research variables**
Predictability and Persistence	Profit after tax for the current year ($PROF_{k,t}$) Profit after tax for the previous year ($PROF_{k,t-1}$)
Smoothness	Earnings before interest and tax ($EBIT_{k,t}$) [Earnings before interest and tax, scaled by total assets] Cash flows from operations ($CFO_{k,t}$) [Cash flows from operations, scaled by total assets]
Accruals quality	Total current accruals ($TCA_{k,t}$) Cash flow from operations for the previous year ($CFO_{k,t-1}$) Cash flow from operations for the current year ($CFO_{k,t}$) Cash flow from operations for the future year ($CFO_{k,t+1}$) Average total assets ($Assets_{k,t}$)

Earnings quality measures	Research variables
Value relevance	Return ($RET_{k,t}$) [12 months share price return] Earnings ($EARN_{k,t}$) [Net income before extraordinary items in the current year, scaled by market value at the end of the previous year] Change in earnings ($\Delta EARN_{k,t}$)
Timeliness and Conservatism	Return ($RET_{k,t}$) [12 months share price return] Earnings ($EARN_{k,t}$) [Net income before extraordinary items in the current year, scaled by market value at the end of the previous year]

(Source: Author's construct)

7.6.1 Descriptive statistics of the research variables

To provide summary measures of the research variables in Table 7.12 above, the mean, standard deviation, minimum, maximum and range of each variable were computed using SPSS for both FC and SE firms pooled across years 2007 to 2015. Table 7.13 below shows the descriptive statistics for the cross-sectional sample of SE and FC firms pooled across years for the research variables used in the estimation of earnings quality. Since prior research suggests there are fundamental differences between the SE and FC firms, the analyses are partitioned based on accounting method choice (Bandyopadhyay, 1994; Bryant, 2003; Deakin, 1979; Misund, 2017).

From Table 7.13 below, the means for the research variables are all larger for SE firms compared to FC firms, partly because the majority of the SE firms are larger. For example, SE firms' means are 1.31 times larger than FC firms' means for *smoothness: cash flow from operations*, 1.07 times larger than the FC firms' means for *accrual quality: cash flow from operations*, 1.27 larger than FC firms' *accrual quality: average assets* and 4.88 times larger than the FC firms' means for *returns*. These research variables on their own are not measures of earnings quality, but inputs in earnings quality measures (see Table 7.12).

The standard deviations for *profit after tax*, *smoothness: earnings before interest and tax*, *smoothness: cash flows from operations*, *earnings* and *changes in earnings* are all larger for FC firms compared to SE firms. These measures for FC firms are therefore more dispersed compared to SE firms, and there is greater total risk, uncertainty and volatility in such variables for FC firms. On the other hand, *accrual quality: cash flow from operations*, *total current accruals*, *average assets* and *return* are all larger for SE firms than for FC firms, signalling greater total risk and volatility.

The ranges for *profit before tax*, *smoothness: earnings before interest and tax*, *smoothness: cash flow from operations* and *earnings* all are larger for FC firms than for SE firms. Therefore, for these variables, FC data are more widely spread out than SE data. Conversely, the ranges for *accrual quality: cash flow from operations*, *total current accruals*, *average assets*, *change in earnings* and *return* all are larger for SE firms compared to FC firms. This implies that, for these variables, SE data are more widely spread out than FC data.

Table 7.13 is presented on the following page.

Table 7.13: Descriptive statistics on research variables for SE and FC firms

Note: negative amounts are indicated in brackets ()

Earnings quality measures	Research variables	N	Range	Minimum	Maximum	Mean	Std. Deviation
FC Firms							
Predictability and Persistence	Profit after tax (USD)	369	27,341,000.00	(22,757,000.00)	4,584,000.00	(185,392.58)	1,798,214.49
Smoothness	Earnings before interest and tax	369	14.18	(12.45)	1.72	(0.23)	0.84
	Cash flow from operations	369	2.89	(2.28)	0.61	0.06	0.25
Accruals quality	Cash flow from operations (USD)	328	10,719,283.00	(237,283.00)	10,482,000.00	680,379.94	1,744,865.85
	Total current accruals (USD)	328	6,846,000.00	(3,047,000.00)	3,799,000.00	(4,150.17)	399,658.35
	Average assets (USD)	328	61,185,725.36	1,274.64	61,187,000.00	4,221,862.62	10,605,866.54
Value relevance	Earnings	287	21.87	(12.53)	9.35	(0.28)	1.24
	Change in earnings	287	23.22	(14.29)	8.93	(0.13)	1.51
	Return	319	5.49	(0.98)	4.51	0.01	0.69
Timeliness and Conservatism	Earnings	287	21.87	(12.53)	9.35	(0.28)	1.24
	Return	319	5.49	(0.98)	4.51	0.01	0.69
SE Firms							
Predictability and Persistence	Profit after tax (USD)	387	15,440,000.00	(8,354,000.00)	7,086,000.00	82,786.54	1,061,960.57
Smoothness	Earnings before interest and tax	387	6.66	(6.18)	0.48	(0.12)	0.63
	Cash flow from operations	387	1.39	(0.92)	0.46	0.08	0.18
Accruals quality	Cash flow from operations (USD)	344	14,870,000.00	(1,797,000.00)	13,073,000.00	730,861.24	1,852,319.68

Earnings quality measures	Research variables	N	Range	Minimum	Maximum	Mean	Std. Deviation
	Total current accruals (USD)	344	10,809,000.00	(4,811,000.00)	5,998,000.00	4,495.79	610,970.36
	Average assets (USD)	344	66,826,124.04	375.96	66,826,500.00	5,353,443.91	11,824,840.84
Value relevance	Earnings	330	10.81	(9.60)	1.22	(0.13)	0.66
	Change in earnings	330	27.88	(9.59)	18.29	(0.03)	1.21
	Return	343	9.41	(1.00)	8.41	0.05	0.75
Timeliness and Conservatism	Earnings	330	10.81	(9.60)	1.22	(0.13)	0.66
	Return	343	9.41	(1.00)	8.41	0.05	0.75

(Source: Author's construct from SPSS output)

7.6.2 Hypothesis tests of the sample means of SE and FC firms

To test whether there is a statistically significant difference in the samples for the research variables for SE and FC firms, tests for the difference between the SE and FC sample means of each of the research variables were carried out in SPSS using the independent samples *t*-test. The null and alternative hypotheses in this regard are:

Null hypothesis: There is no difference between the sample means for SE and FC firms

Alternative hypothesis: There is a difference between each of the sample means for SE and FC firms

Table 7.14 on the next page shows the hypothesis tests of the sample means for FC and SE firms based on the research variables.

Table 7.14: Independent samples test of equality of sample means for SE and FC firms

Independent Samples Test																			
Research variable		**2007**		**2008**		**2009**		**2010**		**2011**		**2012**		**2013**		**2014**		**2015**	
		t	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**
Profit after tax	Equal variances assumed	-.375	0.71	-2.950	0.00	-2.214	0.03	.443	0.66	.400	0.69	-1.672	0.10	-.898	0.37	-.194	0.85	-1.459	0.15
	Equal variances not assumed	-.379	0.71	-2.991	0.00	-2.180	0.03	.443	0.66	.403	0.69	-1.688	0.10	-.911	0.37	-.193	0.85	-1.434	0.16
Earnings before interest and tax	Equal variances assumed	-1.094	0.28	-2.424	0.02	-2.055	0.04	-.505	0.61	-.329	0.74	-.749	0.46	-.069	0.95	-.076	0.94	-.718	0.48
	Equal variances not assumed	-1.084	0.28	-2.421	0.02	-2.030	0.05	-.501	0.62	-.328	0.74	-.735	0.47	-.069	0.94	-.076	0.94	-.727	0.47
Smoothness Cash flow from operations	Equal variances assumed	-.852	0.40	-.454	0.65	-.052	0.96	-.651	0.52	-1.004	0.32	-.872	0.39	.102	0.92	-.584	0.56	.808	0.42
	Equal variances not assumed	-.849	0.40	-.449	0.65	-.052	0.96	-.646	0.52	-.992	0.33	-.856	0.40	.101	0.92	-.580	0.56	.811	0.42
Accrual quality Cash flow from operations	Equal variances assumed			.186	0.85	1.159	0.25	-.031	0.98	-.249	0.80	-.430	0.67	-.595	0.55	-1.430	0.16	.656	0.51
	Equal variances not assumed			.186	0.85	1.139	0.26	-.031	0.98	-.250	0.80	-.430	0.67	-.599	0.55	-1.450	0.15	.652	0.52

Independent Samples Test																			
Research variable		**2007**		**2008**		**2009**		**2010**		**2011**		**2012**		**2013**		**2014**		**2015**	
		t	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**
Total current accruals	Equal variances assumed			1.263	0.21	-1.405	0.16	-1.883	0.06	-.174	0.86	.502	0.62	-.166	0.87	1.219	0.23	-.600	0.55
	Equal variances not assumed			1.275	0.21	-1.432	0.16	-1.890	0.06	-.174	0.86	.498	0.62	-.165	0.87	1.226	0.22	-.613	0.54
Average assets	Equal variances assumed			-.196	0.85	-.489	0.63	-.494	0.62	-.334	0.74	-.306	0.76	-.383	0.70	-.508	0.61	-.986	0.33
	Equal variances not assumed			-.196	0.84	-.491	0.62	-.496	0.62	-.334	0.74	-.306	0.76	-.383	0.70	-.508	0.61	-.992	0.32
Earnings	Equal variances assumed			.298	0.77	-2.262	0.03	-.424	0.67	-.867	0.39	-.307	0.76	-1.120	0.27	.985	0.33	-2.477	0.02
	Equal variances not assumed			.268	0.79	-2.154	0.04	-.426	0.67	-.825	0.41	-.302	0.76	-1.063	0.29	1.031	0.31	-2.325	0.03
Change in earnings	Equal variances assumed			.074	0.94	-.104	0.92	.494	0.62	-.376	0.71	-.362	0.72	-.241	0.81	1.390	0.17	-2.393	0.02
	Equal variances not assumed			.067	0.95	-.108	0.91	.474	0.64	-.358	0.72	-.346	0.73	-.228	0.82	1.433	0.16	-2.245	0.03

Independent Samples Test																			
Research variable		**2007**		**2008**		**2009**		**2010**		**2011**		**2012**		**2013**		**2014**		**2015**	
		t	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**	**t**	**Sig. (2-tailed)**
Return	Equal variances assumed	-.847	0.40	-.831	0.41	.019	0.99	1.268	0.21	-2.155	0.03	-2.150	0.03	-.518	0.61	-.723	0.47	-.305	0.76
	Equal variances not assumed	-.848	0.40	-.805	0.43	.019	0.99	1.251	0.22	-2.160	0.03	-2.169	0.03	-.531	0.60	-.719	0.47	-.320	0.75

(Source: Author's construct from SPSS output)

- Profit after tax

  From Table 7.14 above, the *p*-values for *profit after tax* in the years 2008 and 2009 were very low, less than the chosen significance level of 10% and exactly 10% in 2012. On the other hand, the *p*-values for *profit after tax* for the rest of the years were greater than the significance level of 10%, implying that the means for SE and FC firms based on *profit after tax* are not significantly different. In this case, the null hypothesis can be accepted and it is broadly concluded that the *profit after tax* for SE and FC firms are not statistically significantly different.

- Earnings before interest and tax

  Similar to profit after tax, except for 2008 and 2009, the *p*-values for *earnings before interest and tax* are greater than the significance level of 10% in all the years. This implies that there is no statistically significant difference in the sample means for SE and FC firms based on their *earnings before interest and tax* in all the years except for 2008 and 2009.

- Smoothness: cash flow from operations

  For all the years, the *p*-values for *smoothness cash flow from operations* were greater than the significance level of 10%. In this case, the null hypothesis is therefore accepted and the conclusion drawn that there is no significant difference in the sample means for SE and FC firms based on *smoothness cash flows from operations*.

- Accruals quality: cash flow from operations

  From Table 7.14 above, the *p*-values for *accruals quality cash flow from operations* were greater than the significance level of 10% for all the years. The null hypothesis is consequently accepted and it is concluded that there is no significant difference in the sample means for SE and FC firms based on the measure *accruals quality cash flow from operations*.

- Total current accruals

  Except for 2010, the *p*-values for *total current accruals* were greater that the chosen significance level of 10% for all other years. Because of this, the sample means for *total current accruals* for SE and FC firms are, broadly, not statistically significantly different. As a result, the null hypothesis is generally accepted that there is no difference in the SE and FC firms based on *total current accruals*.

- Average assets

  For all the years 2008 to 2015, the *p*-values for average assets were greater than the 10% significance level, implying that, statistically, there is no significant difference between the samples for *average assets* for SE and FC firms. Because of this, the null hypothesis is accepted and the conclusion made that the *average assets* for SE and FC firms are not statistically significantly different.

- Earnings

  As can be observed from Table 7.14 above, except for 2009 and 2015 where the *p*-values for *earnings* were less than the 10% significance level, for all other years the *p*-values were greater than the chosen significance level. Because of this, the null hypothesis is accepted and it is broadly concluded (i.e. for most years) that the *earnings* for SE and FC firms are not statistically significantly different.

- Change in earnings

  For all the years, the *p*-values for *change in earnings* were greater than the significance level of 10%, except for 2015 where the *p*-value was very low. In this case, the sample means for *change in earnings* for SE and FC firms are not statistically significantly different. As a result, the null hypothesis is accepted and it is broadly concluded (i.e. for most years) that there is no significant difference in the *change in earnings* for SE and FC firms.

- Return

  From Table 7.14 above, for all the years, the *p*-values for *return* were greater than the significance level of 10%, except for the years 2011 and 2012 where the *p*-values were very low (p = .03 for both years). In this case, the sample means for *return* for SE and FC firms are broadly not statistically significantly different. The null hypothesis is thus accepted and it is concluded that for most of the years studied, there is no significant difference in the *return* for SE and FC firms.

Data collected over time are dependent on previous measurements, thus violating the assumption of independence in all basic statistical analysis. Therefore, to ensure that this independence principle is not impaired, the longitudinal data will not be pooled. In other words, the nine years will all be analysed and interpreted independently for purposes of the analysis following in Section 7.7. From the above analysis, it is noted that, for some variables over years, the differences in the sample means are statistically significant, while on the other hand, for most of the other

variables and years, the differences between the sample means were not statistically significant. Because of this, it can be concluded that there are no consistent trends in the data, i.e. no similar observations year on year. In addition, to confirm that there are no trends in the data, i.e. similar trends year on year, correlations were determined for each year separately for each type of firm (FC and SE). The Spearman correlation coefficient was used for this purpose and the results are included at relevant points in the following sections.

7.7 Earnings quality of SE and FC firms

The main objective of this study is to ascertain which, if any, of the two accounting methods (SE and FC) provides superior earnings quality using various earnings quality measures. Since there are various definitions of earnings quality, there are also varying measures of earnings quality that have commonly been used in accounting research (Alipour et *al.,* 2014; Bradshaw et *al.,* 1999; Francis et *al.,* 2004). However, Francis et *al.* (2004) have provided seven measures of earnings quality, which are more comprehensively classified as "accounting-based" and "market-based" attributes. The accounting-based attributes are accruals quality, persistence, predictability and smoothness, while the market-based attributes are value relevance, timeliness and conservatism. In the present research, all seven measures were used to estimate the earnings quality of the sampled SE and FC firms and results are presented below. However, before proceeding to estimate the earnings quality of SE and FC firms using the seven earnings quality measures, the linear regression models used were initially tested on the assumptions of multiple regression. The linear regression models tested included earnings predictability and persistence; accruals quality; timeliness and conservatism; and value relevance.

7.7.1 Test of assumptions of multiple linear regression

Testing of assumptions is an important task for the researcher utilising linear regression, or indeed any statistical technique. When these assumptions are unduly violated, the results of the study may not be trustworthy, resulting in an over or under estimation of significance or effect size(s) (Chatterjee & Hadi, 2012; Osborne & Waters, 2002; Williams *et al.,* 2013). Literature shows that multiple linear regression analysis makes four key assumptions including linearity, normality, no multicollinearity, and homoscedasticity (Ernst & Albers, 2017; Osborne & Waters, 2002). Using SPSS Statistics, all these assumptions were tested on the data and equations contained in this study *(see* Appendix to the thesis) and the results summarised below. It is important to note that all the equations or regressions used to measure earnings quality in this study were not originated by the researcher but were adapted from Francis *et al.* (2004); Gaio and Raposo (2014) and Latif *et al.* (2017), hence considered to be widely used in accounting research.

7.7.1.1 The assumption of a linear relationship

The assumption of linearity is that there is a straight-line relationship between the dependent and independent variables (Tabachnick & Fidell, 2013:117). If the relationship between the dependent variable and independent variables is non-linear, the results of the regression analysis may under-estimate the true relationship (Osborne & Waters, 2002). Scatter plots can be used to show whether there is a linear or non-linear relationship between variables (Tabachnick & Fidell, 2013).

Based on the earnings quality models used in this study, various scatter plots were drawn between the dependent and independent variables in each regression to ascertain whether there are linear or non-linear relationships (*see* Appendix). Visual inspection of the scatterplots indicated fairly linear relationships between the variables for each of the models and for all the years from 2008 to 2015.

7.7.1.2 The assumption of no multicollinearity

Multicollinearity occurs when two or more independent variables are highly correlated with each other. This leads to problems with understanding which variable contributes to the variance explained and technical issues in calculating a multiple regression model (Fox, 2016; Laerd Statistics, 2015; Williams *et al.,* 2013). This assumption is typically tested using the Variance Inflation Factor (VIF) or Tolerance values in SPSS Statistics. VIF values above 10 could be a concern, indicating that multiple correlation with other variables is high, suggesting multicollinearity (Akinwande *et al.,* 2015; Hair *et al.,* 2013; Laerd Statistics, 2015; Myers, 1990; O'brien, 2007; Pallant, 2013:164; Robinson & Schumacker, 2009).

Using SPSS, each of the earnings quality models was tested for multicollinearity (*see* Appendix). VIF values for each of the independent variables were less than 10 for each of the years from 2008 to 2015. This implies that the independent variables in each regression are not highly correlated with each other, hence no concerning multicollinearity exists in the data.

7.7.1.3 The assumption of normality

Multiple linear regression assumes that the variables are normally distributed, hence the residuals of analysis are also normally distributed and independent (Tabachnick & Fidell, 2013:112). Two common methods that can be used to check for the assumption of normality of the residuals are a histogram with superimposed normal curve and a normal probability-probability plot (P-P plot). In addition, the Kolmogorov-Smirnov tests and Shapiro-Wilk tests provide inferential statistics on normality (Field, 2009; Laerd Statistics, 2015; Osborne & Waters, 2002; Pallant, 2013). It is important to note that, in large samples, a variable with statistically significant skewness often does not deviate enough from normality to make a substantive difference in the analysis

(Tabachnick & Fidell, 2013:114). In other words, with large samples, the significance level of skewness is not as important as its actual size and visual appearance of the distribution; thus, the larger the sample, the lesser the importance of the normality assumption (Tabachnick & Fidell, 2013:114; Williams *et al.,* 2013:10).

To check for normality of the data and equations contained in this study, histograms with a superimposed normal curve were drawn for each regression using SPSS (*see* Appendix). From the visual inspection of the histograms, the standardised residuals generally appear to be approximately normally distributed for each regression model for each of the years from 2008 to 2015.

7.7.1.4 The assumption of homoscedasticity

This assumption states that the variance of error terms are similar across the values of the independent variables. When the variance of errors differs at different values of the independent variables, heteroscedasticity is indicated (Ernst & Albers, 2017; Osborne & Waters, 2002; Williams *et al.,* 2013). Slight heteroscedasticity has little effect on significance tests (Berry & Feldman, 1985; Tabachnick & Fidell, 2013). A plot of standardised residuals versus predicted values can show whether points are equally distributed across all values of the independent variables (Osborne & Waters, 2002). Homoscedasticity is achieved if residuals are randomly scattered around the zero point (the horizontal line) providing a relatively even distribution (Pallant, 2013). However, in case the plots of residuals appear to deviate substantially from normal, then this could be an indicator of heteroscedasticity. Heteroscedasticity can take various forms on the scatter plot, such as an increasing funnel, decreasing funnel, a fan shape, or a curvilinear form (Laerd Statistics, 2015; Osborne & Waters, 2002; Tabachnick & Fidell, 2013).

To check for homoscedasticity in the data and equations contained in the study, scatter plots of standardised residuals versus predicted values were drawn for each regression, for each of the years from 2008 to 2015 (*see* Appendix). Visual inspection of the scatter plots indicated that most of the scores are concentrated in the centre (along the zero point). There are generally no clear or systematic patterns to the residuals, hence an indication of homoscedasticity in the data.

Since none of the four assumptions of multiple linear regression was violated, the research then proceeded to estimate the earnings quality of SE and FC firms using the seven earnings quality measures.

7.7.2 Earnings quality measured by earnings predictability

Earnings predictability was measured as the R^2 from the regression of future profit and reported historical profit. First, the Pearson correlation coefficient from the association of current profits and prior profits was estimated for SE and FC firms. The purpose was to measure the degree and significance of association between the two variables. Table 7.15 below shows the correlation coefficients of SE and FC firms based on the association between profit after tax for the current year and profit after tax for the previous year. The Table also shows the significance of association between these two variables for SE and FC firms over the study period.

Table 7.15: Correlation coefficient between profit after tax for current and prior year

Year			**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
			Profit after tax for current year	Profit after tax for current year	Profit after tax for current year	Profit after tax for current year	Profit after tax for current year	Profit after tax for current year	Profit after tax for current year	Profit after tax for current year
FC	Profit after tax for previous year	Correlation Coefficient	-.153	.355	-.551	.902	.395	.358	.283	-.425
		Sig. (2-tailed)	.341	.023	.000	.000	.011	.021	.073	.006
		N	41	41	41	41	41	41	41	41
SE	Profit after tax for previous year	Correlation Coefficient	.625	-.014	.109	.725	.461	.645	.277	.105
		Sig. (2-tailed)	.000	.928	.485	.000	.002	.000	.073	.502
		N	43	43	43	43	43	43	43	43

(Source: Author's construct from SPSS output)

Table 7.15 above shows that there was a weak negative correlation between current and prior year profits after tax for FC firms in the year 2008, a moderate positive correlation in the years 2009, 2012, 2013 and 2014, moderate negative correlation in the years 2010 and 2015 and lastly a strong positive correlation during the year 2011. However, these correlations were statistically significant in each of the years from 2009 to 2015, at the 10% significance level. On the other hand, SE firms had a strong positive correlation in the years 2008, 2011, 2012 and 2013, and a weak positive correlation in the years 2010, 2014 and 2015. However, these correlations were statistically significant in the years 2008 and 2011 to 2014 at the 10% significance level. This implies that there are no similar observations in the year-on-year data, since the correlations for SE and FC firms are not statistically significant for each variable and for each year. Therefore, the regression model under this earnings quality measure will be tested for each year separately for each type of firm (FC and SE) in order to maintain data/variable independence.

The results of testing the first hypothesis are provided in Table 7.16 below. The R^2 from the regression of future profits and historical profits (as a measure of earnings predictability) has been examined for the period 2007 to 2015.

Table 7.16: Earnings predictability model estimation

Model Summary										
						Change Statistics				
Year		R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
2008	FC	.234[a]	.055	.030	633052.84242	.055	2.250	1	39	.142
	SE	.953[a]	.908	.906	374112.22878	.908	404.099	1	41	.000
2009	FC	.237[a]	.056	.032	997735.24773	.056	2.323	1	39	.136
	SE	.857[a]	.735	.729	244911.12670	.735	113.752	1	41	.000
2010	FC	.598[a]	.358	.341	522563.60781	.358	21.724	1	39	.000
	SE	.925[a]	.856	.853	261282.26666	.856	244.386	1	41	.000
2011	FC	.957[a]	.915	.913	240144.00654	.915	420.487	1	39	.000
	SE	.823[a]	.677	.669	606636.32904	.677	85.846	1	41	.000
2012	FC	.549[a]	.301	.284	371780.64055	.301	16.832	1	39	.000
	SE	.523[a]	.273	.255	577948.33394	.273	15.412	1	41	.000
2013	FC	.509[a]	.259	.240	361983.10426	.259	13.618	1	39	.001
	SE	.858[a]	.737	.730	417828.68638	.737	114.668	1	41	.000
2014	FC	.440[a]	.193	.173	651476.96595	.193	9.347	1	39	.004
	SE	.201[a]	.041	.017	616555.98802	.041	1.734	1	41	.195
2015	FC	.157[a]	.025	.000	4666010.40977	.025	.988	1	39	.326
	SE	.055[a]	.003	-.021	1881922.01633	.003	.126	1	41	.724
a. Predictors: (Constant), Profit after tax for previous year										

(Source: Author's construct from SPSS output)

Table 7.16 above provides the *R*, R^2 and the *p*-values. The *R* (the "**R**" column) value represents the simple correlation between historical profits and future profits. The correlation for SE firms in the years 2008, 2009, 2010, 2011 and 2013 was very strong, almost close to 1, indicating a high degree of correlation between future and historical profits for SE firms. In addition, this correlation was very significant. On the other hand, FC firms had a weak positive correlation in the years 2008, 2009 and 2015, a moderate positive correlation in 2013 and 2014, and a strong positive correlation in the years 2010 to 2012. The R^2 value (the "**R Square**" column) indicates how much of the total variation in the dependent variable, "future profits", can be explained by the independent variable, "historical profits". In this case, for the years 2008, 2009, 2010, 2011 and 2013, 90.8%, 73.5%, 85.6%, 67.7 and 73.7%, respectively can be explained for SE firms, which

is very large. Since the corresponding *p*-values for each of the years are very low, less than the chosen significance level of 10%, the ability of historical profits to predict future profits for SE firms is statistically significant for the mentioned years. Conversely, in the same period, except for 2011, the R^2 values for FC firms were 5.5%, 5.6%, 35.8% and 25.9% respectively, which were very small in comparison. However, for the years 2012, 2014 and 2015, both the SE and FC firms had very small R^2 values. Therefore, the overall regression model for SE firms more statistically significantly predicts the outcome variable, "future profits", compared to those of FC firms. In this case, the null hypothesis (see Section 6.6) was rejected, and it is broadly concluded that there is a significant difference in the earnings quality of FC and SE firms based on earnings predictability. More specifically, SE firms exhibited earnings quality (as measured through earnings predictability) that is significantly superior compared to FC firms, though there were exceptions for a few of the years, as mentioned above.

7.7.3 Earnings quality measured by persistence

Persistence was measured as the slope coefficient of the regression of future profit and reported historical profit. The coefficient of the independent variable historical profits (prior year profits) is taken as a measure of earnings persistence.

Table 7.17: Coefficients of the regression of future profit and historical profit for SE and FC firms

Coefficients[a]							
			Unstandardised Coefficients		Standardised Coefficients		
Year			B	Std. Error	Beta	t	Sig.
2008	FC	(Constant)	(156,227.26)	104,587.67		-1.494	.143
		Profit after tax for previous year	-.247	.164	-.234	-1.500	.142
	SE	(Constant)	95,237.97	59,348.98		1.605	.116
		Profit after tax for previous year	1.200	.060	.953	20.102	.000
2009	FC	(Constant)	(241,368.15)	163,921.42		-1.472	.149
		Profit after tax for previous year	.374	.245	.237	1.524	.136
	SE	(Constant)	(80,304.30)	39,597.83		-2.028	.049
		Profit after tax for previous year	.331	.031	.857	10.665	.000
2010	FC	(Constant)	122,420.48	85,647.85		1.429	.161
		Profit after tax for previous year	-.380	.081	-.598	-4.661	.000
	SE	(Constant)	99,015.32	40,176.12		2.465	.018
		Profit after tax for previous year	1.341	.086	.925	15.633	.000
2011	FC	(Constant)	(18,636.35)	40,160.09		-.464	.645
		Profit after tax for previous year	1.209	.059	.957	20.506	.000

Coefficients[a]							
Year			Unstandardised Coefficients		Standardised Coefficients	t	Sig.
			B	Std. Error	Beta		
	SE	(Constant)	(35,203.30)	95,742.76		-.368	.715
		Profit after tax for previous year	1.273	.137	.823	9.265	.000
2012	FC	(Constant)	(81,080.95)	61,385.77		-1.321	.194
		Profit after tax for previous year	.296	.072	.549	4.103	.000
	SE	(Constant)	144,126.30	89,640.63		1.608	.116
		Profit after tax for previous year	.332	.085	.523	3.926	.000
2013	FC	(Constant)	72,357.60	56,532.33		1.280	.208
		Profit after tax for previous year	.481	.130	.509	3.690	.001
	SE	(Constant)	(15,663.26)	66,799.12		-.234	.816
		Profit after tax for previous year	1.031	.096	.858	10.708	.000
2014	FC	(Constant)	134,725.52	103,329.09		1.304	.200
		Profit after tax for previous year	-.759	.248	-.440	-3.057	.004
	SE	(Constant)	76,879.37	96,926.72		.793	.432
		Profit after tax for previous year	.156	.118	.201	1.317	.195
2015	FC	(Constant)	(2,103,450.84)	733,306.44		-2.868	.007
		Profit after tax for previous year	1.024	1.030	.157	.994	.326
	SE	(Constant)	(918,674.80)	291,377.45		-3.153	.003
		Profit after tax for previous year	.166	.467	.055	.355	.724
a. Dependent Variable: Profit after tax for current year							

(Source: Author's construct from SPSS output)

Results from Table 7.17 above show that for the years 2008 and 2010 to 2014, SE firms had higher coefficients (1.200, 1.341, 1.273, .332, 1.031 and .156, respectively) than FC firms (-.247, -.380, 1.209, .296, .481 and -.759, respectively). This is statistically significant at the 10% significance level, since the *p*-values for the coefficients of SE firms were all very low for all the years, except for 2014 and 2015. On the other hand, for the years 2009 and 2015, FC firms had higher coefficients (.374 and 1.024, respectively) than SE firms had (.331 and .166 respectively). However, this difference was not statistically significant, since the *p*-values for the coefficients of FC firms were higher than the 10% significance level. This implies therefore that the overall regression model for SE firms is statistically significantly a better predictor of future profits compared to those of FC firms; hence, signalling a higher earnings quality. Therefore, the null hypothesis (see 6.6) was rejected, and it is broadly concluded that there is a significant difference in the earnings quality of FC and SE firms based on earnings persistence. More specifically, for six of the eight years studied, SE firms exhibited superior earnings quality compared to FC firms, and this difference is statistically significant for all the six years. It therefore appears that, in terms of this earnings quality measure, SE firms exhibit superior earnings quality more often FC

7.7.4 Earnings quality measured by earnings smoothness

Earnings smoothness was measured as the ratio of the firms' standard deviation of operating income scaled by total assets, to the standard deviation of cash flows from operations scaled by total assets. Table 7.18 below shows the Spearman's correlation coefficients of SE and FC firms based on the association between earnings before interest and tax (EBIT) and cash flows from operations (CFO), both scaled by total assets. The Table also shows the significance of association between these two variables for SE and FC firms.

Table 7.18: Correlation coefficient between EBIT and CFO

Year			2007	2008	2009	2010	2011	2012	2013	2014	2015
			Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations	Cash flow from operations
FC	Earnings before interest and tax	Correlation	.940	.103	.34	.890	.905	.376	.830	.676	-.184
		Sig. (2-tailed)	.000	.523	.028	.000	.000	.015	.000	.000	.249
		N	41	41	41	41	41	41	41	41	41
SE	Earnings before interest and tax	Correlation	.740	.696	.626	.861	.812	.720	.711	.580	.337
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.027
		N	43	43	43	43	43	43	43	43	43

(Source: Author's construct from SPSS output)

Table 7.18 above shows that there was a strong positive correlation between EBIT and CFO in all the years for SE firms except for 2015, and that this correlation is statistically significant as shown by the *p*-values that were very low, less than the 10% significance level. On the other hand, FC firms had a strong positive correlation in the years 2007, 2010, 2011, 2013 and 2014, a moderate correlation in 2009 and 2012, weak positive correlation in 2008 and a weak negative correlation in the 2015. These correlations were statistically significant for the years 2007, as well as for 2009 to 2014 at the 10% significance level. For all the years, the direction of the relationship of EBIT and CFO for SE firms was positive, meaning that these variables tend to increase together, i.e. greater cash flows from operations are associated with greater earnings before interest and tax.

Table 7.19 below shows the ratio of the standard deviation of EBIT scaled by total assets, to the standard deviation of CFO scaled by total assets.

