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Impact of US Derivatives Accounting Policy (SFAS 133) on Income Smoothing Choices and Disclosure of Derivatives Related Information

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ABSTRACT

This study is on the effects of United States (US) Statement of Financial Accounting Standards number 133 (SFAS 133), *Accounting for Derivatives Instruments and Hedging Activities,* which was introduced in 2001. The first area of investigation focuses on the impact of SFAS 133 on income smoothing through the application of derivatives and discretionary accruals. The second key aspect is how SFAS 133 influences the disclosure of derivatives related information. Addressing these two issues together, provides an integrated understanding of how accounting policy can affect both risk management and risk disclosure choices.

The study comprises a detailed literature review of extant empirical and analytical studies. It primarily extends the work of studies that initially looked at derivatives and discretionary accruals as income smoothing substitutes, such as Barton (2001) and Rajgopal and Pincus (2002). The theoretical framework developed during the literature review, discusses the genesis and key features of SFAS 133, and the determinants of the two key income smoothing choices of derivatives use and discretionary accruals. These include capital markets, managerial risk and corporate governance determinants. In addition, the theoretical framework outlines how SFAS 133 fair value recognition requirements can influence disclosure of related information through the footnotes. It presents the argument that the extent to which notes are complementary to recognition and measurement requirements should outweigh the extent to which they may be considered substitutes. It further describes the literature on disclosure incentives, including capital markets, proprietary cost concerns, managerial talent, managerial risk incentives based on compensation and litigation cost. This is as a precursor to the univariate and multivariate empirical testing of 1999 to 2003 data from 253 US firms (i.e. 850 firm-year observations).

In conducting the empirical testing, I endeavour to address the problems of model endogeneity that could arise due to derivatives use and discretionary accruals being determined jointly. I also address the individual effects that arise due to the application of panel data. A key empirical finding is that after adopting SFAS 133, corporate managers increase discretionary accruals. However, there is no conclusive multivariate evidence of SFAS 133 reducing derivatives use, as hypothesized. An additional finding is that there is

a substitution relationship between derivatives use and discretionary accruals. However, I also find that SFAS 133 adoption weakens the extent to which accruals influences derivatives use, but not the other way round. This latter finding suggests a partial substitution relationship exists after SFAS 133 and lends itself to a number of plausible explanations. These include accruals being complements rather than substitutes to derivatives use, after SFAS 133. SFAS 133 could trigger either increased earnings volatility or the greater use of speculative derivatives. Either of these could then induce the increased use of accruals in a manner that confounds the income smoothing substitution relationship.

Despite the substitution relationship, the use of derivatives to smooth income is more akin to economic reality, as derivatives use also influences cash flow and fundamental economic volatility. Thus the finding that managers increase their use of accruals in general, after SFAS 133, suggests that SFAS 133 adoption, results in choices that are less beneficial to shareholders. I come to this conclusion based on the empirical evidence of Huang, Deis, Zhang and Moffit (2009). Their study shows that for income smoothing purposes, derivatives enhance shareholder value to a greater extent than the use of accruals.

Further to the study of its impact on income smoothing, the empirical findings of SFAS 133 on derivatives related disclosure, build a collective picture of how different reporting practices can be influenced by accounting policy. The study finds a significant positive association between SFAS 133 and derivative information disclosure index, in all the models. This suggests that the derivatives recognition and measurement requirements have encouraged the provision of greater disclosures. The results also show a significant positive association of capital markets incentives measured as the logarithm of trading volume. However, there is no evidence of association of proprietary costs. The results further show that auditor expertise and the level of derivatives use are positively associated with observed derivatives disclosure levels. In the same vein, litigation risk and discretionary accrual levels have a negative association.

In sum, this study shows that SFAS 133 adoption has potentially adverse consequences on income smoothing choices, but at the same time it has positive consequences through its encouraging disclosures that lower the information asymmetry on risk exposures.

ACKNOWLEDGEMENT AND DEDICATION

'*Two key lessons reinforced during the PhD process are that small steps that are taken persistently, can result in great strides and that in every journey, one cannot get very far when all alone*'

I would like to express my deep gratitude to my Supervisor Professor Sudi Sudarsanam, for his guidance and emphasis on attention to detail throughout the formulation, investigation and documentation of the thesis. To the PhD review panel members, Professors David Parker and Sunil Poshakwale and Dr Colin Pilbeam, for providing guidance and helping to shape the direction of my research, through the three structured annual reviews. I express my gratitude to the academic staff and fellow doctoral students who provided constructive and helpful feedback during two doctoral colloquium sessions at Cranfield University in July 2006 and September 2008, during the 2009 doctoral colloquium at Dundee University and during the 2009 British Accounting Annual Conference where I presented a conference paper on the 'impact of SFAS 133 on disclosure of derivatives information'.

To my employer, CFA Institute, for the financial, time and moral support towards the pursuit of this goal on a part-time basis. I also extend my gratitude to Cranfield University for the financial support and research resources provided at different stages of the PhD and for the helpful assistance of staff members. I make special mention of Wendy Habgood and the research office team. The same goes to ex-Cranfield Professor, Richard Taffler, for facilitating the pursuit of the dissertation phase at Cranfield University. And to IESE Business School (University of Navarra) staff and colleagues, where I started off the PhD journey. I am especially thankful for the quality and eclectic formative education and for being the recipient of a scholarship.

I acknowledge the role of my peers who directly and immeasurably contributed to my research. With a special mention of Kin Huang, Dzung Nguyen and his wife Ang, for their encouragement, assistance during the data collection, acting as a sounding board, and identifying and applying various data and empirical analytical resources. To Carla Hayde and Maia Gedde who assisted in proofreading of the final thesis. There are many others whose names I have not mentioned who enabled, supported and encouraged me at different stages. My heartfelt thanks go out to all of them.

I express special thanks to my Dad, David Papa, whose inspiration and encouragement in my formative years planted the seed for the pursuit of further studies. I would also like to express my immense gratitude to my wife Naomi, for sharing this journey and all the encouragement, prayers and support through the years.

I dedicate this thesis to my Lord Jesus Christ, for His sustenance and blessing with both opportunity and capacity, and in memory of my late mother Jessica Papa.

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1 INTRODUCTION

The unique contribution of this ruling (i.e. SFAS 133), is its recognition of the cash flow impact of hedging activities. This will have far reaching impact on financing and risk taking behaviour of multinational firms –

Feay and Abdullah (2001)

1.1 Background and Statement of Problem

Across the world's major capital markets there has been an ongoing demand for a significant improvement in the general disclosure of financial instruments including derivatives contracts and the particular disclosure of risk exposures and risk management strategies around these instruments. This demand for greater financial instrument risk disclosure has been prominent since the early 1990s and has occurred in various key jurisdictions including the US, United Kingdom (UK) and Australia (Bezzeta and Bozzolan, 2006).

Due to the shortcomings of prevailing derivatives disclosure requirements, massive derivatives risk exposures were hidden in a number of high profile cases such as Orange County, Metagesellschaft, Procter and Gamble, Barings Bank and Long Term Capital Management (LTCM). Therefore, reducing the opacity of risks related to corporate derivatives application is a key objective for both accounting standard setting bodies and capital markets regulatory authorities. The Basel Committee on banking supervision and the International Organisation of Securities Commission (IOSCO) highlight[1] the importance of derivatives disclosures, noting that these can provide details about the impact of these instruments on a company's earnings profile. The objective of improving derivatives disclosure, underpins the promulgation of a number of derivatives related accounting standards.

In the US Generally Accepted Accounting Principles (GAAP), financial instrument risk disclosure requirements are specified through different Financial Accounting Standard Board (FASB) statement numbers 52, 80, 105, 107, 119, 133 and 138. They are also specified through the Security Exchange Commission (SEC) Financial Release (FR) 48, which mandates the disclosure of specific quantitative and qualitative risk information categories. Similarly, the existing set of International Financial Reporting Standards (IFRS), promulgated

[1] Basel Committee on Banking Supervision and Technical Committee of the International Organisation of the Securities Commission (IOSCO) (1999) - Recommendations for Public Disclosure of Trading and Derivatives Activities of Banks and Securities Firms

by the International Accounting Standards Board (IASB), requires financial instruments risk disclosure. This is achieved through IFRS7: *Financial Instruments Disclosures* and International Accounting Standard statement number 39 (IAS 39): *Financial Instruments Recognition and Measurement.*

The promulgation of SFAS 133, effective from June 15th 2000, was part of the ongoing enhancement of derivatives disclosure. Similar to earlier derivatives related standards[2] (**see 2.6.1 for detailed description of SFAS 133**); SFAS 133 had the objective of improving derivatives related disclosure. Prior to SFAS 133, there was a trend of steady enhancement of derivatives accounting and some of the elements that SFAS 133 adopted, were applied inconsistently across instruments, or were reported off-balance-sheet. The key features of SFAS 133 are a) recognition of fair value of all derivatives instruments in the primary financial statements and b) the definition of hedge accounting approach to be applied across all derivatives instruments. Hedge accounting is an approach that aims to minimise the impact of derivatives gains and losses on reported net income. It does so by matching the accounting of the hedging instrument and related hedge. Hedge accounting primarily impacts on whether fair value gains or losses are recorded in the income statement or other comprehensive income (OCI) statement, but it does not affect the recording of derivatives fair values on the balance sheet.

However, on its introduction, SFAS 133 was widely viewed as a controversial accounting standard due to its enforcement of derivatives fair value recording across all derivatives contracts, expected incremental earnings volatility and also due to its highly complex hedge accounting qualification criteria. A survey of the Association of Finance Professionals (2002) finds that during the first year of its implementation, 70% of CFO respondents describe SFAS 133 as excessively burdensome. Given the backdrop that characterized its introduction, it is illuminating to understand the actual consequences of the implementation of SFAS 133.

This study is on the impact of SFAS 133 on two key managerial decisions, namely income smoothing and disclosure of derivatives related information through the footnotes. The two key research questions covered are:

- What is the impact of SFAS 133 on income smoothing using derivatives and discretionary accruals?

- What is the impact of SFAS 133 and related incentives on disclosure of derivatives related information?

[2] SFAS 119, 115,107,105, 80 and 52

Figure 1.1: Diagrammatic representation of two key research questions

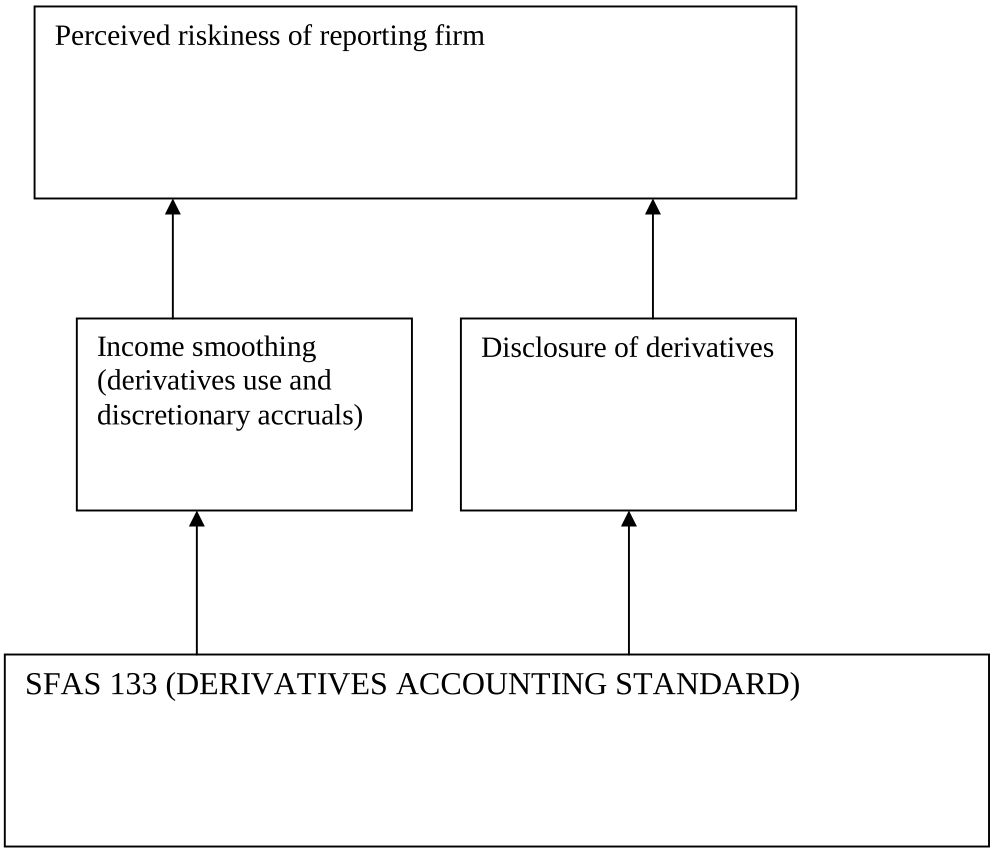

Figure 1.1 above illustrates the common factor between these two questions. Addressing these two questions together provides an integrated understanding of how accounting policy can affect risk management and risk disclosure choices. An integrated empirical investigation of SFAS 133 is also expected to be useful to both the academic community and accounting policy makers.

Furthermore, the questions addressed in this research inform different strands of extant accounting and corporate finance literature. Hence, the study has a cross disciplinary character as it covers the domains of risk management that fall under corporate finance, and earnings management and disclosure that fall under external financial accounting theory.
Another reason for the focus on SFAS 133 and the United States (US) is due to the relatively rich data history available related to the disclosure of derivatives use. SFAS 133 was

introduced with effect from the fiscal year starting after June 15th 2000, while the international equivalent IAS 39 was effective from January 2005.

Despite being a nascent area of study, there is clearly a growing interest in SFAS 133 related studies. In my literature review, I come across at least 8 empirical studies and 6 analytical papers that focus on this subject. The reason why empirical studies on the impact of SFAS 133 on different managerial choices are in a nascent stage is likely to be due to the relatively recent promulgation of the standard.

1.2 SFAS 133 and Income smoothing

Earnings management is a pervasive feature of corporate reporting. The widespread application of earnings management is evidence that managers expect observed earnings to matter to capital markets participants and/or to be beneficial to managers. Graham, Harvey and Rajgopal (2005) found that a majority of Chief Financial Officers (CFOs) believed earnings to be the most important performance measure for outsiders. In a survey of 401 executives they found that 51% ranked earnings as the most important performance measure. This is followed by only 12% of respondents ranking revenues, cash flow from operations or free cash flow as most important. They also find that 96.9% of CFOs prefer a smooth earnings path and that 78% of CFOs would sacrifice real economic value in order to ensure a smooth earnings path. Income smoothing using accruals is a special form of earnings management.

An alternative way of smoothing earnings is the use of derivatives. Similar to earnings management, the use of derivatives is widespread especially among larger firms. A 2003, International Swaps and Derivatives Association (ISDA), survey of the world's 500 largest corporations showed that 92% use derivatives to manage and hedge their risks more effectively, 92% use derivatives to manage interest rate risk, 78% manage currency risk, 25% manage commodity price risk and 12% equity price risk. A Bank of International Settlement (BIS) study estimates that $597 trillion of notional derivatives were outstanding as at the end of 2007. Lins, Servaes and Tamayo (2007) conduct an international survey of 354 companies located in 39 countries. They find that 83% respondent companies indicated that they manage foreign exchange risk exposure, 74% manage interest risk and 49% manage commodity risk exposure. These findings all point to derivatives being an integral part of the financial hedging or income smoothing arsenal applied by corporate treasurers.

Despite the different methods of income smoothing by managers, extant literature has tended to focus separately on the determinants of derivatives use and earnings management. However, recent papers have begun to review these two as joints determinants or substitutes.

These include studies undertaken by Barton (2001), Rajgopal and Pincus (2002), Singh (2004) and Zhang, Deis and Moffit (2009). Barton (2001), in his study of the joint decision on derivatives use and discretionary accruals, recognises that there is a research gap for a similar study data based on post-SFAS 133 data. His own study is based on pre-SFAS 133 data (i.e. 1994-1996). Furthermore, as Triki (2005) noted, there is a paucity of risk management empirical papers that use post -2000 data. Even some papers that focus on SFAS 133 still apply pre-SFAS 133 data. For example, Supanvanij and Strauss (2006) review executive compensation risk incentives on hedging and the impact of SFAS 133, uses 1994 to 2000 data. Hence there is a research opportunity in relation to how SFAS 133 influences managerial choices such as income smoothing. SFAS 133 empirical studies are also complementary to several analytical studies (Barnes, 2002; Nan, 2007; Shin, 2004; and Duffie and DeMarzo, 1996) which postulate on the impact of SFAS 133 on the use of derivatives (i.e. speculative or hedging). Furthermore, Triki (2005) advocates the use of post-2000 data so as to test the stability of risk management determinants after the introduction of new accounting standards.

1.2.1 Data- SFAS 133 and Income Smoothing

The study is based on 850 firm-year observations from 253[3] firms, in the period between1999-2003. This consists of derivatives users (681 firm-year observations, 218 firms) and non derivatives users (169 firm-year observations, 69 firms). The derivatives data is hand collected from annual reports (Form 10-K) that are downloaded from SEC's Edgar database, while the control variables are sourced from Execucomp and Compustat databases.

1.2.2 Method and Findings- SFAS 133 and Income Smoothing

The detailed hypothesis development is discussed in section 2.7. Below are the primary hypotheses that I test:

- Hypothesis 2.1*: SFAS 133 adoption leads to the reduced use of derivatives.*

- Hypothesis 2.2*a: SFAS 133adoption leads to the increased use of discretionary accruals.*

- Hypothesis 2.2*b: Cash flow hedge accounting influences the level of discretionary accruals.*

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[3] 253 firms (218 firms report derivatives use in some years, 69 firms do not report derivatives use in some years, while 34 firms report derivatives use in some years and do not report derivatives use in some years i.e. 253=218+69-34)

- Hypothesis 2.3*a: Derivatives and discretionary accruals are substitutes for income smoothing purposes.*

- Hypothesis 2.3*b: SFAS 133 adoption influences the substitution relationship.*

There is very limited empirical evidence of a) the impact of SFAS 133 on the income smoothing substitution relationship and b) the impact of cash flow hedge accounting on discretionary accruals. The other stated hypotheses are mainly confirmatory of emerging empirical evidence. However, it is still useful to test these, as the body of related empirical evidence is still in embryonic stages and very few studies are actually based on post-SFAS 133 data.

I apply parametric and non parametric testing including; univariate analysis and multivariate regression models. In the multivariate models, I mitigate the problems of endogeneity and panel data individual effects, as these issues can result in flawed inference from the findings. Endogeneity is primarily driven by the simultaneity of derivatives use and discretionary accruals, as they are income smoothing substitutes. In addition to pooled Ordinary Least Squares (OLS) regression, I use two stage least squares (2SLS) models to cater for endogeneity, and random effects panel regression models to cater for panel data related individual effects. I also include censored regression (tobit) and logistic regression models to assess the determinants of the decision to use derivatives.

A key empirical finding is that after adopting SFAS 133, corporate managers increase discretionary accruals as means of income smoothing. However, there is no conclusive evidence of SFAS 133 reducing derivatives use, as hypothesized. An additional finding is that there is a substitution relationship between derivatives use and discretionary accruals. I also find that SFAS 133 adoption weakens the extent to which accruals influence derivatives use, but not the other way round. This latter finding suggests a partial substitution relationship exists mainly after SFAS 133 and lends itself to a number of plausible explanations. These include accruals being complements rather than substitutes to derivatives use, after SFAS 133. SFAS 133 could trigger either increased earnings volatility or the greater use of speculative derivatives. Either of these could then induce the increased use of accruals in a manner that confounds the income smoothing substitution relationship.

Despite the substitution relationship, the use of derivatives to smooth income is more akin to economic reality, as derivatives use also influence cash flow and fundamental economic volatility. Thus the finding that managers increase their use of accruals in general, after SFAS 133, suggests that SFAS 133 adoption results in choices that are less beneficial to shareholders. I come to this conclusion based on the empirical evidence of Huang, Deis, Zhang and Moffit (2009). Their study shows that for income smoothing purposes, derivatives enhance shareholder value to a greater extent than the use of accruals. Hence I infer from the results that the higher use of accruals after SFAS 133 is likely to be less to the benefit of shareholders.

1.2.3 Contribution- SFAS 133 and Income Smoothing

By undertaking a study on the impact of SFAS 133 on income smoothing, there is scope to extend the empirical evidence related to SFAS 133 on various fronts. First, there is scope for a conceptual contribution through looking at two different determinants of income smoothing that are potentially impacted on by the derivatives accounting policy. Hentschel and Kothari (2001), note that derivatives use is just one aspect of the overall corporate risk management. However, the literature on income smoothing tends to focus on single mechanisms of doing so. For example, it has tended to separately focus on derivatives use and discretionary accruals. Barton (2001), Rajgopal and Pincus (2002) and Singh (2004) depart from this trend, through their study of derivatives use and earnings management as jointly determined risk management choices. This study builds on their work. In addition it builds on the very few risk management empirical studies that are actually based on post-SFAS 133 data. This study achieves this by using 1999 to 2003 data and extends the work of Singh (2004) who considers the impact of SFAS 133 on earnings management, earnings volatility and derivatives use but only covered the 2000-2001 periods. I also am not aware of any empirical evidence on the impact of SFAS 133 on the income smoothing substitution or on the impact of cash flow hedge accounting on discretionary accruals. This study fills that gap.

Second, there is an opportunity for a methodological refinement. Bartram and Aretz (2009) assert that the inconclusiveness of the literature on the determinants of derivatives use could be due to flawed models, inappropriate proxies and inadequate resolution of endogeneity related issues. There is scope to use better proxies, including proxies for discretionary accruals and derivatives use, as well as proxies for their determinants. There is also scope to include variables omitted from similar research. For example Barton (2001) does not include corporate governance effects. Based on a comprehensive and integrated review of the literature on determinants of derivatives and discretionary accrual use, I endeavour to build a model based on a more complete and updated set of variables. This includes corporate governance, abnormal investments and a variable for the conditional impact of SFAS 133 cash flow hedge accounting requirements on discretionary accruals.

Regarding empirical modelling, I consider in detail the problems of endogeneity as prescribed by Larcker and Rusticus (2008). I establish a logical test procedure to justify whether the problem exists and how to resolve this. Furthermore unlike many studies, I pay attention to individual effects that could arise due to the use of panel data. Singh (2004) and Supanvanij and Strauss (2006) are the only two other derivatives related studies that I came across that have at least tried to resolve the problem of individual firm effects.

Third, while this study focuses on SFAS 133, the findings on the related corporate reporting and risk management consequences, has global relevance. Insights about these consequences could be extended to firms in IFRS jurisdictions. This is because IAS 39's derivatives accounting requirements were heavily modelled on SFAS 133 (Hague, 2004). Besides, both SFAS 133 and IAS 39 are the subject of regulatory scrutiny[4] due to their complexity and in 2010, both US FASB and IFRS, hedge accounting requirements, will be updated. Hence this study, with its insights on consequences, could help inform the design of future standards.

1.3 SFAS 133 and disclosure

Enhanced financial instrument risk disclosure can be achieved through recognition and measurement in the balance sheet and income statement, and also through the disclosure of corresponding risk exposure and risk management information, through the notes to the accounts. The second key research question aims to understand how SFAS 133, which necessitated the recognition of derivatives fair values on the balance sheet and income statement, affected the disclosure of related derivatives information through the footnotes to the accounts. The study is part of a broader investigation of the impact of SFAS 133.

Derivatives disclosure through the footnotes is an important subsection of overall risk disclosure, as it can contribute to the anticipation, by external users, of future earnings, cash flow and asset value trends. Such disclosure can also potentially inform users on risks/exposure that are peculiar to the derivatives instrument category, including basis risk and counterparty credit risk. Risk disclosure can help in the assessment of the risk profile, estimation of market value and accuracy of security price forecasts (Helliar and Dunne, 2004; and Linsley and Shrieves, 2001). By reducing information asymmetry and estimation risk, risk reporting may decrease the firm's risk premium demanded by the investors and decrease the firm's cost of capital (Linsley and Shrives, 2000).

[4] G20 Leaders communiqué- 2nd April 2009, called for accounting standard setters to take action to reduce complexity of financial instrument accounting. This gave impetus to IASB and FASB undertaking a fundamental overhaul of existing standards

However, these disclosures remain inadequate; Campbell and Slack (2007) conducted a survey on the perception of risk disclosure by analysts and they note the frustration with the shallow and perfunctory nature of risk content that was raised by several analysts. They include the below quote from a respondent analyst:

'*What I would like to see- and I've seen it absolutely nowhere- is you always have to drag these statements out of the investor relations people and it is always like pulling teeth to get them to say something. Simple things like do you hedge the following foreign exchange risk*'

The view encapsulated in the above quote, is echoed in a sample survey of UK institutional investors, which found a significant number agreed that directors needed to provide more detailed risk disclosures rather than generalised statements of risk management policy (Linsley and Shrieves, 2006).

In essence, risk information is often too brief, not sufficiently forward looking and inadequate for decision making purposes (Abraham and Cox, 2007).

1.3.1 Data- SFAS 133 and Derivatives Related Footnote Disclosure

In this study, I use the same dataset applied in the first question of the impact of SFAS 133 on income smoothing (see 1.2.1). The dependent variable is a self-constructed derivatives disclosure index which captures the level of disclosure. The constituent factors to the index inform about the reporting firm's risk exposure and risk management effectiveness. The control variables are proxies for other determinants of derivatives disclosure.

1.3.2 Method and Findings- SFAS 133 and Derivatives Related Footnote Disclosure

Below are the primary hypotheses that I test:

Hypothesis 3.1*:* SFAS 133 leads to an increase in the level of disclosure of related derivatives information provided by reporting managers.

Hypothesis 3.2a): Capital markets incentives influence disclosure of derivatives related information through the footnotes

Hypothesis 3.2 b): Capital markets incentives are more significant after the adoption of SFAS 133

Hypothesis 3.3a): Proprietary cost concerns influence the level of disclosure

Hypothesis 3.3 b): Proprietary cost concerns are lower after the adoption of SFAS 133

Similar to the first question, in the multivariate modelling, I take an approach that mitigates the individual effects that arise due to panel data. The study finds a significant positive association between SFAS 133 and disclosure in all the models. This would suggest that the derivatives recognition and measurement requirements have encouraged the provision of greater disclosures. The results also show a significant positive association of capital markets incentives measured as the logarithm of trading volume. However, there is no evidence of association of proprietary costs. The results also show a significant positive association of capital markets incentives when these are measured by the logarithm of share trading volume. However, there is no evidence of association of proprietary costs. The results further show that auditor expertise and the level of derivatives use are positively associated with observed derivatives disclosure levels. In the same vein, litigation risk and discretionary accrual levels have a negative association.

1.3.3 Contribution- SFAS 133 and Derivatives Related Footnote Disclosure

A key contribution of this study is to evaluate whether improvement in recognition and measurement through the main financial statements can encourage or deter the provision of supplementary disclosure information. I propose a framework of how SFAS 133 can influence disclosure. In particular the study aims to understand whether footnote disclosure is a complement or substitute to recognised derivatives fair value gains and losses. The study also evaluates the different determinants of disclosure and how these interact with SFAS 133. The primary incentives investigated are capital markets and proprietary cost incentives as it is possible based on the literature, to postulate how SFAS 133 can alter these particular incentives. On the premise that current levels of risk disclosure in general and derivatives related disclosure in particular are inadequate, this study can contribute to financial reporting risk disclosure literature. It can also provide useful insights for accounting policy makers with regards to whether more effort needs to be expended in developing and enforcing disclosures.

The empirical contribution of this study is at various levels. First, similar to Aggarwal and Simkins (2004) and Chalmers and Godfrey (2004), this study includes the incentives for derivatives disclosure. In this respect, it differs from many UK based studies that primarily focus on the content analysis before and after a specific event (e.g. the introduction of FRS 13) as was the case with Dunne et al (2004). Second, this study unlike Aggarwal and Simkins

(2004) and Chalmers and Godfrey (2004) focuses on the impact of a standard that deals with recognition and measurement of derivatives, rather than only footnote disclosure, as was the case with Aggarwal and Simkins (2004) and their focus on SFAS 107 in the US. Third, I include a number of novel variables: these consist of a self constructed disclosure index, a new proxy for managerial talent based on executive compensation and a proxy for proprietary cost based on a combination of industry leadership and profit margin.

1.4 Thesis Structure

The rest of the thesis is organised as follows:

Chapter 2: Theoretical framework (SFAS 133 and Income smoothing choices): This is the theoretical framework of the first question. This chapter provides a detailed description of the literature on determinants on the two key income smoothing choices of derivatives use and discretionary accruals. These include capital markets, managerial risk and corporate governance determinants. It then provides details of the institutional background of SFAS 133 including its genesis and key features. Thereafter, the link between SFAS 133 and income smoothing choices is established and hypotheses are proposed, based on related analytical and empirical studies.

Chapter 3: Theoretical framework (SFAS 133 and disclosure): This is the theoretical framework of the second question. This chapter outlines a framework of how SFAS 133 fair value recognition requirements can influence disclosure of related information through the footnotes. It further describes the literature on incentives influencing disclosure, including capital markets, proprietary, managerial talent, compensation and litigation cost.

Chapter 4: Data, Research Design (SFAS 133 and Income smoothing choices). This chapter describes the high level conceptual model, the sample selection, data sources, detailed variable definition and empirical modelling approach, required to test the impact of SFAS 133 on income smoothing. This chapter highlights the approach taken towards resolving panel data individual effects plus the problem of endogeneity and describes in detail the multivariate testing protocol.

Chapter 5: Empirical findings: (SFAS 133 and Income smoothing choices). This chapter lays out the univariate and multivariate findings of the impact of SFAS 133 on income smoothing. This chapter includes the table of findings and an analysis of these findings, linked to the theoretical framework developed in chapter 2.

Chapter 6: Research Design (SFAS 133 and footnote disclosure of derivatives related information) This chapter describes the high level conceptual model, the sample selection, data sources, detailed variable definition and empirical modelling approach, required to test the impact of SFAS 133 on derivatives related disclosure. A different set of control variables are defined, including some of those that are used for the first primary research question as described in chapter 4.

Chapter 7: Empirical findings: (SFAS 133 and footnote disclosure of derivatives related information). This chapter lays out the univariate and multivariate findings of the impact of SFAS 133 on disclosure. This chapter includes the table of findings and an analysis of these findings, linked to the theoretical framework developed in chapter 3.

Chapter 8: Conclusion: This chapter highlights the principal conclusion from the empirical findings, key contributions (conceptual, methodological and practice related), limitations of research methods and findings, and areas for future research.

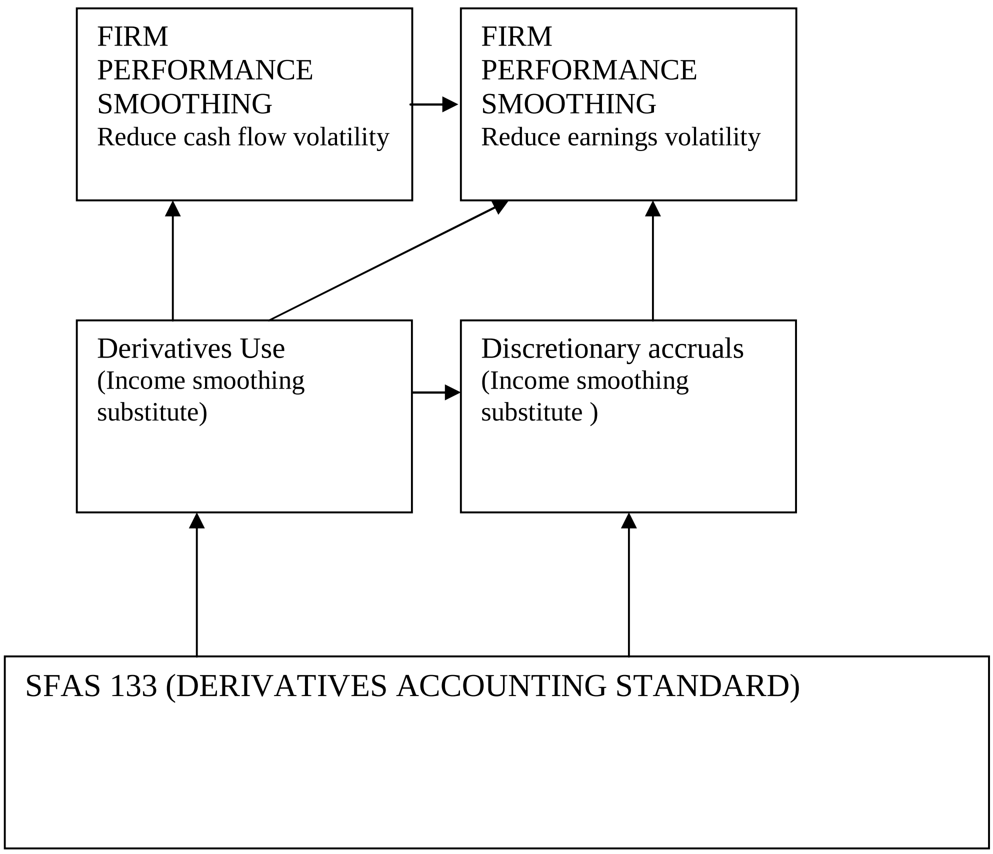
PART 1 THEORETICAL FRAMEWORK- SFAS 133 AND INCOME SMOOTHING

2 INCOME SMOOTHING CHOICES

2.1 Introduction

This chapter focuses on the analysis of how SFAS 133 impacts on the income smoothing choices of derivatives use and discretionary accruals. It also outlines the determinants of each of these two key choices and thereafter shows the extent to which they have either overlapping or differentiating determinants. It is on the basis of their impact on income smoothing and overlapping determinants that some authors have considered derivatives use and discretionary accruals to be substitutes (Barton, 2001). However, they are also used for different purposes. For example, of these two choices, only derivatives can be used to manage cash flow volatility[5]. On the other hand, speculative derivatives use will require accruals to be used as complements rather than substitutes. Figure 2.1 below is a schematic representation of the interaction of the primary income smoothing variables and SFAS 133.

Figure 2.1 Integrated Theoretical Framework



[5] Reported earnings are a function of accruals and cash flow. By influencing cash flow, derivatives influence earnings. Hence derivatives can influence both cash flow and earnings volatility.

This chapter is structured as follows,

- A literature review of derivatives use and determinants (sections 2.2 and 2.3)
- Earnings management and its determinants (section 2.4)
- Hedging derivatives and earnings management as joint determinants (section 2.5)
- SFAS 133 background (section 2.6)
- Hypothesis development on the impact of SFAS 133 and income smoothing (section 2.7)

2.2 Derivatives use and corporate risk management

2.2.1 Definition of risk and risk management

Before evaluating derivatives use for corporate risk management, it is appropriate to define risk. The definition of risk can be drawn from different academic disciplines including financial economics, insurance, strategy and sociology. Across these disciplines different notions of risk are put forward; these include a) the view of risk as exposure to loss or adverse events b) risk as uncertainty or volatility of outcomes and c) risk as exposure to favourable opportunities or upside events. In finance literature risk management tends to follow the notion of minimising volatility of firm performance as well as exposure to adverse events and losses (Miller, 1992).

Hedging using derivatives is one choice among several alternatives to reducing firm financial performance volatility and is mainly applied to manage market risk exposures. Market risk exposure is defined as the exposure that can arise due to the unexpected volatility of external, key macroeconomic risk factors such as currency exchange rate, interest rate, commodities and equity prices (Choi and Meek, 2008). Market risk exposure is a subset of the broader spectrum of exposures that firms face. The non-market risk exposures fall outside the scope of this study.

In addition to hedging with derivatives, there are other mechanisms to manage enterprise wide risk exposures. These could include the use of earnings management techniques, operational hedges including strategic measures such as production location, corporate conglomeration and broadening of product lines (Crouhy, Galai and Roberts, 2000). In addition, financial hedging of the firm’s credit risk can be implemented through insurance contracts e.g. credit default swaps or through risk transfer mechanisms such as collateralisation and securitisation (Crouhy, Galai and Mark, 2001).

Derivatives and Risk Management

Financial hedging with derivatives reduces the impact of macroeconomic external risk factors on firm performance and correspondingly reduces firm performance (earnings, cash flow and balance sheet) volatility. A 1995 Wharton survey of 2000 US firms, had 350 respondents. Of these, 49% claimed to use derivatives to manage cash flow volatility while 42% use derivatives to manage earnings. A derivatives instrument can be defined by its three attributes; it has one or more underlying risk factors or assets, requires *no minimum initial net investment* and the terms of its settlement are either by cash or by delivery of an asset that can be converted to cash or a derivatives contract (Trombley, 2003 and Culp, 2003).