Table 7.19: Ratio of standard deviation of EBIT and CFO scaled by total assets

Year		2007	2008	2009	2010	2011	2012	2013	2014	2015
FC	Standard deviation of EBIT	.4231	.4117	.5124	.5396	.2244	2.0291	.2890	.5351	.7425
	Standard deviation of CFO	.1929	.3385	.2180	.2566	.1978	.4079	.1506	.2297	.2006
	Ratio	2.1928	1.2163	2.3507	2.1030	1.1345	4.9743	1.9187	2.3300	3.7016
SE	Standard deviation of EBIT	.2736	.3928	.2886	.3727	.1945	.7014	.4143	.4229	1.3847
	Standard deviation of CFO	.1654	.2056	.2324	.1768	.1164	.1372	.1271	.1730	.2295
	Ratio	1.6544	1.9107	1.2423	2.1087	1.6717	5.1116	3.2602	2.4445	6.0331
Difference in ratios		-.5384	.6945	-1.1085	.0057	.5372	.1373	1.3416	.1145	2.3315

(Source: Author's construct from SPSS output)

Table 7.19 shows that, for all the years except in 2007 and 2009 the ratios of the standard deviation of EBIT and CFO for SE firms were greater than those of FC firms are, by .694, .006, .537, .137, 1.342, .115 and 2.332, respectively. This implies that, broadly speaking, earnings of SE firms are less smoothened and thus exhibit a superior earnings quality, compared to FC firms. In order to evaluate the significance of the difference in the ratios for FC and SE firms, an independent samples *t*-test was conducted on the ratios. The results are presented in Table 7.20 below.

Table 7.20: Independent samples test of the ratios of standard deviation of EBIT and CFO for SE and FC firms

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Ratio	Equal variances assumed	1.328	.266	-.568	16	.578	-.3905889	.6881074
	Equal variances not assumed			-.568	14.559	.579	-.3905889	.6881074

(Source: Author's construct from SPSS output)

From Table 7.20 above, since the *p*-value is greater than the chosen significance level of 10%, it can be concluded that the mean ratios for SE and FC firms are not statistically significantly different. This implies that, although SE firms had superior earnings quality compared to FC firms, this difference was not statistically significant. Therefore, the null hypothesis (see Section 6.6) is accepted and it is broadly concluded that there is no significant difference in the earnings quality of FC and SE firms based on earnings smoothness. For seven of the nine years studied, SE firms exhibited earnings quality (as measured through smoothness) that is superior compared to FC firms, although broadly these differences are not statistically significant.

7.7.5 Earnings quality measured by accruals quality

According to Dechow and Dichev (2002), accrual quality as a measure of earnings quality is based on the view that earnings that map more closely into cash flows are of a better quality. In the present research, accrual quality was estimated based on the residuals of the regression of total current accruals (TCA) into last-period, current, and next period cash flows from operations (CFO_previous, CFO_current and CFO_future). Accruals quality is the standard deviation of a firm's estimated residuals. A Spearman's correlation was run to determine the relationship between the accruals quality variables, the results of which are presented in Table 7.21 on the next page.

Table 7.21: Correlations of accruals quality variables

FC firms: N=41, SE firms: N=43

Year			2008	2009	2010	2011	2012	2013	2014
			CFO_future	CFO_future	CFO_future	CFO_future	CFO_future	CFO_future	CFO_future
FC	TCA	Correlation	.352	.273	.066	.272	-.018	.075	.255
		Sig. (2-tailed)	.024	.084	.681	.085	.909	.643	.108
	CFO_previous	Correlation	.371	.419	.307	.327	.326	.466	.344
		Sig. (2-tailed)	.017	.006	.051	.037	.037	.002	.028
		N	41	41	41	41	41	41	41
	CFO_current	Correlation	.283	.366	.622	.436	.377	.563	.281
		Sig. (2-tailed)	.073	.019	.000	.004	.015	.000	.075
SE	TCA	Correlation	.464	.114	.026	-.088	.157	.204	.3
		Sig. (2-tailed)	.002	.465	.867	.576	.314	.190	.026
	CFO_previous	Correlation	.489	.402	.318	.427	.592	.489	.412
		Sig. (2-tailed)	.001	.008	.038	.004	.000	.001	.006
	CFO_current	Correlation	.187	.571	.465	.461	.758	.728	.395
		Sig. (2-tailed)	.231	.000	.002	.002	.000	.000	.009
			CFO_current	CFO_current	CFO_current	CFO_current	CFO_current	CFO_current	CFO_current
FC	TCA	Correlation	-.167	-.379	.050	-.066	-.241	-.391	-.044
		Sig. (2-tailed)	.296	.014	.755	.681	.128	.012	.784
		Correlation	.573	.347	.429	.641	.376	.431	.515

Year			2008	2009	2010	2011	2012	2013	2014
			CFO_future	CFO_future	CFO_future	CFO_future	CFO_future	CFO_future	CFO_future
	CFO_ previous	Sig. (2-tailed)	.000	.026	.005	.000	.016	.005	.001
SE	TCA	Correlation	-.142	-.336	-.307	-.490	-.114	.188	-.044
		Sig. (2-tailed)	.364	.028	.045	.001	.468	.228	.778
	CFO_ previous	Correlation	.422	.082	.535	.535	.432	.749	.676
		Sig. (2-tailed)	.005	.601	.000	.000	.004	.000	.000
			CFO_previous	CFO_previous	CFO_previous	CFO_previous	CFO_previous	CFO_previous	CFO_previous
FC	TCA	Correlation	.213	.215	.468	.329	-.115	.164	.099
		Sig. (2-tailed)	.182	.176	.002	.036	.475	.306	.537
SE	TCA	Correlation	.172	.371	.119	-.197	.483	.249	.248
		Sig. (2-tailed)	.270	.014	.446	.206	.001	.108	.109

(Source: Author's construct from SPSS output)

- Correlation between future CFO and TCA

  There was a weak positive correlation between future CFO and TCA for FC firms for the years 2009 to 2011, 2013 and 2014; a moderate positive correlation in 2008; and a weak negative correlation in the year 2012. However, the correlation was only statistically significant in the year 2008. On the other hand, SE firms had a weak negative correlation in the year 2011, a weak positive correlation in the years 2009 to 2010 and 2012 to 2014, and a moderate positive correlation in 2008. However, this correlation was only statistically significant in the years 2009 to 2011, since the *p*-values were very low in those years, less than the 10% significance level.

- Correlation between future CFO and previous CFO

  For all the years, the correlation between future CFO and previous CFO for FC firms was a moderate positive correlation, which was statistically significant since all the *p*-values were very low, less than the 10% significance level. Similarly, SE firms also had a moderate positive correlation in all the years, except for 2012, where the correlation was strong. These correlations were statistically significant for each of the years.

- Correlation between future CFO and current CFO

  For the years 2008 and 2014, FC firms had a weak positive correlation, a moderate positive correlation in the years 2009, 2011 and 2012, and a strong positive correlation during the years 2010 and 2013. For each of the years, the correlation was statistically significant. On the other hand, SE firms had a weak positive correlation in 2008, a moderate positive correlation in the years 2010, 2011 and 2014 and a strong positive correlation in the years 2009, 2012 and 2013. These correlations were statistically significant in all the years except for 2008.

- Correlation between Current CFO and TCA

  For all the years, except in 2013, FC firms had a weak negative correlation. However, this correlation was only statistically significant in the years 2009 and 2013. Conversely, SE firms had a weak negative correlation in the years 2008, 2012 and 2014, a moderate negative correlation in the years 2009 to 2011 and a weak positive correlation during 2013. However, this correlation was only statistically significant in the years 2009 to 2011.

- Current CFO and previous CFO

  For the years 2009, 2010, 2012 and 2013, FC firms had a moderate positive correlation and a strong positive correlation in the years 2008, 2011 and 2014. In addition, the correlation was statistically significant for each of the years. Conversely, SE firms had a weak positive correlation in 2009, a moderate positive correlation in the years 2008 and 2012 and a strong positive correlation in 2010, 2011, 2013 and 2014. The correlation was statistically significant in all the years, except for 2009.

- Previous CFO and TCA

  There was a weak positive correlation between previous CFO and TCA for FC firms for the years 2008, 2009, 2013 and 2014, a weak negative correlation in 2012, and a moderate positive correlation in 2010 and 2011. These correlations were only statistically significant in the years 2010 and 2011. On the other hand, SE firms had a weak negative correlation in 2011, a weak positive correlation in the years 2008, 2010, 2013 and 2014, and a moderate positive correlation in the years 2009 and 2012. However, this correlation was only statistically significant in the years 2009 and 2012, since the *p*-values were very low in those years, less than the 10% significance level.

From the above analysis, it can be concluded that there are no similar observations in the data year-on-year, since the correlations for SE and FC firms are not statistically significant for each variable and for each year. Therefore, the regression model under this earnings quality measure will be tested for each year separately for each type of firm (FC and SE) in order to maintain the independence of the data and the variables.

Table 7.22: Accruals quality model estimation

Model Summary										
						Change Statistics				
Year		R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
2008	FC	.672[a]	.452	.408	.213090990	.452	10.178	3	37	.000
	SE	.764[a]	.583	.551	.097253508	.583	18.195	3	39	.000
2009	FC	.816[b]	.666	.639	.180241970	.666	24.617	3	37	.000
	SE	.816[b]	.666	.640	.115308713	.666	25.874	3	39	.000
2010	FC	.622[b]	.386	.337	.122918375	.386	7.763	3	37	.000
	SE	.820[a]	.673	.648	.176691665	.673	26.737	3	39	.000
2011	FC	.426[b]	.182	.115	.112928982	.182	2.735	3	37	.057

Model Summary										
Year		R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change
	SE	.577[b]	.333	.281	.063020116	.333	6.482	3	39	.001
2012	FC	.508[b]	.259	.198	.308257778	.259	4.300	3	37	.011
	SE	.558[a]	.312	.259	.083662608	.312	5.889	3	39	.002
2013	FC	.853[a]	.728	.706	.082517491	.728	32.994	3	37	.000
	SE	.388[b]	.150	.085	.063308013	.150	2.301	3	39	.092
2014	FC	.974[b]	.948	.944	.146599250	.948	223.959	3	37	.000
	SE	.418[b]	.175	.111	.084526149	.175	2.755	3	39	.055
a. Predictors: (Constant), CFO_future, CFO_current, CFO_previous										
b. Predictors: (Constant), CFO_future, CFO_previous, CFO_current										

(Source: Author's construct from SPSS output)

Table 7.22 shows that the R^2 value of FC firms is greater than that of SE firms in the years 2013 and 2014. This is statistically significant at the level of 10%. This implies that for 2013 and 2014, 72.8% and 94.8% of the total variation can be explained for FC firms compared to 15% and 17.5% for SE firms respectively. Therefore, it can be concluded that for those years, the FC regression line fits the data better than the SE model. However, for the years 2008 and 2010 to 2012, the R^2 for SE firms is greater than that of FC firms, and this is statistically significant.

Table 7.23: Standard deviation of the regression residuals for SE and FC firms

Residuals Statistics[a]							
Year			Minimum	Maximum	Mean	Std. Deviation	N
2008	FC	Predicted Value	-.5488	.3721	-.0505	.1862	41
		Residual	-.8779	.5109	.0000	.2049	41
	SE	Predicted Value	-.3629	.2806	-.0131	.1109	43
		Residual	-.2958	.2169	.0000	.0937	43
2009	FC	Predicted Value	-.9375	.4936	-.0535	.2449	41
		Residual	-.3770	.4118	.0000	.1734	41
	SE	Predicted Value	-.5597	.3152	-.0508	.1568	43
		Residual	-.4448	.2100	.0000	.1111	43
2010	FC	Predicted Value	-.3757	.1723	-.0457	.0938	41
		Residual	-.4583	.2355	.0000	.1182	41
	SE	Predicted Value	-1.1594	.7115	-.0209	.2442	43
		Residual	-.4213	.4614	.0000	.1703	43
2011	FC	Predicted Value	-.1505	.1222	-.0123	.0512	41

Residuals Statistics[a]							
Year			**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**N**
		Residual	-.2288	.4618	.0000	.1086	41
	SE	Predicted Value	-.1337	.1068	-.0260	.0429	43
		Residual	-.1558	.1419	.0000	.0607	43
2012	FC	Predicted Value	-.2668	.6542	.0571	.1751	41
		Residual	-.8276	1.2666	.0000	.2965	41
	SE	Predicted Value	-.2087	.1783	-.0044	.0543	43
		Residual	-.2710	.2812	.0000	.0806	43
2013	FC	Predicted Value	-.7721	.2106	-.0377	.1298	41
		Residual	-.2117	.2962	.0000	.0794	41
	SE	Predicted Value	-.1242	.0330	-.0094	.0257	43
		Residual	-.1587	.1980	.0000	.0610	43
2014	FC	Predicted Value	-.2730	3.7913	.0798	.6008	41
		Residual	-.7301	.1862	.0000	.1410	41
	SE	Predicted Value	-.1344	.0796	-.0053	.0375	43
		Residual	-.1780	.3053	.0000	.0815	43
a. Dependent Variable: TCA							

(Source: Author's construct from SPSS output)

Table 7.23 above shows that, except for the year 2010, the standard deviation of the estimated residuals for SE firms is lower than those of FC firms are for all the years. This implies that the accruals quality for SE firms is better than for FC firms for most of the years, since there is more precision about the mapping of current accruals into last period, current, and next period cash flows in those years. Hence, for six of the seven years studied, SE firms had higher earnings quality compared to FC firms. Further, in order to ascertain if the difference in the earnings quality was statistically significant, an independent samples *t*-test of the standard deviation of the residuals was conducted and the results presented in Table 7.24 below.

Table 7.24: Independent samples test of the standard deviation of the regression residuals

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Standard deviation of residuals	Equal variances assumed	2.442	.144	2.125	12	.055	.0661512159	.0311348225
	Equal variances not assumed			2.125	9.014	.063	.0661512159	.0311348225

(Source: Author's construct from SPSS output)

From Table 7.24, since the *p*-value (.055) is less than the chosen significance level of 10%, it can be broadly concluded that the mean residuals for SE and FC firms are statistically significantly different. Therefore, the null hypothesis (see Section 6.6) is rejected for most of the years studied, and it is broadly concluded that there is a significant difference in the earnings quality of FC and SE firms based on accruals quality. Specifically, for six of the seven years studied, SE firms thus exhibited earnings quality (as measured through accrual quality) that is superior compared to FC firms.

7.7.6 Earnings quality measured by value relevance

Value relevance as a measure of earnings quality is the ability of accounting numbers to explain variation in stock returns, where earnings with greater explanatory power are viewed as more desirable; hence, indicating a higher earnings quality (Francis et *al.,* 2006). Most accounting research measures value relevance as the explanatory power (the adjusted R^2) of the regression of returns to the level and change in earnings (Bushman et *al.,* 2004; Collins *et al.*, 1997; Francis & Schipper, 1999).

Table 7.25: Correlations of value relevance variables

Year			**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
			Return	Return	Return	Return	Return	Return	Return	Return
FC	Earnings	Correlation	.505	.030	.058	.258	-.091	.482	.530	.468
		Sig. (2-tailed)	.010	.866	.735	.123	.594	.002	.001	.005
		N	25	35	36	37	37	37	37	35
	Change in Earnings	Correlation	.218	.062	-.368	.160	-.161	-.113	.195	.396
		Sig. (2-tailed)	.296	.721	.027	.344	.341	.507	.248	.019
		N	25	35	36	37	37	37	37	35
SE	Earnings	Correlation	.186	-.070	.206	.173	-.078	.036	.138	.486
		Sig. (2-tailed)	.308	.678	.203	.280	.627	.825	.391	.001
		N	32	38	40	41	41	41	41	43
	Change in Earnings	Correlation	.025	-.063	.142	-.100	.170	-.196	.111	.424
		Sig. (2-tailed)	.894	.707	.381	.535	.289	.219	.491	.005
		N	32	38	40	41	41	41	41	43
			Earnings	Earnings	Earnings	Earnings	Earnings	Earnings	Earnings	Earnings
FC	Change in Earnings	Correlation	.845	.321	.514	.715	.613	.238	.724	.865
		Sig. (2-tailed)	.000	.060	.001	.000	.000	.156	.000	.000
		N	25	35	36	37	37	37	37	35
SE	Change in Earnings	Correlation	.820	.257	.586	.342	.488	.301	.527	.778
		Sig. (2-tailed)	.000	.119	.000	.028	.001	.056	.000	.000
		N	32	38	40	41	41	41	41	43

(Source: Author's construct from SPSS output)

- Correlation between earnings and return

  Table 7.25 above shows that, for FC firms, there was a weak positive correlation between earnings and return in the years 2009 to 2011, a moderate positive correlation in 2013 and 2015 and a strong positive correlation in 2008 and 2014. However, FC firms had a weak negative correlation in 2012. These correlations were statistically significant in the years 2008 and 2013 to 2015 since their *p*-values were less than the significance level of 10%. On the other hand, for the years 2008, 2010, 2011, 2013 and 2014, SE firms had a weak positive correlation between earnings and return, although this was not statistically significant for all those years. In addition, there was a weak negative correlation between earnings and return for SE firms for the years 2009 and 2012, however not statistically significant, and a moderate positive correlation in the year 2015, which was statistically significant.

- Correlation between change in earnings and return

  For the years 2008, 2009, 2011, 2012 and 2014, FC firms had weak positive correlations between change in earnings and return, a weak negative correlation in 2013, a moderate negative correlation in 2010 and a moderate positive correlation in 2015. However, these correlations were only statistically significant in the years 2010 and 2015, since the *p*-values in those years were less than the significance level of 10%. Conversely, the correlations for SE firms in the years 2008, 2010, 2012 and 2014 were weak positive correlations, and not statistically significant. In addition, the correlation in 2015 was a moderate positive correlation, which was statistically significant. However, for the years 2009, 2011 and 2013, SE firms had weak negative correlations, although not statistically significant.

- Correlation between earnings and change in earnings

  Except for 2009 and 2013, FC firms had strong positive correlations in all the years, which were statistically significant, at a significance level of 10%. Similarly, SE firms had positive correlations for all the years, with the relationship being strong in 2008, 2010, 2014 and 2015, moderate in 2011 to 2013 and weak 2009. These correlations were statistically significant for all the years, except 2009.

From the above analysis, it can be concluded that there are no similar observations in the year-on-year data, since the correlations for SE and FC firms are not statistically significant for each variable and for each year. Therefore, the regression models under this earnings quality measure (value relevance) plus the other two earnings quality measures including conservatism and

timeliness, will be tested for each year separately for each type of firm (FC and SE) in order to maintain the independence of the data and the variables.

Table 7.26: Value relevance model estimation

Model Summary[b]										
						Change Statistics				
Year		R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
2008	FC	.300[a]	.090	.007	.6498	.090	1.088	2	22	.354
	SE	.239[a]	.057	-.008	.4518	.057	.877	2	29	.427
2009	FC	.171[a]	.029	-.032	.7654	.029	.481	2	32	.623
	SE	.101[a]	.010	-.046	.8747	.010	.181	2	35	.835
2010	FC	.373[a]	.139	.087	.9871	.139	2.673	2	33	.084
	SE	.082[a]	.007	-.047	.5777	.007	.126	2	37	.882
2011	FC	.224[a]	.050	-.006	.3239	.050	.895	2	34	.418
	SE	.362[a]	.131	.085	.3276	.131	2.867	2	38	.069
2012	FC	.255[a]	.065	.010	.3161	.065	1.181	2	34	.319
	SE	.306[a]	.094	.046	.3864	.094	1.967	2	38	.154
2013	FC	.328[a]	.107	.055	.3266	.107	2.044	2	34	.145
	SE	.301[a]	.091	.043	.6967	.091	1.891	2	38	.165
2014	FC	.450[a]	.202	.155	.3095	.202	4.310	2	34	.021
	SE	.196[a]	.038	-.012	.2830	.038	.759	2	38	.475
2015	FC	.124[a]	.015	-.046	.5504	.015	.251	2	32	.780
	SE	.016[a]	.000	-.050	1.4173	.000	.005	2	40	.995
a. Predictors: (Constant), Change in Earnings, Earnings										
b. Dependent Variable: Return										

(Source: Author's construct from SPSS output)

Table 7.26 shows that, for the years 2008 to 2010 and 2013 to 2015, the R^2 values for FC firms are greater than those of SE firms by .033, .019, .132, .016, .164 and.015, respectively. This implies that for those years, FC earnings have greater explanatory power in explaining the variation in share returns than SE earnings, thus indicating a higher earnings quality. Since the *p*-values for FC firms for the years 2010 and 2014 are very low, lower than the chosen significance level of 10%, the ability of FC earnings to explain the variation in share returns is statistically significant for those years. On the other hand, the R^2 for SE firms for almost all the years is very low, less than 10%. This implies that SE earnings have much less explanatory power in explaining the variation in share returns. This is not statistically significant for all the years, except for 2011. Therefore, for six of the eight years studied, FC firms exhibited superior earnings quality compared to SE firms, and this difference is statistically significant for two of the years. It therefore appears that, in terms of this earnings quality measure, FC firms broadly exhibit superior earnings quality more often than SE firms do. However, as the effect was only statistically significant for

three of the years studied, the null hypothesis is accepted for most of the years studied and it can broadly be concluded that the differences in earnings quality of FC and SE firms (as measured through value relevance) were not statistically significant for most years.

7.7.7 Earnings quality measured by timeliness

Timeliness as a measure of earnings quality is measured as the explanatory power of a reverse regression of earnings and return. Thus, it reflects the ability of earnings to reflect good news and bad news impounded in returns (Ball et *al.,* 2000; Francis et *al.,* 2006). In this research, timeliness was measured as the adjusted R^2 on the reverse regression of earnings and returns.

Table 7.27: Timeliness model estimation

Model Summary										
						Change Statistics				
Year		R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change
2008	FC	.986[a]	.972	.969	.3304	.972	268.557	3	23	.000
	SE	.132[a]	.017	-.088	.1928	.017	.165	3	28	.919
2009	FC	.267[b]	.071	-.019	.5778	.071	.792	3	31	.508
	SE	.192[b]	.037	-.048	.1551	.037	.432	3	34	.732
2010	FC	.264[b]	.070	-.018	.3034	.070	.798	3	32	.504
	SE	.279[b]	.078	.001	.3300	.078	1.013	3	36	.398
2011	FC	.170[a]	.029	-.059	.3828	.029	.329	3	33	.805
	SE	.620[a]	.384	.334	.0989	.384	7.702	3	37	.000
2012	FC	.208[a]	.043	-.044	.3310	.043	.498	3	33	.686
	SE	.506[a]	.256	.196	.2251	.256	4.254	3	37	.011
2013	FC	.298[a]	.089	.006	.6378	.089	1.075	3	33	.373
	SE	.621[b]	.385	.335	.1655	.385	7.725	3	37	.000
2014	FC	.424[a]	.180	.105	.3840	.180	2.414	3	33	.084
	SE	.209[a]	.044	-.034	1.5407	.044	.562	3	37	.643
2015	FC	.254[a]	.065	-.020	2.5507	.065	.760	3	33	.524
	SE	.372[a]	.138	.072	.7370	.138	2.087	3	39	.118
a. Predictors: (Constant), NEG_RETURN, NEG, Return										
b. Predictors: (Constant), NEG_RETURN, Return, NEG										

(Source: Author's construct from SPSS output)

Table 7.27 shows that for the years 2010 to 2013 and 2015, the adjusted R^2 values of SE firms are greater than those of FC firms by .019, .393, .24, .329 and .092, respectively. This implies that SE earnings have greater explanatory power and the ability to reflect good news and bad news that is impounded in returns, compared to FC firms for those years. In addition, for the years 2011 to 2013, SE firms have less *p*-values than the significance level of 10%, thus the explanatory power is statistically significant. On the other hand, the adjusted R^2 values for FC firms are greater

than those of SE firms are for the years 2008, 2009 and 2014. This is statistically significant in the year 2008 at a 10% significance level. Therefore, for five of the eight years studied, SE firms exhibited superior earnings quality compared to FC firms, and this difference is statistically significant for three of the years. It therefore appears that, in terms of this earnings quality measure, SE firms broadly exhibit superior earnings quality more often than FC firms do. Therefore, the null hypothesis is rejected for most of the years studied and it can broadly be concluded that the differences in earnings quality of FC and SE firms (as measured through timeliness) were statistically significant.

7.7.8 Earnings quality measured by conservatism

Conservatism refers to the ability of accounting earnings to reflect economic losses (measured as negative stock returns) versus economic gains (measured as positive stock returns) (Ball *et al.,* 2000). In this research, conservatism is measured as the difference between the slope coefficients on negative returns to the slope coefficients on positive returns, in a reverse regression of earnings on returns (Ball et *al.,* 2000; Basu, 1997).

Table 7.28: Slope coefficients on negative returns and positive returns

Coefficients[a]							
			Unstandardised Coefficients		Standardised Coefficients		
Year			B	Std. Error	Beta	t	Sig.
2008	FC	(Constant)	23.066	.960		24.026	.000
		NEG	-22.993	.979	-3.290	-23.496	.000
		Return	-9.019	.459	-3.567	-19.667	.000
		NEG_RETURN	9.502	.555	1.308	17.117	.000
	SE	(Constant)	.039	.103		.377	.709
		NEG	.080	.135	.182	.592	.558
		Return	.073	.162	.177	.448	.658
		NEG_RETURN	.033	.255	.043	.129	.898
2009	FC	(Constant)	-.558	.192		-2.905	.007
		NEG	.476	.332	.368	1.431	.162
		Return	.201	.173	.264	1.160	.255
		NEG_RETURN	.362	1.047	.080	.346	.732
	SE	(Constant)	-.101	.036		-2.795	.008
		NEG	.060	.116	.146	.515	.610
		Return	.013	.032	.071	.388	.700

Coefficients[a]							
Year			Unstandardised Coefficients		Standardised Coefficients	t	Sig.
			B	Std. Error	Beta		
		NEG_RETURN	-.127	.488	-.073	-.261	.796
2010	FC	(Constant)	.005	.072		.070	.945
		NEG	.092	.206	.115	.445	.659
		Return	-.057	.053	-.196	-1.065	.295
		NEG_RETURN	1.133	.973	.295	1.165	.253
	SE	(Constant)	-.070	.090		-.770	.446
		NEG	.280	.179	.344	1.568	.126
		Return	.060	.120	.102	.495	.624
		NEG_RETURN	.559	.428	.276	1.308	.199
2011	FC	(Constant)	.043	.188		.229	.820
		NEG	-.075	.238	-.084	-.315	.755
		Return	.026	.488	.022	.053	.958
		NEG_RETURN	.143	.627	.081	.227	.821
	SE	(Constant)	.063	.032		1.973	.056
		NEG	.023	.044	.096	.528	.601
		Return	-.138	.086	-.390	-1.596	.119
		NEG_RETURN	.554	.129	.923	4.279	.000
2012	FC	(Constant)	.015	.291		.051	.960
		NEG	-.150	.304	-.146	-.494	.625
		Return	-.334	.546	-.327	-.612	.545
		NEG_RETURN	.069	.607	.047	.113	.911
	SE	(Constant)	-.034	.068		-.503	.618
		NEG	.173	.098	.347	1.770	.085
		Return	-.188	.145	-.297	-1.296	.203
		NEG_RETURN	.903	.265	.717	3.404	.002
2013	FC	(Constant)	-.044	.229		-.194	.847
		NEG	-.096	.331	-.076	-.291	.773
		Return	.028	.515	.015	.055	.956
		NEG_RETURN	1.316	1.333	.233	.987	.331
	SE	(Constant)	.030	.038		.793	.433
		NEG	.096	.083	.228	1.163	.252

Coefficients[a]							
Year			Unstandardised Coefficients		Standardised Coefficients	t	Sig.
			B	Std. Error	Beta		
		Return	-.119	.044	-.417	-2.731	.010
		NEG_RETURN	.889	.210	.823	4.231	.000
2014	FC	(Constant)	.094	.186		.505	.617
		NEG	.147	.237	.135	.622	.538
		Return	.075	.611	.063	.124	.902
		NEG_RETURN	.631	.675	.435	.935	.356
	SE	(Constant)	-.010	.963		-.010	.992
		NEG	.215	1.095	.043	.197	.845
		Return	.357	2.994	.066	.119	.906
		NEG_RETURN	1.059	3.220	.165	.329	.744
2015	FC	(Constant)	-.040	1.206		-.033	.974
		NEG	-1.093	1.655	-.172	-.660	.514
		Return	-1.600	1.494	-.339	-1.071	.292
		NEG_RETURN	2.798	2.486	.330	1.125	.269
	SE	(Constant)	-.028	.752		-.037	.970
		NEG	-.036	.792	-.010	-.045	.964
		Return	-.111	.126	-.201	-.879	.385
		NEG_RETURN	1.152	.463	.416	2.490	.017
a. Dependent Variable: Earnings							

(Source: Author's construct from SPSS output)

From Table 7.28 above, the coefficients of negative returns (NEG_RETURN) are used as a proxy for "bad news", and coefficients of positive returns (Return) as a proxy for "good news". Considering SE firms, except for 2008 and 2009 (-.04 and -.14, respectively), the "bad news" coefficients are higher than the "good news" coefficients for all other years by .499, .692, 1.091, 1.008, .702 and 1.263 respectively. In addition, for FC firms, the coefficients of negative returns are greater than the coefficients of positive returns by 18.521, .161, 1.19, .117, .403, 1.288, .556 and 4.398 for all the years in the study period. Since the coefficients of negative returns for both SE and FC firms are greater than their coefficients of positive returns, both categories of firms are conservative in the years specified above. However, the average difference in the slope coefficients on negative and positive returns for FC firms (3.329) is higher than those of SE firms (.634) by 2.695. This implies that the ability of accounting earnings to reflect economic losses versus economic gains is greater in FC firms compared to SE firms for most of the years; hence,

FC firms are broadly more conservative than SE firms are. Further, the independent samples *t*-test for equality of means for SE and FC firms for the difference between negative and positive returns showed that broadly there is no statistically significant difference between conservatism for SE and FC firms, since the *p*-value (.266) is greater than the chosen significance level of 10% (see Table 7.29 below). Therefore, the null hypothesis is accepted and it can be broadly concluded that there is no significant difference in the earnings quality of FC and SE firms based on conservatism. FC firms thus exhibited earnings quality (as measured by conservatism) that is generally superior compared to SE firms, although the difference is not statistically significant overall.

Table 7.29: Independent samples test for the difference between negative and positive returns

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Difference	Equal variances assumed	5.176	.039	1.207	14	.247	2.69462376	2.23241011
	Equal variances not assumed			1.207	7.092	.266	2.69462376	2.23241011

(Source: Author's construct from SPSS output)

7.8 Conclusion

This chapter presented the empirical findings of the study. In order to address the main objective of the study, the study employed different statistical techniques to analyse the data using Microsoft Excel and SPSS. From the analysis, it is evident that neither of the two methods (SE or FC) dominates accounting for E&P activities in the US, since oil and gas companies appear to have equal preference for the two methods. Generally, (i.e. for most of the years studied), SE firms were found to have higher earnings quality than FC firms, based on earnings predictability, persistence, smoothness, accruals quality and timeliness. In all these cases, except for smoothness, the difference between the earnings quality for SE and FC firms was statistically significant on an overall basis (i.e. for the vast majority of years studied). However, based on value relevance and conservativism, FC firms exhibited superior earnings quality than SE firms for most of the years studied, although the difference in the earnings quality was generally not statistically significant. Similarly, the average market capitalisation, enterprise value, year-end market price, total assets, debt, equity, total revenue, cash flow from operations and number of employees were generally higher for SE firms compared to those of FC firms during most of the

years studied. However, FC firms generally had a higher DD&A for most of the years compared to SE firms. SE firms generally experienced more stability in value growth compared to FC firms, whose growth in value were more irregular in most of the years.

Financial ratio analysis generally revealed that the profitability and investment ratios for SE firms were generally better than those of FC firms were for studied most of the years. SE firms are broadly more effective in utilising resources under their control to generate more profits compared to FC firms. Liquidity analysis also generally favoured SE firms when compared to FC firms. In terms of gearing, SE firms are more highly geared than FC firms are. However, in terms of efficiency, management of FC firms were better in running the business more efficiently by minimising the level of working capital employed compared to SE firms. Despite the differences in these ratios for SE and FC firms, results of the hypotheses tests of the differences in the ratios showed that, for all the ratio categories (profitability, efficiency, liquidity, gearing and investment), the differences between SE and FC firms were not statistically significant for the majority of years studied.