Options, forwards/futures and swaps are the basic 'vanilla' derivatives instruments and there exist many complex variations of these instruments, sometimes referred to as exotic derivatives instruments. They also include structured derivatives instruments and hybrid instruments with embedded derivatives. Derivatives may be embedded in a financial instrument in combination with a host contract. A host contract is the part of the combined contract other than the embedded derivatives (the contract in which the derivatives is embedded). The combination of a host contract and an embedded derivative[6] is known as a hybrid contract. Some of these instruments are exchange traded and others are over the counter.

2.3 Determinants of derivatives use for risk management

Corporate risk management literature highlights a) maximising shareholder wealth and b) maximising utility of managerial wealth portfolio as the two principal objectives of managerial risk management using derivatives.

2.3.1 Shareholder value focused incentives

A key building block of corporate finance theory is the Modigliani and Miller's (MM) (1958 and 1963) capital structure theory. One of the key assumptions of MM also espoused in the capital asset pricing model (CAPM) developed by Sharpe (1964), is the existence of perfect capital markets where market participants are not subject to any transaction, taxes and information costs and firms do not incur bankruptcy costs due to holding debt. A further premise of CAPM is that capital markets participants are able to fully diversify their portfolios.

[6] *Examples of embedded derivatives*

- A commodity indexed note in which the principal or interest payments are based on the commodity price
- Debt with an option for repayment in fixed amount of foreign currency
- Synthetic CDO (i.e. purchase treasury bonds and enter credit derivatives contracts). This allows firms to mimic the risk profile of cash CDOs

A corollary of the above conditions is that how firms finance themselves ought not to have any bearing on shareholder value. The implication is that managers are only able to enhance shareholder value through their operating and investing decisions. An extension of the above line of reasoning is the *hedging irrelevance proposition*. Hedging irrelevance also arises because investors, who are only rewarded for bearing systematic risk as they hold diversified portfolios, ought to be able to hedge any firm specific risk in their portfolio.

However, capital markets do have frictions and it is on this basis that firm hedging can increase firm value. Capital markets participants face information costs, taxes and transaction costs. Information costs arise due to the information asymmetry between managers and investors on firm specific risk exposures. Concurrently, the earnings and/or cash flow volatility of firms, can lead to market frictions including:

- Firm performance volatility leads to an increase in the perceived riskiness of reporting firms. This in turn leads to an increase in the expected costs of financial distress (i.e. bankruptcy costs);
- Sub-optimal investment decisions due to a) concerns about having to access costly external finance (i.e. contracting costs) due to inadequate or volatile internally generated cash flows and b) agency costs of debt and equity
- An increase in expected tax liabilities due to convex tax schedules (i.e. tax costs)
- An increase in the perceived riskiness and thereafter the cost of capital (i.e. information costs)

An elaboration on how these factors interact with the hedging choice is provided, in sections (2.3.1.1, 2.3.1.2, 2.3.1.3 and 2.3.1.4) below. This discussion is at the heart of illustrating how hedging increases shareholder value. In effect, hedging increases shareholder value by mitigating the impact of earning and/or cash flow volatility on information, bankruptcy and contracting costs.

2.3.1.1 Impact on the expected costs of financial distress

The expected costs of financial distress comprises of direct and indirect components. Direct financial distress costs include costs incurred to deal with default, bankruptcy, reorganisation or liquidation. It comprises the fees paid to lawyers, accountants and liquidators. On the other hand, indirect costs of financial distress arise from the reduced incentives of the firm’s stakeholders (i.e. employees, suppliers, customers and creditors) to contract with firms that are perceived to be in financial distress and the costs of resulting underinvestment (Grinblatt and Titman, 2001). Expected costs of financial distress are a function of the probability of financial distress and the costs incurred in the event of distress. The probability of financial distress increases when 1) fixed claims coverage[7] declines (as leverage increases) and 2) earnings, asset and cash flow volatility increase.

By reducing the volatility of earnings and cash flow, hedging correspondingly reduces the probability of financial distress. Reducing the probability of financial distress reduces the expected costs of financial distress and increases the expected future available free cash flows. This correspondingly results in higher firm value.

Empirical evidence

There is supporting empirical evidence on the positive relationship between hedging and enhanced firm value due to reduced financial distress costs (Fok, Carroll and Chiou, 1997). Graham and Rogers (2002) document a positive relationship between derivatives use and debt capacity due to the reduced financial distress. They find that hedging increases debt ratio (debt/total assets) by 3% and increases firm value by 1.1% due to the incremental tax shield. Using a dataset of UK firms, Judge (2006) finds financial distress to be the most significant explanatory variable behind the hedging decision. He finds this to be more often the case for UK firms than for US firms. He explains that this could be due to the relatively more liberal US bankruptcy code and thus UK firms face higher bankruptcy costs and have higher incentives to hedge.

2.3.1.2 Tax convexity: Impact on expected tax liabilities

The tax function is the depiction of the relationship between income of a firm and its expected tax liability. A convex tax function has the characteristic of the expected tax liability increasing at an increasing rate in relation to income increases. Stulz (1996) identifies that a convex tax liability function can occur when

- There is a progressive tax regime where the firm's average tax rate rises as its pre-tax income rises.
- There are constraints to the use of the 'carry forward tax loss '. If a firm has negative income, it will incur tax losses. However, if there are statutory restrictions to applying the tax loss, it cannot then be applied to lower the taxable income in future periods (with higher income generated)
- Similarly if the tax relief for losses is lower than the tax rate, then the effective tax payable function will be convex

[7] A measure of a firm's ability to meet its fixed-charge obligations: the ratio of (net earnings before taxes plus interest charges paid plus long-term lease payments) to (interest charges paid plus long-term lease payments).

A convex tax function implies that volatility of the pre-tax income will increase the expected tax liability. Barnes (2003) cites an illustrating example showing how volatility of earnings impacts on expected tax in the situation of a prevailing progressive tax regime

'*Consider a company that has in any year a pre-corporate tax profit that is with equal probability either a 100 million loss or a 200 million profit. For example one year could see a loss of 100 million and the following year a profit of 200 million. That is, it's expected pre-tax profit for the two years is (50 %* -100m)+ (50 %* 200m) = 50 m. Suppose the company operates under an onerous tax where profits are taxed at 40 per cent but relief for losses is only given at 20 per cent. The expected corporate tax bill is thus (50 %* 20%*-100) + (50%*40%*200) = 30m and expected post tax profit= 50m-30m= 20m.*

*Suppose we allow the organisation to hedge in such a way that it locks in it expected pre-tax profit (i.e. after hedging), the company's pre-tax result will be 50m. In this case the expected profit will be 50m with certainty and the expected tax will be 40%*50m=20m. The expected post tax profit will be 30m.'*

The above example shows that stable earnings result in lower tax liabilities across multiple periods. On this basis, when a convex tax schedule is in place, hedging can reduce the expected tax liability, by reducing the volatility of firm performance (Stulz, 1985).

Empirical evidence

There is limited empirical evidence on the link between tax convexity and hedging. Nance, Smith and Smithson (1993) using a dummy variable for tax progressivity, find supporting evidence of hedging lowering the tax liability. On the other hand, Graham and Rogers (2002) using the tax loss carry forward amount as a proxy, do not find statistically significant evidence of the hedging impact on tax liability.

2.3.1.3 Information asymmetry and the cost of external financing

An increase in the earnings, cash flow and asset value volatility increases the information asymmetry between managers and external investors but also among investors (DaDalt, Gay and Nam, 2001). In contrast to non-volatile firm performance, higher volatility increases cost of capital (Froot, Scharfstein &Stein, 1993). Smoother earnings and cash flows make it easier for users of financial reporting information to make judgments about the persistence of future cash flows and earnings, and the prediction of future earnings. Easier to predict future earnings are likely to lead to an increase in analyst coverage and greater participation of institutional investors. Lower estimation risk reduces analyst reputational risk. In turn, greater analyst coverage leads to greater scrutiny and lower information asymmetry between managers and shareholders (Barton, 2001) and this reduces the risk premium associated with external financing. This reinforces the effect of smooth earnings generally reducing the perceived riskiness of the firm and cost of capital.

Empirical evidence

There is empirical evidence that firms with smoother earnings are more highly valued by the market (Myers and Skinner, 1998; Barth, Elliot and Finn, 1999). DaDalt, Gay and Nam (2001) also find supporting empirical evidence on the relationship between hedging and reduced information asymmetry. Using the dispersion of analyst forecast and realised earnings as a proxy for the level of information asymmetry, the authors find that for firms that use currency derivatives, analyst forecasts have significantly greater accuracy and lower levels of dispersion. Lin, Pantzalis and Park (2009) in a study of the impact on the post acquisition performance of acquiring firms, find that derivatives users outperform non users. They infer that this is consistent with derivatives use lowering information asymmetry related agency problems.

2.3.1.4 Sub-optimal investment

Sub-optimal investment arises due to:

- Agency costs; and
- Managerial reluctance to seek costly external financing.

Agency costs

Agency costs can arise when managers act in the interests of shareholders but to the detriment of bondholders. This could arise when the likelihood of financial distress increases due to high leverage. In such situations, managers avoid low risk projects yielding cash flows that can only be used to offset bondholder claims without benefiting impact on shareholders' residual claims (Myers, 1977).

Agency costs can also arise when the appropriation of bondholder wealth occurs or wealth transfer from bondholders to equity holders. This can for example occur when managers invest in excessively risky projects. Such a choice can potentially lead to an upside for the shareholders but without any corresponding upside gains for bondholders despite the increase in risk to the bondholder claims. Hence, there is effectively a reduction in the bondholder risk adjusted return. The shift towards disproportionately risk assets purely in the short term interest of shareholders[8] is also described as the '*asset substitution problem'*. A consequence of bondholders anticipating the asset substitution is that they will demand higher yields and stronger covenant protection for any debt capital provided. In effect this raises the cost of external capital and reduces firm value. Asset substitution and its consequences can be alleviated by hedging with derivatives. Morellec and Smith (2007) show that shareholders typically benefit from negotiating the issuance of debt and hedging strategy simultaneously, since lenders will provide funds at a lower cost.

In effect, due to agency costs associated with firms having both equity and high levels of debt, if firms have high probability of financial distress, managers will likely be biased towards high risk projects and avoid low risk/low return projects that they deem to be non beneficial to shareholders. This combination contributes to the described sub-optimal investment, and raises the cost of external capital. On the other hand, hedging with derivatives can alleviate the adverse impact.

Costly external finance and underinvestment

There is yet another explanation linking investment choices, financing and risk management. Pecking order theory of capital structure asserts that costly external finance leads to managerial caution and a corresponding preference by managers for internally generated finance for investment purposes (Myers and Majluf, 1984). In conditions of cash flow volatility, managers will be cautious about investing, due to concerns about the anticipated level of internal funding. By reducing cash flow volatility, derivatives reduce both the need as well as the cost of external finance if accessed.

Empirical evidence

There is supporting empirical evidence of a positive relationship between the use of derivatives and increased investment levels (Gay and Nam, 1998; Geczy, Minton and Schrand, 1997; Lel, 2004). Minton and Schrand (1998) provide evidence that hedging cash flow volatility reduces the reliance on external financing and this in turn reduces under investment. Froot, Scharfstein and Stein (1993) also show that the cost of underinvestment will be greater for firms with growth options, because such firms tend to have a greater number of positive NPV projects and thus such firms are inclined to hedge. Judge (2006) in a study of UK firms, affirms the finding of Froot et al (1993)

[8] The asset substitution phenomenon is consistent with the view that shareholders are equivalent to holders of call options on the firm's assets as described by Merton (1974).

Summary: Derivatives use and shareholder value

The above sections have described how hedging derivatives can increase shareholder value. This is principally due to that alleviation of market imperfections (i.e. information, tax and bankruptcy costs) that are associated with earnings or cash flow volatility. The contention that hedging influences shareholder value has been backed by several studies; Allayanis and Weston (2001) and Nain (2004) provide empirical evidence that hedging increases firm value by 4.8% and 5% respectively.

2.3.2 Speculative use of derivatives

In addition to risk management, derivatives instruments can also be used by firms for speculative purposes. A number of high profile derivatives use failures made visible the practice of speculative derivatives use. An example is Procter and Gamble's (P&G) derivatives related losses in 1994. Whereas the derivatives instrument applied seemed to be used for the purposes of hedging the interest rate risk of a floating rate bond that it had issued, a closer examination of the nature of derivatives reveals that the management was essentially taking bets[9] on the flattening/steepening of the yield curve (Feay and Abdullah, 2001). Another example is Metallgesellschaft that experienced liquidity problems and a realised loss of $1.3 billion due to speculation on US Oil futures (Neuberger, 1998).

As discussed earlier (section 2.3.1), risk management literature mainly discusses the impact of derivatives use on shareholder value in the context of it alleviating the market imperfections (i.e. information, bankruptcy, tax and contracting costs) arising due to earnings or cash flow volatility. However, Adams and Fernando (2006) explore whether there is another source of shareholder value due to an inherent risk premium built into the pricing of derivatives contracts that gives rise to positive cash flows if a firm holds speculative derivatives contracts. Using quarterly observations of outstanding gold derivatives positions for a sample of 92 North American firms, from 1989 to 1999, they find an associated positive cash flow from the use of speculative derivatives contracts. This finding is evidence of a positive realised risk premium and indicates that managers can add value by the speculative use of derivatives. However, similar to Brown et al (2001), Adams et al (2006) do not find supporting evidence that selective hedging (i.e. partial hedging or using derivatives to time the market) increases firm value.

[9] P&G forecasted that deutsche mark swaps would stay between 4.05% and 6.1% and that US and German interest rates would not increase significantly. Interest and currency rates moved opposite to P&G's forecast forcing them to borrow at 1412 basis points above commercial paper rate (Chance, 1998 and Feay and Abdullah, 2001)

Hence even for studies, such as Allayanis and Weston (2001) and Nain (2004) that have shown a positive association exists between derivatives use and firm value, one cannot rule the positive impact on shareholder value is due to the positive realised risk premium associated with derivatives use. This differs from the notion of shareholder value-enhancement only arising due to the alleviation of market frictions that in turn increases expected cash flows (i.e. reduce tax liabilities and underinvestment) or reduces cost of capital (i.e. reduced perceived risk of reporting firms). Backing the notion of frequent speculative derivatives use is the survey evidence by Geczy, Minton and Schrand (2007). They show that 54% of US firms of derivatives users did so speculatively at least once while 7% did so frequently. Lins, Servaes and Tamayo (2007) found that 50% of respondents to a global survey claimed that they sometimes use derivatives speculatively.

However, determining speculative derivatives use is a key empirical challenge in this study because the focus is on firms that are expected to mainly use derivatives for risk management purposes (i.e. non financial institutions).

2.3.3 Managerial risk incentives and derivatives use

In contrast to pursuing shareholder value maximisation, managers can use derivatives for risk management driven by the objective of maximising managerial wealth. One reason for such managerial behaviour is the inherent divergence in managers' and shareholders' risk preferences. This in turn arises from managers' holding relatively undiversified portfolios and having their human capital and sources of monetary wealth being concentrated in their employer firms. The concentration of managerial wealth portfolio in their employer firms, contrasts with the portfolios of external shareholders, who are able to diversify their investment portfolios across multiple firms and thus to eliminate any firm specific, idiosyncratic risk. As a result, managers, as agents, tend to be more risk averse than the shareholders (principals), whom they represent (Smith and Stulz, 1985). Managerial risk aversion may be manifested in managers' sub-optimal risk management and/or investment choices (Smith and Stulz, 1985). Managers could impose agency costs, for example, by engaging in excessive or full cover hedging (i.e. beyond the level that maximises risk neutral shareholder value) with the cost of excessive hedging eroding firm value.

One mode of mitigating such agency conflict is through the design of executive compensation contracts. Executive compensation components can be designed to a) alter risk preferences through the pay-to-performance[10] sensitivities and b) facilitate the capacity of managers to unwind and thereafter diversify their wealth outside their employer firms. Core, Guay and Larcker (2002) delineate the components of executive compensation. Executives are provided variable compensation and incentives through 1) flow compensation, which is the total of the executive annual salary, bonus, new stock and stock options grants, and other compensation and 2) changes in the value of the executive portfolio of stock and options (exercisable and un-exercisable options). Alternatively, executive compensation can be categorised into cash based components (base salary, bonuses) and stock based components (stock options, long term incentive plans (LTIP), and restricted stock), (Gao and Shrieves, 2002). There has been a proliferation of managerial stock options and stock based compensation, driven by the goal of creating a pay-to-performance sensitivity and aligning shareholder and manager risk preferences. Stock based compensation including stock and stock options represents about 50% of the total compensation received by CEOs from 1996 onwards and the median exposure of CEO wealth to firm stock price tripled between 1980 and 1994 and doubled between 1994 and 2000 (Hall and Liebman, 2000).

2.3.3.1 Pay-to-performance sensitivity and managerial risk incentives

Pay-to-performance sensitivity can be characterised as being either linear or convex depending on the sensitivity of the value of the compensation to movements of either stock price or stock price volatility. A linear function depicts a constant change in value of compensation/managerial wealth for every unit change in stock price. In other words, it reflects a constant slope for the function of executive compensation value and stock price. On the other hand, a convex function depicts an increasing change in value of managerial wealth for every unit increase in the volatility of stock price. In other words, it reflects an increasing slope for the function of executive compensation value and stock price volatility. The linearity and convexity of the managerial wealth distribution function creates a linkage between managerial risk aversion, risk management choices and the directional movement and volatility of a firm's stock price (Core, Guay, and Larcker, 2002; Holmstrom, 1979). These elements are discussed further below.

2.3.3.2 Convex and linear pay-to- performance sensitivities

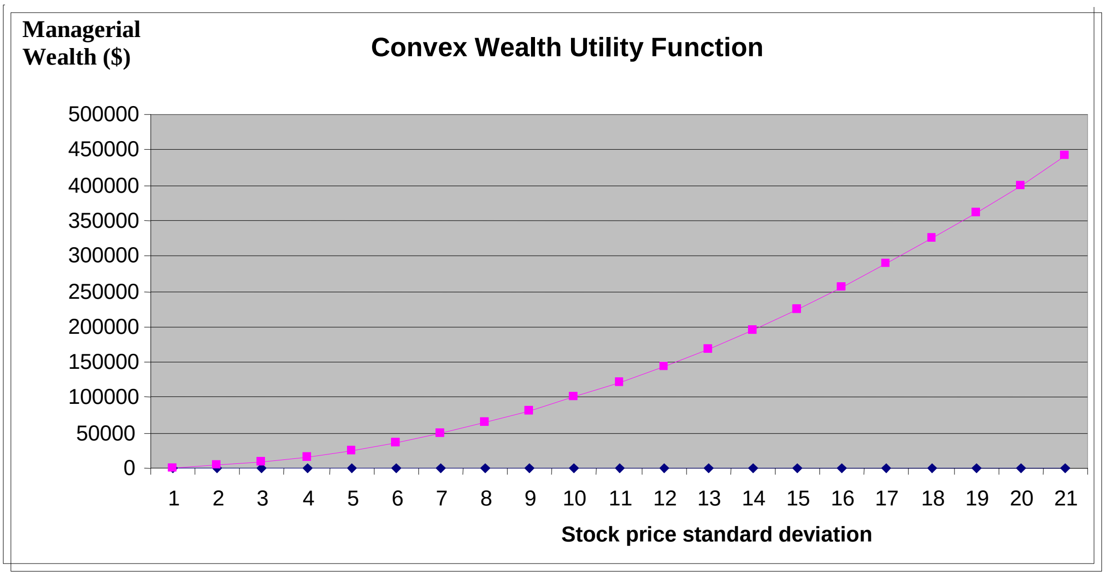
Convexity

The value of stock option value has a convex relationship with underlying stock price and volatility. Figure 2.2 below depicts the nature of a convex pay-to-performance function. A convex pay-to-performance function results in managerial wealth increasing, at an increasing

[10] Pay-to-performance sensitivity can be defined as the variation in executive compensation value resulting from the variation in either firm performance level or volatility. A pay-to-performance alignment has been advocated by various scholars and corporate governance practitioners to ensure that managerial wealth portfolios can mimic the shareholder portfolios and thereafter foster a congruence of risk preferences (Jensen and Meckling, 1976 and Smith and Stulz, 1985).

rate, when the stock volatility or stock price increases. At the same time, it shields the managerial wealth portfolio from any reduction in firm value/stock price. This is because, as visible in the graph in Figure 2.2, decreases in firm price have a decreasing impact on managerial wealth. Hence volatility increases the overall expected wealth of managers as upswings in stock price have an increasingly larger impact on firm value while downswings have a decreasing impact on firm value. Compensation contracts with convex characteristics provide greater incentives for managerial risk seeking preference.

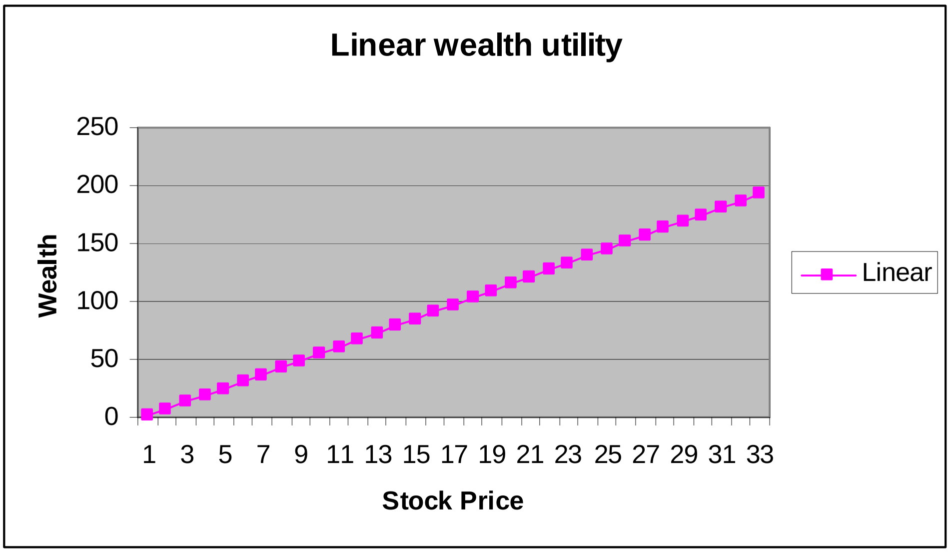
Figure 2.2: Convex pay-to- performance function



Linearity

A linear pay-to-performance relationship can result from the granting of stock compensation (LTIP and restricted stock). A linear pay-to-performance function, as shown in Figure 2.3 below, will only lead to an increase in managerial wealth when the stock price increases and it will lead to a corresponding reduction in managerial wealth when the stock price decreases. The incentive effective will depend on the slope or delta (sensitivity of shareholder wealth to stock price) of the linear function. The greater the slope value, the greater will be the wealth fluctuation when stock prices change. Hence an increase in delta will increase managerial risk aversion because volatility of stock price/firm value creates a larger managerial wealth fluctuation. Consistent with these arguments, linearity may result in greater managerial risk aversion (Smith and Stulz, 1985).

Figure 2.3: Linear pay-to-performance function (Wealth'$'000 and Stock Price-$)



The impact of risk aversion resulting from the linear pay-to-performance sensitivity can be measured by the slope or delta (sensitivity of managerial wealth to a $ change in stock price). An increase in delta should lead to increased managerial risk aversion.

Empirical evidence

Since stock options introduce convex pay-to- performance sensitivity, the proportion of stock options in managerial wealth/ compensation may be a suitable proxy for the convexity and reduced risk aversion. Indeed, several empirical papers (Gao and Shrieves, 2002 and Barton, 2001), have modelled risk incentives using proportion of stock options. However, theoretical arguments by Carpenter (2000) and Ross (2004) and empirical evidence from Knopf, Nam and Thornton (2002), show that granting more stock or option based compensation does not always result in a consistent alteration in the managerial risk preference (e.g. more stock options will not necessarily result in less risk averse or more risk seeking managers). Carpenter (2000) finds that the observed risk preference depends on the class of utility functions that govern a manager's behaviour. If a manager has a constant relative risk aversion utility function (CRRA), as the asset value (wealth in the firm) grows or if the evaluation date is far away, the manager will moderate asset risk. Managers are assumed to target a fixed volatility level for their personal portfolio of options and outside wealth. Giving a manager more stock options increases the volatility of his/her personal portfolio. To mitigate the increase in volatility of personal portfolio, the manager will aim to reduce the volatility of the underlying asset portfolio (or firm asset value). Similarly, Ross (2004) questions the conventional wisdom that the presence of stock options automatically alters the risk preference of managers. Ross (2004) develops a theoretical model that examines risk taking behaviour when the fee schedule (executive compensation) for the agent (manager) is a call option and when the fee schedule is equivalent to a short put option or bond position. He also models the alteration of respective utility functions. Ross' (2004) principal conclusion is no contract exists, which will make all managers who seek to maximise expected utility to be less risk averse. For example, he asserts that call options and put options have different incentive effects. Put options make individuals less risk averse, while call options do not.

Furthermore, Supanvanij et al (2006) argue that managerial risk incentives and hedging choices can be determined by whether executive options are in-, out- or at- the money. In other words, whether or not, they have a positive intrinsic value due to the exercise price being lower than the trading price of the underlying shares. If options are out-of-the- money (i.e. stock price is much lower than exercise price), then volatility is desirable as it increases the likelihood of managerial wealth increase and mangers become risk seeking and concurrently hedge less. On the other hand when options are at-the- money (i.e. stock price is close to option exercise price) or in-the- money (i.e. stock price is higher than the exercise price), then managers are likely to be anxious about firm performance volatility as it could result in their option portfolio being out-of-the- money. Hence, they become more risk averse and are likely to hedge more or engage in smoothing firm performance.

The line of reasoning, highlighting the variation of risk preferences despite the granting of options to managers, strengthens the argument against simplistically taking proportion of options as proxy for reduced risk. Based on reasoning similar to Knopf (2002), rather than taking proportion of stock options, Guay (1999) proposes the use of vega and delta[11] as appropriate measures of managerial risk preferences. These sensitivities can act in opposing directions in shaping managers' risk preferences. Increased sensitivity to stock price levels (i.e. higher delta) may create risk aversion, while increased sensitivity to volatility (i.e. higher vega) may encourage risk seeking. Recent empirical papers have used vega and delta to measure risk seeking incentives (Supanvanij et al, 2006; Rogers, 2002; Core and Guay 2002; Knopf, Nam and Thornton 2002). Supanvanij et al (2006) and Rogers (2002), find a significant association of the vega and delta measures and level of hedging. A further discussion of the measurement of vega and delta risk incentive is included in the research design in 4.6.1.

[11] Delta = the sensitivity of the option value with respect to a 1% change in stock price
Vega = the sensitivity of the option value with respect to a 1% change in stock volatility

2.3.3.3 Diversification of Managerial wealth

Managers may moderate the impact of compensation based risk incentives if they can diversify their wealth portfolios. The capacity of managers to diversify their wealth moderates their risk exposure caused by the concentration of their wealth and human capital in their employer firms. Diversification can be achieved through the hedging of personal income or through the granting of cash compensation. These two aspects are explained further below

Managerial personal hedging

Bettis, Bizjak and Lemmon, (2001), show that managers can unwind some of the risk of their undiversified portfolio. Managers can use zero cost collars[12] and equity swaps to hedge the risk associated with their personal holdings. The studies show that the mean number of shares hedged is 36% of total holdings and that this can effectively reduce the risk associated with their personal holdings by 25%. Bettis et al (2001) made use of a private database (Primark Data Company, a firm contracted by the SEC to collect information on insider trading) and this database is not accessible for the purposes of this research.

Cash Compensation

The greater the cash compensation that can be invested outside the firm, the more likely it will be that the CEO holds a diversified wealth portfolio and hence the lower her risk aversion. The current period cash compensation may be a suitable proxy for risk aversion as it represents the proportion of compensation demanded by managers, which is not sensitive to stock price volatility (Coles, Daniel and Naveen, 2005).

2.3.3.4 Summary: managerial risk incentives and derivatives use

As discussed above, managerial hedging choices can be driven by the goal of optimising managerial wealth rather than shareholder value. In the above sections, I have reviewed the linkage between executive compensation, managerial risk preferences and risk management choices. The form of compensation can influence risk preferences and it is on this basis that compensation can offset agency costs as it can align manager risk preferences to that of shareholders. This in turn can influence their inclination to use derivatives for risk management purposes. The literature shows that stock options introduce risk seeking tendencies and this can offset the relative risk aversion that arises from managers holding

[12] A zero cost collar involves the purchase of a put option funded by the proceeds received from the sale of a call option on the stock of the company. An equity swap is an exchange of the returns on the firm's stock for the cash flows on an asset such as an index fund or risk free security. A zero cost collar option limits the downside and upside of the manager's holding of the stock (long position) and hence makes the manager less sensitive to volatility. The increase in payoff function value is limited to lower and upper bound exercise price.

relatively undiversified portfolios. On the other hand, stock based compensation (LTIP, shares granted) has a linear pay-to-performance function and this creates or maintains the risk aversion and likelihood of managers using derivatives. For example risk averse managers may engage in full cover hedging in situations where it would be to the interest of shareholders to partially hedge an exposure. The literature also shows that granting cash compensation or zero collar options to managers can offset their risk aversion as these enables them to hold more diversified portfolios.

2.3.4 Other determinants of derivatives use

In the above sections, I have described managerial incentives for derivatives use based on shareholder value maximisation and managerial wealth concerns. I now evaluate other factors that determine corporate derivatives use below including corporate governance mechanisms and firm specific structural factors.

2.3.4.1 Corporate governance mechanisms

Similar to executive compensation, other corporate governance features can affect the risk management choice, as they are part of the market solution to shareholder-management agency conflicts (Triki, 2005). Strong corporate governance enables the enhanced oversight of managerial activities, and effective monitoring and penalising capabilities. Strengthening corporate governance is one of the mechanisms for reducing managerial agency costs. Firm specific corporate governance mechanisms and the prevailing country corporate governance regime can have an impact on the hedging activities. The different corporate governance mechanisms that may influence managerial risk choices include a) board characteristics such as independence and c) significant outsider ownership.

Board independence

Board independence is influenced by the proportion of non executive, independent directors (also described as outside directors). Directors have a key role in ensuring that companies have strong internal control systems to manage and control the risks faced by the company. The Higgs report (2003) asserts that a director is considered independent in character and judgement when there are no relationships with the company or its management or any other circumstances that could affect or be perceived to affect the director’s judgement. Srinivasan (2004) similarly defines outside directors as board members who have no relationship with the company other than their role as directors. Other directors are classified as insiders and affiliated (or grey) directors. Insiders are executives of the company while affiliated directors are those with some link to the firm and hence potential conflicts of interest. Conflicts of interest can include consulting arrangements, family relationship, and interlocking board memberships.

Board independence leads to greater monitoring of managerial actions, including the use of derivatives (Whidbee and Wohar, 1999). Fama and Jensen (1983) argue that directors are effective monitors, when they are acting in the interest of shareholders. These authors contend that outside directors have greater incentives to act in the interest of shareholders, relative to inside directors who tend to be aligned with managerial motives. They have the incentive to do so in order to protect their own reputation and thereby the value of their human capital.

Lel (2006) finds that firms with weak governance are more likely to partake in speculative use of derivatives because in such firms the board is unable to identify when managers use derivatives for speculative purposes rather than to manage risk. On the other hand, firms that have strong corporate governance mainly use derivatives for risk management purposes aimed at maximising shareholder value (Lins, Servaes, and Tamayo, 2007). Borokhovich, Brunarski, Crutchley and Simkins (2004) provide supporting empirical evidence that a more independent board, measured by the proportion of outside directors, is likely to effectively support financial hedging by the firm. Similarly, Huang, Zhang, Deis and Moffit (2009) found that poor corporate governance discourages prudent risk management using derivatives.

However, Buckley and Van Der Nat (2003) express scepticism about the abilities of non-executive, independent directors. They conducted a survey using a small sample of UK quoted companies and found that two thirds of the directors confessed to an inadequate knowledge of derivatives. The board members may be independent, have the right incentives and willingness to act in shareholder interest, yet may lack the capacity to effectively do so. Indeed, Dionne and Triki (2005) provide evidence showing that the financial education of the directors sitting on the board and on the audit committee is a determinant of hedging. This implies that independence and competence of the Board of Directors must be viewed together as a determinant of hedging.

Separation of CEO from board chairman

The presence of a dual CEO (holding both positions) gives rise to conflict of interest as the CEO evaluates his/her own performance and sets the firm's agenda. Such weak governance could result in risk management choices that are not targeted at value maximisation (Allayanis, Lel and Miller, 2003). Managers can pursue risk management to serve their own, rather than shareholders interests.

Outsider ownership concentration

Firms with a high outsider ownership concentration or non managerial block-holders are less likely to suffer from agency conflicts. For such firms, there is likely to be lower levels of information asymmetry as large shareholders have resources and incentives to strictly monitor managerial activities. This in turn is likely to result in risk management actions e.g. hedging, which are based mainly on shareholder value maximisation as opposed to protecting managerial risk aversion (Allayanis, Lel and Miller, 2003).

2.3.4.2 Operational hedging

Operational hedging can include a) the diversification of operations b) set up of foreign subsidiaries c) borrowing in a foreign currency to match export revenues and d) the issue of fixed rate debt in order to stabilise interest rate payments. Operational hedging such as hedging of input costs and/or revenues can stabilise costs and pricing policy and the realisation of this benefit cannot be replicated by capital markets participants.

Operational hedging is a possible substitute for financial hedging. Petersen and Thiagarajan (2000), show that firms with greater flexibility in their operating costs are less likely to engage in financial hedging activities, as they are bound to prefer to apply operational hedges. Kim, Mathur and Nam (2006) find that non-operationally hedged firms use more financial hedging relative to operationally hedged firms. This is indicative of a substitution relationship.

However, there is also evidence that operational hedging has a complementary relationship with financial hedging. While financial hedging is used to mitigate transaction exposure[13],

[13] There are three main types of currency risk exposure, namely transaction exposure, economic/operating exposure and translation exposure. Economic/Operating exposure refers to the long term impact of changes in foreign currency exchange rates on a firm's business. It affects the demand and supply dynamics, long term competitiveness, pricing strategy and pass through of a firm's foreign based operations. Economic currency exposure tends to be long term in nature.

operational hedging is used to mitigate economic exposure (long term and permanent risk exposures). As described by Pantzalis, Simkins and Laux (2001), operating exposure arises from unexpected changes in the exchange rate on the firm's input costs (e.g. raw material prices) and output prices (e.g. product prices). Operating exposure is typically managed using operational hedges for example, by having production location in foreign locations (i.e. operational hedge). Bartram, Brown and Minton (2009) find that in addition to derivatives use, corporations rely heavily on input cost pass-through, operational hedging and foreign currency debt, as means of managing financial risk exposures.

2.3.4.3 Firm size

Culp and Miller (2002) found that derivatives were mainly used by large rather than small firms. They found that 65% of companies with market value greater than $250 million use derivatives as opposed to only 13% of firms with market value equal to or less than $50 million. Large firms are more likely to use derivatives as they are more able to afford the costs of skill, technology and process in running a treasury department. Large firms tend to have more complex business models and underlying risk exposures. Larger firms are more likely to face risk exposure magnitudes that make a derivatives hedging strategy to be more viable (Judge, 2006). Indeed, Mian (1996) proposes that it is uneconomical to hedge exposures of less than $10 million.

2.3.5 Summary of derivatives literature

The above sections have shown the key determinants of derivatives use including shareholder value maximisation, managerial risk preferences, corporate governance and firm specific structural features. The impact of derivatives on firm value arises due to alleviation of market frictions created by earnings or cash flow volatility. I have also briefly discussed how the risk premium in derivatives prices creates an opportunity for companies to profit from speculative derivatives use. Another key derivatives use determinant is the form of compensation as this can influence the agency conflicts that arise due to managers holding undiversified portfolios relative to shareholders. Finally, I have reviewed how corporate governance and other factors

On the other hand transaction exposure pertains to the risks associated with either short term consummated or anticipated foreign currency transactions. For example in relation to imports, exports and foreign debt interest payments. As Pantzalis, Simkins and Laux (2001) assert, transaction exposure is the effect of unexpected changes in the nominal exchange rate on cash flows associated with monetary assets and liabilities (i.e. contractually fixed cash flows). Transaction exposure is short term and can be hedged with currency derivatives. Finally, translation or accounting currency exposure is the volatility, attributable to fluctuations in exchange rate, of earnings from a foreign held subsidiary that needs to be consolidated in a reporting firm's results and this is managed using a combination of operational and financial hedging.

such as firm size and operational hedging influence derivatives use. The following section reviews earnings management as the other income smoothing choice.

2.4 Earnings management and discretionary accruals

2.4.1 Introduction

Section 2.3 outlines the determinants of derivatives use as an income smoothing decision. The discussion will now focus on the second key income smoothing choice of discretionary accruals. Earnings management via discretionary accruals is widespread and tends to have the negative connotations of managers' intent to mislead users of financial reports. This is evident in the characterisation of earnings management as a 'numbers game' by former Security and Exchange Commission (SEC) chairman Arthur Levitt and the commitment thereafter to attack this practice. Earnings management can impose costs[14] on the reputation of managers. Srinivasan (2004) found that company directors experience significant labour market penalties, evidenced by turnover, when earnings restatements occur.