The next chapter, titled Discussion and Conclusions, presents a discussion of the results, the contribution of the study, limitations of the research, recommendations for future research and recommendations for future practice.

CHAPTER 8: DISCUSSION AND CONCLUSIONS

8.1 Introduction

Accounting for oil and gas upstream activities has been politically charged and hotly debated in the US since the 1970s (Bryant, 2003; Cortese *et al.,* 2009; Misund, 2017; Nichols, 2012). The APB, the FASB and the SEC have debated whether the SE or FC accounting methods provide investors with more informative accounting numbers, and should therefore be mandated for use by all oil and gas companies (Bandyopadhyay, 1994; Misund, 2017; Murdoch & Krause, 2008; Nichols, 2012). The fundamental difference between the SE and FC accounting methods is that the FC method capitalises all exploration costs, irrespective of the success or failure of the exploration activity, while the SE method capitalises exploration costs only if they can be associated with a discovery of oil and gas reserves (Bryant, 2003; Cortese *et al.,* 2009; Misund, 2017; Wright & Gallun, 2008). Despite the evidence of incomparability of financial statements for SE and FC firms as illustrated in the case of Conquest Petroleum, the SEC was seen to have caved in to the political pressures and chose not to eliminate the FC accounting method (Neveling, 2005; Nichols, 2012).

The need for a comprehensive reporting standard for extractive industries has also long been considered at the international level (Cortese, 2013; Nichols, 2012). Efforts undertaken by the IASB to formulate and release a comprehensive standard for the extractive industries have been unsuccessful, possibly due to the political influence held by members of the industry (Cortese, 2013). It is believed that the IASB also currently faces political pressures similar to those experienced in the US. However, as an interim measure, the IASB issued IFRS 6, *Exploration for and Evaluation of Mineral Resources,* to make limited improvements to accounting practices for extractive activities without making major changes, in anticipation of the issuance of a comprehensive standard in the future. IFRS 6 allowed the continued use of either the SE or FC accounting methods (IASB, 2004). Therefore, since the IASB, SEC and FASB are still undecided on which accounting method to mandate for use by all upstream oil and gas companies it is still relevant to conduct research on these two accounting methods.

Previous research studies have compared the earnings quality of SE and FC accounting methods (Bandyopadhyay, 1994; Bryant, 2003; Harris & Ohlson, 1987; Misund, 2016; Murdoch & Krause, 2009). Whereas some of the studies considered the SE method superior to the FC method in terms of earnings quality (Bandyopadhyay, 1994; Murdoch & Krause, 2009), others found the FC method to have superior earnings quality compared to the SE method (Bryant, 2003). This creates contrasting conclusions regarding the superiority of the SE and FC methods in terms of earnings quality and thus necessitates further research.

The overriding purpose of this study was to ascertain which, if any, of the two accounting methods (SE and FC) provides superior earnings quality using various earnings quality measures (see Subsection 1.3.1 in Chapter 1). To accomplish this goal, secondary objectives were formulated, namely

(1) Reviewing the literature on the SE and FC accounting methods;
(2) Reviewing the literature on earnings management and the various earnings quality measures;
(3) Comparing financial data and financial ratios for SE and FC firms; and
(4) Empirically comparing the quality of earnings of SE and FC firms using various earnings quality measures (see Subsection 1.3.2).

This study adapted a quantitative research methodology, employing a deductive approach to theory development and utilising a longitudinal design to evaluate the earnings quality of SE and FC firms.

Chapter 7 reported on the results from the data analysis and interpretation thereof. The analysis was structured on a comparative basis by accounting method, incorporated descriptive, correlation and inferential statistics. This final chapter of the thesis captures the significant elements comprising the thesis. The chapter begins with an overview or summary of the study. It then proceeds with a discussion of the results, with the emphasis on comparing and contrasting the results with those of other researchers. The chapter also presents the implications of the study in relation to theory, further research and practice, thereby emphasising the value and contribution of the study. A discussion regarding the limitations of the study and directions for future research then follows. Additionally, the chapter outlines the recommendations for further research and for future practice. It ends with concluding remarks.

8.2 Overview of the thesis

This thesis is divided into eight (8) chapters. The contents of each chapter are summarised in Figure 8.1 below.

Chapter 1 provided the foundation of the thesis, since it covered the introductory issues leading to the study. The introduction (Section 1.1), problem statement and justification (Section 1.2) of the study were presented. The chapter also briefly discussed the research design and method (Section 1.5) used in the study and the objectives of the study (Section 1.3). The overarching hypothesis to be tested in the empirical study was also formulated (Section 1.4). In addition, the chapter outlined the salient features of the SE and FC accounting methods that were discussed in more detail in the proceeding chapters.

Chapter 2 provided a comprehensive literature review on the underlying philosophical assumptions made by researchers when undertaking research (Section 2.2), as well as the major research philosophies which included positivism, critical realism, interpretivism, pragmatism and postmodernism (Section 2.3). Positivism was the philosophical position selected to guide the study. The chapter further discussed the various theories that were considered relevant for this thesis. (Section 2.4).

Chapter 3 discussed the recent and relevant literature regarding the background and politics of standard setting for oil and gas accounting. This chapter commenced with presenting a detailed description of upstream and downstream activities (Section 3.2). It proceeded by discussing the characteristics of upstream oil and gas activities (Subsection 3.2.2), followed by a brief history of the US oil and gas industry (Section 3.3). In addition, the US debate on oil and gas accounting was presented (Section 3.4). The chapter concluded by discussing Reserve Recognition Accounting (RRA), the history of the Extractive Industries Project, as well as the Extractive Activities Discussion Paper and its status.

Chapter 4 provided a comprehensive review of the literature on the status of accounting for upstream activities in the oil and gas industry. This chapter presented an international comparison of the US GAAP with the UK GAAP and IFRS 6. The first theoretical objective of this study was to review the literature on the FC and SE accounting methods. This objective was achieved by reviewing the relevant literature on the differences, similarities and theoretical arguments for and against the two methods as used under the US GAAP. In addition, the relevant FASB standards, being ASC 932 and SFAS 69, were reviewed and discussed under this chapter. From the review of the literature, it was evident that the primary difference between the SE and FC accounting methods is the capitalisation or expensing of the costs incurred, and consequently a difference in the timing of the expense or loss charge against revenues (Section 4.2). SE firms capitalise only those pre-discovery costs, which are directly identifiable with the discovery of oil and gas reserves (Section 4.2) while FC firms capitalise all pre-discovery costs irrespective of the outcome (Section 4.3). The SE method is conservative and reflects the traditional concept of an “asset” (Subsection 4.2.1). It is also consistent with the underlying philosophy of SFAS No. 2, *Accounting for Research and Development Costs* (Subsection 4.2.1). However, using the SE method causes variability in the earnings (Subsection 4.2.2).

The FC method reduces variability in the earnings since both successful and unsuccessful costs are capitalised and amortised over time (Subsection 4.3.1). However, the FC method contradicts the "matching" concept since the capitalised unsuccessful costs in the future will not match the economic benefits (Subsection 4.3.2). At the international level, the chapter also discussed the principles contained in IFRS 6. This was followed with a discussion on accounting for oil and gas activities under the UK GAAP, specifically section 34 of FRS 102. In addition, a comparison of the FC and SE accounting methods for accounting for research and development costs under IAS 38 was presented, followed by the main differences between the US GAAP and IFRS in accounting for upstream oil and gas activities. The chapter concluded with a comparison of these three standards and a discussion on the international implications emanating from the differences. From the review of the literature above, it is evident that IFRS 6, which is the only standard specific to the extractives industry under IFRS, does not take any position on the SE versus FC issue; instead, it permits a continuation of a choice between the methods. However, the treatment of pre-discovery costs provided under IFRS 6 is similar to the SE method (Section 4.5). Therefore, it can be concluded that all companies following IFRSs indirectly apply the SE (or similar) method of accounting. It is also evident from the literature review that the accounting treatment of exploration and evaluation expenditures in the UK is currently the same as in IFRS 6 (Section 4.6).

The accounting treatment of research (prospecting) costs, as well as successful and unsuccessful E&E costs under the SE method is the same as the criteria in IAS 38 (Section 4.7). In contrast, the FC method capitalises both prospecting costs and unsuccessful E&E costs, which differ from the accounting criteria in IAS 38. For development costs, both the SE and FC methods capitalise these costs because at this stage, technical feasibility and commercial viability of producing the reserves are demonstrable; hence, similar to the requirements in IAS 38 (Section 4.7).

Although the convergence of the US GAAP and IFRS continues to be a high priority on the agendas of both the FASB and the IASB, it was noted from the literature review that there are still significant differences between the two GAAPs, most importantly in accounting for upstream oil and gas activities (Table 4.1). Such differences make it difficult to compare financial statements of oil and gas companies in the two regimes. Nevertheless, in contrast with IFRS, the US GAAP has tried to be more exhaustive in providing specific guidance for the extractives industry.

Chapter 5 discussed literature on earnings management and earnings quality. The second theoretical objective was to conduct a literature review on earnings management and the various earnings quality measures. The foregoing discussion describes how the second theoretical objective was achieved. This chapter started by explaining the meaning of earnings management, followed by a discussion of earnings management incentives, and then the earnings management techniques. Earnings management is referred to also as income smoothing, creative accounting, earnings smoothing, financial engineering and cosmetic accounting (Amat & Gowthorpe, 2004:4). It occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers (Section 5.2). The earnings management incentives discussed in this chapter included capital markets incentives, meeting the expectations of analysts and investors and contractual incentives (Section 5.3).

The chapter also presented the most successful and widely used earnings management techniques. These included “cookie-jar-reserve” techniques, “big-bath” techniques, “big-bet-on-the-future” techniques, “throw out” a problem child, “flushing” the investment portfolio, timing of adoption of new accounting standards, sale/leaseback and asset exchange techniques, write-off of long-term operating assets, voluntary accounting changes and operating versus non-operating income (Section 5.4).

Chapter 5 also described the concept of earnings quality and the earnings quality measures. Earnings quality is broadly defined as the stability, sustainability or persistence, and non-fluctuation of reported earnings (Beneish & Vargus, 2002; Bellovary *et al*., 2005:32; Ranjbar *et al.,* 2013:353). The earnings quality measures discussed were classified as either accounting-based or market-based attributes. The accounting-based earnings quality measures, which are estimated using accounting data, are accruals quality, persistence, predictability and smoothness. These attributes rely on accounting data for their estimation, and assume that the function of earnings is to allocate cash flows to reporting periods via accruals. The market-based earnings quality measures include value relevance, timeliness and conservatism. These attributes rely on both accounting data and returns for their estimation, and they assume that the function of earnings is to reflect economic income as represented by share prices (Section 5.6). These attributes were used to operationalise the concept of earnings quality during the empirical research in this study.

Chapter 6 presented the methodological framework employed in investigating the earnings quality of SE and FC firms. This chapter builds on Chapter 2 of the study. Based on the research philosophy chosen for the study, this chapter explored the three research methodological choices, i.e. a quantitative, qualitative or a mixed methods research design, with an aim of identifying the appropriate research design and strategies for this study (Section 6.2). It proceeded with sections describing the data types (Section 6.3), sample selection (Section 6.4) and earnings quality measures used in this study (Section 6.5). The chapter concluded by explicating the analysis approach for the empirical data (Section 6.7), the reliability and validity of the data (Section 6.8) and analysis thereof, the limitations and mitigations in the research methodology (Section 6.9), as well as ethical considerations (Section 6.10).

Chapter 7 presented the results from the data analysis and interpretation thereof in order to address the third and fourth objectives of the study, namely to compare financial data and financial ratios for SE and FC firms and to compare the quality of earnings of FC and SE firms empirically using various earnings quality measures. The results were presented in the form of tables and graphs. The results of the comparison of financial data for SE and FC firms were presented (Section 7.4), followed by a comparison of the financial ratios for SE and FC firms (Section 7.5). In addition, the research variables used in the empirical study and descriptive statistics were discussed. The chapter concluded by presenting the results of the comparisons of the earnings quality of SE and FC firms using the seven earnings quality measures (Section 7.7). Chapter 7 assisted in responding to the research hypotheses that were presented in Section 6.6 of the thesis.

Chapter 8, the last chapter, provides a discussion and conclusion of the study. More specifically, it presents a summary of the eight chapters of the thesis in a condensed and logical manner, followed by a discussion of the results. Further, the chapter presents the implications and contribution of the study, followed by the limitations of the study and afterwards makes recommendations for further research and recommendations for future practice. The distinct contributions of the study to the literature relating to earnings quality of SE and FC firms are also highlighted in this chapter.

Figure 8.1: Summary of the chapters in the thesis

8.3 Discussion of the results

In this section, the results of the study are summarised, interpreted and then qualified with the related literature (research and theory). The section highlights the interesting, surprising or illuminating results of the study and positions them within the current debates in the field. The section serves as a critical reflection on how this study has contributed to the knowledge field, how it speaks to other authors, and how the results might be interpreted or evaluated. The results in this section are discussed in the same order they were presented in Chapter 7.

8.3.1 Composition of SE and FC firms

The results of this study suggest that neither of the two accounting methods dominates accounting for upstream oil and gas activities in the US. Fifty-one percent (51%) of the sampled firms were found to be using the SE method, while 49% were using the FC method of accounting. That is, approximately half of the upstream oil and gas industry firms use the SE method and about half use the FC method. These results are consistent with the findings of Murdoch and Krause (2009). They concluded in their study of earnings quality of SE and FC methods that the proportion of E&P oil and gas industry firms using the SE method was approximately the same as that of FC firms, i.e. SE firms were 50.4%, while FC firms were 49.6% of the population in their study. This implies that upstream oil and gas firms in the US have equal preference for the two methods, thus justifying the failure of attempts to have a uniform accounting method.

8.3.2 Comparison of financial data for SE and FC firms

The comparison of financial data for SE and FC firms was based on data pertaining to market capitalisation, enterprise value, number of employees, year-end market price, total assets, turnover, depreciation, depletion and amortisation (DD&A), cash flow from operations, net profit after tax, year-end market price, equity, long-term debt and key financial ratios (see Section 7.4).

Overall, the results of the study show that the market capitalisation, enterprise value, number of employees, market price, total assets, turnover, cash flows from operations, earnings after tax, equity and debt are higher for SE firms compared to FC firms (see Section 7.4). This implies that firms using the SE method are larger and older firms compared to firms using the FC method. These findings were broadly consistent with those of other researchers (Deakin, 1979; Collins & Dent, 1979; Lilien & Pastena, 1982; Misund, 2017). The FC method has a desirable impact on reported income and net assets of growing firms. It results in a smoothing of reported earnings because costs that would have been written off in the current period under the SE method are capitalised and amortised against revenues in future periods (Boone & Raman, 2007; Bryant, 2003; Wolk *et al.,* 2000:559). Therefore, the findings here concur with the widely expressed view

that the larger, more mature and fully integrated oil and gas companies usually use the SE method, while the smaller, infant and less integrated oil and gas companies usually use the FC method, since it allows them to access the capital markets more easily due to less volatile earnings. For example, currently, many of the major oil and gas companies such as ExxonMobil, BP, Royal Dutch/Shell Group, etc. use the SE method of accounting, while the FC method has continued to be popular with smaller companies. However, the earnings of the FC firms seemed to be more volatile compared to SE firms for the study period 2007 to 2015 (see Subsection 7.4.8). Therefore, FC firms could just as well adopt the SE method. Perhaps the volatility in their earnings can be attributed to their size, the way they are managed, etc. and not just the accounting method used.

The results of the study further showed that the DD&A expense for FC firms was generally higher than that of SE firms (see Subsection 7.4.5). This is attributed to the FC company's higher level of capitalised costs (all pre-discovery costs), compared to SE firms which capitalise only successful pre-discovery costs. These findings are consistent with previous literature, which suggests that the FC method allocates higher DD&A costs against revenue compared to the SE method, because the FC method capitalises all acquisition, exploration and drilling costs, including those relating to unsuccessful activities (Cortese *et al.,* 2009; Jennings *et al.,* 2000; Johnston & Johnston, 2006; Wright & Gallun, 2008).

8.3.3 Comparison of financial ratios for SE and FC firms

This study compared the profitability, efficiency, liquidity; gearing and investment ratios for SE and FC firms (see Section 7.5). Hypothesis tests for each of the ratios for SE and FC firms were also conducted for each year to test whether the differences in the ratios for SE and FC firms were statistically significantly different. The results are therefore summarised and discussed as follows:

Profitability ratios

Profitability of SE and FC firms was based on the key profitability ratios, which included ROE, ROCE, profit margin, gross profit margin and return on assets (see Subsection 7.5.1). The results of the study showed that, generally, SE firms were more profitable than FC firms were. The ROE, ROCE, gross profit margin and return on assets for SE firms were higher compared to FC firms. These findings further support the view that most SE firms are larger and more mature enterprises compared to FC firms, which tend to be younger and less established than their SE counterparts are (Deakin, 1979; Lilien & Pastena, 1982; Misund *et al.,* 2015). As a result, SE firms generate more revenue from their operations, compared to FC firms (see Subsection 7.4.7), resulting in higher profits. However, FC firms had a higher profit margin than SE firms did. This could be

because, given the fact that most FC firms are younger firms and striving to achieve maximum sales, they try to keep their costs as low as possible in order to maximise profit margins. Nevertheless, despite the differences in the profitability ratios for SE and FC firms, these differences were not statistically significantly different for most of the years studied; hence, this study concluded that profitability ratios for SE and FC firms are not significantly different.

Efficiency ratios

Efficiency in this study was measured based on the net assets turnover ratio, stock turnover, collection period and credit period. The results showed that management of FC firms were generally more effective in running their businesses more efficiently than SE firms were. The collection period for FC firms was lower and with a higher credit period compared to SE firms (with exceptions only in certain years). In addition, the net assets turnover for FC firms generally was higher, implying that FC firms utilise their assets better to generate sales, compared to SE firms. However, similar to the profitability ratios, the differences in the efficiency ratios for SE and FC firms were found not to be statistically significantly different for most years.

Liquidity ratios

Liquidity was measured using the current ratio. It was noted from the results of the study that SE firms are in generally more liquid than FC firms (see Subsection 7.5.3). The ability of SE firms to meet their short-term obligations as and when they fall due was higher than in FC firms, resulting in lower liquidity risk for SE firms, although this difference was not found to be statistically significant in most of the years studied.

Gearing ratio

From the results of the study, SE firms were found to be more highly geared than FC firms (see Subsection 7.5.4), although not statistically significantly higher in most years studied. This implies that a greater portion of SE firms' total assets is financed by debt than equity as compared to FC firms. These results are inconsistent with those of older studies, which found that FC firms were more highly leveraged or geared than SE firms were (Deakin, 1979; Dhaliwal, 1980; Lilien & Pastena, 1982). This inconsistency could be attributed to the difference between the time when their studies were conducted (20th century) and the present time (21st century) that this study was conducted. If the same studies were conducted in the present time, it is believed that the results obtained would be similar to those obtained in this study.

Investment ratios

The investment ratios considered in this study were earnings per share, dividends per share and price earnings ratio. The results of the study indicated that the investment ratios for SE firms were better than those of FC firms, implying that SE firms' shares were performing better than shares of FC firms (see Subsection 7.5.5), although this result was not statistically significant for most years in the study period. These results are similar to Figure 7.4, which shows that the average market price for SE firms was higher than that of FC firms for all the years studied. The DPS for SE firms was higher than that of FC firms, implying that shareholders of SE firms received more returns from their investments compared to those of FC firms. In addition, SE firms had a higher price earnings ratio, an indicator that investors of SE firms were willing to pay more per dollar of earnings of SE firms compared to FC firms.

8.3.4 Descriptive statistics of the research variables

The research variables computed for this study were based on the earnings quality measures (see Table 7.12). From the results of the descriptive statistics, the means for all the research variables used in this study were larger for SE firms compared to FC firms. Although a size comparison is not the focus of this study, size differences are apparent from Table 7.13, where SE firms were found to be larger than FC firms were. These findings are in harmony with those of other researchers (Lilien & Pastena, 1982; Misund *et al.,* 2015; Murdoch & Krause, 2009). However, Dhaliwal (1980) found that FC firms were larger than SE firms in terms of assets. Given that Dhaliwal's sample covered 19 SE and 19 FC firms it is believed that the results of the current study are more reliable since the sample size was bigger and the study is more recent. Further to the above, hypothesis tests for the differences between SE and FC sample means for all the research variables indicated that there was no statistically significant difference between SE and FC firms for the majority of years studied (see Table 7.14).

The standard deviations for the variables *profit after tax*, *smoothness: earnings before interest and tax*, *smoothness: cash flows from operations*, *earnings* and *changes in earnings* were all larger for FC firms (see Table 7.13). Earnings and cash flows for FC firms were greatly spread out compared to SE earnings, implying greater total risk, uncertainty and higher volatility in the earnings of FC firms. Volatile earnings are an indicator of lower earnings quality (Ewert & Wagenhofer, 2015:327). Thus, it could be argued that FC firms have lower earnings quality than SE firms. On the other hand, the standard deviations for *accrual quality: cash flows from operations*, *total current accruals*, *average assets* and *return* were all larger for SE firms (see Table 7.13). However, conclusions about superior earnings quality were rather based on the specific earnings quality measures, which are summarised in the next subsection 8.3.5 below.

8.3.5 Earnings quality of SE and FC firms

The focus of this study was to compare the earnings quality of SE and FC firms using various earnings quality measures so as to ascertain which, if any, of the two accounting methods (SE or FC) provides superior earnings quality. Since there are different definitions of earnings quality, there are also different measures of earnings quality (Bradshaw *et al.,* 1999). However, based on the comprehensive classification of earnings quality of Francis *et al.* (2004), the measures used to estimate earnings quality for SE and FC firms in this study included accruals quality, persistence, predictability, smoothness, value relevance, timeliness and conservatism. The hypotheses for this part of the study were formulated as shown in Table 6.4 and the results of the empirical study were presented in the previous chapter (see Section 7.7). These results are discussed and summarised below.

8.3.5.1 Earnings quality measured by earnings predictability

This study measured predictability as the R^2 from the regression of future profit and reported historical profit, where a higher R^2 indicated superior earnings quality and vice versa. According to the first hypothesis, there is a significant difference between SE and FC firms in earnings quality based on earnings predictability (see Subsection 7.7.2). The results of the empirical study showed that the SE method results in higher earnings quality than the FC method over a period (i.e. for the vast majority of years studied). In addition, the correlation between current and prior year profits for SE firms was generally higher than that of FC firms. This implies that earnings of SE firms are more useful in predicting future earnings than for FC firms, indicating higher earnings quality for SE firms.

One of the fundamental qualitative characteristics of the FASB's and the IASB's conceptual frameworks is "relevance". Financial information is relevant if it is capable of making a difference in the decisions made by users. This can be achieved if financial information has predictive value, confirmatory value, or both. Financial information has predictive value if it can be used as an input to processes employed by users to predict future outcomes. Information that has predictive value often also has confirmatory value (FASB, 2010; IASB, 2010b). This study concludes that the SE method is more broadly in harmony with the FASB's and the IASB's conceptual frameworks since financial information for SE firms generally has greater predictive and confirmatory values compared to those of FC firms.

8.3.5.2 Earnings quality measured by earnings persistence

This study measured persistence as the slope coefficient of the regression of future profit and reported historical profit, where a higher coefficient represented superior earnings quality and vice

versa. Considering the second hypothesis, there was a significant difference found between SE and FC firms in terms of earnings quality based on earnings persistence for the large majority of years in the study period (see Subsection 7.7.3). The results of the study show that SE firms generally have higher quality earnings than FC firms. This implies that the extent to which current earnings persist or recur in the future is usually greater for SE firms than for FC firms. High earnings persistence suggests a stable, sustainable and lower-risk earnings process, which is a desirable attribute sought by investors (Bellovary *et al.,* 2005; Ewert & Wagenhofer, 2015). A highly persistent earnings number is viewed by investors as sustainable, that is more permanent and less transitory (Schipper & Vincent, 2003:99). Persistence of reported earnings usually causes larger investor responses to reported earnings, which in turn is attributed to a larger valuation multiple attached to persistent earnings (Kormendi & Lipe, 1987).

8.3.5.3 Earnings quality measured by earnings smoothness

In this study, earnings smoothness was measured as the ratio of the firm's standard deviation of operating income to the standard deviation of cash flows from operations, both variables scaled by total assets. A higher ratio indicates higher earnings quality since earnings are less smoothened, and vice versa. The results of the study show that SE firms generally have superior earnings quality when compared to FC firms (see Table 7.19). This implies that earnings of SE firms are less smoothened and thus of a superior quality. This view is based on the argument that smoothness is a measure of earnings management, whereby smoother earnings are undesirable since they are associated with earnings management and thus of a poorer earnings quality (Ewert & Wagenhofer, 2015; Hand, 1989; Hunt *et al.,* 1996; Leuz *et al.,* 2003). In contrast, some researchers argue that, consistent with persistence and predictability, smoother earnings are less volatile and allow for better forecasting, which is a desirable trait (Francis *et al.*, 2004). Considering the third hypothesis, despite SE earnings being superior to FC earnings, the difference in earnings quality was not statistically significant for most of the years studied (see Table 7.20). Therefore, there is generally no significant difference between SE and FC firms in earnings quality in terms of on earnings smoothness based on the results of this study.

8.3.5.4 Earnings quality measured by accruals quality

In this study, accruals quality was measured as the standard deviation of the estimated residuals of the regression of total current accruals into lagged, current and future cash flows from operations, all scaled by average total assets. The better this mapping explains the accruals the lower is the residual from the regression based on these cash flows and thus the higher the earnings quality. Therefore, small values of the standard deviation of the estimated residuals correspond to superior earnings quality and vice versa. According to the fourth hypothesis, there

is generally (i.e. for most years) a significant difference between SE and FC firms in earnings quality based on accruals quality (see Subsection 7.7.5). The results of the study showed that SE firms have better quality earnings than FC firms (see Table 7.23). This implies that SE earnings normally map more closely into cash flows than FC earnings. The accruals quality for SE firms is good compared to FC firms because there is more precision about the mapping of current accruals into lagged, current and future cash flows from operations. These findings are broadly consistent with previous research (Murdoch & Krause, 2009; Sunder, 1976). Sunder (1976) in her study argued that SE earnings are more highly correlated with future cash flows than FC earnings. In addition, Murdoch and Krause (2009), in their study of earnings quality of the SE and FC methods, concluded that the SE method of accounting provides earnings quality superior to the FC method, based on the association of contemporaneous earnings and cash flows, and the association of earnings and future cash flows. However, Sunder (1976) also concluded that FC income is more highly correlated with contemporaneous cash flows than is SE income.

8.3.5.5 Earnings quality measured by value relevance

In this study, value relevance was measured as the explanatory power (the adjusted R^2) of the regression of returns to the level and change in earnings, where a higher value of the adjusted R^2 represents better quality earnings. The results of the study indicated that there is a strong positive correlation between earnings and change in earnings for both SE and FC firms for most of the years studied, and this is statistically significant for both methods almost in all years (see Table 7.25).

The results further showed that generally, the FC method is more value relevant than the SE method since FC earnings have greater explanatory power in explaining the variation in stock returns than SE earnings, thus signalling a higher earnings quality. However, considering the fifth hypothesis of this study (see Section 6.6), the difference in earnings quality between SE and FC firms based on value relevance were not statistically significant for most of the study years (see Subsection 7.7.6). Still, the results of this study support Bryant (2003) who concluded in his study that the FC method of capitalisation is more value relevant than the SE method of capitalisation. According to Bryant (2003), both FC and SE methods have high value relevance and the capitalisation of exploration and development expenditures provides useful information to investors. He also suggested that, while some exploration and development costs may relate to unsuccessful activities, the market treats these costs as part of the necessary overall cost of obtaining oil and gas reserves. Hence, his view was consistent with the arguments made by proponents of the FC method. However, the findings in this study are inconsistent with the results of Bandyopadhyay (1994) as well as Harris and Ohlson (1987), who concluded that earnings under the SE method are more relevant to security prices and with greater explanatory power

than the earnings recognised under the FC method. This could be because their studies were conducted in earlier times, almost two decades back.

8.3.5.6 Earnings quality measured by timeliness

In this study, timeliness was measured as the adjusted R^2 of the reverse regression of earnings and returns. The difference in the timeliness is assessed based on the ability of the alternative accounting methods to explain returns for the period, where a higher adjusted R^2 for one method indicates a better ability to summarise economic events in the period which they occur and therefore that method is considered more timely (Bryant, 2003:11). The results of the study showed that the SE method is better able to capture the economic events in the period those events occurred. The SE method is timelier and has greater explanatory power and the ability to reflect good and bad news that is impounded in returns compared to the FC method. Therefore, the SE method of accounting provides earnings quality superior to the FC method and the difference is statistically significant for the majority of years studied (see Subsection 7.7.7). Considering the sixth hypothesis of this study (see Table 6.4), there is a significant difference between SE and FC firms in earnings quality based on timeliness for most of the study years.

The findings in this study are broadly coherent with those of Bandyopadhyay (1994), Harris and Ohlson (1987) and Bryant (2003). Bandyopadhyay (1994), using a cross-firm design, found that SE earnings had a higher earnings response coefficient (ERC) than FC earnings, which he interpreted as SE earnings being of a higher quality than FC earnings. Similarly, Harris and Ohlson (1987) found SE book value to have greater explanatory power than FC book value when regressed on the implied market value of oil and gas properties; hence, the SE method was found to be timelier. Bryant (2003) further suggests that, while the FC method is more value-relevant in the sense that it summarises the relevant information better than the SE method, it is not timelier.

8.3.5.7 Earnings quality measured by conservatism

This study estimated conservatism as the difference between the slope coefficients on negative returns to the slope coefficients on positive returns in a reverse regression of earnings on returns, whereby the higher the difference, the more conservative are the earnings and consequently there is higher quality earnings. The results of the study highlighted that FC earnings have a greater ability to reflect economic losses versus economic gains and were thus more conservative than earnings for SE firms (see Subsection 7.7.8). However, the results of testing the seventh hypothesis (see Section 6.6) indicated that, for most years, there is no significant difference between SE and FC firms in earnings quality based on conservatism (see Table 7.28).

The findings of this study are inconsistent with earlier research studies that support the superiority of the SE method in respect of conservatism (Bryant, 2003; Harris & Ohlson, 1987; Sunder, 1976). Sunder (1976) found that the SE method produces more conservative net assets and income numbers than the FC method. Moreover, Bryant (2003) concluded, based on the means of the actual book values of SE and FC firms, that the SE method is a more conservative accounting method. In addition, Harris and Ohlson (1987) found the coefficient on SE book value to be larger than the coefficient on FC book value when regressed on the market value of oil and gas properties. They attributed this to the SE method being more conservative than the FC method. The cause for the inconsistence could be attributed to the fact that the above studies adapted the accounting-based approach of measuring conservatism while this study relied on the market-based approach. In addition, many of these studies were conducted decades ago, implying that the results in the present times are likely to be different. Nevertheless, the difference in earnings quality of FC compared to SE firms based on conservatism was not significant in this study.

Table 8.1 below summarises the findings of the study relating to the seven earnings quality measures in broad terms:

Table 8.1: Summary findings of the study

Earnings quality measure	Superior accounting method	Difference statistically significant for most years?
Predictability	SE	Yes
Persistence	SE	Yes
Smoothness	SE	No
Accruals quality	SE	Yes
Value relevance	FC	No
Timeliness	SE	Yes
Conservatism	FC	No

(Source: Author's construct)

8.4 Implications and unique contribution of the study

The results of the present study have numerous implications for managers, investors, standard setters and other stakeholders of businesses. Users of financial statements like financial analysts, investors, lenders and other creditors are recommended to pay close attention to the quality of financial statements, specifically the quality of earnings, in making decisions about providing resources to the entity. The results of the study suggest the effect of accounting method choice on earnings quality. Firms often resort to particular accounting methods in order to report target earnings to avoid adversely affecting their share prices in the market. This study shows that smaller, infant and less integrated oil and gas companies use the FC accounting method because

it results in smoother streams of net income since income is not highly dependent on the exploratory success rate in a given year; hence, favouring their ability to raise capital. This implies that the accounting method used by a company should be considered by users of financial statements in any kind of business decision making.

The findings of this study make an important contribution towards addressing the ongoing debate about whether the SE or FC accounting method provides investors with numbers or earnings quality that are more informative, and as such could be mandated for use in the extractives industry. This debate has caused the IASB, FASB and the SEC to remain undecided about which accounting method should be mandated for use by all upstream oil and gas companies. Most research studies have supported the superiority of the SE method over the FC method (Bandyopadhyay, 1994; Harris & Ohlson, 1987; Murdoch & Krause, 2009; Yee, 2006). The results of this study are broadly in harmony with the above researchers and therefore expands the literature that supports the use of the SE accounting method.

One of the unique contributions of this thesis is its extensiveness. It looked at nine years of data of 84 firms and considered seven different measures of earnings quality that have been widely used in accounting research. These metrics categorised as “accounting-based” or “market-based”, have all been used to measure earnings quality of SE and FC firms; hence, making the results more reliable compared to earlier studies. Based on the literature consulted, it is also a much more recent study compared to most previous research on this topic. The IASB is in the process of developing a comprehensive accounting standard for the extractives industry and the results of this contemporary study may specifically guide them in determining which accounting method should be required for use by all upstream oil and gas companies.

Although this study was conducted on upstream oil and gas companies in the US, the results of the research are very relevant internationally, since most upstream oil and gas companies globally have adopted the accounting methods and practices used in the US. For example, the failure by the IASB to issue a comprehensive accounting standard for the extractives industry timely, possibly due to the intense political pressures, has caused most companies in the UK, Africa and other countries globally (especially countries following the IFRSs) to adopt the accounting practices and methods used in the US. In addition, whereas most upstream oil and gas companies operating in Africa are foreign companies with their parent companies in either the US, the UK or other developed countries, there are still a number of independent African upstream oil and gas companies operating in Africa. The findings of this study provide evidence to such companies and others interested in accounting for expenditures with uncertain future benefits about the superiority of using the SE over the FC accounting method.

This study also provides an international comparison of the US GAAP with the UK GAAP and IFRS, specifically in accounting for extractive activities. It is evident from the study that IFRS lacks specific comprehensive guidance for extractive activities; therefore, requiring entities to apply the *Conceptual Framework* and general IFRSs in developing relevant accounting policies. The study finds that there is no difference in accounting for extractive activities under the UK GAAP and IFRS, since both follow the requirements of IFRS 6. These do not take any position on the SE versus FC issue, but instead allow the use of either of the two methods, although most companies use the SE and modified FC accounting approaches. On the other hand, the US GAAP is more exhaustive in providing guidance on accounting for extractive activities compared to the IFRS and UK GAAP, one of the reasons why a number of companies reporting under different regimes opted to adapt some of the reporting requirements in the US. Therefore, this study provides evidence that is useful to such companies that are adapting the requirements under the US GAAP.

Despite the numerous empirical studies supporting the superiority of the SE over the FC accounting method, the IASB, FASB and the SEC have failed to move ahead to mandate the use of the SE method as one method of accounting for the extractives industry. The IASB, as an "independent" global standard-setting body, with representation across different countries was hoped not to be subject to the intense political pressure that could be felt by individual country standard setting bodies such as the FASB. However, it is believed that the IASB's failure to issue a comprehensive accounting standard for extractive industries is possibly attributed to the significant political pressure regarding the issue of the SE versus FC accounting methods. This study recommends that the IASB and the FASB undertake a joint project with the objective of the team coming up with a single method of accounting for the extractives industry. With the prominence of oil and gas companies in the US, the FASB should have heavy representation on the project team. Other key national standard setters such as in Norway, South Africa, Canada and Australia should also have their staff represented on this team. The team should come up with strict deadlines within which to achieve this objective and be ready to stand the political pressures that could arise thereafter. The team should consult widely by reviewing the different empirical studies, such as this study, that have been conducted about the two accounting methods with a view of taking an objective stance on this matter. While many individual companies may not support the outcome of the project, adapting a single accounting method will serve to standardise reporting in the extractives industry, consequently resulting in a more efficient allocation of capital resources among industry participants.

8.5 Limitations of the study

This study has come up with interesting findings. However, like any other research, the present study had certain limitations.

Firstly, the sample for the study was not randomly selected, as the companies were selected based on convenience, accessibility and availability of data over the study period. While the sample size of 84 firms was considered adequate since it was consistent with similar studies, the results in this study may not represent those of the entire population globally. Hence, the generalisation of the results to the greater population should be approached with the necessary caution.

This study was limited only to companies engaged primarily in the exploration and production of crude oil and natural gas (upstream activities), referred to as independent oil and gas companies. Upstream activities include exploration, acquisition, drilling, developing and producing oil and gas. Therefore, the study excluded companies that have at least one downstream activity like refining, processing, marketing and distribution. Such companies are referred to as integrated oil and gas companies.

The study focused on public listed US companies. Non-listed non-US and US companies were not included in this study. Although the US is one of the major oil and gas producing countries globally, there are other major oil and gas producing countries in the world, which include Russia, Saudi Arabia, Iraq, Iran and China, among others. Even within the US, a number of independent unlisted oil and gas companies use either of the two accounting methods. All such companies were excluded from the study, due to a possible limitation in accessing their financial data.

The period for the study was restricted to nine years (2007–2015) due to the time constraint. However, the study period could be extended to, say, 20 years in order to cater properly for changes in economic cycles such as booms and recessions. This could possibly give different results about the earnings quality of SE and FC firms, and could therefore be an area for further research.

The study focused on one category of users of financial statements, being the investors. However, general-purpose financial reporting is meant to provide information about a reporting entity to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity (FASB, 2010).

As earlier noted in this research, there are varying definitions for earnings quality and, consequently, different measures of earnings quality. Although this study utilised the measures that have been widely used in accounting research as proposed by Francis *et al.* (2004), using

other earnings quality measures could possibly yield different results. This is an area for further research.

8.6 Recommendations for further research

In consideration of the general limitations associated with this study, the following proposals for further research are hereby put forward.

First, the number of countries used should be extended to cover at least three major oil and gas producing countries where these accounting methods are in use. This will help to increase the generalisability of the findings. In addition, the same study could be replicated on US companies not listed and/or on privately owned companies. However, this poses a challenge of obtaining data about these companies, since it may not be readily available on on-line databases. Future research should also consider extending the study period to at least 20 years in order to cater in full for changes in economic cycles and variations in macro-economic factors that affect companies. Furthermore, investigating the reasons for the differences in the findings between this study and earlier studies performed in the same country could be an area for future research. The sample size of the study could also be increased by including integrated oil and gas companies in the study and thus evaluate their impact on the earnings quality of SE and FC firms. It is also suggested that other studies be carried out on earnings quality and earnings management since these subjects are still of interest to users of financial statements. Moreover, since the IASB and FASB are still undecided on which accounting method is superior, further study is still suggested on the value relevance of these two accounting methods. Lastly, future research can compare the earnings quality of SE and FC firms using other earnings quality metrics outside those used in this study, such as the relationship between operating cash flows and net profit, abnormal accruals, earnings variability, earnings informativeness and earnings opacity.

8.7 Final conclusion

This thesis investigated the quality of earnings of FC and SE firms using various earnings quality measures, with an objective of ascertaining which, if any, of the two accounting methods (SE and FC) provides superior earnings quality. The thesis relied upon a longitudinal research design to evaluate the issue of earnings quality of SE and FC firms, with the unit of analysis being at firm level, and the sample consisting of 84 US upstream oil and gas firms (43 SE firms and 41 FC firms) with data for the years 2007 to 2015. Seven earnings quality measures including persistence, predictability, smoothness, accruals quality, value relevance, timeliness and conservatism were used to estimate the quality of earnings for SE and FC firms for each year of the study period.

The results of the study are significant for four out of the seven hypotheses tested (all four significant findings supporting SE), and the researcher concluded this study by stating that the SE method of accounting provides earnings quality superior to the FC method. Despite using the US as the case study, it is still the conviction of the author that the findings and recommendations arising from this study will not only influence the FASB, but also the global standard setter, the IASB, which is currently in the process of developing a comprehensive accounting standard for the extractive industries. It is important to note that the IASB and the FASB are still undecided on which accounting method should be required for oil and gas firms. Further, the research findings arising from this study reinforce the opinion of other researchers whose works have suggested the superiority of the SE method over the FC accounting method.

The IASB's efforts to formulate and release a comprehensive standard for the extractives industry seem to be at a standstill. It may be that the global standard setter is currently facing significant political pressures similar to those that were experienced in the US and as such is hesitant to move forward towards resolving this issue. This study therefore recommends that the IASB and the FASB should form a joint project team with an objective of coming up with one single method of accounting and reporting for the extractives industry. The team should consult widely, relying more on the results of earlier empirical studies conducted about these two methods. This study envisages that if the IASB works alone, the desire for a single accounting method may never become known. Nonetheless, the thesis encourages more studies in respect of the earnings quality of the two accounting methods with such studies being provoked by the findings in this thesis. Lastly, from this study, future research can be conducted to investigate why the FASB has failed to mandate the use of the SE accounting method in the US despite numerous empirical studies supporting the superiority of the SE method over the FC accounting method.

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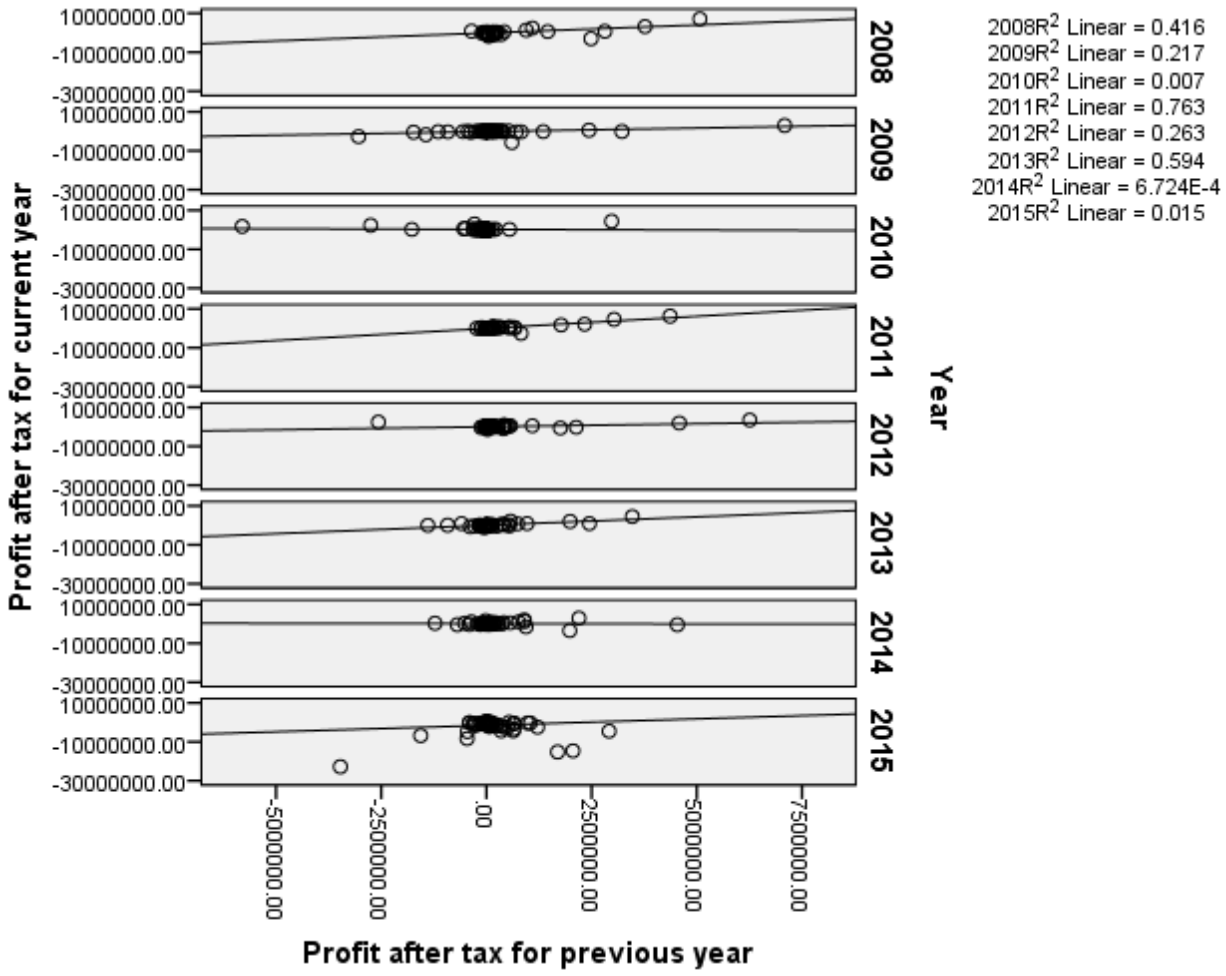
APPENDIX: TEST OF ASSUMPTIONS OF MULTIPLE REGRESSION

Earnings Predictability and Persistence model

Linear relationship

Scatter graph for current year profit after tax and previous year profit after tax



A scatterplot of *profit after tax for current year* against *profit after tax for previous year* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2015.

Multicollinearity

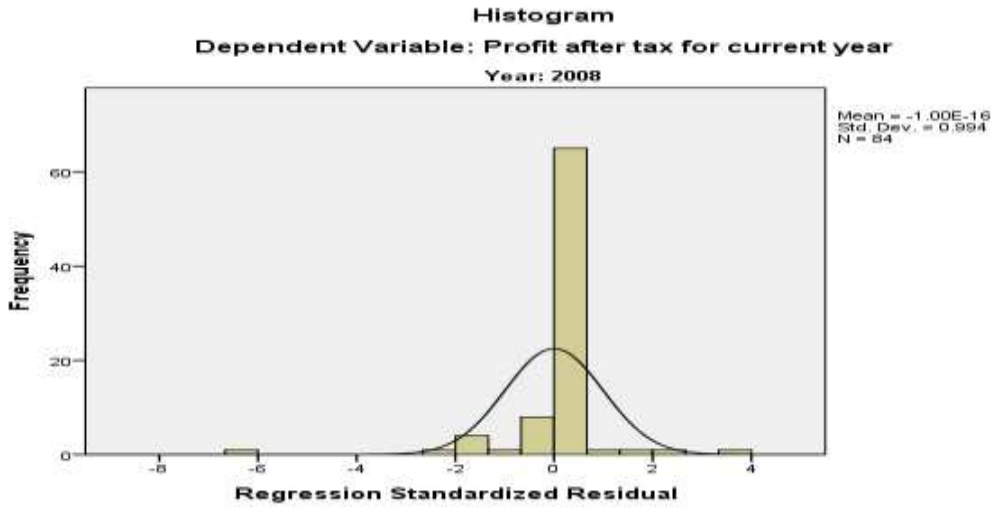
Coefficients[a]

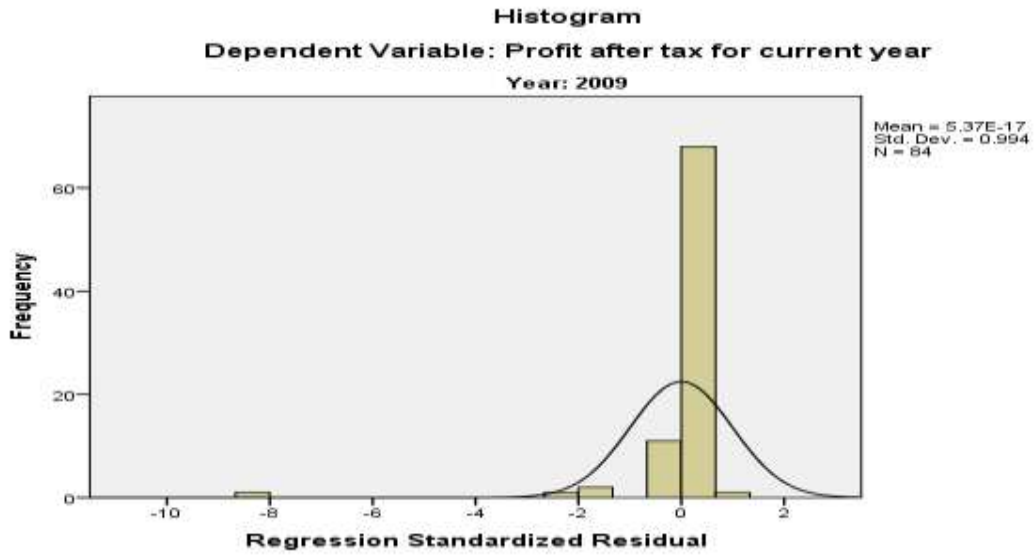
Year	Model		Sig.	Collinearity Statistics	
				Tolerance	VIF
2008	1	(Constant)	.364		
		Profit after tax for previous year	.000	1.000	1.000
2009	1	(Constant)	.036		
		Profit after tax for previous year	.000	1.000	1.000
2010	1	(Constant)	.007		
		Profit after tax for previous year	.448	1.000	1.000
2011	1	(Constant)	.590		
		Profit after tax for previous year	.000	1.000	1.000
2012	1	(Constant)	.548		
		Profit after tax for previous year	.000	1.000	1.000
2013	1	(Constant)	.328		
		Profit after tax for previous year	.000	1.000	1.000
2014	1	(Constant)	.194		
		Profit after tax for previous year	.815	1.000	1.000
2015	1	(Constant)	.000		
		Profit after tax for previous year	.260	1.000	1.000

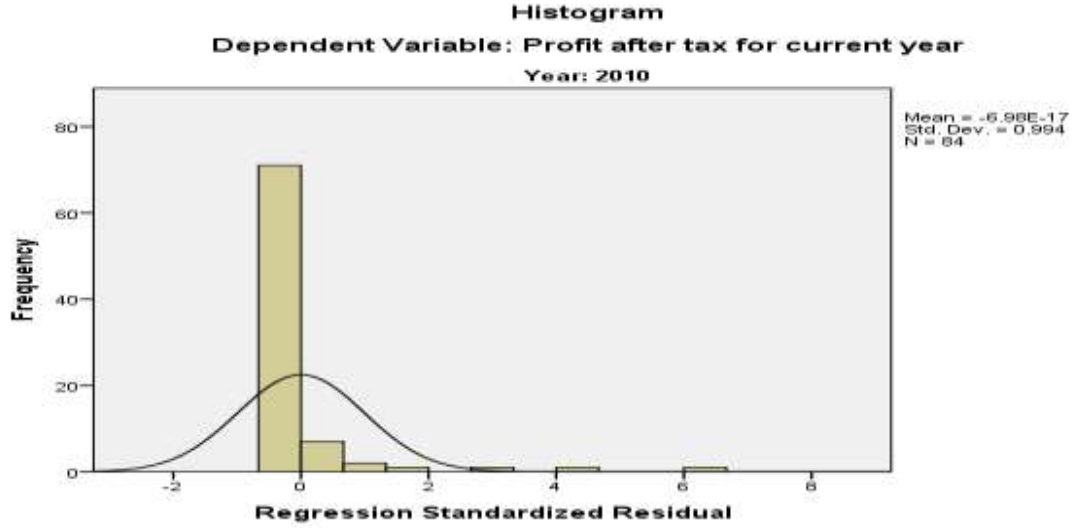
a. Dependent Variable: Profit after tax for current year

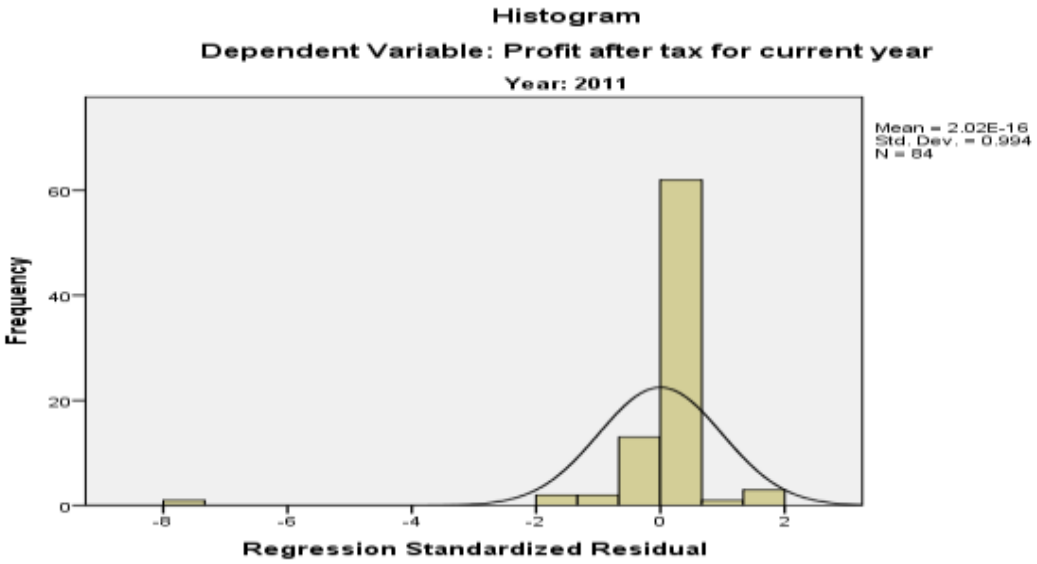
From the table above, values of the VIF (Variance Inflation Factor) for *profit after tax for previous year* are less than 10 for each of the years from 2008 to 2015, implying that there is no problem with collinearity in this particular dataset.

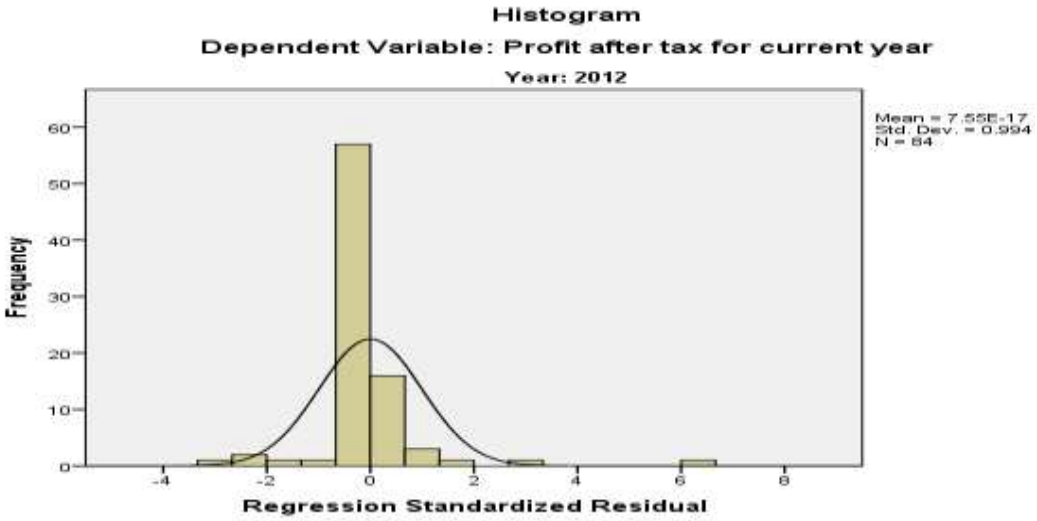
Normality

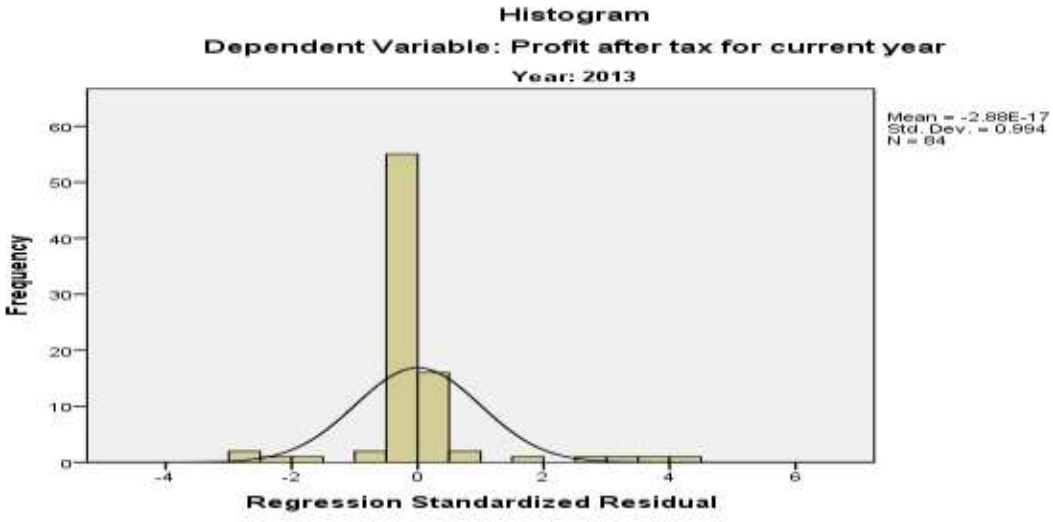

Histogram
Dependent Variable: Profit after tax for current year
Year: 2008
Mean = -1.00E-16
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual

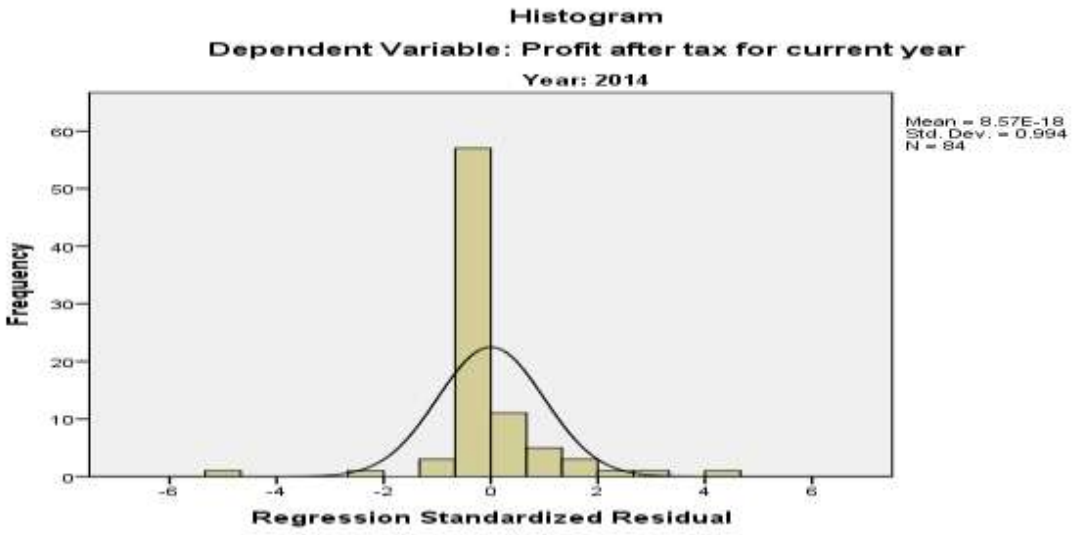

Histogram
Dependent Variable: Profit after tax for current year
Year: 2009
Mean = 5.37E-17
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual

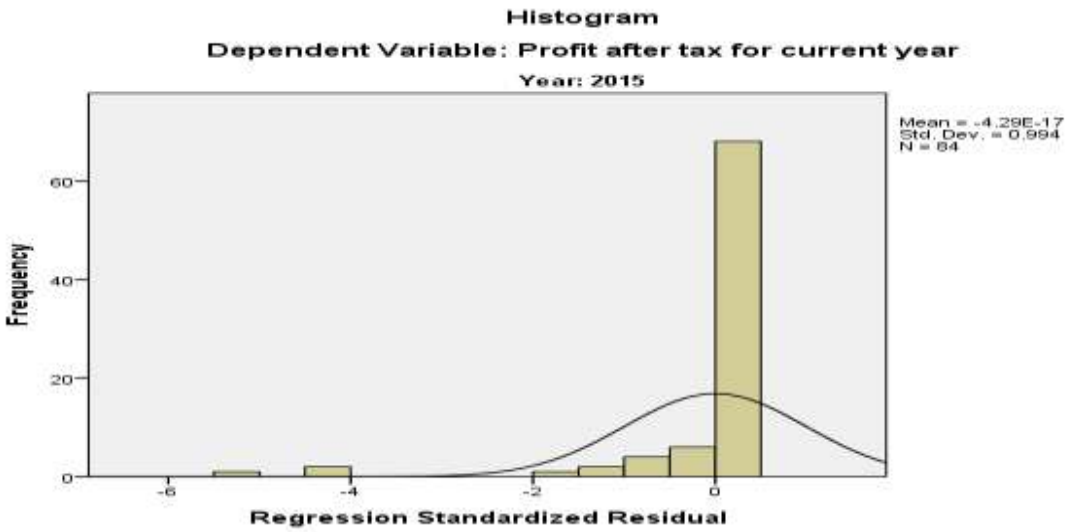

Histogram
Dependent Variable: Profit after tax for current year
Year: 2010
Mean = -6.98E-17
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Profit after tax for current year
Year: 2011
Mean = 2.02E-16
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Profit after tax for current year
Year: 2012
Mean = 7.55E-17
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual

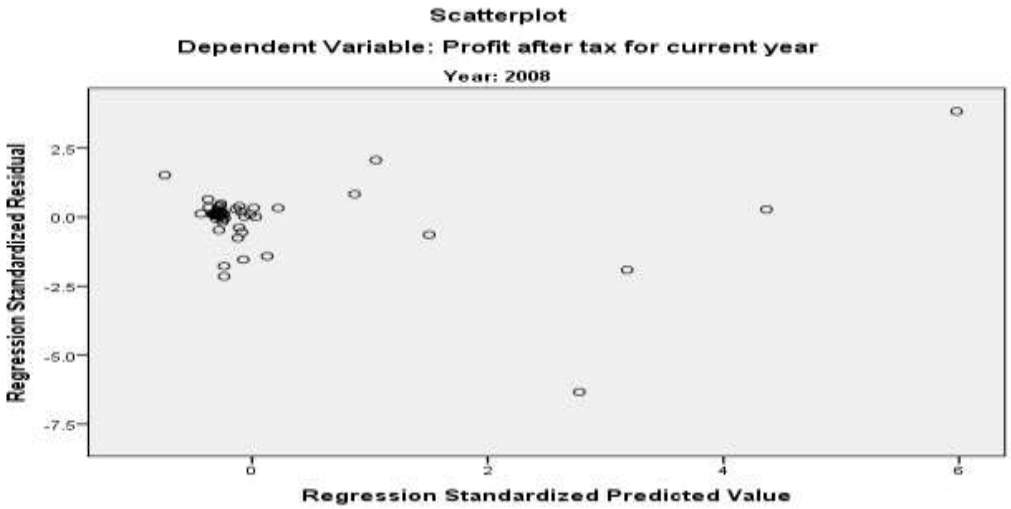

Histogram
Dependent Variable: Profit after tax for current year
Year: 2013
Mean = -2.88E-17
Std. Dev. = 0.994
N = 84
Frequency
Regression Standardized Residual

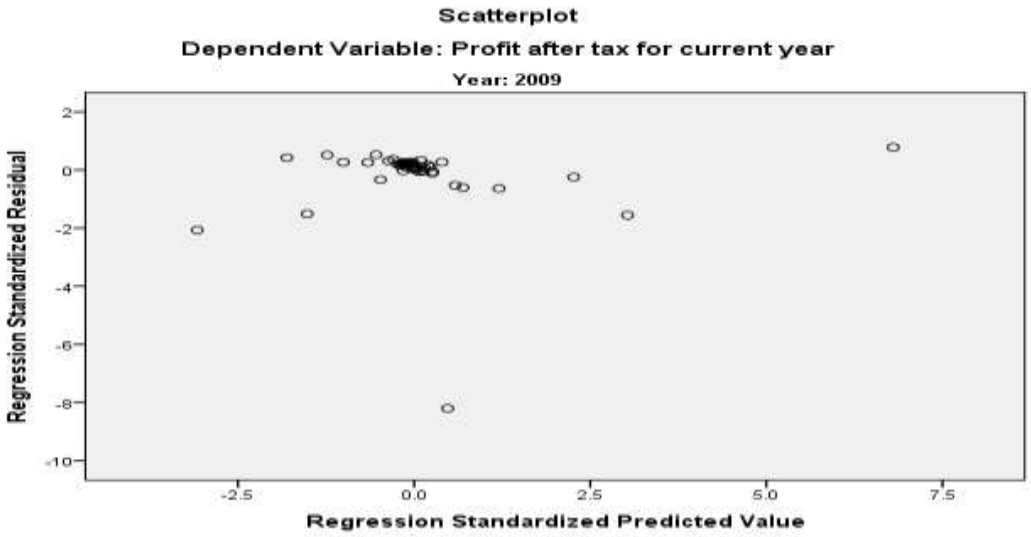


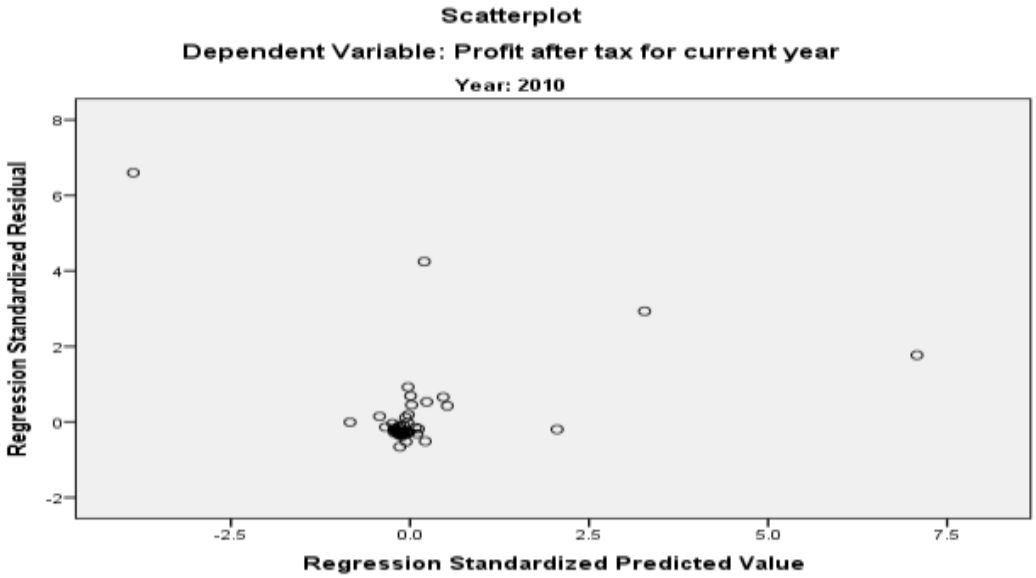


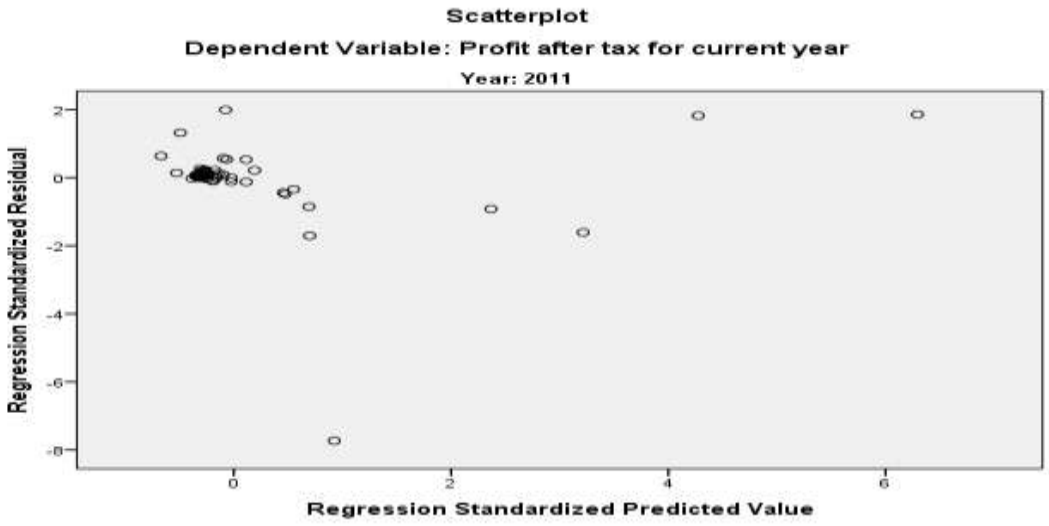
From the visual inspection of the histograms above, the standardised residuals show roughly normal curves, hence generally appear to be approximately normally distributed for each of the years from 2008 to 2015.