However, the widespread phenomenon of earnings management is evidence that managers expect observed earnings to matter to capital markets participants and/or to be beneficial to managers. Graham, Harvey and Rajgopal (2005) found that a majority of Chief Financial Officers (CFOs) believed earnings to be the most important performance measure for outsiders. In a survey of 401 executives, they found that 51% ranked earnings as the most important performance measure. This is followed by only 12% ranking revenues, cash flow from operations, or free cash flow as most important. They also found that 96.9% of CFOs prefer a smooth earnings path and that 78% of CFOs would sacrifice real economic value in order to ensure a smooth earnings path. To illuminate on the widespread earnings management, the following sections provide a definition of earnings management and reviews managerial motives for engaging in earnings management.

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[14] The expected cost of engaging in earnings management includes tainted reputation should allegations of earnings management emerge in the future and be proved. Apart from the direct cost of engaging in earnings management, managers risk the loss of reputation, credibility, job security and future income, should the capital markets participants ascertain that opportunistic earnings management has occurred in an organization (Dechow and Schrand, 2004). Karpoff, Lee and Martin (2006) provide evidence showing the costs of engaging in earnings management. Based on the examination of 585 firms that were targeted for enforcement action for financial misrepresentation between the 1978-2002 periods, they estimate that the reputational penalty is up to 7.5 times in magnitude of legal penalties imposes. They define reputational penalty as the expected loss in the present value of future cash flows due to lower sales and higher contracting and financing costs. The legal costs are on average of $23.5 million per firm. They find that for every dollar of inflated market value, the firm loses the dollar plus an additional $3.08. $0.36 is lost due to legal penalties and $2.71 due to lost reputation.

2.4.2 Earnings management definition

Earnings management is defined by Healy and Wahlen (1998) as '*occurring when managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about underlying economic performance of the company, or to influence contractual outcomes that depend on reported numbers*'. Schipper (1989) defines earnings management as '*the purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain as opposed to say, merely facilitating the neutral operation of the process*'. These definitions have connotations of earnings management as an opportunistic activity. However, as discussed in section 2.4.3 below, earnings management occurs for informational purposes as well.

Earnings management may occur through the use of discretionary accruals (Dechow, Sloan and Sweeney, 1995). It can also occur through

- the timing of mandatory accounting changes;
- voluntary accounting changes (Ayers, 1994; Stolowy and Breton, 2000),
- real economic transactions that influence cash flow and thereafter earnings, and
- off-balance-sheet financing (Gul, Leung and Srinidhi, 2003).

2.4.2.1 Earnings management through real actions

Reported earnings are made up of cash flows and accrued revenue and costs (i.e. accruals). The manipulation of either cash flows or accruals can be used as a lever for influencing observed earnings. Managers can alter cash flows through their operating, investing or financing decisions. Managers can, for example, cut research and development, advertising and employee training expenditures or offer product discounts in order to boost revenues during a particular reporting period at the expense of higher revenues at a future period. Managers can increase production, so as to spread overall production costs and reduce the per unit product cost, reduce the reported period cost of goods and increase profitability. In fact, Parfot (2000) views operational earnings management as good and necessary, and an integral part of legitimate business practice.

Unlike on discretionary accruals, the empirical evidence on earnings management using real economic actions is scarce. There is survey evidence that managers are sometimes willing to give up real economic value in order to manage earnings (Graham et al, 2005). Kedia and Philippon (2008) study a sample of firms forced by the SEC to restate previously overstated reported earnings. These authors find that firms over-invested in physical and human capital during periods of earnings manipulation so as to lower their reported earnings. These firms, then under-invested after enforcement action so as to reverse the earlier impacts. The focus of this study is on discretionary accruals. Operational and investment decisions as income smoothing choices are treated as control variable.

2.4.2.2 Earnings management using discretionary accruals

In this thesis, discretionary accruals, abnormal accruals and earnings management using accruals are used interchangeably. Accrual accounting, as opposed to cash flow accounting, is a central accounting concept based on the principle of matching economic gains and costs in a particular period rather than matching the corresponding cash inflows and outflows (Beaver, 1998; Dechow and Skinner, 2000). Accrual accounting aims to record the financial effects on an entity of transactions and other events and circumstances that have cash consequences for the entity in the periods in which those transactions, events and circumstances occur (Beaver, 1998). This is as opposed to the period in which any associated cash is received or paid by the entity. The principal goal of accrual is to help investors assess the entity's performance during a period through the use of basic accounting principles such as revenue recognition and matching. Accrual accounting is justified on the basis that it provides a better indicator or higher predictive ability of a firm's future cash flow generation than the use of current cash flow (Dechow, 1994). Accrual accounting uses accrual, deferral and allocation procedures whose goal is to match revenues, expenses, gains and losses to periods to reflect an entity's performance during a period instead of merely listing its cash receipts and outlays (Dechow and Skinner, 2000). Generally Accepted Accounting Principles (GAAP), based on accrual accounting, provides management with some latitude to exercise judgement with regard to a wide range of economic transactions and to report on their underlying economic reality. Hence, accrual accounting by its very nature involves estimation, discretion and judgement (Beaver, 1998).

Accruals can be decomposed into *discretionary* and *non-discretionary* accruals. Beaver (1998) notes that opportunities for discretion arise because of uncertainty related to the basis of management's accounting estimates and also because of the asymmetry of information between managers and shareholders. While the total accruals figure is observable from the financial statements and the principles relating to a range of accounting estimates is accessible in the notes to the accounts, the basis of managerial judgement relating to all possible accounting transactions is not fully transparent and accessible to outsiders. Hence, there is information asymmetry between managers and shareholders on the underlying justification of the estimation criteria.

Accrual management affects the timing of recognition of earnings. The overstatement of reported earnings during a particular period is likely to result in the understatement of earnings during a future period. This is described as the mean reverting character of discretionary accruals. For example if a commercial bank originates a portfolio of loans and makes a provision for loan losses of 3% during a reporting period, but the economic characteristics of its customers will likely lead to losses of 5%, then while the banks may minimize its expense in the immediate term by under-provisioning, it will have to understate its future profits when the actual loan losses are realized.

The discussion in section 2.3.1 has outlined how hedging derivatives enhances shareholder value by reducing the expected tax liabilities, expected costs of financial distress, tendency to under-invest and lowering information risk. The same arguments, with the exception of the under-investment to conserve cash, can be readily extended to the reasons for applying discretionary accruals (Park, 2004). Nevertheless, unlike discretionary accruals, hedging with derivatives also lowers cash flow volatility. The fact that discretionary accruals do not influence firm cash flows makes it less clear as to how they influence firm value, even with the premise that discretionary accruals and hedging derivatives are substitutes. As a precursor to the review of related incentives, it is useful to discuss how discretionary accruals influence the stock price.

2.4.3 Discretionary accruals and stock price

Earnings management using accruals is expected to be beneficial to shareholders (Graham et al, 2005). How do earnings management using accruals impact on a reporting firm’s stock price? There have been arguments (Barnes, 2001) that investors can see through non-cash related discretionary accruals and, therefore, earnings management ought not to be value relevant. Backing this argument, Hand (1992), as an example, contends that investors are able to see through tax minimising LIFO (Last in First Out) inventory valuations that result in earnings declines and that they do not price these declines into stock prices.

However, the relationship between earnings management and stock pricing is not as clear cut as implied in the expectation that investors should see through any distortions through earnings. To begin with, there is plenty of anecdotal evidence in the financial press showing that investors react to earning announcements in a fashion that reveals an element of surprise against expectations impacts on stock price. The accounting scandals in the early 2000s involving Enron and WorldCom would also indicate that investors were fooled by the earning management practices. Backing this observation, Dechow, Sloan and Sweeney (1996) find that firms subject to an SEC investigation for earnings management experienced a 9% stock price decline when establishment of earnings management is first announced. This is indicative that investors had not adjusted for earnings management in their pricing of the stock prior to the investigation.

Overall, the literature shows that discretionary accruals can be used for either short term, opportunistic[15] purposes or for long term informational and shareholder value enhancing objectives. The common denominator is that either of these objectives aims to influence stock price. Discretionary accruals can be used to temporarily fool investors on a firm's prospects and this can lead to the short term increases of stock price. Managers, due to opportunistic motives, can capitalise on the time window that investors are fooled and try and inflate the stock price. However, in the long run, investors are able to determine whether the observed earnings are associated with realisable future cash flows. At the same time, accruals can be used to smooth earnings while conveying private information on underlying economic reality. This is explained further below.

2.4.3.1 How do accruals influence stock price: Information risk

By smoothing earnings, accruals can influence long term share value in a similar fashion to derivatives. This is achieved by reducing the expected tax liabilities; expected costs of financial distress and lowering information risk (see section 2.3.1). In addition, accruals applied by management, can affect share price in the long run depending on whether they improve or lower the earnings quality (i.e. the extent to which earnings convey information related to likely future operating performance).

Linked to lowering information risk[16] and enhancing earnings quality[17], is the accrual informational enhancement hypothesis. Guay, Kothari and Watts (1996) describe the information enhancing earnings management as '*earnings management through which*

[15] Jensen (2005) contends that managers engage in opportunistic earnings management to sustain their overvalued stock. The case of Enron and the lengths to which its management went to manipulate earnings so as to maintain stock price supports Jensen's assertion.

[16] Francis, LaFond, Olsson and Schipper (2005) define information risk as the likelihood that firm specific information pertinent to investor pricing decisions is of poor quality. They posit that the information risk of observed earnings has an impact on asset pricing. This is because as outsiders to the firm, investors do not have full knowledge of management choices in relation to accruals and are, therefore, constrained in readily judging the earnings quality.

[17] Earnings quality is defined as the extent to which the observed earnings depict the underlying economic reality or reflects the operating performance. In empirical studies, earnings quality is defined by persistence of earnings or the extent to which current period earnings are associated with future period earnings and thus can be characterised as predictive.

managers strive to accurately reflect the impact of current economic events in the current earnings report'. The information enhancement hypothesis posits that managers take actions to reduce fluctuations around some level considered normal for the firm in order to generate more informative earnings i.e. earnings that credibly signal managerial quality and long term performance trends of the firm (i.e. persistence of firm performance). Essentially, accruals can be used to convey private information and to enhance the prediction of future cash flows, earnings and dividends (Jiraporn, Miller, Yoon and Kim, 2008). As an example, accruals can convey the extent to which receivables will be uncollectable in the future. Having said this, the predictive value of accruals is likely to depend on firm specific attributes such as whether it is in a mature or high growth industry. Accruals are likely to better enable future earnings prediction in mature industries. However, earnings have limited predictive value in high growth industries because the embedded growth options are not recognised in the financial reports. In such industries, current earnings may reflect current operating performance but will be a poor proxy for future performance and this could negate the information value of accruals.

As discussed in section 2.3.1 related to derivatives, smoother earnings make it easier for users of financial reporting information to make judgements about the persistence of future cash flows and earnings. At the same time, smooth, predictable earnings likely lead to an increase in analyst coverage[18] and the participation of institutional investors. This is because, all things being equal, the capacity to predict future earnings is higher for analysts when earnings are smoother. This will incentivise greater coverage by analysts as they face reduced estimation and reputational risk. Myers et al (1998) and Barth et al (1999) find evidence that all else held constant, firms with smoother earnings are more highly valued by the market. They reason that this is because smooth earnings equate to lower perceived risk of the firm and reduce the firm's cost of external capital.

Impact of information asymmetry between informed and uninformed investors on share price

Income smoothing can lower the information asymmetry between managers and investors. In addition, it can also lower the information asymmetry between informed and uninformed investors. This in turn can influence the risk premium of a firm's share price. Easley and O'Hara (2004) further develop the line of reasoning on how information risk affects firm value. Based on a multi-asset rational expectations model, they postulate that greater earnings volatility results in a bigger informational advantage for informed investors over uninformed investors. This translates into the systemic loss for uninformed investors who may have to trade their stock for liquidity purposes. Therefore, whenever there is information asymmetry

[18] However, Yu (2008) provides seemingly contradictory evidence that shows that greater analyst coverage is associated with low level of accruals. This is likely to be due to accruals in his study being largely opportunistic rather than informational.

between informed (i.e. holding and trading on private information on firm's prospects) and uninformed investors, the uninformed investors will require a higher risk premium. Therefore, uninformed shareholders who typically engage in liquidity trading will benefit from smooth earnings as this lowers the information risk, reduces the risk premium and increases stock price. Goel and Thakor (2003), apply an analytical model to show that the expected loss for uninformed investors is higher when earnings volatility is higher. As a result, they postulate that uninformed investors will avoid firms with high earnings volatility.

2.4.3.2 Opportunistic versus informational accrual use: empirical evidence

In a study that looked at both opportunistic and information accruals, Badertscher, Collins and Lys (2007)[19] test whether either of the two has predictive value of future cash flows. They find that unlike informational accruals, opportunistic accruals do not have predictive value on future cash flows.

Opportunistic accruals evidence: Sloan (1996) provides evidence of opportunistic accruals. The author reports that future stock returns are negative for firms whose current earnings include large accrual components and positive for firms with low accrual components. An interpretation of these findings is that investors do not immediately fully see through earnings management, reflected in abnormal accruals. Consequently, firms that use income-increasing accruals in particular periods will show stock price declines in subsequent periods because investors were unable to see through the earnings management at inception. Sloan concludes that market participants overestimate the persistence of low quality current earnings and underestimate the persistence of high quality current period earnings. Extending the work of Sloan (1996), Chan, Chan and Jegadeesh (2006) argue that abnormal accruals should not necessarily be construed as evidence of managerial manipulation. The authors then endeavour to formulate alternative explanations for the link between large abnormal accruals and poor future stock returns. They contend that accruals could in fact simply be conveying information on the fundamental economic reality of reporting firms and that this ought to

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19 Badertscher, Collins and Lys (2007) overcome the difficulties faced in most empirical studies of differentiating opportunistic from informational motives in the application of accruals. Using a sample of firms that have restated their earnings, they are not constrained by having to use proxies such as the modified Jones accruals estimate that are subject to mis-classification error. As the first step, it is straightforward to deduce the discretionary accruals as the difference between original (managed) earnings and restated (unmanaged) earnings. To determine the opportunistic discretionary accruals, they evaluate the original earnings against both the analyst earnings estimate and the restated earnings. If based on restatement earnings (RE), income increasing accruals are deemed to have occurred and the original earnings (OE) exceed analyst earnings (AE) estimate, then the original earnings are considered to be opportunistic (i.e. OE>AE>RE). On the other hand if income decreasing accruals have occurred and OE >AE then OE is considered opportunistic (i.e. RE> OE>AE). Discretionary accruals that are not classified as opportunistic are then assumed to be informational.

have a corresponding bearing on their valuation. However, in their empirical testing they reaffirm the findings of Sloan (1996), finding significant evidence that abnormal accruals occur largely due to opportunistic reasons. Specifically they find that a large increase in accruals is a leading indicator of deterioration in the financial condition of the company.

Informational accruals evidence: On the other hand, Subramanyan (1996) find evidence showing discretionary accruals have informational content and improve the quality of earnings. Subramanyam (1996), apply the Jones (1991) model to differentiate between discretionary and non discretionary accruals. Using a sample of 21,135 firm-years comprising 2,808 firms during the 1973-1993 periods, his study provides empirical evidence that on average the use discretionary accruals does increase the stock price. The author finds empirical evidence of pervasive income smoothing that improves the persistence and predictability of earnings amongst the sample firms. He finds that current period discretionary accruals help to predict future cash flows, earnings and dividends. Similarly, Louis (2003) found that discretionary accruals tend to occur in conjunction with stock splits and the author sees this as evidence of managers signalling[20] favourable performance. Finally, Jiraporn, Miller, Yoon and Kim (2008) find that firms where earnings management has occurred to a large extent, these accrual levels tend to be positively associated with firm value. They interpret this as evidence that accruals are not opportunistic and could in fact be occurring for long term shareholder benefit.

2.4.4 Earnings management incentives

As discussed above discretionary accruals influence stock price and the pursuit of stock price increases can be done either for short term self serving purposes or for long term shareholder benefit. This leads to the discussion of underlying incentives of managers to influence reported earnings level and volatility, using discretionary accruals. This study focuses on accruals for income smoothing (i.e. reducing earnings volatility). However, as Goel and Thakor (2003) note, income smoothing accruals are simply a special case of earnings management.

[20] This is consistent with the view that managers mainly undertake stock splits when they are optimistic about the future prospects of their firms.

Accruals can be used to influencing earnings level via directional[21] earnings management.

Healy and Palepu (2000) identify a range of earnings management motives including

- capital markets or shareholder value maximisation motives,
- contractual motives including executive compensation and fulfilling debt covenant stipulations

Below I discuss the motives that will influence both income smoothing and directional earnings management discretionary accruals.

2.4.4.1 Capital markets Incentive: Contextual Settings

Dechow (2004) describes the empirical evidence in relation to application of discretionary accruals across multiple capital markets related contexts with the view of influencing the stock price. These include:

- Seasoned equity offerings (SEO);
- Initial public offerings (IPO);
- Mergers and management buyouts; and
- Dividends distribution.

SEO/IPO

Similar to SEO, there is empirical evidence showing that there tends to be underperformance after an IPO following a period of excess returns driven by abnormally high accruals in the pre-IPO period (Teoh, Welch and Wong, 1998b). However, the probability of fooling investors is higher with IPOs as the expected benefits of managing earnings (i.e. short term stock price increases before investors realize that discretionary accruals have distorted firm performance) outweigh the costs.

Mergers and management buyouts

In relation to mergers and management buyouts, both the acquirer and target firms have incentives to manage earnings to alter their stock prices. Management buyout firms are likely

[21] Three main directional earnings performance benchmarks[21] have been proposed in the literature. These are

- loss avoidance (Burgstahler and Dichev, 1997b)
- previous years' or seasonally lagged earnings and
- analysts' consensus estimates (Payne, Robb, and Payne, 1997; and Burgstahler and Eames, 1998).

Degeorge, Patel and Zeckhauser (1999) provide evidence of a hierarchy of priorities among the three proposed earnings benchmarks. They assert that it is important for firms to initially avoid losses; once profitability is attained it is important to demonstrate growth in quarterly earnings and thereafter it is important to focus on meeting analyst earnings forecasts.

to aim to minimize the purchase price. Hence they are likely to engage in income decreasing accruals. On the other hand targets are likely to want to increase their share price. There is empirical evidence supporting this expectation. Erickson and Wang (1999) found evidence consistent with income increasing earnings management in share swap mergers between 1985 and 1990. Easterwood (1998) found evidence that takeover targets use discretionary accruals during months preceding and following a takeover attempt. Perry and Williams (1994) provide evidence of pre-buyout income decreasing accruals. Wu (1997) find that earnings changes are significantly smaller than industry median changes for buyout companies in the year preceding the buyout. Christie and Zimmerman (1994) showed that targets more frequently used income increasing accounting methods much more than do non-targets.

Dividend distribution

Reported earnings tend to provide a dividend threshold. Daniel, Denis and Naveen (2007 find that dividends only exceed earnings in less than 7% of reported cases. Thus they postulate that managers have incentives to manage earnings upwards so as to be able to maintain dividend levels. They also find that dividend paying firms tend to manage earnings upwards when their earnings would fall short of expected dividends levels. They find that the tendency to manage earnings is more evident in firms with higher levels of debt as debt covenants tend to place more restrictions on dividend distribution. They also find that higher earnings management occurs in high payout firms.

2.4.5 Contractual motives

This section explains how executive compensation contracts and debt covenants, influence the use of accruals. The executive compensation design can contribute to or mitigate opportunistic managerial choices. Similar to derivatives risk management literature (Core and Guay, 2002; Supanvanij et al, 2006; Rogers, 2002) discussed in section 2.3.3, earnings management literature assesses the impact of stock based compensation. In addition, the earnings management literature provides evidence that focuses on the bonus component of compensation. These are linked to opportunistic objectives described in section 2.4.3.2.

2.4.5.1 Executive compensation contract motives

Stock based compensation

Stock based compensation is a significant component of executive compensation. This has occurred on the grounds of creating shareholder and manager alignment and the past decade has correspondingly experienced a significant increase in incentive based executive compensation (stock based and option based executive compensation). Median exposure to CEO wealth to firm stock price tripled between 1980 and 1994 and doubled between 1994 and 2000 (Hall and Liebman, 2000). By 2001, equity based compensation accounted for approximately two thirds of the pay of the median firm. Murphy (1999) and Core and Guay (2002) report that by the 1990s changes in the value of executive stock and stock options were as much as fifty times as large as the annual changes in cash compensation.

There is a growing body of empirical evidence showing the interrelationship between stock based compensation and earnings management choices. Gao and Shrieves (2002) conduct a study on earnings discretionary accruals. In contrast to the authors who study how the bonus component affects earnings management choice, Gao and Shrieves (2002) adopt a sophisticated approach that factors the joint rather than individual impact of each compensation component, more akin to the approach taken by Core and Guay (2002) and Rogers (2002) when studying the impact of executive compensation on derivatives choice. Gao and Shrieves (2002) frame the compensation driven incentives to undertake earnings management based on a set of stylized facts including:

- The impact of accruals on share price and the potential wealth realizations across multiple time horizons.
- The linearity and non-linearity of each component of compensations:

Linearity and non linearity of compensation

The linearity and non linearity was described in section 2.3.3 in the assessment of executive compensation on the choice of derivatives. These components capture the sensitivity of managers to volatility of firm performance and sensitivity to level of firm performance depending on the structure of their compensation. These sensitivities influence the decision on whether or not to engage in earnings management using discretionary accruals.

Empirical evidence

Gao and Shrieves (2002) find that the proportion of stock options is positively related to earnings management intensity. They find that the delta effect can influence managerial incentives towards earnings management depending on whether management’s goal is to maximise current period wealth or to maximise their wealth on a multi-period basis. Should management aim to maximise the current period wealth, income increasing discretionary accruals will be tend to be used. Consequently, managers will tend to overstate earnings when the option component is relatively large, and when the sensitivity of the option value to stock price is relatively high i.e. when the options are in-the- money (Gao and Shrieves, 2002).

On the other hand, if the manager’s objective is to maximise his/her wealth on a multi-period basis, the key consideration will be the mean reverting impact of discretionary accruals on observable earnings. Whilst considering the impact of accruals on the share price and stock option value, management holds a valuable timing option with regards to when they choose to engage in either income increasing or income decreasing discretionary accruals. This simply implies that the manager can choose which period to report higher earnings than justified by underlying firm economic performance, and when to reverse this with a view to maximising the cumulative wealth through the current and future periods. However, the main constraint of a multi-period based framework of discretionary accruals is the cost of loss of reputation by a manager engaging in period-to-period management earnings management (Gao and Shrieves, 2002). The cost of earnings management comes to the fore if management is suspected or established. For example, if an enforcement action or regulatory investigation by the SEC occurs.

Gao and Shrieves (2002) also analyse the restricted stock component. Restricted shares have a linear payoff function in relation to the stock price. They find that due to the linearity of the payoff, the marginal impact of discretionary accruals on restricted stock is much lower than it is for stock options. This is because stock options have both linear and convex, non linear pay off functions. A non linear pay off function leads to the increase (decrease) of stock price at an increasing (decreasing rate) when there are positive (negative) earnings surprises. Hence restricted stock compensation provides less incentive for earnings management behaviour than stock option compensation. At the same time LTIPs are usually based on three to five year moving average of firm's performance. Due to the mean reverting impact of discretionary accruals on earnings, 5 year moving average earnings is likely to be more stable and stripped off the exogenous discretionary accrual impact on share price, when compared to one-year earnings. On this basis, LTIP reduces the incentive to engage in earnings management practices that aim to maximise managerial wealth. Gao and Shrieves' (2002) empirical findings do not support either positive or negative effects of long-term incentive plans or restricted stock compensation earnings.

The assertion that stock based compensation influences earnings management is consistent with the insider capital markets objectives shown by Beneish and Vargus (2002). Insiders have incentives to increase earnings in order to artificially inflate stock prices in the short run around the time that they intend to sell their shares. These actions reflect opportunistic earnings management objectives by managers. In supplying empirical evidence, Beneish and Vargus (2002) analyse accruals, insider sales and subsequent earnings and they find very high accruals are contemporaneously associated with sales of shares by insiders. They also find that low earnings and stock returns follow the periods of high accruals that are accompanied by insider sales. In other words, the accruals that occur around the time of an insider selling their shares tend not to be persistent in future periods and as argued earlier one can conclude that these accruals do not reflect underlying economic reality of the firms' activities but are a reflection of an attempt to influence the short time share price.

Other Empirical Studies

In other stock option based empirical studies, Aboody and Kasznik (2000) find that CEOs opportunistically manage investor expectations during the interval around scheduled option award dates. Bergstresser and Philippon (2006), find that the use of discretionary accruals is more pronounced in firms where the CEOs' total compensation is more closely tied to the value of stock and stock holdings. In addition, they find that during years of high accruals, CEOs exercise unusually large amounts of options, and that CEOs and other insiders sell large quantities of shares. Cheng and Warfield (2005), using 1993-2000 US data, find that managers with high equity incentives are less likely to report large positive earnings. They instead tend to meet or just beat analyst forecast. Their motivation tends to be to engage in earnings management practices that increase the value of their future shares. This finding is consistent with the view by Teoh et al (1998) that large accruals tend to have an adverse impact on future share prices.

Furthermore, Denis, Hanouna and Sarin (2006), provide indirect evidence of the impact of stock based compensation. They find that there is a significant positive association between opportunistic management choices, evidenced by securities fraud allegations, and stock option incentives. Burns and Kedia (2006) find that earnings restatements are more common at firms where CEOs hold large option portfolios. Bergstresser, Desai and Rauh (2006) find that firms make more aggressive assumptions about returns on defined benefit pension plans during periods in which executives are exercising options. The use of aggressive returns and other pension calculation assumptions can be used as a way of smoothing pension expenses recognised in the income statement.

In the same vein, Burns and Kedia (2008) study a sample of firms that announce restatements to determine whether managers realise gains by exercising options. In this study they control for managers seeking to diversify their holdings as the reason for exercising their options. They find significant evidence of higher exercising of options in firms that are more likely to have made deliberate, aggressive accounting choices. For these firms, options are 20-60% higher in comparison to industry and size matched non restating firms.

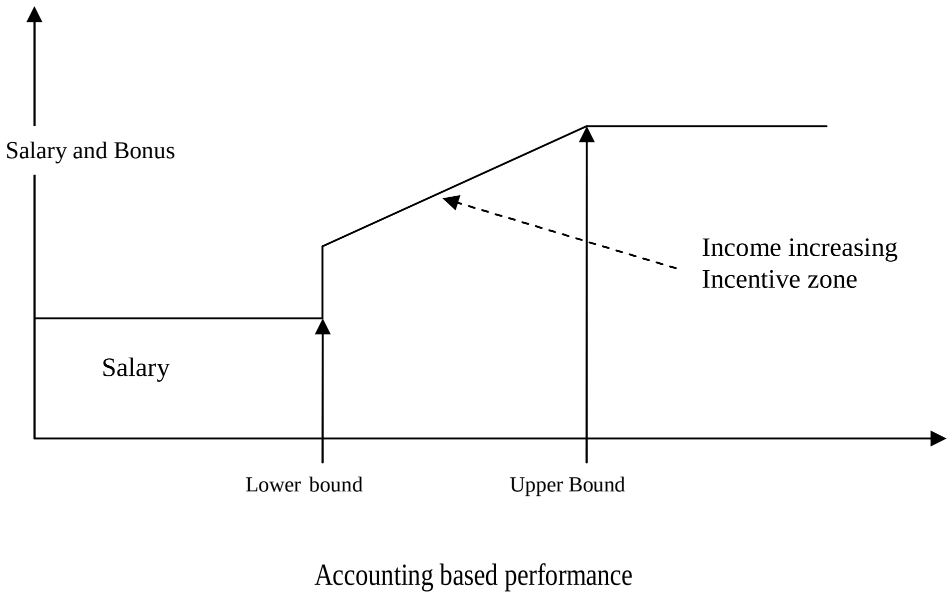
Overall the varied empirical evidence supports the notion that the structure and composition of the executive compensation package including stock based compensation, influences earnings management.

2.4.5.2 Bonus

Unlike the stock based compensation that could induce income smoothing accruals, the bonus component of managerial compensations tends to mainly influence directional earnings management. Earlier earnings management studies (Healy, 1985; Sloan, 1993; Gaver, Gaver and Austin, 1995; Holthausen, Larcker and Sloan, 1995; Balsam, 1998; and Guidry, Leone and Rock, 1999) tended to focus mainly on the effect of the bonus component and not stock based component of compensation[22].

Figure 2.4 below illustrates a pay-to-performance relationship of a bonus plan.

Figure 2.4: Cash (Including Bonus) Pay-to-performance Relationship



Healy (1985) postulates that different incentives could cause either income increasing or income decreasing accruals depending on the attained firm performance. He asserts that if firms attain performance between the lower and upper bound of bonus eligibility performance targets, then managers are likely to engage in income increasing accruals. Alternatively the incentive can be to maximise future period bonuses should the performance fall well below or above the designated eligible performance zone (Balsam, 1998). If the performance is above the upper bound, then managers have an incentive to decrease earnings so as to fall within the bonus eligibility zone. If the performance is below target managers have incentives to

[22] The subsequent shift of emphasis towards stock based compensation in empirical studies could be due to the diminished importance of bonus as a compensation form and incentive due to the increase in stock based compensation as an alternative compensation aimed at achieving pay-to-performance alignment

decrease earnings so as to create a reserve that can be used to increase future earnings and future bonuses. This latter scenario is predicated on the likelihood of an overstatement of future income should there be an understatement during current period.

Empirical evidence

Healy (1985) provides supporting empirical evidence of his postulation, based on 1527 company year observations between 1930 and 1980. However, Gaver, Gaver and Austin (1985) using 1980 to 1990 data, find evidence of income decreasing accruals when performance is above the upper bound but contrary to Healy (1985) they find that companies engage in income increasing accruals when below the lower bound. The latter finding is consistent with the view that companies engage in earnings management to smooth the time series of earnings. Similarly, Holthausen, Larcker, and Sloan (1995) find evidence of income decreasing accruals when firms exceed upper bounds but no evidence of income decreasing accruals when they fall below lower bounds. However, these bounds are often unobservable.

2.4.5.3 Debt Covenant

Accounting data can be used to monitor and regulate contractual relations amongst the firm’s stakeholders, including bondholders (Watts and Zimmerman, 1990). For example, lending covenants require that certain performance objectives be met or can impose limits on the allowed investment, financing and dividend distribution (Beneish, 2001). The assumption is that debt covenants provide incentives for managers to increase earnings so as to either reduce the restrictiveness of accounting based constraints in debt agreements or to avoid the costs of covenants violations (Beneish, 2001).

Empirical evidence

There is mixed empirical evidence on economic consequences of earnings management influenced by debt covenants. Some evidence supports the argument that managers take income increasing discretionary accruals so as to delay the onset of default (Sweeney, 1994; Defond and Jiambalvo, 1994). Dichev and Skinner (2000) find that there is a significantly greater proportions of firms above the covenant’s violation threshold than below. This suggests that managers take earnings management actions consistent with avoiding covenant default.

But there is also evidence that does not support this argument (Beneish and Press (1993), DeAngelo and Skinner (1994)). De Angelo et al, looked at a sample of distressed companies, defined as firms with at least three annual losses and reduced cash dividends over a six year time span. They did not find any significant difference in the accrual levels between firms with binding covenants and those without. They also found that companies with binding constrains had more negative accruals but they attribute these to inventory write-off that they deem to be economically necessary rather than a discretionary accounting decision (Dechow and Schrand, 2004). Jaggi and Lee (2002) offered evidence that potentially reconciles the conflicting results. They find that companies that are unable to obtain waivers of debt covenants and thus are forced to renegotiate and restructure their debt tend to have income decreasing accruals so as to avoid having to fulfil covenant requirements, but observed income increasing accruals for firms that are able to obtain debt waivers.

2.4.6 Other determinants of earnings management

Other than the capital markets and contractually based motives, discretionary accruals can be influenced by the prevailing firm specific, country corporate governance and regulatory regimes.

2.4.6.1 Corporate governance

While the introduction of pay-to-performance sensitivity into the executive compensation design aims to reduce agency conflicts, the literature and empirical evidence shows that the compensation package can exacerbate managerial self interest. On the other hand, Cornett, Marcus and Tehranian (2008) find that corporate governance mechanisms provide countervailing factors to those provided by the incentive compensation package, provide greater oversight of the financial reporting process and serve to prevent earnings management of an opportunistic nature. Hence, firms with poor corporate governance and severe agency costs would be expected to have higher levels of opportunistic and lower levels of informational earnings management. In contrast, firms with strong corporate governance would be expected to mainly apply informational earnings management (Jiraporn, Miller, Yoon and Kim, 2008), if at all.

Section 2.3.4.1 describes how corporate governance influences the decision to use derivatives. Similarly, there are various components to corporate governance covered in earnings management literature including Board attributes, the audit function and the form of ownership (e.g. level of institutional investors). I discuss these further below, mainly with a focus on earnings management related empirical evidence.

Board of Directors attributes

Board Composition and Independence: Boards dominated by outsiders are presumed to be more independent than those comprised mainly of insiders. Outside directors bring a greater breadth of experience to the table (Cornett, Marcus and Tehranian, 2008). Klein (2006) similarly argues that independent directors are best able to fulfil the oversight function. By being financially independent of management, independent directors have the ability to withstand pressure from the firm to manipulate earnings. In addition as pointed out by Fama and Jensen (1983), outside directors have strong incentives[23] to develop reputations as experts in decision control and monitoring ability.

Financial literacy of Board: McDaniel, Martin and Maines (2002) showed in an experimental setting that financial experts evaluate financial statements in a different fashion from those who are simply financially literate. Financial literates are more likely to focus on issues being discussed in the financial press and on large non recurring items while financial experts focus on less trendy issues and on recurring earnings.

Board audit committee: The audit committee's primary function is to oversee the financial reporting process of the firm. This is done through regular meetings with the firm's outside auditors and internal financial manager to review the corporation's financial statements, audit process, and internal accounting controls (Klein, 2006). Some regulatory proposals, such as the Blue Ribbon Committee envisage the audit committee as the ultimate monitor and propose several best practices to ensure that these committees effectively fulfil the oversight functions. The expectation is that audit committees ought to engage equally with management and the external auditors and that they ought to keep track of management judgements, accounting estimates, audit adjustments, disagreements between management and the external auditor and the transactions between the firm and employees of the firm. However, Klein (2006) highlights that while the audit committee is expected to fulfil an oversight function; legitimate differences of opinion could exist between managers and external auditors. Auditors tend to have a bias towards conservatism due to client litigation risk (DeFond and Subramanyan, 1998). The audit committee nevertheless plays a direct role in monitoring earnings management. Executive committee may play an indirect role in monitoring earnings management. Its function is to monitor firm performance. McMullen (1996) indicated that companies with audit committees had lower instances of shareholder litigation alleging management fraud and fewer earning restatements.

There are different strands of supporting empirical evidence on the role of board structure and earnings management. DaDalt, Davidson and Xie (2001) show that the composition of the board and audit committee is related to the likelihood that a firm engages in earnings management. They find that firms tend to have lower levels of discretionary accruals, when

[23] Srinivasan (2004) found that outside directors experience significant labour market penalties, evidenced by large turnovers, when earnings restatements occur.

their boards and audit committees comprise of members who hold financial expertise. Dadalt, Davidson and Xie (2001) find that the presence of corporate executives and investment bankers reduces the earnings management levels. Klein (2006) finds that earnings management is positively related to whether the CEO sits on the board's compensation committee. He also finds that earnings management is negatively related to the CEO's shareholdings and to whether a large outside shareholder sits on the board's audit committee. His findings are indicative that boards that are structured to be independent of the CEO are more effective in monitoring the corporate financial accounting process. Klein (1998, 2000) provides evidence that a board where the CEO sits on its nominating committee or executive compensation committee is less independent of the CEO. Klein (2006) finds a non linear negative relation between audit committee independence and earnings manipulation. A significant relation is found only when the audit committee has less than a majority of independent directors

Board Size: DaDalt et al (2001) assert that a larger[24] board may be able to draw from a broader range of experience and thus may be better at detecting and preventing earnings management.

Frequency of Board Meetings: A board that meets more often is better equipped to detect and prevent earnings management. Vafeas (1999) shows that boards that meet more often during period of turmoil and in general tend to show improved financial performance and this is assumed to be a proxy for lower earnings management.