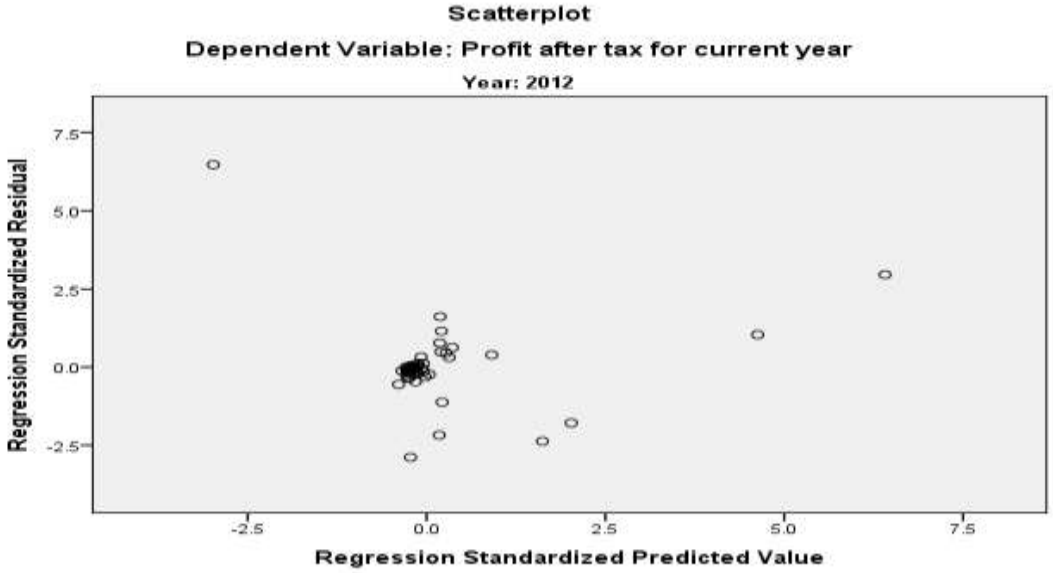
Homoscedasticity

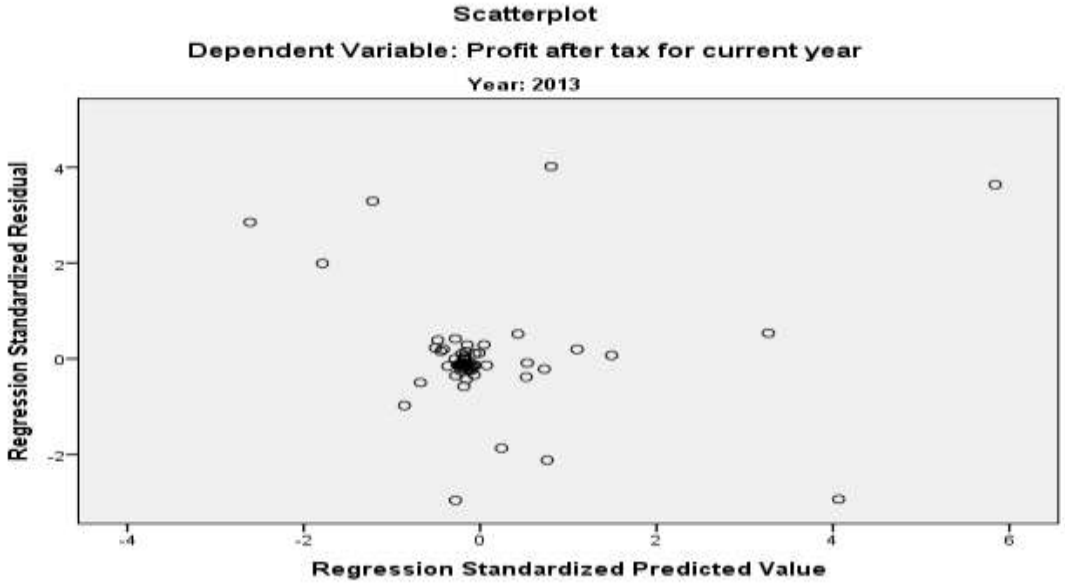


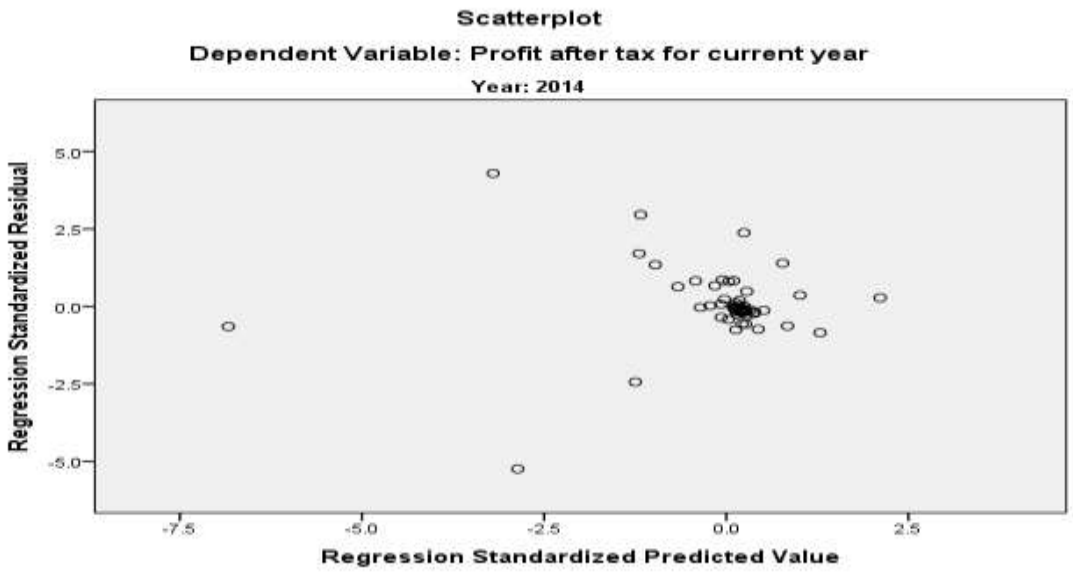


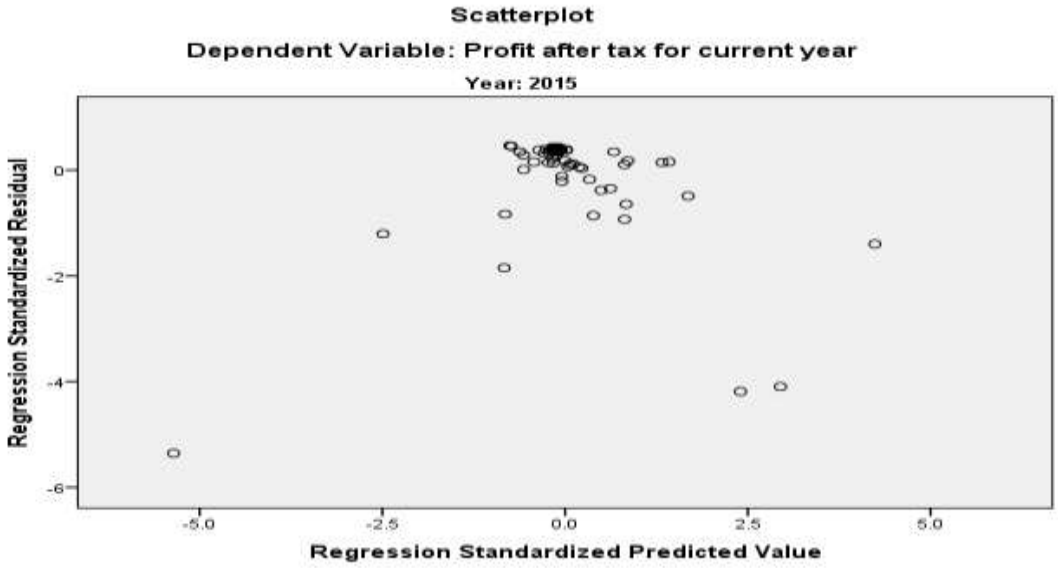



Scatterplot
Dependent Variable: Profit after tax for current year
Year: 2011
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Profit after tax for current year
Year: 2012
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Profit after tax for current year
Year: 2013
Regression Standardized Residual
Regression Standardized Predicted Value



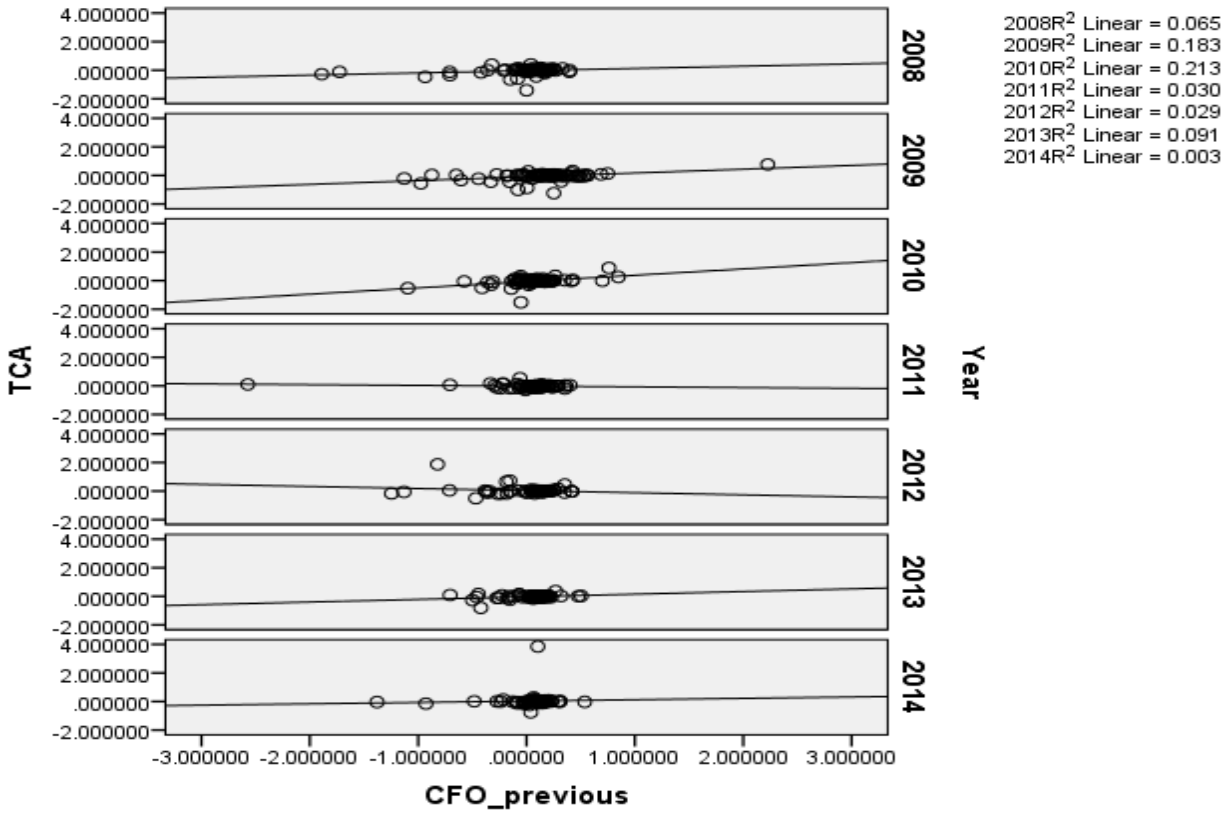


From the scatter plots above, for each of the years from 2008 to 2015, generally most of the scores are concentrated in the centre (along the zero point). There are no clear or systematic patterns to the residuals (e.g. no curvilinear, or higher on one side than the other). Therefore, there was homoscedasticity, as assessed by visual inspection of a plot of *standardised residual values* versus *standardised predicted values.*

Accruals quality model

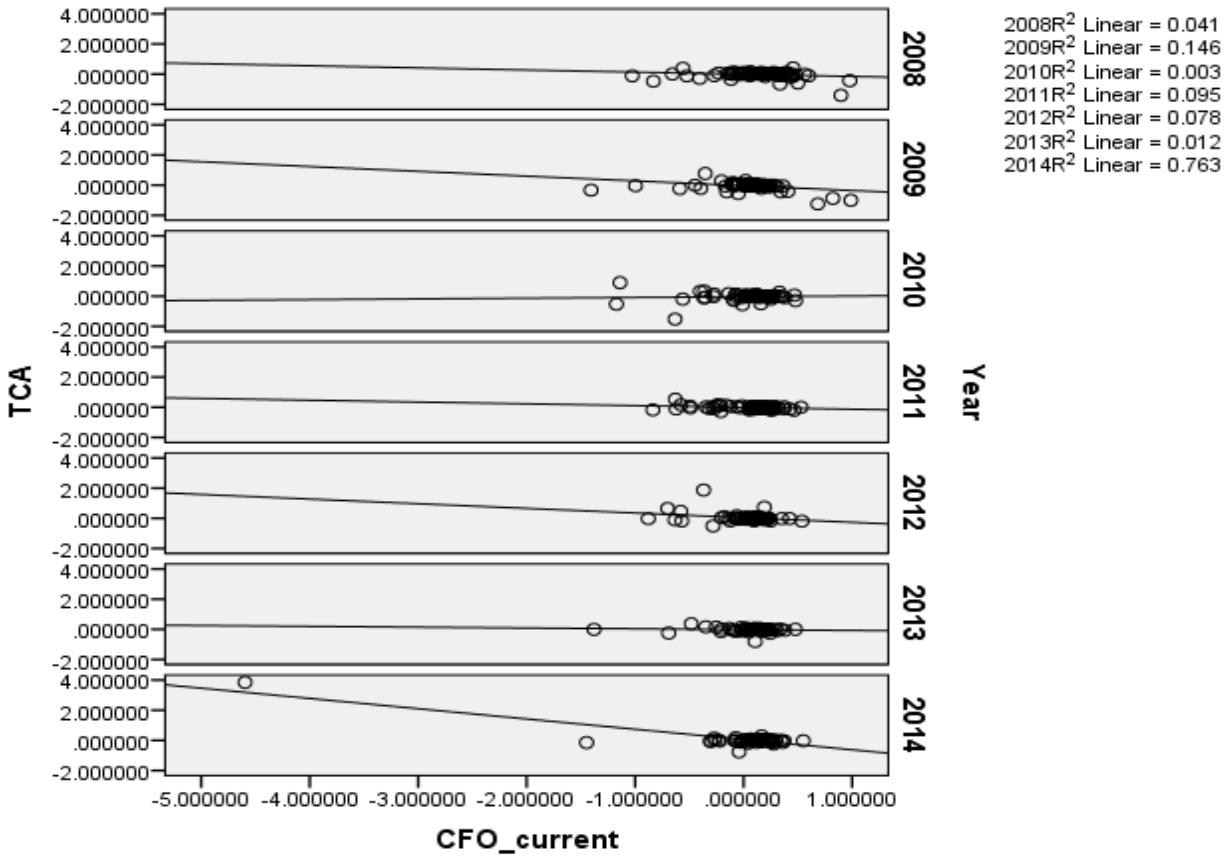
Linear relationship

Scatter graph for total current accruals and previous cash flows from operations



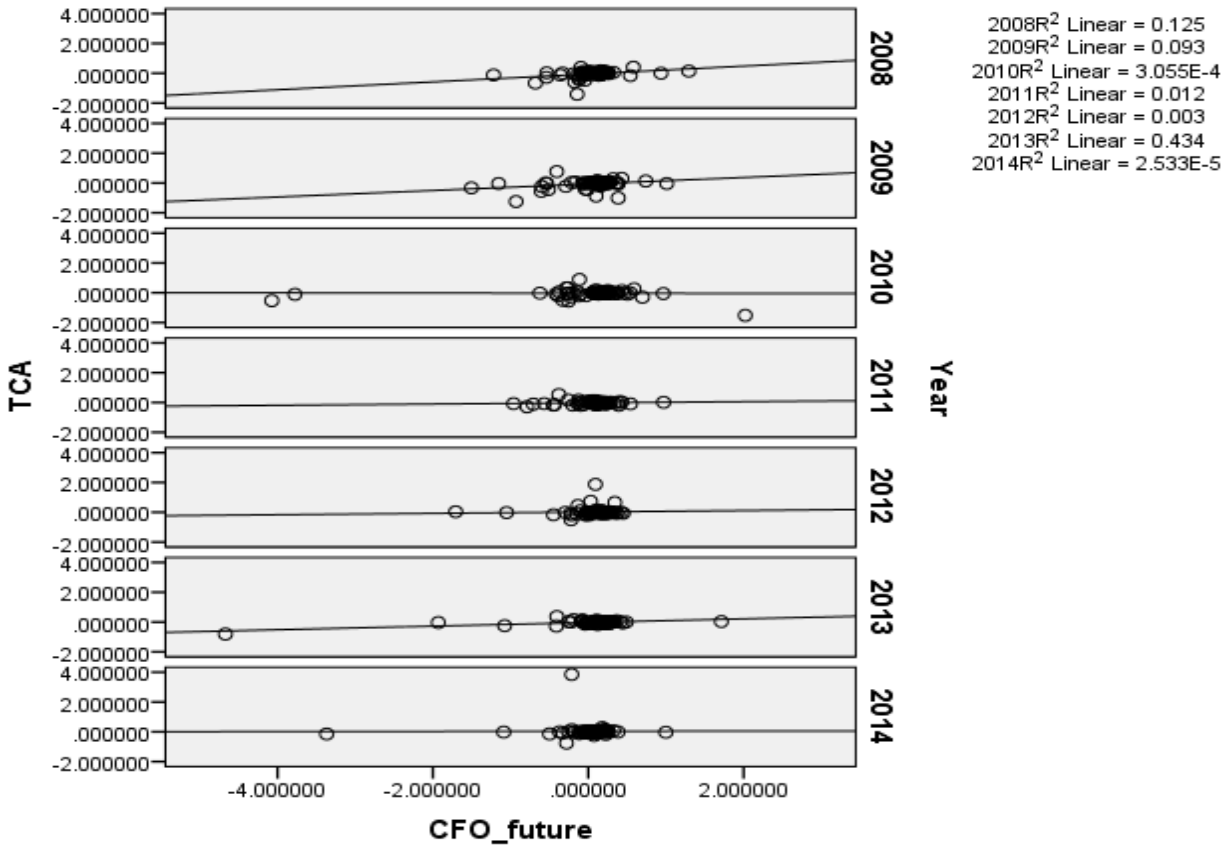
A scatterplot of *total current accruals* against *cash flows from operations for the previous year* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2014.

Scatter graph for total current accruals and current cash flows from operations



A scatterplot of *total current accruals* against *cash flows from operations for the current year* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2014.

Scatter graph for total current accruals and future cash flows from operations



A scatterplot of *total current accruals* against *cash flows from operations for the future year* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2014.

Multicollinearity

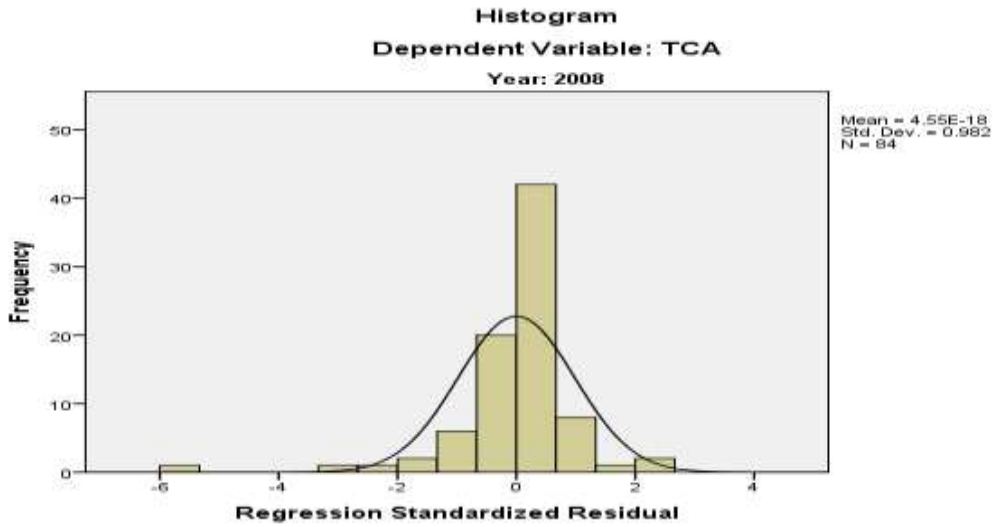
Coefficients[a]

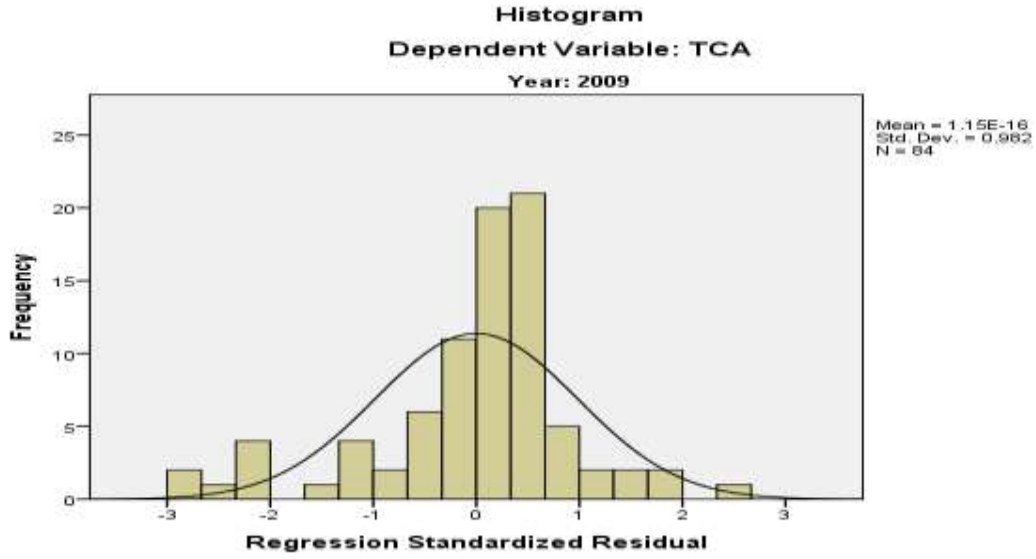
Year	Model		Collinearity Statistics	
			Tolerance	VIF
2008	1	(Constant)		
		CFO_previous	.469	2.131
		CFO_current	.591	1.692
		CFO_future	.733	1.365
2009	1	(Constant)		
		CFO_previous	.928	1.078
		CFO_current	.725	1.380
		CFO_future	.694	1.440
2010	1	(Constant)		
		CFO_previous	.755	1.324
		CFO_current	.741	1.350
		CFO_future	.637	1.569
2011	1	(Constant)		
		CFO_previous	.787	1.271
		CFO_current	.728	1.375
		CFO_future	.910	1.099
2012	1	(Constant)		
		CFO_previous	.836	1.196
		CFO_current	.793	1.261
		CFO_future	.697	1.434
2013	1	(Constant)		
		CFO_previous	.782	1.279
		CFO_current	.853	1.172
		CFO_future	.854	1.171
2014	1	(Constant)		
		CFO_previous	.769	1.300
		CFO_current	.854	1.171
		CFO_future	.720	1.390

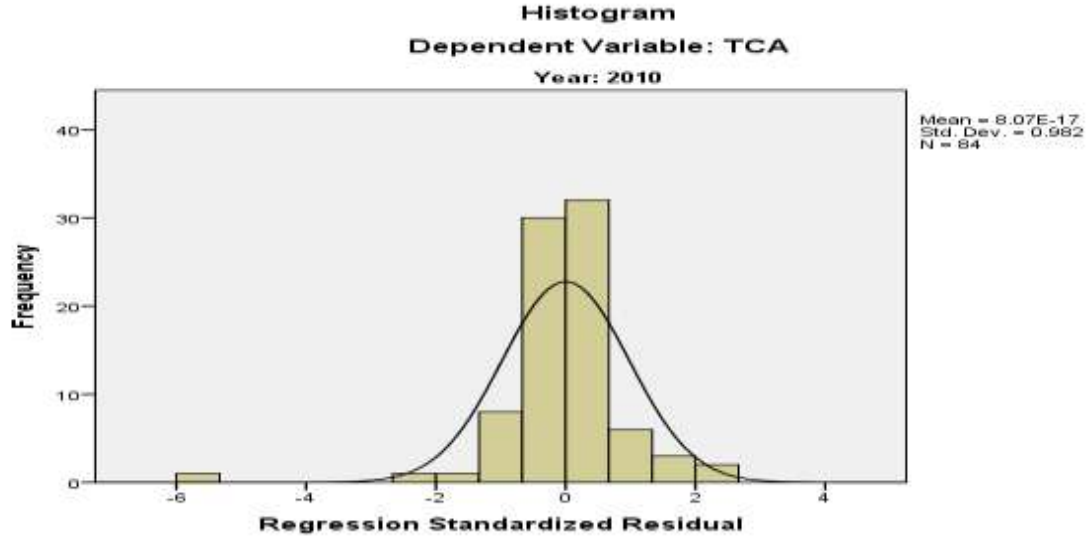
a. Dependent Variable: TCA

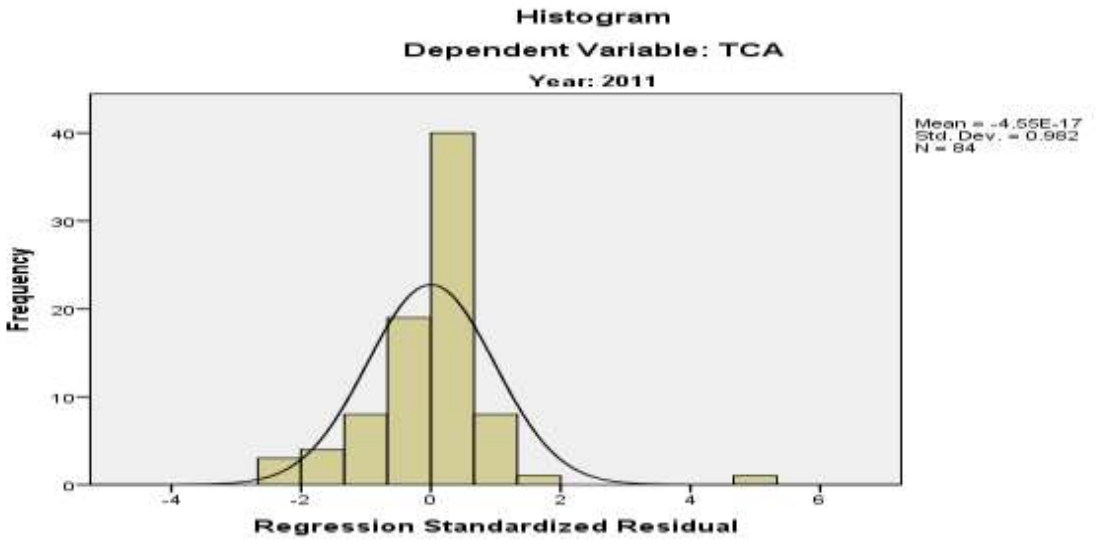
From the table above, values of the VIF for each of the independent variables are less than 10 for each of the years from 2008 to 2014. This implies that the independent variables are not highly correlated with each other, hence no multicollinearity.

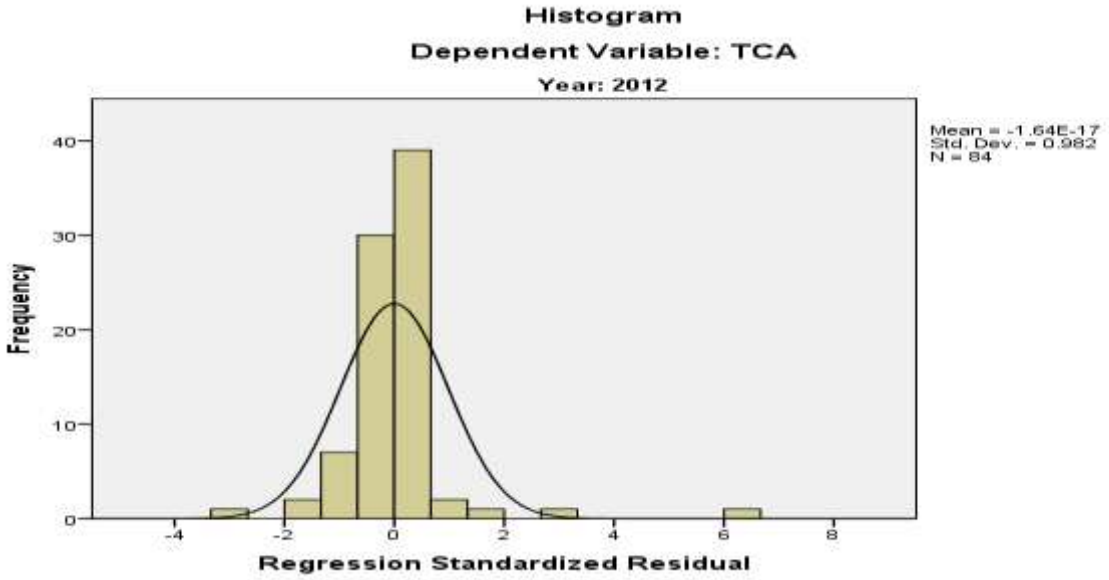
Normality

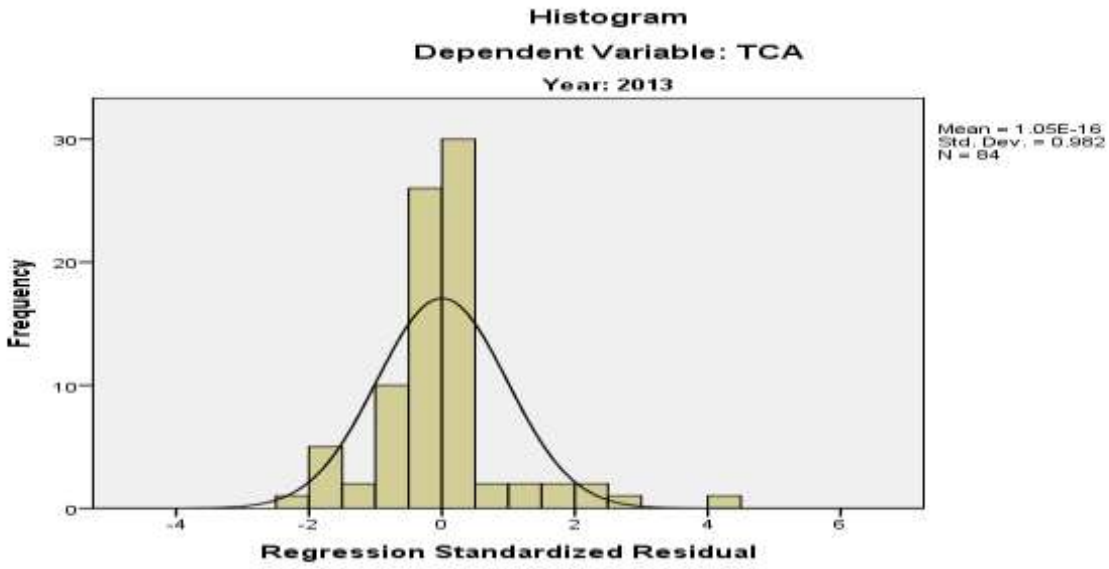

Histogram
Dependent Variable: TCA
Year: 2008
Mean = 4.55E-18
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual

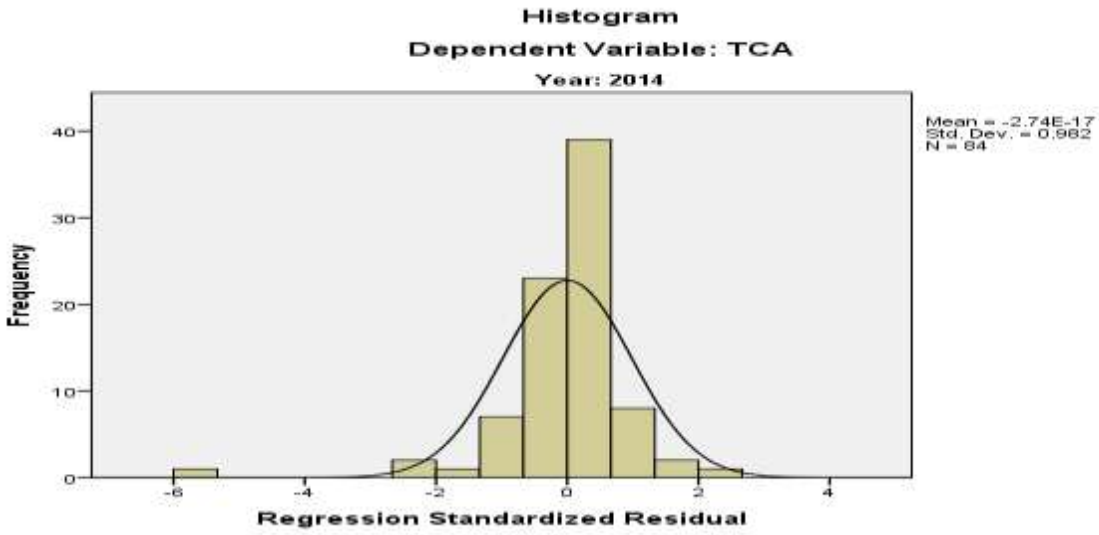

Histogram
Dependent Variable: TCA
Year: 2009
Mean = 1.15E-16
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: TCA
Year: 2010
Mean = 8.07E-17
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: TCA
Year: 2011
Mean = -4.55E-17
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual

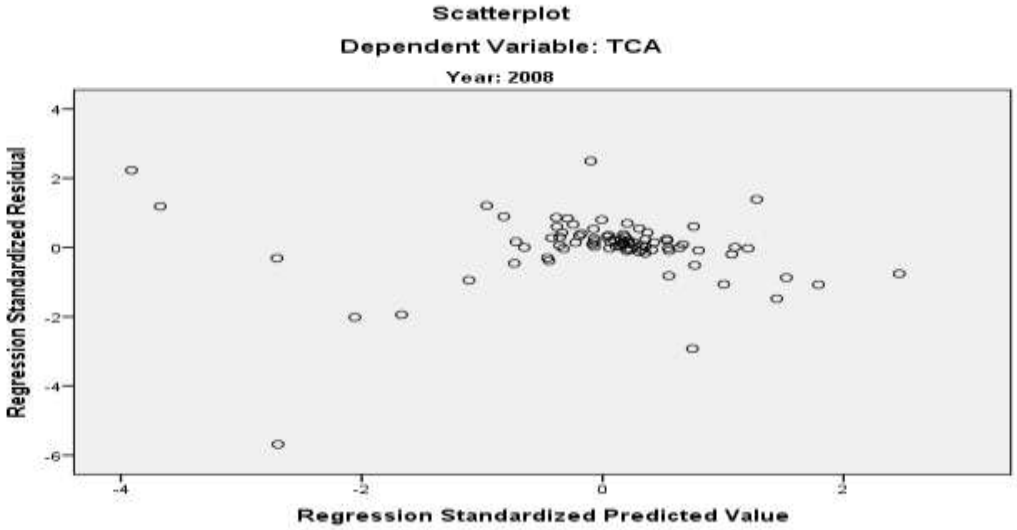

Histogram
Dependent Variable: TCA
Year: 2012
Mean = -1.64E-17
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual

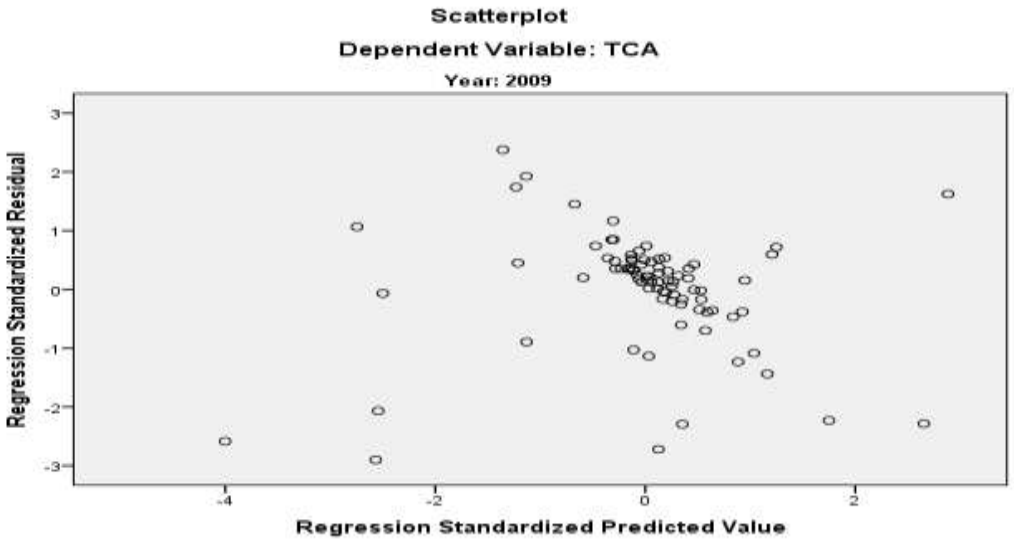

Histogram
Dependent Variable: TCA
Year: 2013
Mean = 1.05E-16
Std. Dev. = 0.982
N = 84
Frequency
Regression Standardized Residual

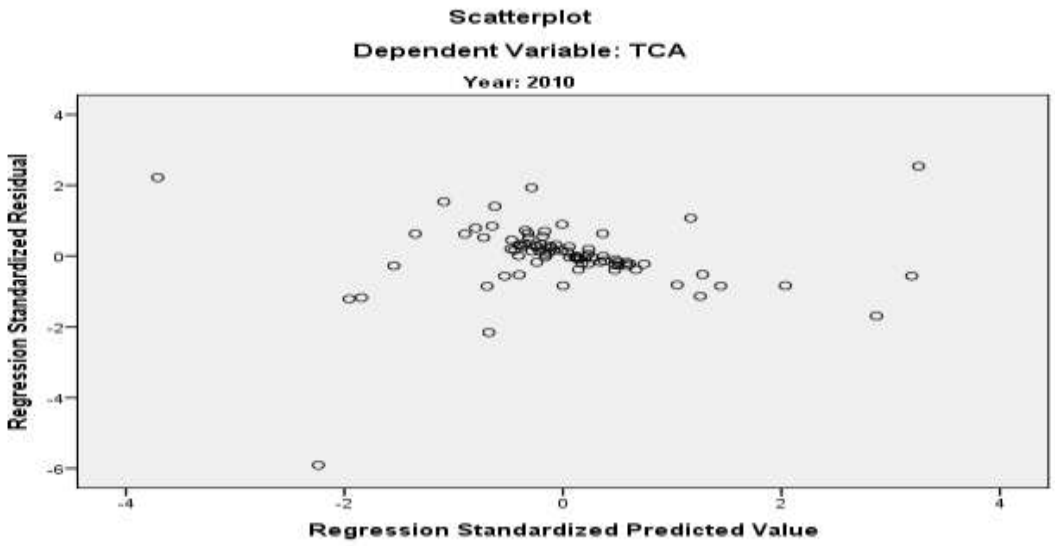


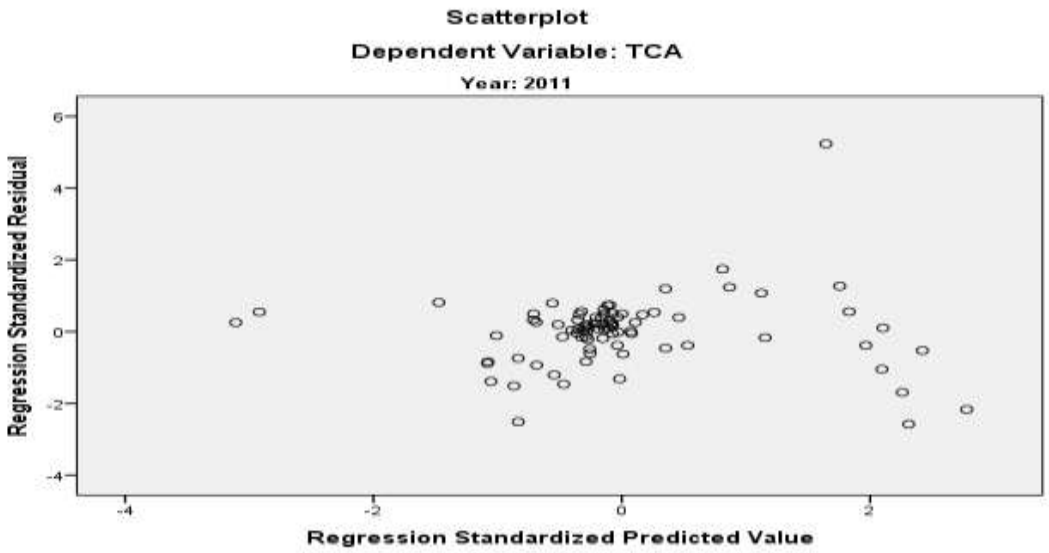
From the visual inspection of the histograms above, the standardised residuals show roughly normal curves, hence generally appear to be approximately normally distributed for each of the years from 2008 to 2014.

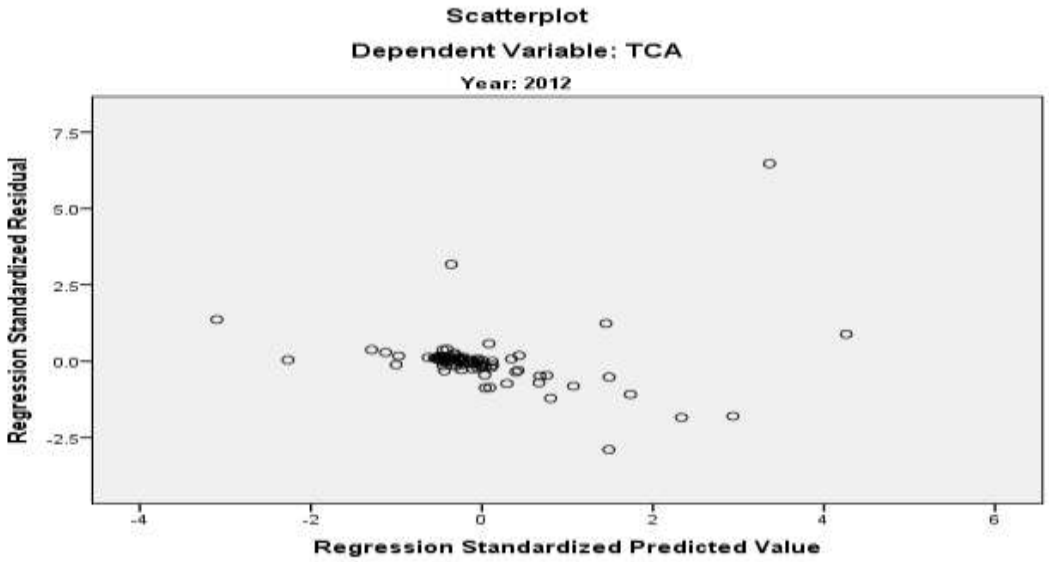
Homoscedasticity

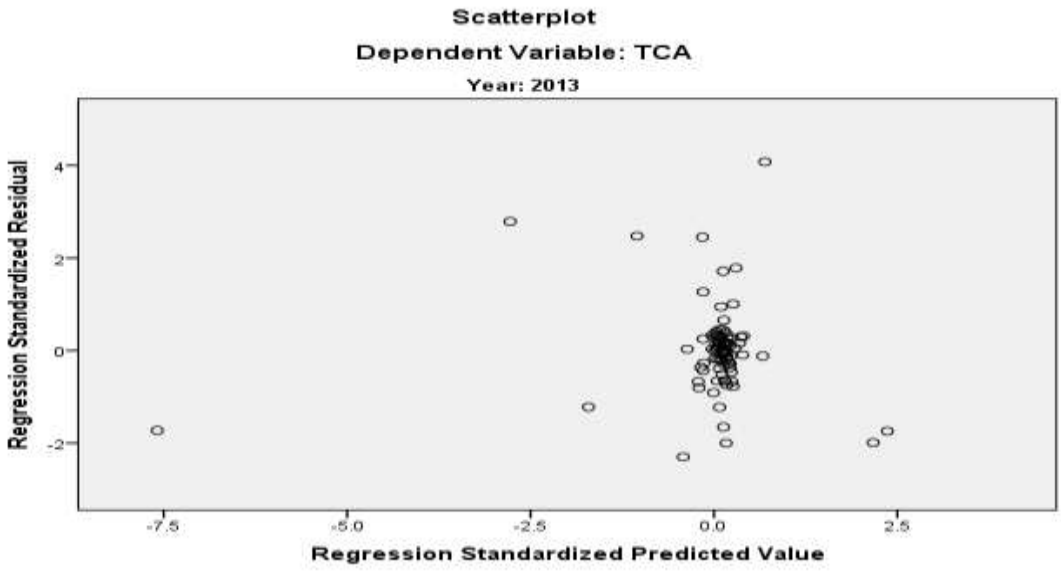


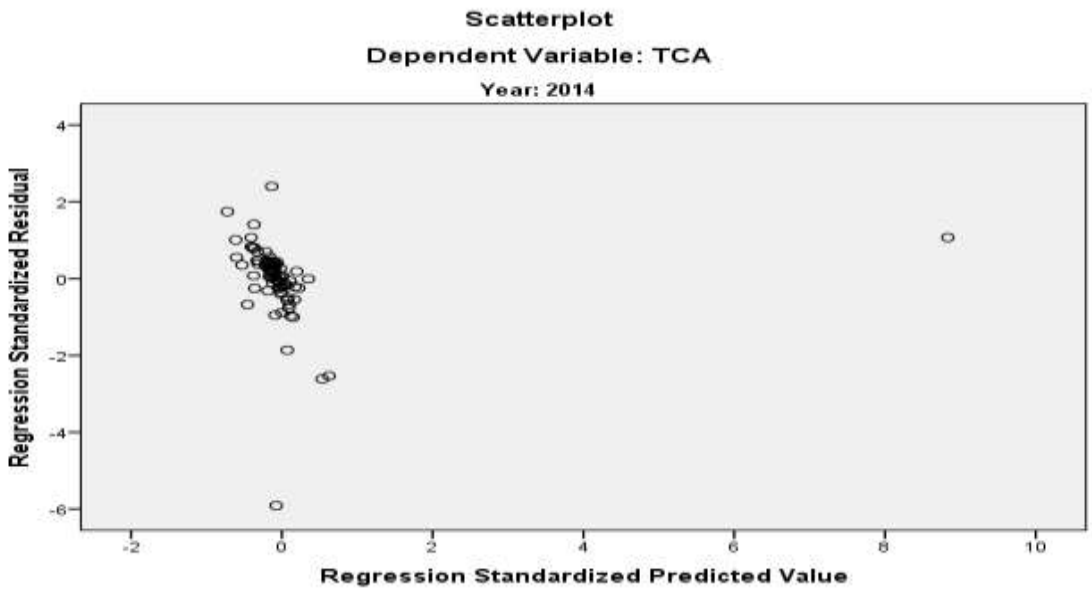





Scatterplot
Dependent Variable: TCA
Year: 2011
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: TCA
Year: 2012
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: TCA
Year: 2013
Regression Standardized Residual
Regression Standardized Predicted Value

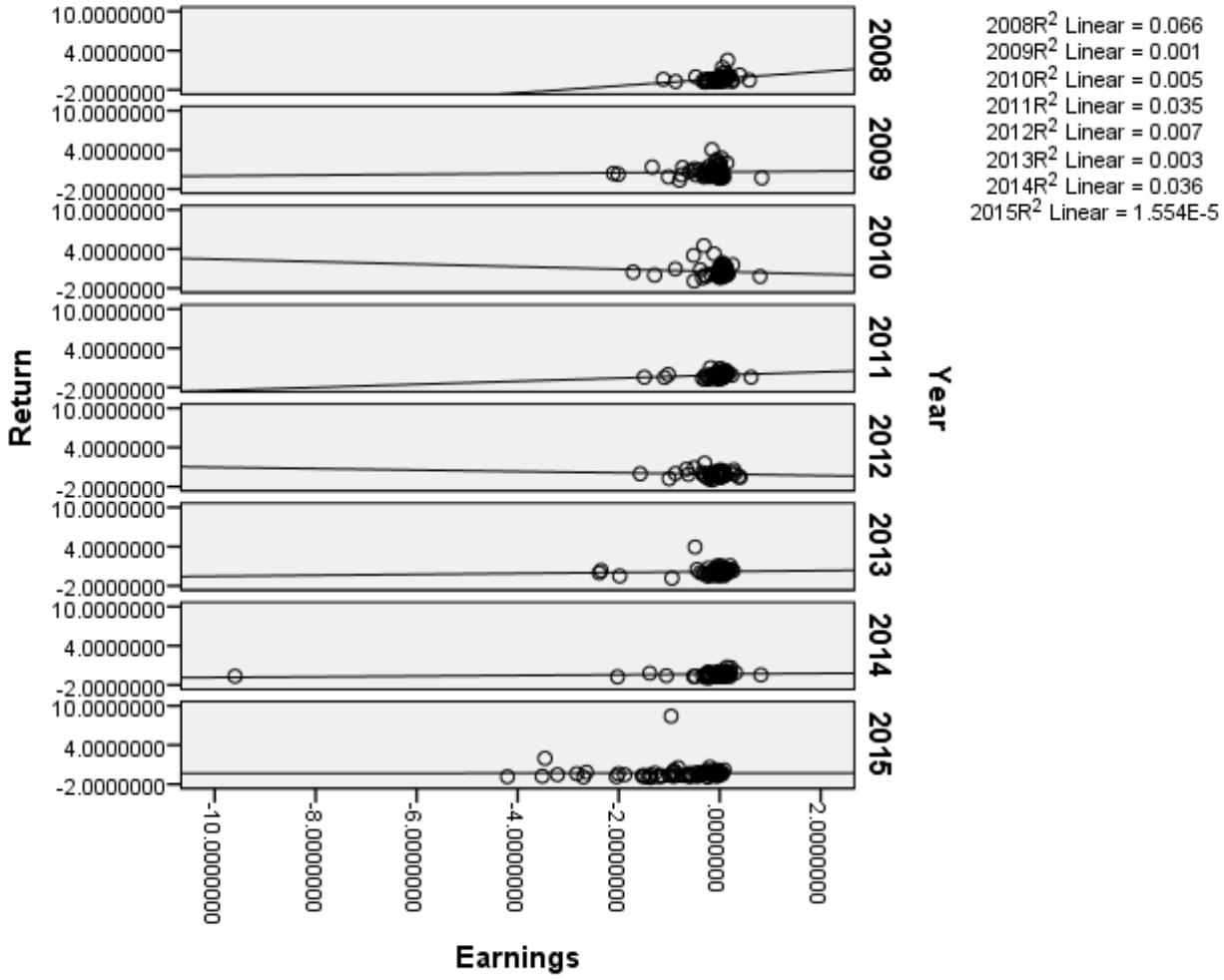


From the scatter plots above, for each of the years from 2008 to 2014, most of the scores are concentrated in the centre (along the zero point). There are no clear or systematic patterns to the residuals. Therefore, there was homoscedasticity, as assessed by visual inspection of a plot of *standardised residual values* versus *standardised predicted values*.

Value relevance model

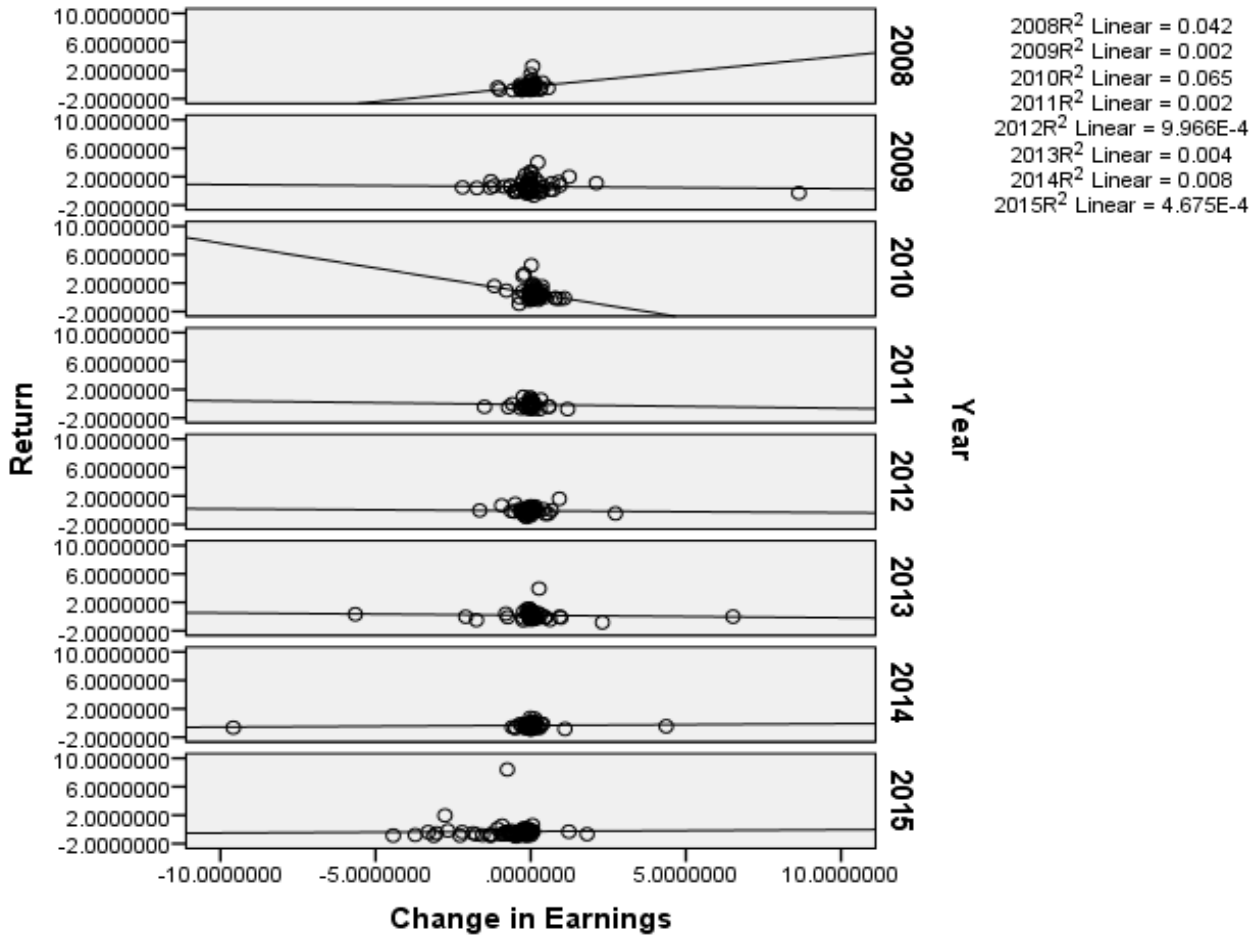
Linear relationship

Scatter graph for returns and earnings



A scatterplot of *returns* against *earnings* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2015.

Scatter graph for returns and change in earnings



A scatterplot of *returns* against *change in earnings* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2015.

Multicollinearity

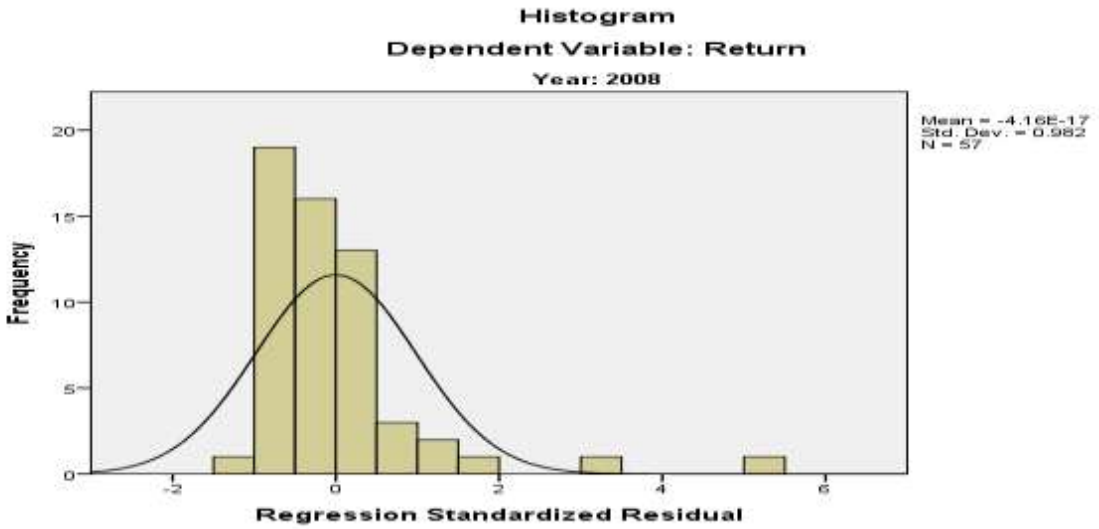
Coefficients[a]

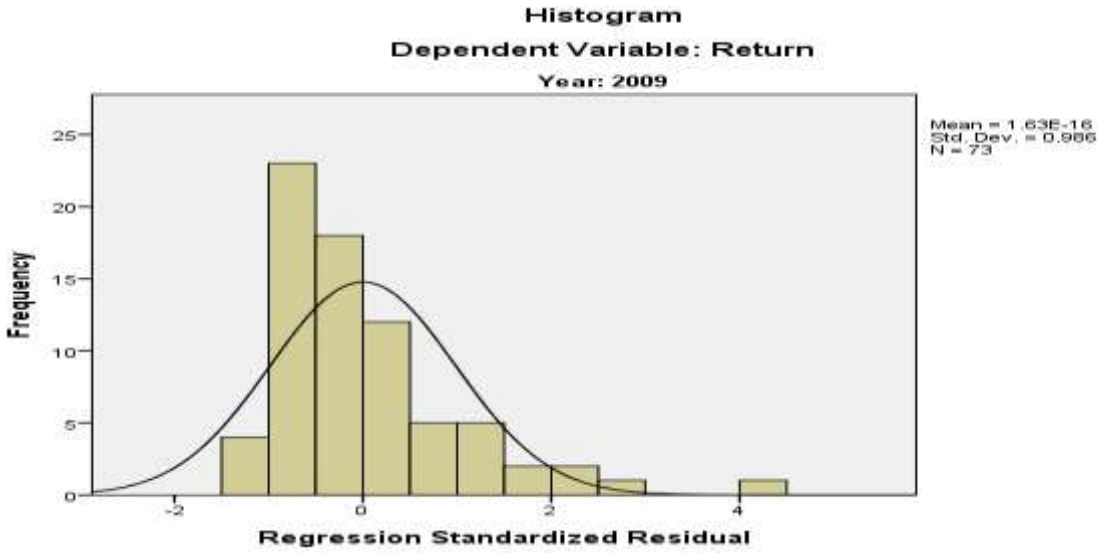
Year	Model		Sig.	Collinearity Statistics	
				Tolerance	VIF
		(Constant)	.000		
2008	1	Earnings	.147	.112	8.898
		Change in Earnings	.392	.112	8.898
		(Constant)	.000		
2009	1	Earnings	.667	.858	1.165
		Change in Earnings	.624	.858	1.165
		(Constant)	.000		
2010	1	Earnings	.736	.824	1.214
		Change in Earnings	.031	.824	1.214
		(Constant)	.007		
2011	1	Earnings	.011	.563	1.777
		Change in Earnings	.048	.563	1.777
		(Constant)	.031		
2012	1	Earnings	.510	.735	1.361
		Change in Earnings	.916	.735	1.361
		(Constant)	.006		
2013	1	Earnings	.390	.795	1.258
		Change in Earnings	.371	.795	1.258
		(Constant)	.000		
2014	1	Earnings	.024	.169	5.905
		Change in Earnings	.082	.169	5.905
		(Constant)	.073		
2015	1	Earnings	.765	.199	5.029
		Change in Earnings	.726	.199	5.029

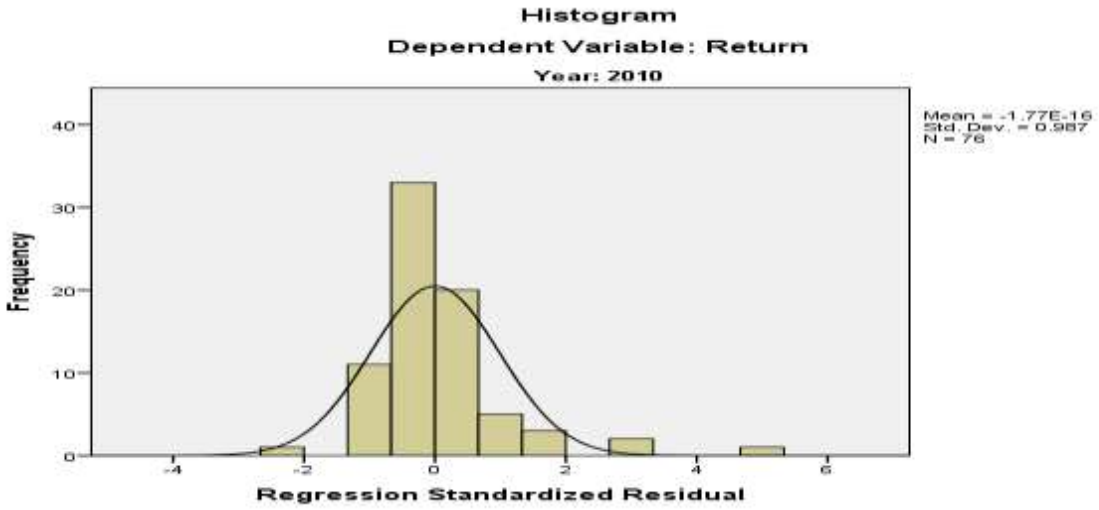
a. Dependent Variable: Return

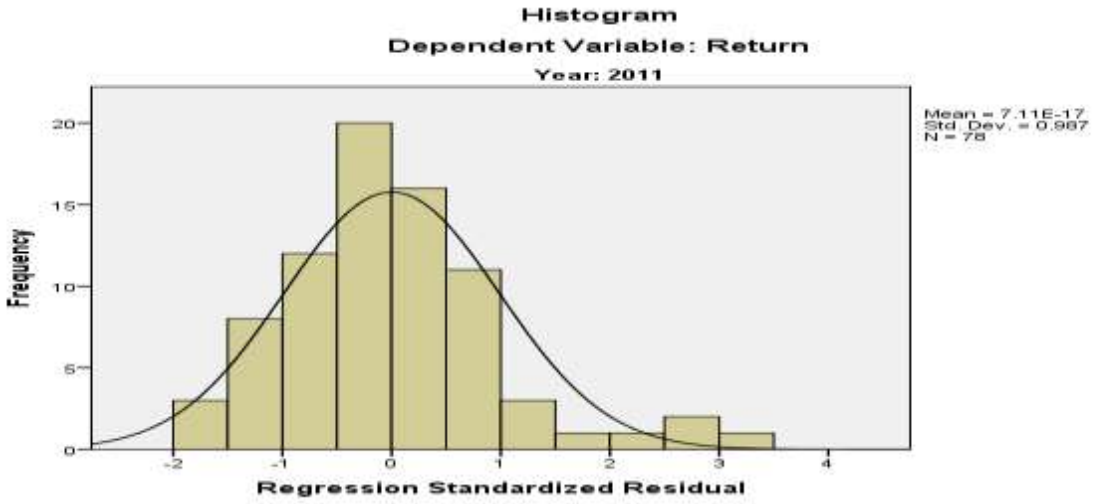
From the table above, values of the VIF for each of the independent variables are less than 10 for each of the years from 2008 to 2015. This implies that the independent variables are not highly correlated with each other; hence, no undue multicollinearity exists in the dataset.