Chairman/CEO duality: The CEO/Chairman duality concentrates power in the CEO's position, permits the CEO to control information that is available to the rest of the board and effectively allows for greater opportunities for earnings management (Jensen, 1993 and Cornett, Marcus and Tehranian, 2006). Hence the separation of role of Chairman and CEO bestows greater independence and strengthens the oversight function.

Audit Function

The auditors' primary role and responsibility is to attest that managers have reported financial results that are consistent with Generally Accepted Accounting Principles (GAAP). Dechow and Schrand (2004) describe the non conclusive evidence available on the effectiveness of audit in detecting earnings management. Early studies found a positive association between

[24] Jensen (1993) and Yermack (1996) assert that small boards tend to be more effective than large boards in the fulfilling the oversight function. Large boards are more easily controlled by the CEO as their emphasis is on 'politeness and courtesy' and not rocking the boat. A smaller board might face less bureaucratic obstacles that impede its effectiveness (DaDalt et al, 2001) However, there is contrasting, albeit indirect evidence of board size on earnings management. Dalton, Daily, Johnson and Ellstrand (1999) conducted a meta analysis of 131 different study samples and find a positive relationship between board size and financial performance, and took this to be evidence that larger boards are more effective in their oversight.

modified audit opinions and high abnormal accruals. Krishnan (2003) found an association between auditors with expertise in an industry and discretionary accruals. Lower levels of discretionary accruals tend to be observed for firms with such specialist auditors. Myers, Myers and Omer (2003) documented that auditor's tenure with the company being audited improves earnings quality. However, Bradshaw, Richardson and Sloan (2001), found no evidence on whether auditors issue more qualified opinions for high accrual companies.

Ownership

Large institutional investors have the opportunity, resources and ability to monitor, discipline and influence managers. This puts pressure on managers to focus on optimising firm performance and to steer clear of opportunistic, self serving behaviour. There is limited evidence of effectiveness of institutional investors as monitors of earnings quality. However, there is evidence that institutional investors are more sophisticated than individual investors in disentangling non persistent earnings components. Bartov, Radhakrishnan, and Krinsky (2000) show that the cumulative abnormal return over a 60 day window following an earnings announcement is more pronounced with individual investors than it is for institutional investors. The interpretation of these findings could be that either companies with higher levels of institutional ownership tend to issue higher quality of earnings, or that institutional investors are more difficult to fool using earnings management practices. Bushee (1998) provides other supporting evidence showing that companies with higher levels of institutional ownership do not cut research and development expenditure, as do companies with low levels of institutional ownership, during periods of low earnings. In other words there are constraints to use the full arsenal of earnings management devices in companies with high levels of institutional ownership. However, there have been studies that show that the transient nature of some institutional investors or their short term holding orientation, can lead to situations where they pressure managers to engage in short term attempts at inflating stock price (Graham et al, 2005).

2.4.6.2 Country Specific Corporate Governance

Section 2.4.6.1 analyses the impact of firm level corporate governance features on earnings management and this section extends the analysis to country level corporate governance mechanisms. At a country level, Leuz, Nanda and Wysocki (2003) provide evidence showing that earnings management scores are lower in countries with large stock markets, dispersed ownership, strong investor rights and strong legal enforcements. Fonseca and Gonzalez (2008) in a study of determinants of income smoothing by loan loss provisions across banks around the world, find that there is less bank smoothing with stronger investor protection, restrictions on bank activities, and official and private supervision.

An example of country specific corporate governance is that arising from the Sarbanes Oxley (SOX) legislation in the US. SOX, was enacted in 2002 in response to a number of high profile accounting related failures such as Enron and WorldCom. The legislation aimed to improve the corporate governance regime and internal control environment[25], and consequently to improve the overall financial reporting quality (SEC 2003 and Leech, 2003). On corporate governance, the Act addresses board composition and responsibilities, auditor independence, auditor review of internal controls and CEO and CFO certification of financial statements. The improvement in disclosure involve reporting off-balance-sheet transactions and contractual obligations, communicating information that has a material impact in a timely fashion and assessing the adequacy of internal controls (Akhigbe, Martin and Newman, 2008).

The imposition of SOX illustrates the underpinning expectation that strong corporate governance oversight can mitigate opportunistic earnings management. The regulatory and legal regime can by imposing stringent penalties can also increase the direct costs of engaging in earnings management. Carter, Lynch and Zechman (2005) find that post Sarbanes Oxley, there was a reduction in the level of discretionary accruals. To further confirm whether the legislation achieved its purpose, Li, Pincus and Rego (2004) conducted an event study to assess the anticipated impact, by investors, on earnings quality. Their results are consistent with investors expecting the Act to have a net beneficial effect of improving the accuracy and reliability of financial reports by constraining earnings management and enhancing corporate governance.

2.4.6.3 Regulatory motives

These motives pertain to regulated several industries such as utilities, banking and insurance. These companies face regulatory monitoring that is based on accounting numbers. For example, banks and insurance companies have capital adequacy and minimum reserve requirements while utilities are rate regulated and are permitted to earn only a normal return on their invested assets. On this basis, regulations create incentives to manage the income statement and balance sheet variables that are of interest to the regulators (Healy et al, 1998).

Fonesca and Gonzalez (2008) describe the capital management hypothesis as one of the motivations for managing earnings. This hypothesis posits that banks that violate capital requirements incur both out-of-pocket and opportunity costs. Under-capitalised banks have to

[25] Section 404 requires companies to include an assessment of the effectiveness of the internal control over financial reporting and an auditors' attestation of the assessment in their annual reports. Section 302 requires a report on any changes in the internal control

submit costly capital restoration plans to regulators and in addition they could be subject to restrictions on dividend distribution, management fees as well as on investment choices such as branch expansion and new service offerings. The incentives to manage earnings could also exist for well capitalized banks, as capital adequacy provides a source of competitive advantage as it enables a higher likelihood of regulatory approval for expansion objectives as well as incurring lower Deposit insurance premiums (Dechow and Schrand, 2004). There is strong evidence (Ahmed, Takeda and Thomas, 1999; Beatty, Chamberlain, and Magliolo, 1996) supporting the view that financial institutions manage earnings to meet or beat regulatory capital requirements. Most of the evidence focuses on the management of loan loss reserves or insurance reserves in financial institutions as these particular measures are readily observable and hence subject to an ex post valuation of whether the created reserves during a particular period were too low or too high.

Fonesca and Gonzalez (2008) also describe the risk management hypothesis. This hypothesis posits that earnings management could be justified as a means of avoiding pro-cyclical provisioning. Banks could increase their loan loss provisions during buoyant, high growth phases of the economic cycle as a buffer to drawn upon during distressed market periods. Correspondingly reduce the provisioning level during distressed markets. In effect earnings management could occur as a countercyclical measure. However, there is no empirical evidence supporting the use of earnings management for countercyclical purposes. On the contrary, the available empirical evidence does show pro-cyclical earnings management is what occurs. Specifically, Bikker and Metzemaker (2006) found there to be a negative association between GDP and earnings growth.

2.4.7 Earnings management literature summary

The main conclusions from the literature review are that discretionary accruals are a special case of earnings management. They can be used for both income smoothing and directional earnings management. Earnings management can be done for either opportunistic or informational reasons. More specifically, capital markets, compensation based and other contractual based motives, such as avoidance of debt covenant violations, influence earnings management. A strong corporate governance environment will deter opportunistic earnings management, but it could also encourage informational earnings management. This implies that the impact on the level of accruals could be ambiguous as it is contingent on whether these are opportunistic or informational. Similarly, the prevailing country level regulatory requirements influence earnings management.

2.5 Derivatives hedging and discretionary accruals as a joint decision

2.5.1 Derivatives and discretionary accruals as earning smoothing substitutes

As discussed above, both hedging derivatives and discretionary accruals have capacity to smooth earnings. The literature review related to derivatives for financial hedging and earnings management shows that they are in part influenced by the same set of managerial incentives. It is on this basis that different authors (Barton, 2001; Rajgopal and Pincus 2002; Singh, 2004 and Zhang et al, 2009) conducted empirical studies to establish whether either of these two choices available to managers seeking to smooth earnings, are in fact substitutes[26]. The assumption being that as discussed in sections 2.3.1 and 2.4.3, derivatives used for hedging and earnings management through discretionary accruals can enhance shareholder value. This is by making earnings informative and reducing the:

- perceived riskiness, cost of capital and expected cost of financial distress;
- information disadvantages between informed and uninformed investors;
- reducing underinvestment; and
- expected future tax liabilities.

Hence, these two choices also can assuage managerial concerns regarding the volatility of their stock holdings in the employer firms.

Empirical evidence on substitution

In contrast to the relatively established strands of literature (see sections 2.3 and 2.4) that separately study derivatives based risk management and earnings management, empirical evidence on their joint use has only begun to emerge. Using 304 firms over the 1994-1996 periods, Barton (2001) finds that there is a substitution relationship between discretionary accruals and derivatives. Using a simultaneous equation model, he finds that increased derivatives use is associated with reduced discretionary accruals and vice versa. He finds that firms with larger derivatives portfolios tend to have lower levels of discretionary accruals and they also show that non-users of derivatives are more likely to violate GAAP by aggressively managing accruals. Barton (2001) recognises that there is a research gap for a similar study data based on post-SFAS 133 data.

Rajgopal and Pincus (2001), focusing on the interaction of discretionary accrual choices in managing earnings volatility in oil and gas producing firms that also face oil exploration risk, also find that derivatives and discretionary accruals are used as substitutes. Zhang, Huang,

[26] The effective use of derivatives as hedging instruments lowers earnings volatility and, at an aggregate level, reduces the need to manage earnings using discretionary accruals and this yields the substitution relationship.

Deis and Moffit (2009), studying the relationship between discretionary accruals, hedging and firm value, find significant evidence of a substitution relationship between discretionary accruals and the use of derivatives.

See Table 2.3 (for detailed review of studies)

However, Huang, Zhang, Deis and Moffit (2009) find that discretionary accruals have lower impact on firm value relative to the use of derivatives and hence managers will prefer derivatives when seeking to smooth income for long term shareholder benefit. Huang et al (2009), show that accruals are preferred to derivatives use when managers are being opportunistic and seeking privative benefit. The assertion of opportunistic use of accruals is consistent with the evidence of Sloan (1996) showing that managerial self interest, manifest in pursuit of short term oriented, transitory stock price inflation, leads to the higher use of discretionary accruals. Huang et al's (2009) study suggests that accruals are not really substitutes, as they principally are used in firms with weak corporate governance and with opportunistic intent. However, these claims are inconsistent with a significant body of literature that suggests that accruals also have informational purposes and positively impact long term shareholder value (Subramayan, 1996 and Jiraporn et al, 2008). In fact, Jiraporn et al (2008) find that there are lower levels of accruals in firms with high agency costs (e.g. through weak prevailing corporate governance structures). The findings of Jiraporn et al (2008) contradict the conclusions of Huang et al (2009).

Post-SFAS 133 studies on substitution

Singh's (2004) investigation of the effects of SFAS 133 on earnings management, earnings volatility and derivatives use, was a necessary extension of the work of Barton (2001) that relied on pre-SFAS 133 data (i.e. 1994-1996). Unlike Barton (2001), Singh (2004) finds evidence of a partial substitution relationship where derivatives use is associated with earnings management, but finds no evidence that earnings management similarly influences the use of derivatives. The few post-SFAS 133 studies reveal an opportunity for studies that are based on post-year 2000 data.

See Table 2.3, for further details of empirical studies

2.5.2 *Factors that could offset substitution relationship*

Despite the assumption of substitution relationship between hedging derivatives and discretionary accruals, there are several factors that could restrict the substitution relationship including:

- Objective of managing cash flow rather than earnings volatility;
- Directional earnings management;
- Costs and stringent implement requirements of derivatives use; and
- Complementary relationship

Objective of managing cash flow rather than earnings volatility: Derivatives affect both cash flow and earnings volatilities. But discretionary accruals only affect earnings volatility but not cash flow volatility. In situations where the manager's intention is to primarily manage cash-flow volatility, derivatives and discretionary accruals cease to be substitutes. Discretionary accruals only influence earnings and not cash flow. If seeking to cash flow volatility, companies are likely to use derivatives rather than discretionary accruals.

Directional earnings management: As discussed in section 2.4.4, discretionary accruals can be used to meet earnings targets as opposed to smoothing income. For example to avoid violation of debt covenants, maintain dividends, meet bonus targets or analyst forecasts. However, directional earnings management does not occur for derivatives. Hence when the goal is directional earnings management, discretionary accruals should be more likely to be used.

Costs of derivatives use: As Rajgopal and Pincus (2002) and Lin, Servaes and Tamayo (2007) point out, another constraint to the interchangeable use of derivatives and earnings management, is that it is more costly to implement the use of derivatives. The use of derivatives imposes direct and indirect costs. For example, there are significant direct costs of running an effective treasury or risk management function. To use derivatives effectively, organizations have to establish and source personnel with expertise in derivatives use for risk management purposes as well as to establish supporting technological platforms and processes to enable the selection, pricing and accounting of derivatives instruments. The high profile derivatives failures, such as Procter and Gamble and Orange County, were in part a consequence of the shortfall of risk management skills that resulted in ineffective hedges. In addition, there is basis risk (i.e. the economic cost of ineffective hedges) associated specifically with derivatives use (Singh, 2004).

Complementary relationship: Rather than being substitutes, it is plausible that accruals could complement derivatives use. This could, for example, occur when firms use derivatives for speculative purposes. This could lead to increased earnings volatility and a corresponding need to use accruals to offset the increased earnings volatility.

2.5.3 Summary of Income Smoothing choices

The above conceptual analysis of the purpose and determinants of derivatives use and discretionary accruals shows that there is an overlap in how they influence shareholder value and managerial risk incentives. It also shows that there are situations where these two choices cannot be substitutes. This is consistent with Singh (2004) who assumes that they are partial substitutes.

With an understanding of income smoothing choices, it is appropriate at this stage to develop the linkage to derivatives accounting policy, SFAS 133. Dechow and Schrand (2004) asserted that earnings management requires both incentive and opportunity. The earlier sections have analysed the incentives for income smoothing. The focus of the subsequent sections of the theoretical framework is on how SFAS 133 provides both incentive and opportunities for income smoothing choices. This includes a description of the key features of SFAS 133 and shows how these could incentivise income smoothing.

2.6 SFAS 133 INSTITUTIONAL BACKGROUND

This section outlines the institutional background to SFAS 133 describing its features and factors underpinning its promulgation. It, proceeds to develop detailed hypotheses on the impact of SFAS 133 on derivatives use and accrual use. The hypotheses are based on the theoretical framework, described in detail below, of the interaction between SFAS 133 and earnings smoothing.

2.6.1 Chronology of US derivatives accounting standards

Table 2.1 outlines the main features and implementation dates of the standards preceding SFAS 133. It is useful as it shows the evolution of derivatives accounting standards, the trend of piecemeal enhancements and makes visible the novelty of SFAS 133. In promulgating SFAS 133, FASB identified shortcomings that plagued the predecessor standards including:

- Lack of transparency. Derivatives that did not require a cash outlay (e.g. forward contract, interest rate swaps and currency swaps) were not reported in the primary financial statements (i.e. balance sheet and income statement)
- Inconsistent guidance. There were inconsistencies in application across instruments due to inconsistencies in literature (e.g. between SFAS 52 and SFAS 80). SFAS 80 permitted hedge accounting (defined further below) on a portfolio basis whereas SFAS 52 allows it on a transaction basis.
- Incomplete guidance: SFAS 52 and 80 provided guidance for foreign currency derivatives and non foreign currency futures. There were Emerging Issues Task Force (EITF) guidance[27] related to foreign currency options but there was no guidance for interest rate swaps (Herz, 1990). The application across other instruments without authoritative literature was by analogy. Thus, there was a situation where some derivatives were marked to market in income statement and balance sheet (e.g. speculative derivatives); others were accounted for on either historical cost basis or fair value depending on how the underlying hedge was accounted for.

Improvement[28], under SFAS 133, occurred across several dimensions

- Location. Greater prominence and transparency by inclusion in the balance sheet and income statement

[27] EITF provides guidance on application and emerging accounting issues. Its guidance is complementary though subordinate in authority to FASB guidance
[28] Paragraph 238 of SFAS 133 states: 'SFAS 133 increases the visibility, comparability, and understandability of the risks associated with derivatives by requiring that all derivatives be reported as assets or liabilities and measured at fair value.'

- Enhanced information content. The application of fair value for all derivatives instruments conveys relevant information and improves the consistency and comparability of derivatives instrument accounting.
- Greater consistency. Providing guidance across all derivatives instruments, rather than the situation where only some derivatives had authoritative guidance (e.g. foreign currency futures).

Table 2.1 SFAS 133 and predecessor derivatives accounting standards

Year	**FASB statement**	**Accounting and disclosure requirements**
1981	SFAS 52	'*Foreign Currency Translation'*. SFAS 52 classifies foreign currency forward currency contracts into a) hedging forward contracts and b) speculative forward contracts. It allows hedge accounting for hedging forward contracts on a transaction basis (i.e. instrument level).
1984	SFAS 80	'*Accounting for Futures Contracts*' established standards for exchange traded futures (other than currency futures). Allowed hedge accounting on a portfolio basis
1990	EITF 90-17	'*Hedging foreign currency risks with purchased options*'- Emerging Issues Task Force (EITF) guidance complements FASB guidance
1990	SFAS 105	'*Disclosure of Information about Financial Instruments with Off-balance Sheet Risk and Financial Instruments with Concentrations of Credit Risk*' required companies to disclose a) contractual amounts, nature and terms b) amount of probable accounting loss due to default by contracting parties c) concentrations of credit risk of financial instruments including derivatives. It did not require fair value disclosures
1991	EITF91-1	*'Hedging Intercompany foreign currency risks'*
1991	EITF 91-4	*'Hedging foreign currency risks with complex options and similar transactions'*
1992	SFAS 107	'*Disclosures about Fair Value of Financial Instruments'* required companies to disclose the fair market value of unsettled financial instruments including derivatives in the notes. The disclosure of carrying values was recommended but not required. Did not require fair value disclosures in the primary financial statements. Historical costs are shown on balance sheet.

1995	SFAS 119	'*Disclosure about Derivatives Financial Instruments and Fair value of Financial Instruments'* -required disclosures about the purposes of derivatives financial instruments and about how the derivatives are reported in financial statements. For derivatives used to hedge risks associated with anticipated transactions, required disclosure about the nature of the anticipated transactions and the amounts of deferred hedging gains and losses. Required disclosure in the footnotes of fair values and carrying values (clearly indicating asset or liability position). Essentially expanded 105 and 107 disclosure requirements to all derivatives instruments.
1999	133	a) All derivatives recorded on the balance sheet at fair value b) income statement impact depends on activity, with a distinction between speculative hedges, fair value hedges, foreign currency hedges c) hedged item's carrying value is adjusted for changes in fair value attributable to hedged risk
1999	137	Delayed effective date of SFAS 133 to beginning after June 15th 2000
2000	138	Made certain technical changes in the way SFAS 133 is to be applied to specific types of hedges

Adapted from Trombley (2003), Park (2004) and Aggarwal and Simkins (2004).