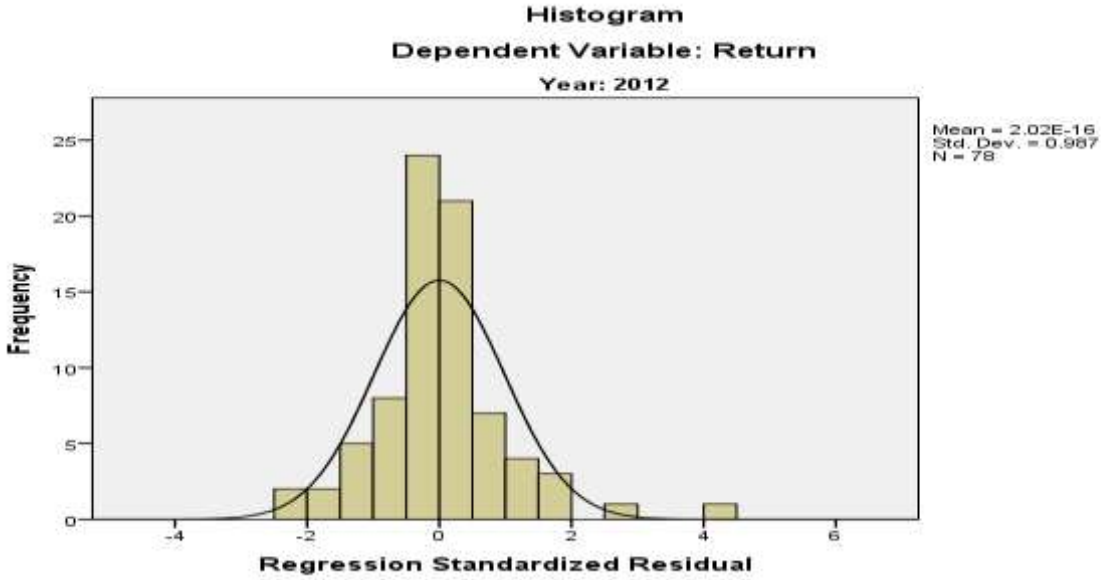
Normality

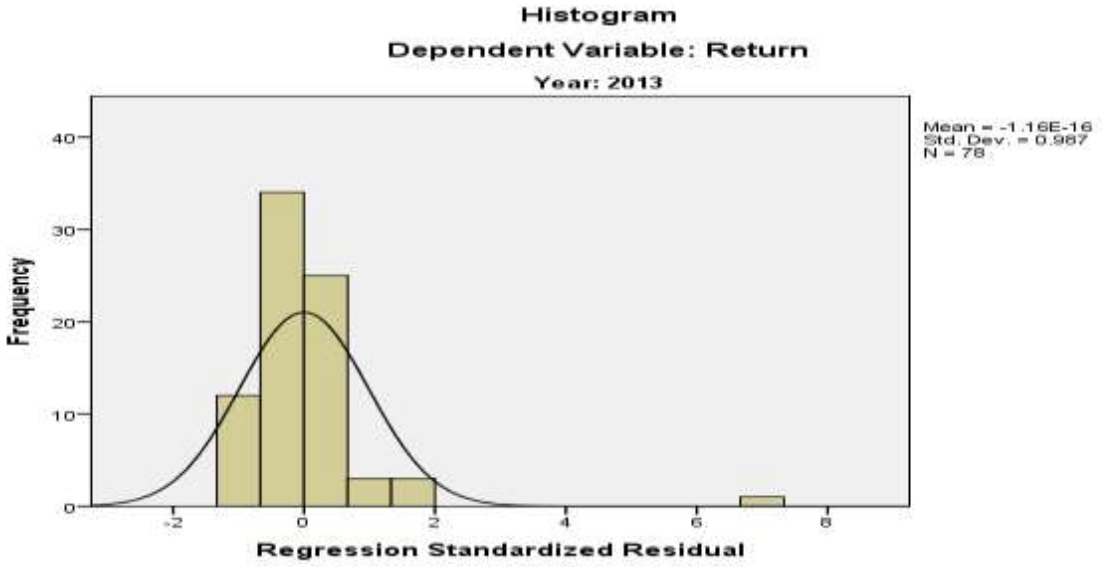

Histogram
Dependent Variable: Return
Year: 2008
Mean = -4.16E-17
Std. Dev. = 0.982
N = 57
Frequency
Regression Standardized Residual

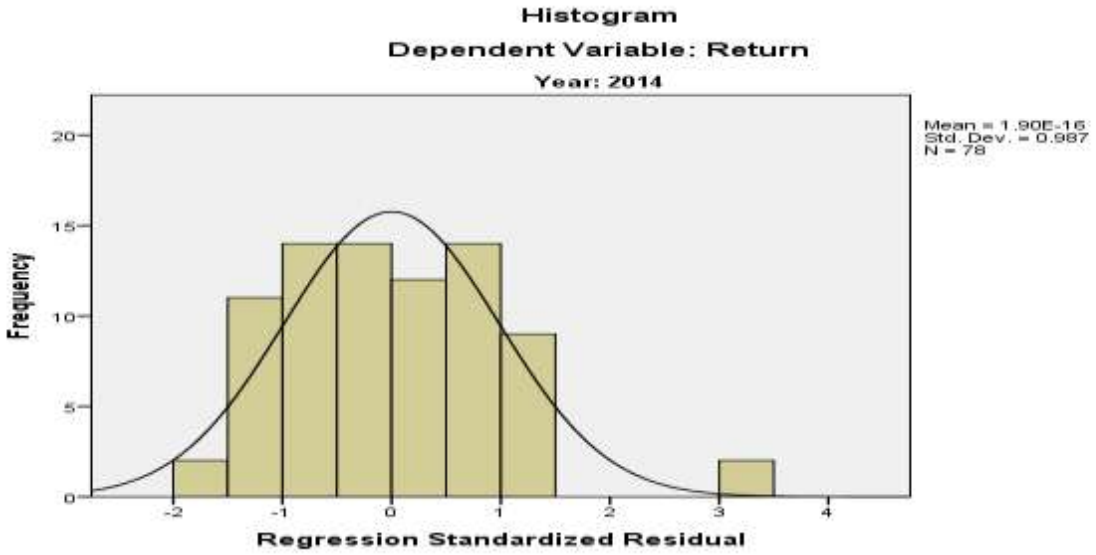

Histogram
Dependent Variable: Return
Year: 2009
Mean = 1.63E-16
Std. Dev. = 0.986
N = 73
Frequency
Regression Standardized Residual

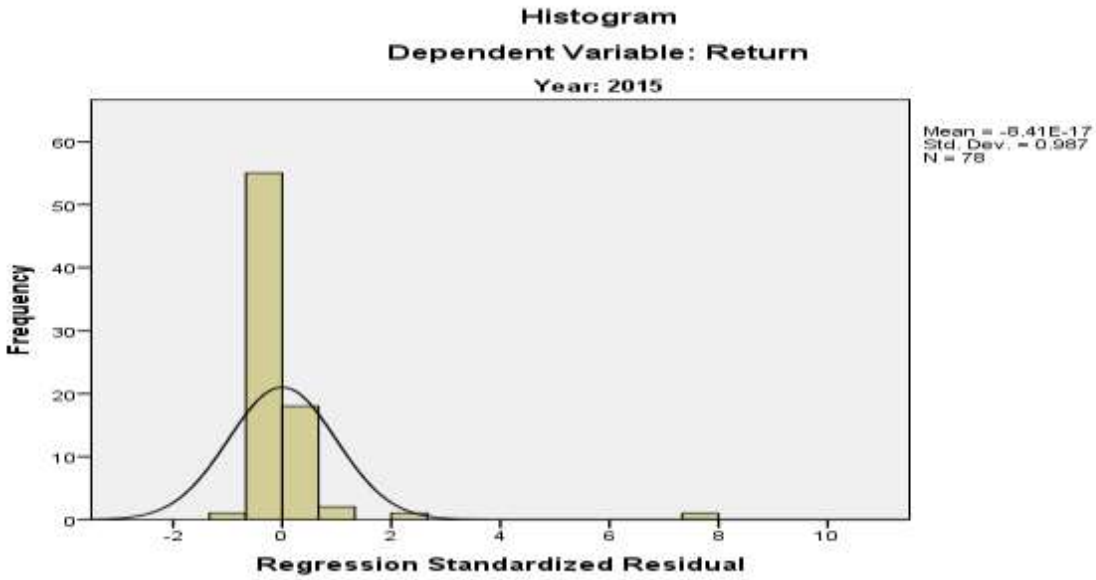

Histogram
Dependent Variable: Return
Year: 2010
Mean = -1.77E-16
Std. Dev. = 0.987
N = 76
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Return
Year: 2011
Mean = 7.11E-17
Std. Dev. = 0.987
N = 78
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Return
Year: 2012
Mean = 2.02E-16
Std. Dev. = 0.987
N = 78
Frequency
Regression Standardized Residual

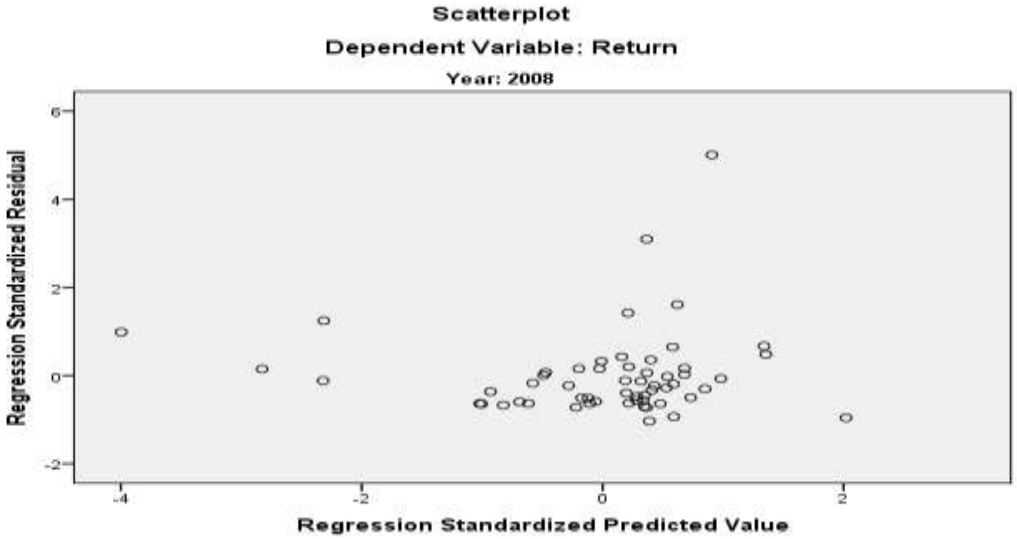

Histogram
Dependent Variable: Return
Year: 2013
Mean = -1.16E-16
Std. Dev. = 0.987
N = 78
Frequency
Regression Standardized Residual

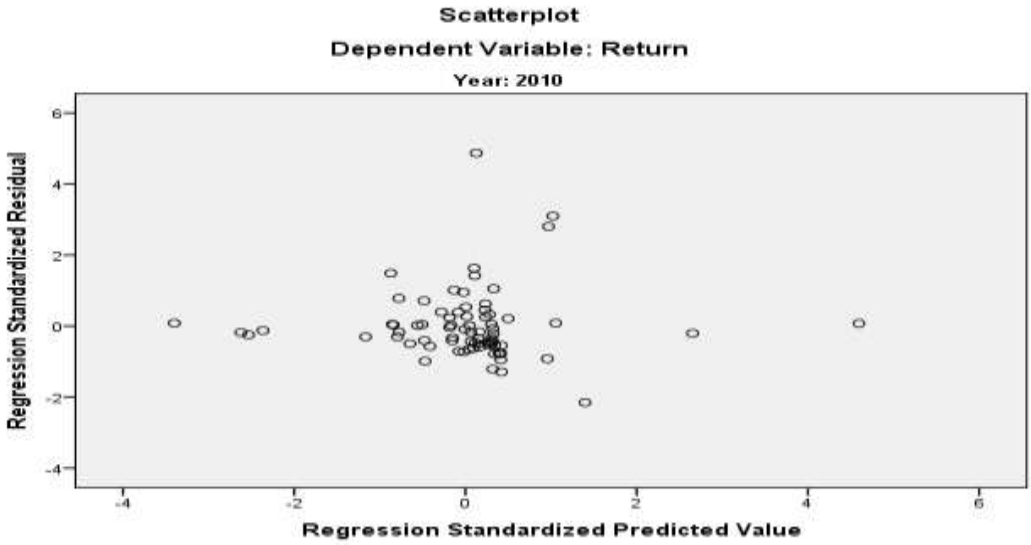


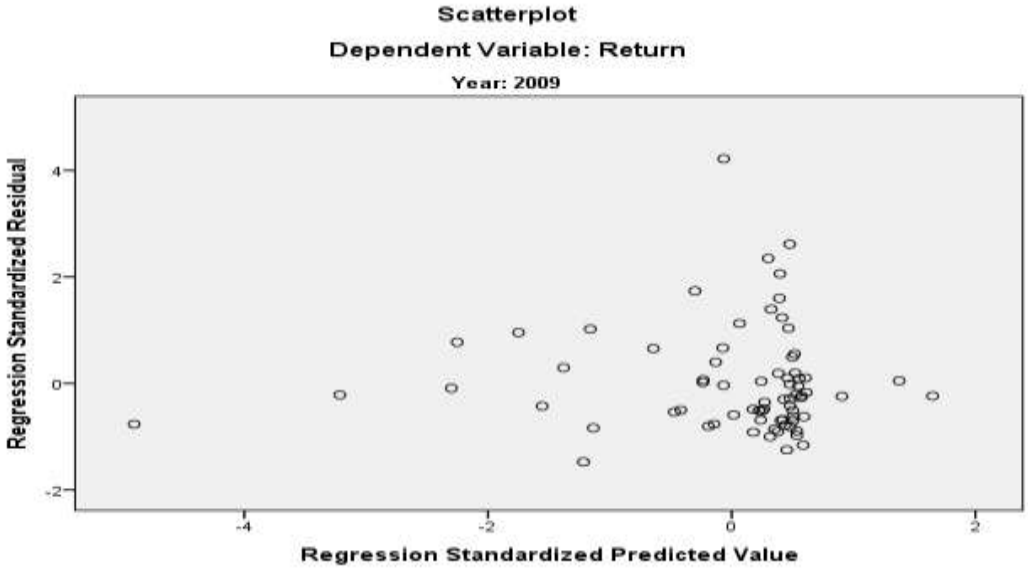


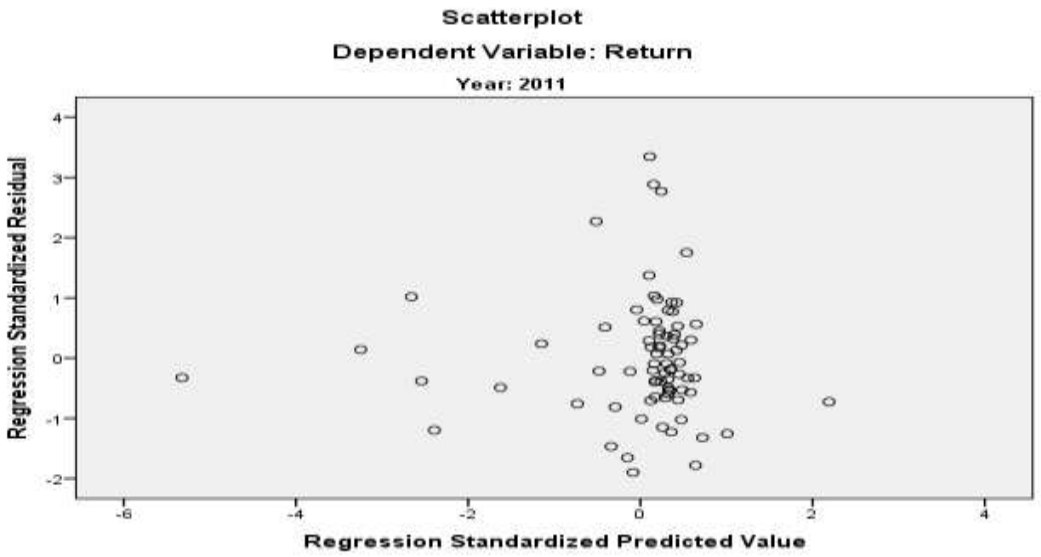
From the visual inspection of the histograms above, the standardised residuals show roughly normal curves, hence generally appear to be approximately normally distributed for each of the years from 2008 to 2015.

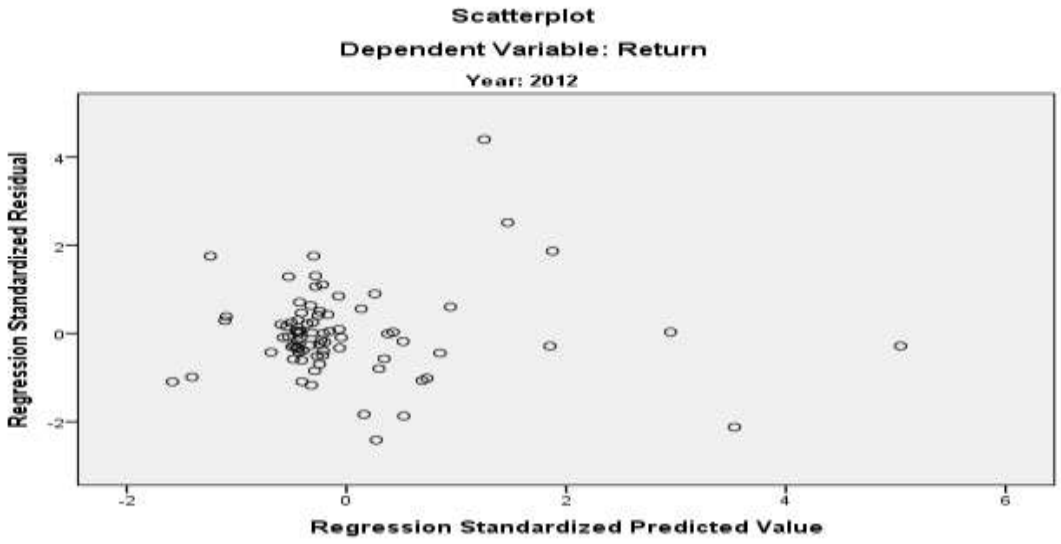
Homoscedasticity

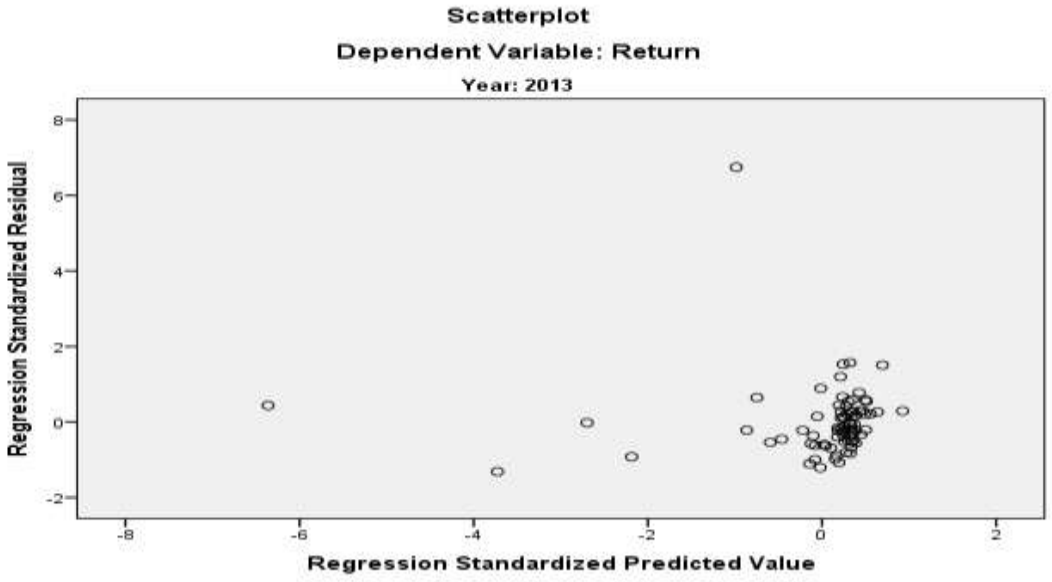


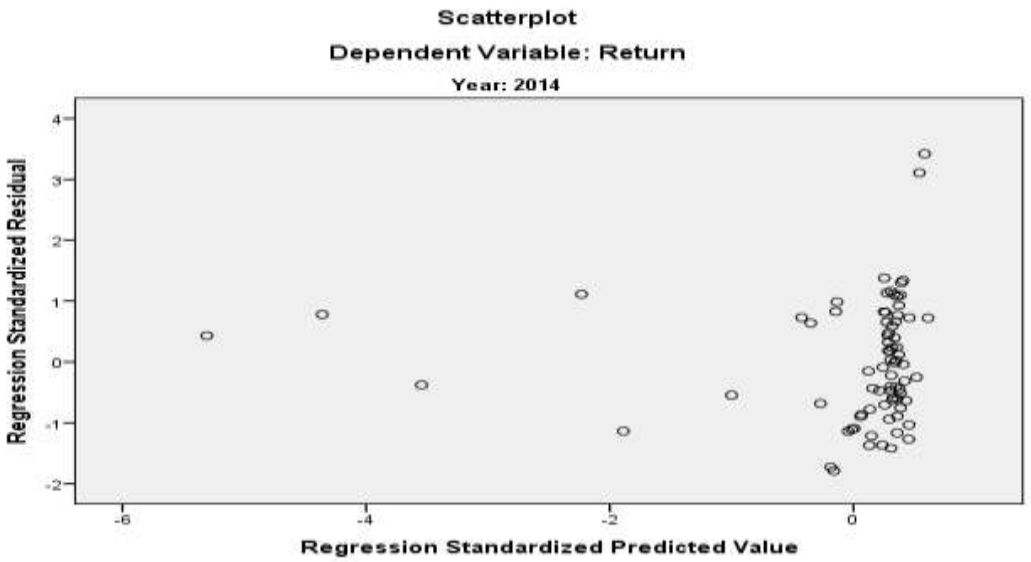


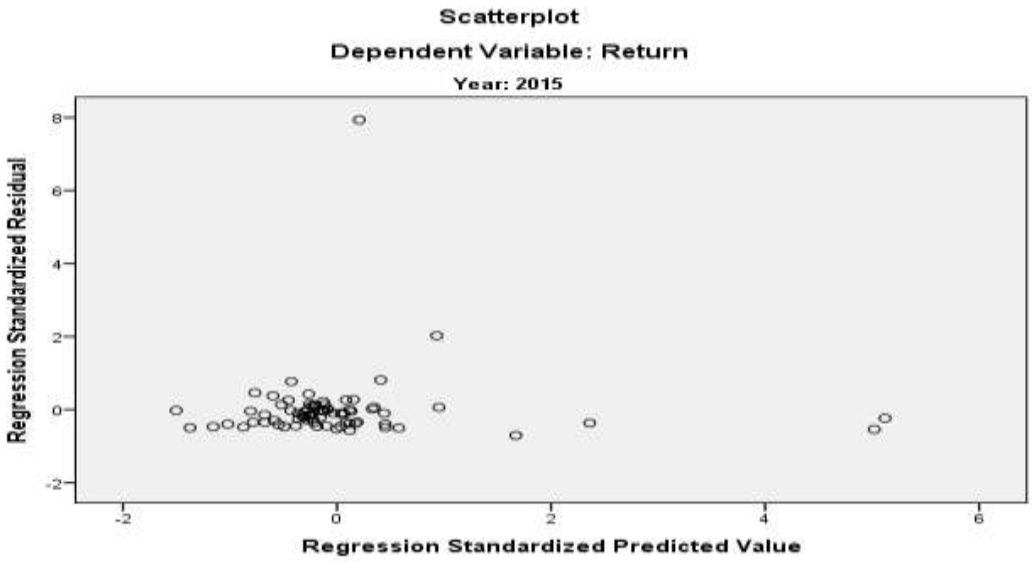



Scatterplot
Dependent Variable: Return
Year: 2011
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Return
Year: 2012
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Return
Year: 2013
Regression Standardized Residual
Regression Standardized Predicted Value



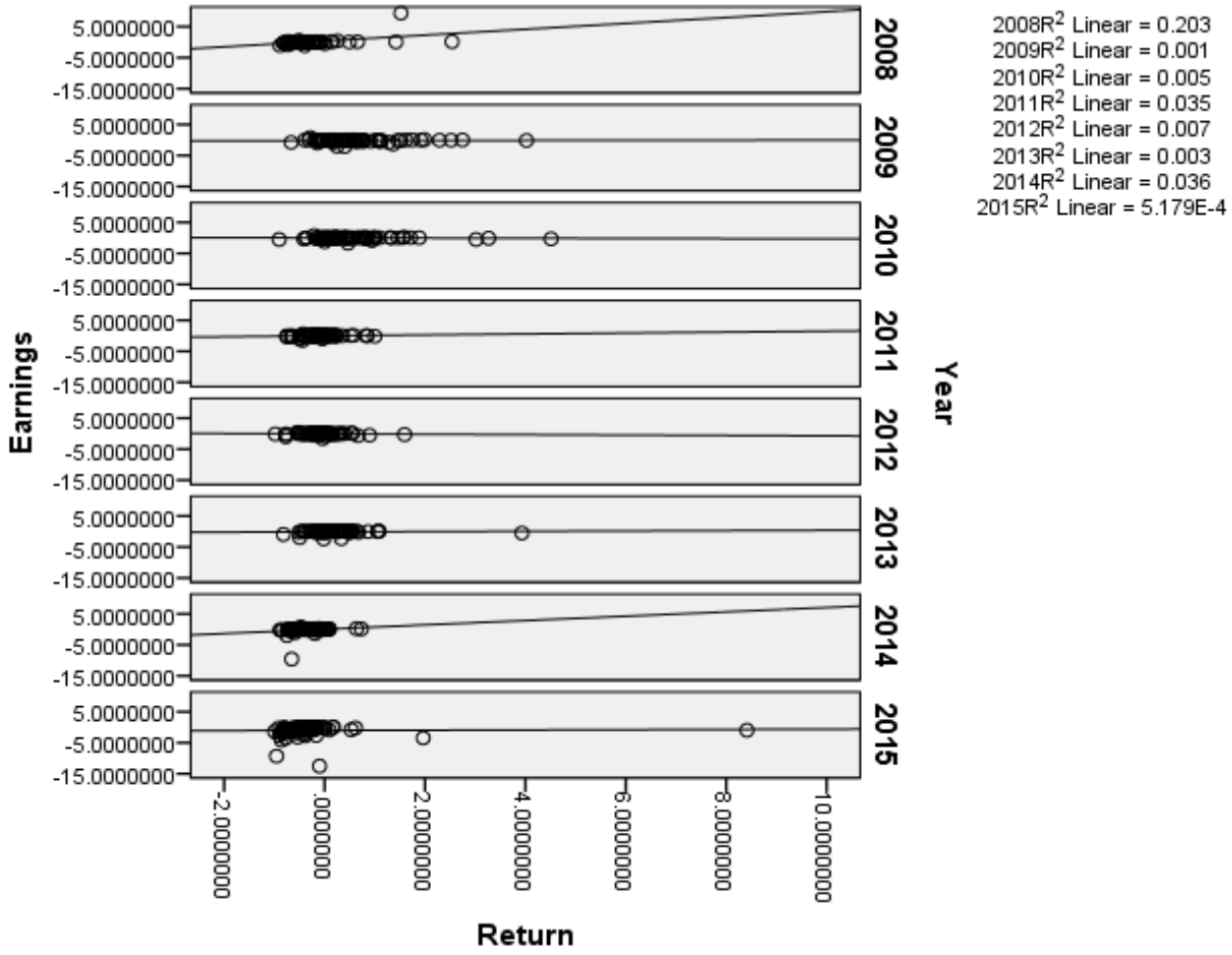


From the scatter plots above, for each of the years from 2008 to 2015, most of the scores are concentrated in the centre (along the zero point). There are no clear or systematic patterns to the residuals. Therefore, there was homoscedasticity, as assessed by visual inspection of a plot of *standardised residual values* versus *standardised predicted values.*

Timeliness and Conservatism model

Linear relationship

Scatter graph for earnings and returns



A scatterplot of *earnings* against *returns* was plotted. Visual inspection of the scatterplot generally indicated a linear relationship between the variables for each of the years from 2008 to 2015.

Multicollinearity

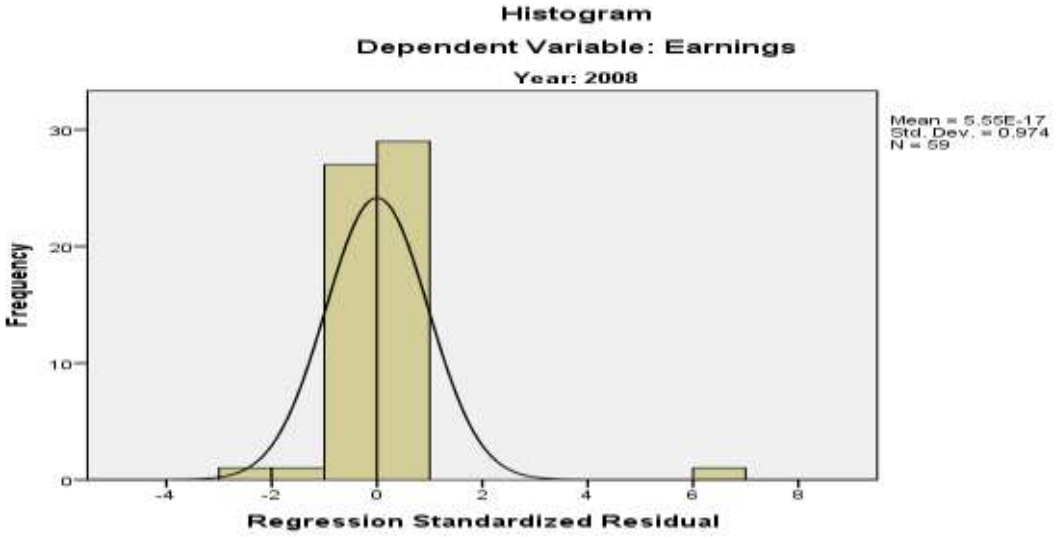
Coefficients[a]

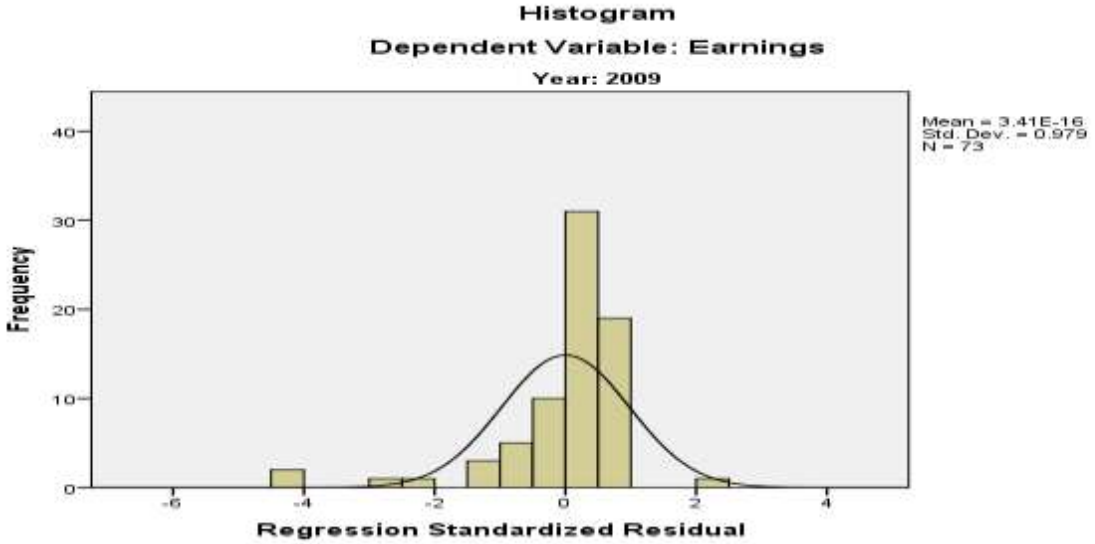
Year	Model		Collinearity Statistics	
			Tolerance	VIF
2008	1	(Constant)		
		Return	.280	3.567
		NEG	.390	2.565
		NEG_RETURN	.407	2.456
2009	1	(Constant)		
		Return	.742	1.348
		NEG	.453	2.206
		NEG_RETURN	.498	2.009
2010	1	(Constant)		
		Return	.798	1.253
		NEG	.566	1.766
		NEG_RETURN	.604	1.656
2011	1	(Constant)		
		Return	.216	4.637
		NEG	.451	2.219
		NEG_RETURN	.287	3.485
2012	1	(Constant)		
		Return	.270	3.703
		NEG	.513	1.950
		NEG_RETURN	.380	2.629
2013	1	(Constant)		
		Return	.661	1.513
		NEG	.508	1.969
		NEG_RETURN	.529	1.890
2014	1	(Constant)		
		Return	.091	9.059
		NEG	.548	1.825
		NEG_RETURN	.110	9.069
2015	1	(Constant)		
		Return	.655	1.527
		NEG	.588	1.701
		NEG_RETURN	.636	1.572

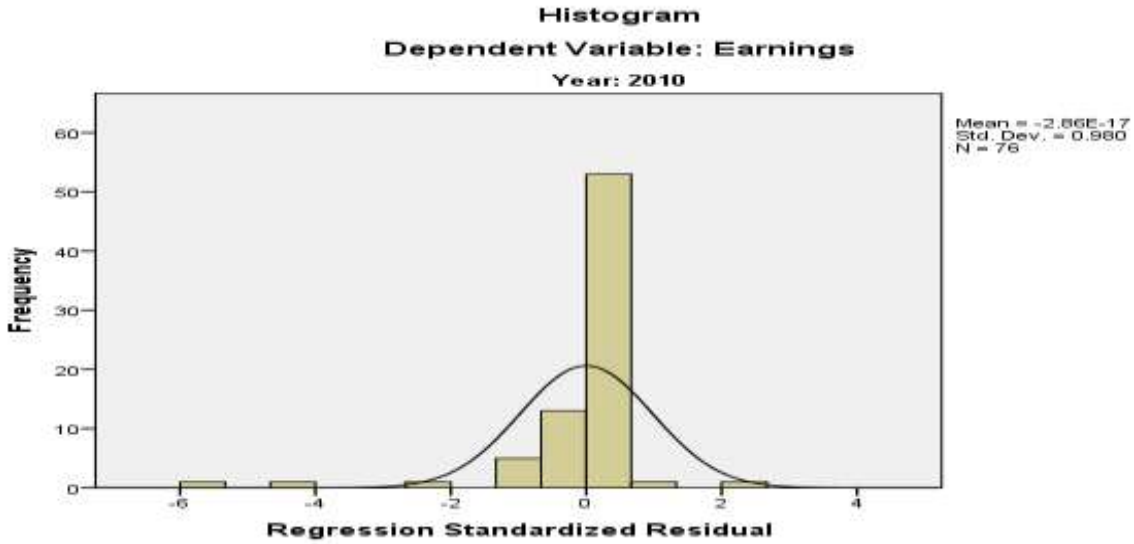
a. Dependent Variable: Earnings

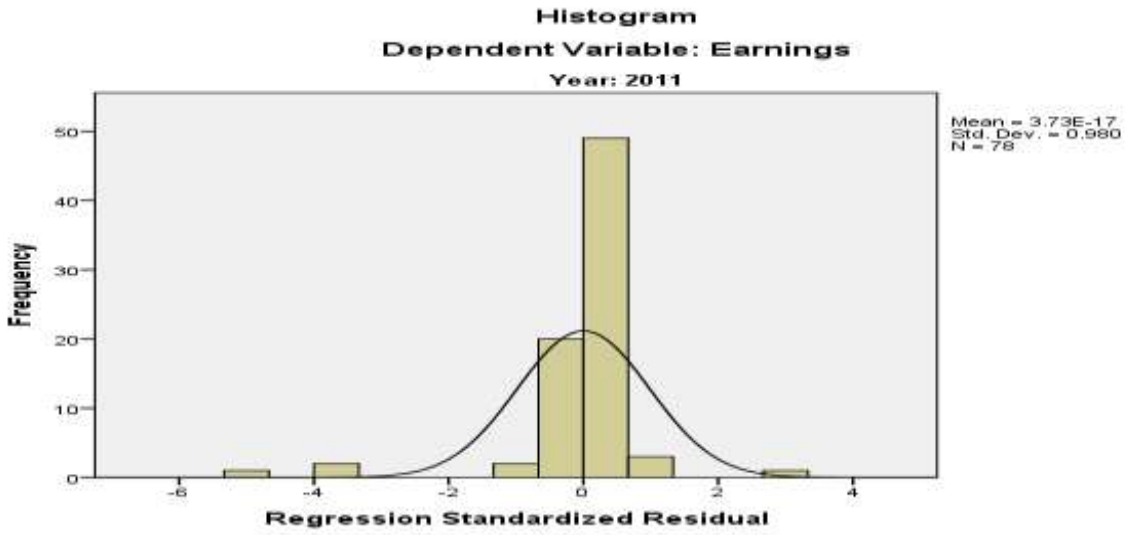
From the table above, values of the VIF for each of the independent variables are less than 10 for each of the years from 2008 to 2015. This implies that the independent variables are not highly correlated with each other; hence, no undue multicollinearity exists in the dataset.

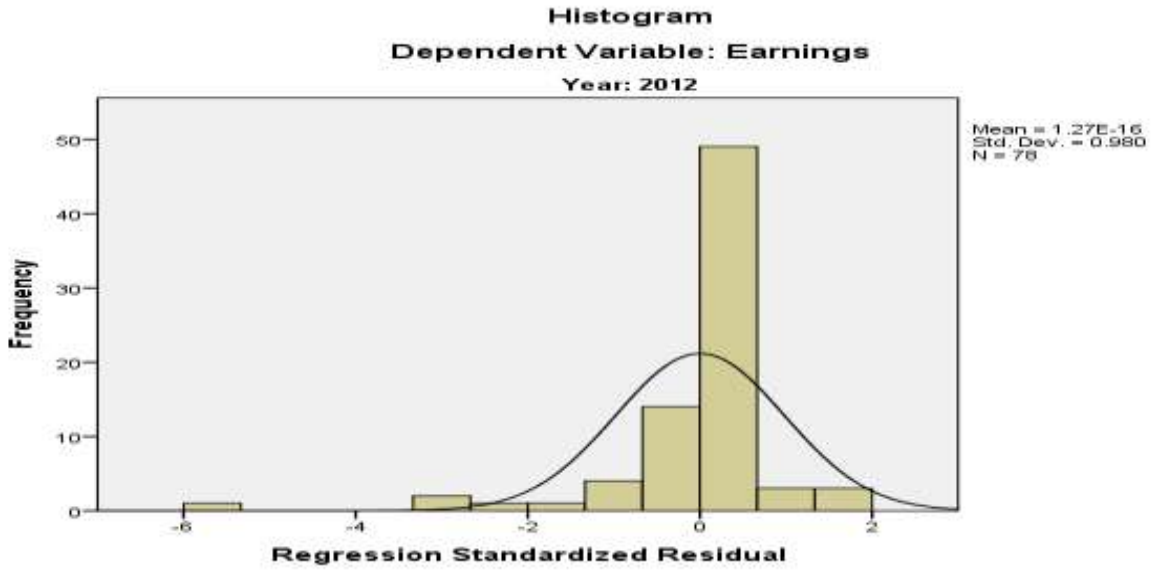
Normality

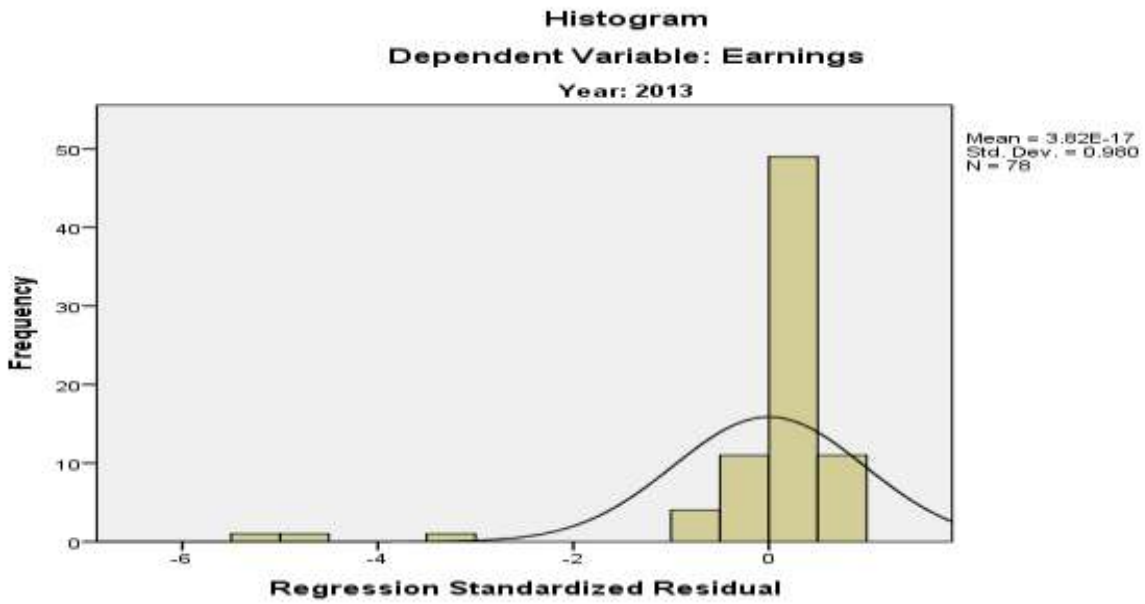

Histogram
Dependent Variable: Earnings
Year: 2008
Mean = 5.55E-17
Std. Dev. = 0.974
N = 59
Frequency
Regression Standardized Residual

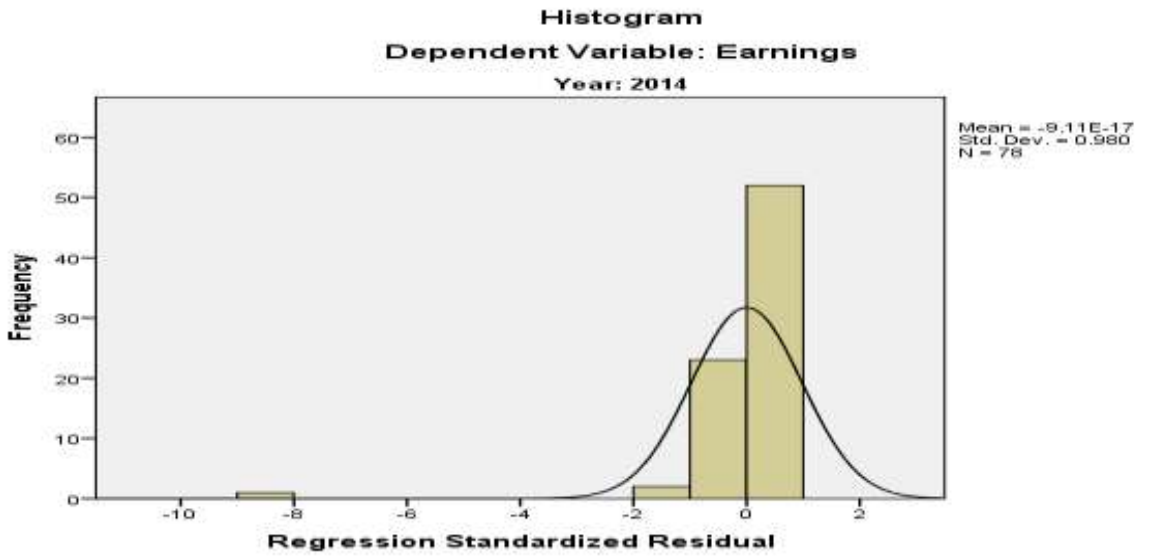

Histogram
Dependent Variable: Earnings
Year: 2009
Mean = 3.41E-16
Std. Dev. = 0.979
N = 73
Frequency
Regression Standardized Residual

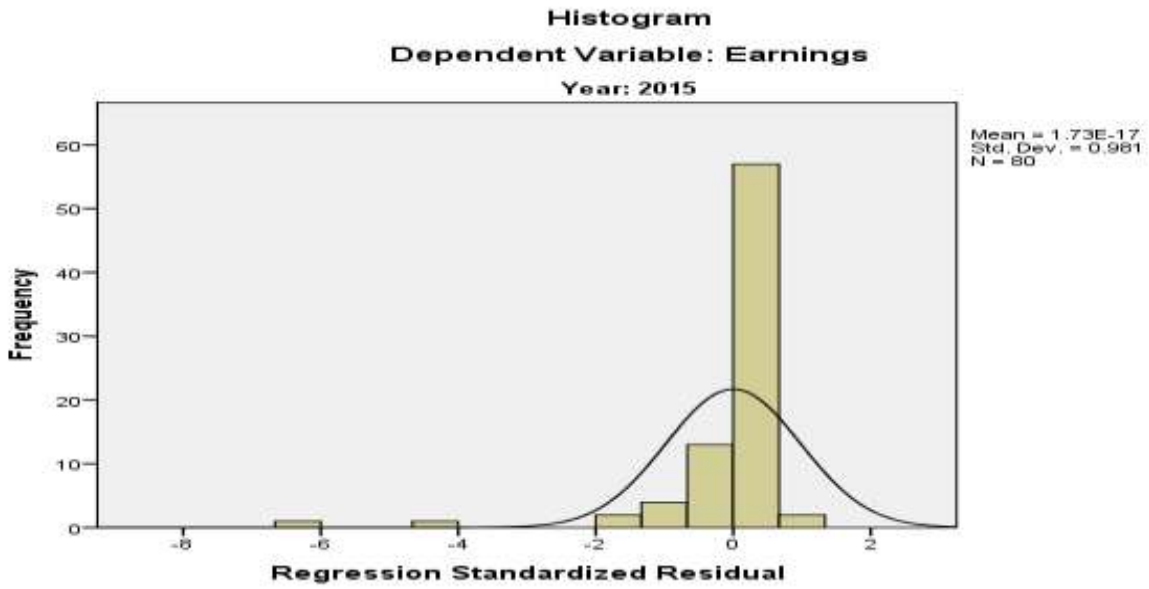

Histogram
Dependent Variable: Earnings
Year: 2010
Mean = -2.86E-17
Std. Dev. = 0.980
N = 76
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Earnings
Year: 2011
Mean = 3.73E-17
Std. Dev. = 0.980
N = 78
Frequency
Regression Standardized Residual


Histogram
Dependent Variable: Earnings
Year: 2012
Mean = 1.27E-16
Std. Dev. = 0.980
N = 78
Frequency
Regression Standardized Residual

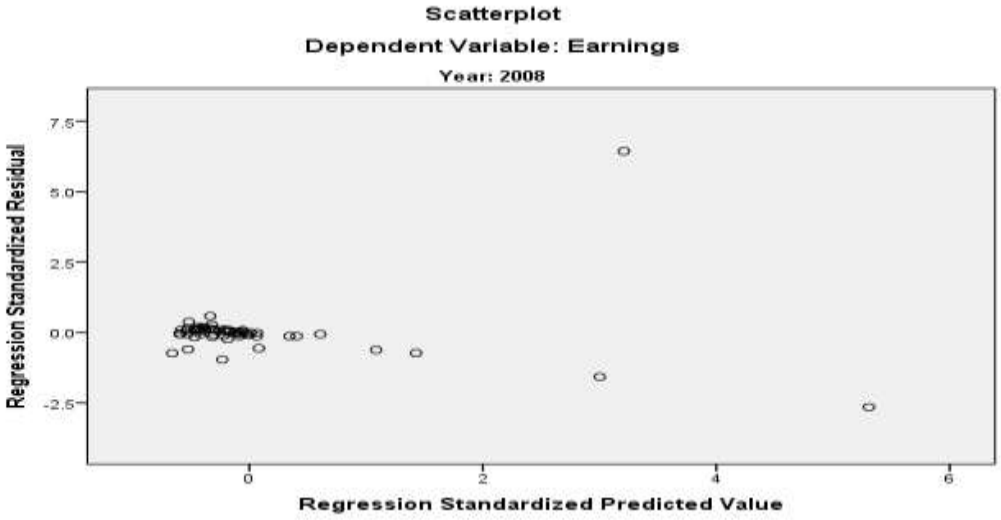

Histogram
Dependent Variable: Earnings
Year: 2013
Mean = 3.82E-17
Std. Dev. = 0.980
N = 78
Frequency
Regression Standardized Residual

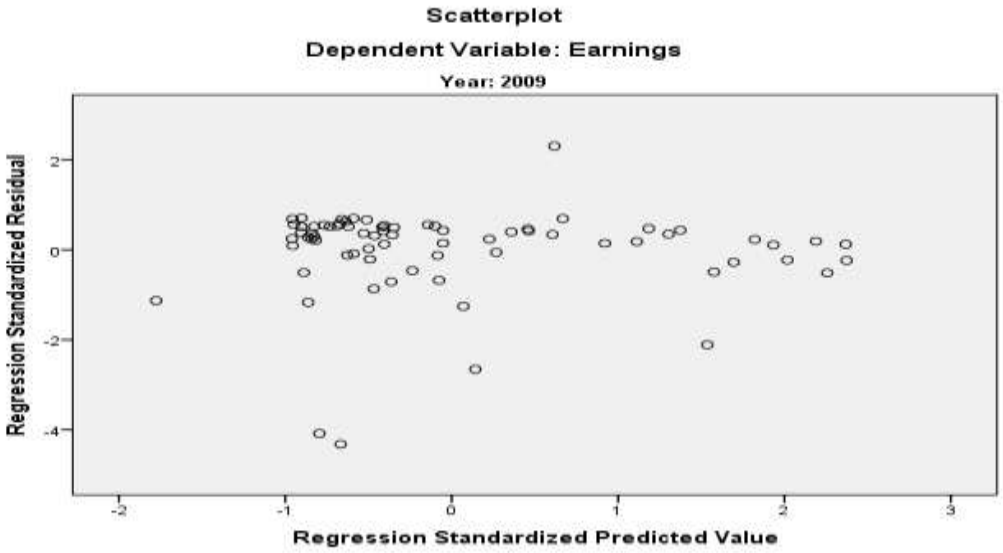


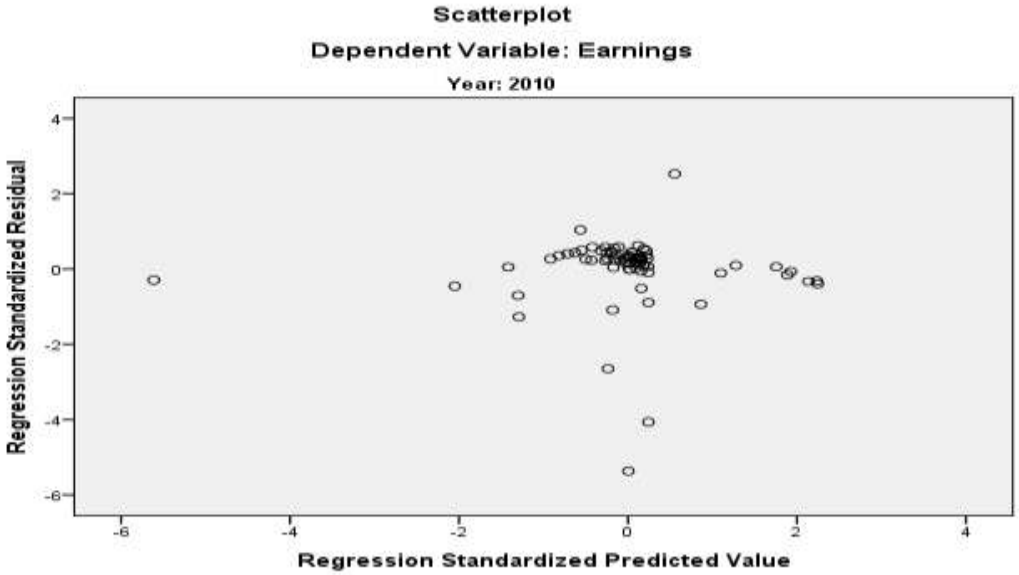


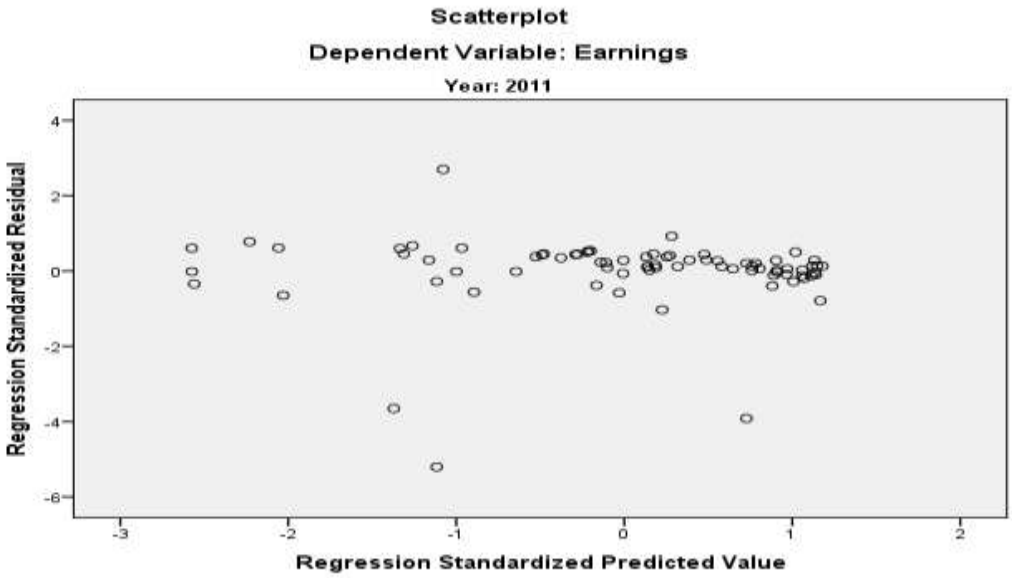
From the visual inspection of the histograms above, the standardised residuals show roughly normal curves, hence generally appear to be approximately normally distributed for each of the years from 2008 to 2015.

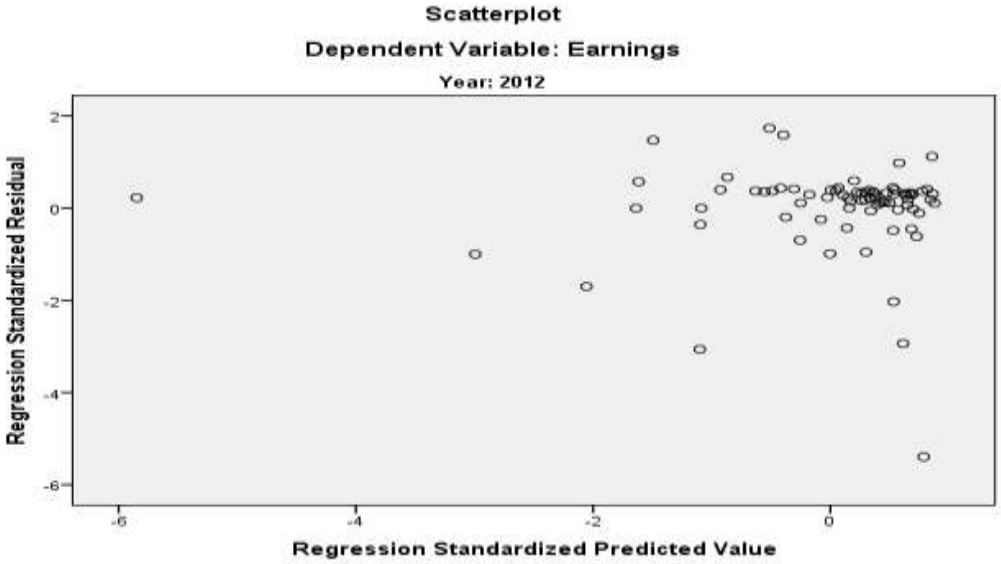
Homoscedasticity

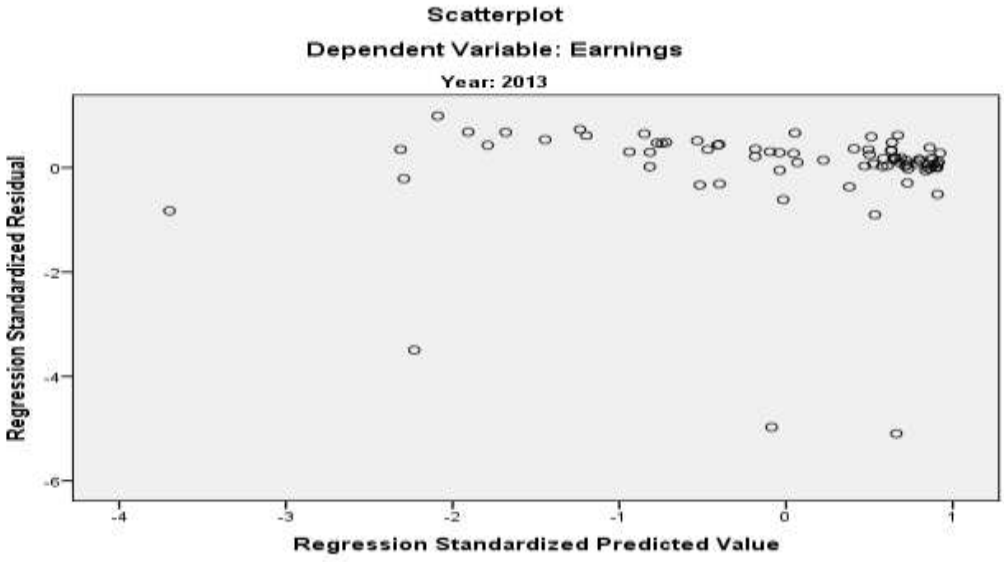


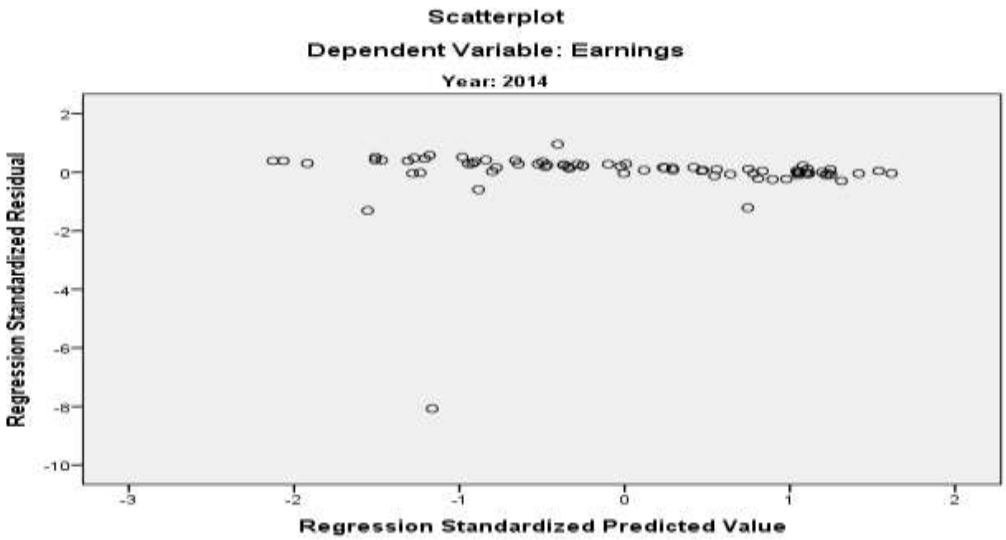


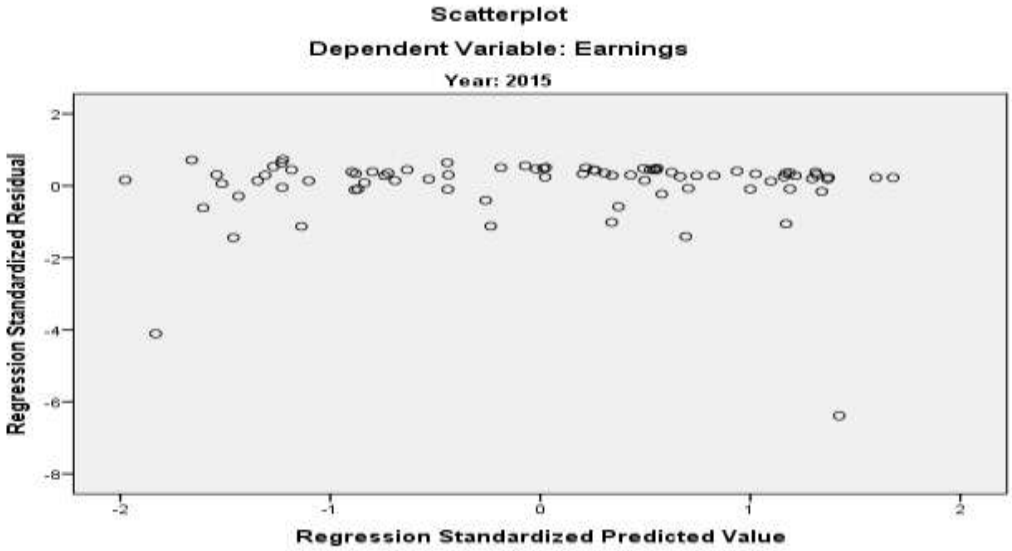



Scatterplot
Dependent Variable: Earnings
Year: 2011
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Earnings
Year: 2012
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: Earnings
Year: 2013
Regression Standardized Residual
Regression Standardized Predicted Value





From the scatter plots above, for each of the years from 2008 to 2015, most of the scores are concentrated in the centre (along the zero point). There are no clear or systematic patterns to the residuals. Therefore, there was homoscedasticity, as assessed by visual inspection of a plot of *standardised residual values* versus *standardised predicted values*.