Subsequent to SFAS 133, there have been several updating pronouncements (e.g. SFAS 161, 137 and 138), but SFAS 133 remains the authoritative derivatives accounting standard.

Key elements of SFAS 133

As Table 2.1 shows, there has been a trend of steady enhancement of derivatives accounting and some of the elements that SFAS 133 adopted, already existed but were applied inconsistently across instruments or were reported off-balance-sheet. The key features of SFAS 133 are a) recognition of fair value of all derivatives instruments in the primary financial statements and b) the definition of hedge accounting to be applied across all derivatives instruments. Hedge accounting primarily impacts on whether fair value gains or losses are recorded in the income or other comprehensive income statement. Hedge accounting does not affect the recording on the balance sheet. Below is an elaboration of these main features

2.6.2 *Fair value recognition in balance sheet and income statement*

Prior to SFAS 133, only derivatives used for speculative purposes were recorded at fair value on the balance sheet and income statement. SFAS 119 only required fair value disclosure of risk management derivatives through the notes. SFAS 133 goes a step further than its predecessors (SFAS 119, 107, 80) as it requires the recognition and measurement of all derivatives instruments on a fair value basis through the balance sheet, with gains or losses incurred during an accounting period being immediately posted to either the income statement or comprehensive income statement.

Fair value definition

The IASB defines fair value as the amount for which an asset can be exchanged or a liability settled, between knowledgeable, willing parties in an arm's length transaction. Under the US GAAP define fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value inputs include direct market quotes for traded, highly liquid financial instruments (e.g. exchange traded derivatives). For less liquid financial instruments, fair value can be determined by the use of indirect market proxies, adjusted for factors specific to the asset or liability such as condition and location and activity level of the market. In the absence of observable market inputs, fair value can be determined by management estimates using unobservable inputs. Market exchange price as fair value is predicated on the market price being an objective indicator of the true economic value of assets and liabilities (Hague, 2004).

Rationale for fair value measurement

Fair value accounting results in an updated assessment of the economic condition and value of financial instruments held and at the same time makes the volatility of these values visible (Hague, 2007). This is especially important for instruments with insignificant costs at inception such as derivatives. There are various benefits associated with the recognition of derivatives fair values. Hague (2007) identifies some of the key benefits of fair value, relative to the alternative historical cost measurement basis, including:

- Enhanced visibility of derivatives gains and losses;
- The provision of an early warning system on likely losses;
- Incorporating the updated risk factors that influence derivatives values;
- Information on the asset and liability management and/or risk management effectiveness;
- Information on risk exposures; and
- Reflecting the economic volatility of underlying assets.

Recognition of derivatives fair value through the balance sheet and income statement thus aids the assessment of risk exposure and risk management effectiveness by capital markets participants.

In addition to the above, Beck and Liu (2007) assert that unlike the case with fair value accounting, a historical cost regime can provide managers with the option to realize gains when asset values increase, but at the same time allow them to conceal losses when asset values drop, as they can simply report such assets at historical cost. They see this situation as being equivalent to granting managers a favourable call option[29] on a firm's assets. This can lead to morally hazardous[30] behaviour where managers undertake speculative projects knowing that they have the option of minimising their reported losses through historical cost reporting regime. This in turn increases the probability and severity of significant, unanticipated losses. In effect, the alternative historical cost measurement basis leaves firm outsiders vulnerable to unanticipated losses in the absence of an early warning system.

Most empirical studies have focused on the value relevance (i.e. significant association with stock price) of the fair value disclosure of a broad array of financial instruments rather than only derivatives. These studies tend to show value relevance for financial instruments where fair values are reliable and complete e.g. investment securities. However, there is conflicting evidence for some other financial instruments such as loans (Nelson, 1996). Instruments that do not have liquid markets such as loans are prone to higher degrees of measurement error and therefore market values are a less reliable indicator of economic worth.

Regarding derivatives instruments, Ahmed, Kilic and Lobo (2006) conducted studies on the impact of recognition and measurement of their fair values for a sample of US banks. They use separate samples of pre-SFAS 133 (146 banks) and post-SFAS 133 data (82 banks that were a sub-sample of the pre-SFAS 133 data). The pre-SFAS 133 was from 1995-2000 and post-SFAS 133 from 2001-2004. In these samples, they distinguish between recognised and disclosed amounts. They find that SFAS 133 recognition and measurement requirements have significant incremental impact on firm value. On this basis, they infer that SFAS 133 improved the quality of derivatives accounting information. Similarly, Zhou (2009), looking at US bank hold companies from 1995 to 2005, finds that the inclusion of derivatives fair value gains or losses in the income statement, as required under SFAS 133, increases the

[29] Described as a call option, as historical cost only allows managers to realise upside but not get penalised for downside of poor project selection. Hence, the payoff mimics a call option. Gains trading in the banking sector is an example of the aforementioned morally hazardous behaviour. Gains trading occurs when banks purchase financial instruments , designate them in the banking book and have them being accounted for at amortised historical cost on the assumption that they will be held to maturity. Gains trading occurs when such instruments are then traded when markets are favourable yet kept at historical cost in depressed markets.

[30] Moral hazard occurs when managers undertake disproportionately risky choices, precisely due to risk protection measures being in place

information content of the core earnings. This judgement is based on the persistence of reported earnings.

Fair value recognition and measurement requirements also provide risk relevant information. Hodder, Hopkins and Wahlen (2006) provide empirical evidence showing that fair value measurement conveys information on the risk of reporting firms. Their study, conducted using data of 202 commercial banks spanning the 1996-2004 period, showed that if reported income was adjusted[31] to include a) fair value amounts reported in other comprehensive income (OCI) and b) fair value items that are only disclosed in the notes, then a strong association between the adjusted full fair value income and the observed stock prices exists. The adjusted full fair value income has incremental volatility and this conveys elements of risk not captured by net income volatility. Full fair value income volatility has a closer association to capital markets pricing than does current reported income volatility.

2.6.3 Hedge accounting recognition and measurement

On the adoption of full fair value treatment for derivatives through the balance sheet and income statement, concerns were raised[32] that recognition and measurement inconsistencies (i.e. accounting mismatches), between the hedging instrument and hedged items, could trigger artificial earnings volatility. A mixed measurement approach[33] and accounting mismatches can for example arise when a derivatives instrument (e.g. a cross currency swap) is accounted for on a fair value basis but the hedge (e.g. a held-to-maturity bond) is accounted for on a historical cost basis.

To address the concerns of artificial' earning volatility, the accounting standard setters allow hedge accounting. Hedge accounting requires a similar accounting approach of both the hedging derivatives instruments and the hedge (i.e. source of risk exposure). The 'hedge to hedge instrument' matching principle under hedge accounting is effectively an exceptional accounting treatment to the general requirement to apply full fair value, and recognise gains and losses through the income statement, regardless of how the hedge is being accounted for (Hague, 2004). The main hedge accounting approaches are:

- Fair value hedge accounting;
- Cash Flow hedge accounting; and

[31] Currently there is a disaggregation in the recording of gains and losses between OCI and net income. Therefore to recreate a full fair value picture, adjustments have to be made to reported income. A full fair value income statement would only be achieved if a) all items were accounted for on a fair value basis and b) their gains and losses were only recognised, through the current income statement.

[32] These concerns were especially pronounced from the financial services industry with claims that a mixed attribute accounting will distort the reflection of their asset and liability management practices.

[33] Mixed measurement accounting refers to the use of multiple measurement bases (historical cost and fair value) across different asset and liability categories. This is problematic for assets and liabilities with similar economic characteristics or items that need to be matched (e.g. a hedge and hedging instrument).

- Net investment hedge accounting.

The main difference in the hedge accounting options is in the timing and location of recognised derivatives value gains and losses. Recognition of gains and losses could occur in the current period income statement or it could be deferred through the comprehensive equity statement (OCI). However, there are **no differences in the balance sheet recognition** of fair value amounts under the hedge accounting options (i.e. all derivatives fair values are recorded on balance sheet). I describe the hedge accounting options in more detail below:

2.6.3.1 Fair value hedge accounting

Hedge accounting aims to resolve accounting mismatches and fair value hedge accounting adjusts the accounting treatment of the hedged item to that of the derivatives instrument. Given that the derivatives is accounted for on a fair value basis with gains and losses recognised through the income statement, the hedged item is adjusted to conform to the derivatives accounting approach. Hence, the gains and losses of the hedging instrument and hedged exposure are recognised in the income statement during the current period.

Fair value hedge accounting is applied to hedge fixed rate assets, fixed rate liabilities and unrecognized firm commitments. A firm commitment is a binding agreement for the exchange of a specified quantity of resources at a specified price on a specified future date or dates. An example of a fair value hedge is the use of an interest swap to hedge the value of a fixed rate bond (i.e. the principal risk or variation is in the value of the bond, which rises/falls with fall/rise of interest rate).

2.6.3.2 Cash flow hedge accounting

An additional reason for allowing hedge accounting was to enable managers to better reflect the management of risks associated with future transactions, given that future transactions are not reflected in current period income statement or balance sheet. Hence when management enters into derivatives transactions with the objective of managing future transactions, it is desirable to match the derivatives to the future transactions by deferring the recognition of gains/losses of the derivatives instrument (Hague, 2004). Cash flow hedge accounting is applied to forecast transactions (e.g. sales, purchases) and future interest rate payments.

The accounting treatment works in the opposite direction of fair value hedge accounting only as far as income statement treatment is concerned. Cash flow hedge accounting effectively adjusts the accounting treatment of the derivatives to that of the hedged item, while fair value hedge accounting works the other way round. It requires the deferral of derivatives gains and losses through the accumulated other comprehensive income (AOCI) statement or statement of equity and only transferred to the income statement at a future date. The idea of cash flow hedge accounting is to match the gains and losses of the derivatives to the gains or losses of the hedged item. The subsequent transfer from AOCI to income statement occurs either when the hedge is ineffective or when the derivatives instrument is realised (Ramirez, 2007). The movement from AOCI to the income statement in accounting parlance is referred to as 'recycling' of gains and losses.

Under cash flow hedge accounting the hedging instrument and underlying exposure valuation adjustments are not recognised periodically through the income statement but rather recognised through comprehensive equity income statement in the balance sheet until the point of realisation of the anticipated cash outflow or inflow. Hence the fluctuations in derivatives value do not get reflected in reported earnings but instead the adjustments in hedging derivatives value and the underlying exposure are only recognised in the income statement and thus reflected in earnings only at the point of realisation.

An example of a cash flow hedge is if an airline manufacturer such as EADS has orders for the Airbus carriers from different airlines, located in different countries, due in 3 years time. It is appropriate to hedge the anticipated foreign currency revenue receipts, given that the carrier construction costs are incurred using local currency (i.e. the Euro), lest the profitability may be adversely affected should the Euro appreciate significantly relative to the revenue currency. Another example would be the use of an interest swap to primarily hedge interest rate payments of a floating rate bond (i.e. the principal risk is in the variation of interest payments).

In sum, cash flow hedge accounting through its deferral requirements, reduces the earnings volatility that would arise from the fair value recognition of derivatives.

2.6.3.3 Net investment hedging

This refers to the hedging of investments in subsidiaries in foreign countries, where the subsidiaries' functional currency (i.e. the currency which an entity reports its performance in the financial statements) differs the domestic parent company's functional currency. Net investment hedging is the approach to hedging foreign currency translation risk exposures of foreign subsidiaries.

Net investment hedging requires the reporting of the derivatives instrument in the same manner as the foreign currency translation adjustments. The changes in a derivatives that hedges a net investment in a foreign operation are reported in the Foreign Cumulative Translation Adjustment (FCTA) account, in the comprehensive equity statement, to correspond with translation adjustment. However, if the derivatives gain or loss is greater than the translation adjustment, then such changes are recorded in current earnings. In addition, if the functional currency is the domestic currency (i.e. USD), then the gain or loss of derivatives in foreign investments are recorded in current earnings, under re-measurement gains or losses (Trombley, 2003). Effectively net investment hedging only allows the matching of the hedging instrument to the hedge, if the functional currency is the foreign currency. It is similar to cash flow hedge accounting in that changes are posted to the comprehensive equity account but it differs as it does not allow recycling. Table 2.2 summarises the impact of the different hedge accounting options on the primary financial statements.

Table 2.2 outlines and clarifies the posting of hedge accounting balances, gains and losses to respective balance sheet and income statement accounts.

Table 2.2 Hedge accounting: Impact on primary financial statements

	Gain/loss recognised in income statement	Gains /losses recognised in comprehensive income statement	Mark to market in balance sheet
No designated hedging relationship (Speculative derivatives and unqualified hedges)	X		X
Fair value hedge accounting			
Fair value hedge instrument (e.g. interest rate swap)	X		X
Fair value Hedged item (e.g. fixed rate bond)	X		X
Cash flow hedge accounting			X
Effective portion of derivatives instrument		X	
Ineffective portion of derivatives instrument (i.e. ineffective hedge)	X		
Forecasted transaction (e.g. sales)			
Effective portion on realisation (e.g. order delivery for forecasted export sales)		X	
Ineffective portion	X		
Net Investment in a foreign subsidiary			X
Foreign currency portion of transaction gain/loss		X	
Ineligible portion[34]	X		

[34] Only amounts that are less than or equal to the translation gain/loss of foreign investment are recorded in comprehensive income statement. Otherwise it is recorded in income statement

2.6.3.4 Consequences of SFAS 133 requirements

SFAS 133 has several consequences including:

- Imposing significant interpretation and implementation costs;
- Sub-optimal instrument selection; and
- Increasing earnings volatility.

Implementation complexity

Choosing the appropriate derivatives accounting method and complying with the hedge accounting requirement is an onerous requirement for financial statement preparers (Ramirez, 2007).To qualify for hedge accounting, firms need to fulfil stringent criteria to demonstrate anticipated hedge effectiveness (i.e. effectively minimising exposure volatility). A hedge is deemed effective if, at its inception and throughout the life of the hedge, the enterprise can expect the changes in the reported value or cash flows of the hedged item to be almost fully offset by the changes in the fair value or cash flows of the hedging instrument, and the actual results are within 80 to 125% of such value. Otherwise, the hedge is deemed ineffective and firms have to immediately recognise all the derivatives gains and losses incurred too date. There are onerous prospective (prior to qualifying for hedge accounting) and retrospective tests (applied during the period of application of hedge accounting). These tests could include regression analysis of the exposure on derivatives value and a simulation of values. These tests are onerous as they are prospective in nature, and are skill and cost intensive (Ramirez, 2007).

The multi-layered complexity arising from hedge accounting also leaves investors with the burden of deciphering the managerial intent underpinning each derivatives accounting choice as the accounting depends on the nature of the underlying risk exposure, under hedge accounting rules. Furthermore, allowing multiple variations in accounting for derivatives (i.e. cash flow hedge accounting, full fair value) reduces comparability and leaves room for inconsistent[35] derivatives accounting.

Sub-optimal instrument selection

The onerous requirements on hedge accounting have had the unintended consequence of accounting policy effectively dictating risk management choices in certain instances. The design of the complex hedge accounting eligibility tests is based on the presupposition that

[35] For example, an interest swap's accounting will depend on the hedge. If it is a fair value hedge, all gains and losses go through income statement. If it is a cash flow hedge they are deferred through OCI.

hedge accounting would likely be the favoured accounting option for derivatives users, as it minimises the accounting mismatches. The stringent hedge accounting requirements inherently make it difficult for certain risk management derivatives instruments to qualify for hedge accounting. Options and non linear contracts in particular often fail to meet requisite hedge effectiveness tests and only qualify for hedge accounting to the extent that they have changes in intrinsic value but not time value.

The famous derivatives loss incurred by Procter and Gamble provides a good case study of sub optimal instrument selection. The management opted to use exotic interest rate swap instruments, rather than option instruments, to hedge interest rate exposure. The rationale for their choice was that option instruments had greater difficulty in qualifying for hedge accounting (Gastineau et al, 2001). This case is also discussed in section 2.3.2 covering the speculative use of derivatives.

SFAS 133 and earnings volatility

As described in the analysis of derivatives accounting rules (Trombley, 2003 and Park, 2004), relative to the preceding period, the adoption of SFAS 133 is likely to increase earnings volatility due to a) unqualified hedges b) interim hedge ineffectiveness and c) discontinued hedges. I further elaborate on these below:

a) Unqualified hedges. The ineligibility for hedge accounting of certain derivatives instruments used for risk management purposes results in unqualified hedges and hedge accounting ineligible derivatives instruments. Therefore the general application of fair value measurement for all derivatives causes earnings volatility when the corresponding hedge (e.g. bond being held-to-maturity) is accounted for on a historical cost basis. That is when there is an accounting mismatch between the hedge and hedging instrument.

b) Interim hedge ineffectiveness of hedging instruments. Hedge ineffectiveness could result in interim volatility of derivatives instruments used for risk management purposes and accounted for on hedge accounting basis. Interim volatility could for example arise due to
   - Exclusion of the time value parameters for option instruments when determining eligibility for hedge effectiveness. The value of an option consists of intrinsic value plus a time value element while forward contract prices consist of spot price plus a forward discount or premium. Companies can choose to exclude the

time value component for either options or forward contracts, and most companies do so in order to meet the hedge effectiveness tests. However, should a derivatives be eligible for hedge accounting (i.e. gains and losses are recognised on realisation or unwinding of the position), the excluded time value of either options or forward contracts will nevertheless be recognised in the income statement on a periodic basis and this will result in earnings volatility.

- Basis risk: This can occur when managers initiate hedges, where there is a significant mismatch between the changes in value of the derivatives instrument and the changes in value of the underlying exposure. Ineffective hedges also arise due to application of cross-hedging strategies (i.e. the use of derivatives that have an underlying commodity, currency or index that is different from the hedged item). The hedge ineffectiveness could result from notional/principal differences, for example a debt of $1million could be the underlying hedge for an interest rate swap of $1.5million. Basis risk, in this example, could arise from maturity or re-pricing date differences between the hedging instrument (i.e. interest rate swap) and hedged exposure (i.e. debt). It could also arise from creditworthiness differences, for example, a company may hedge a high yield BB-rated debt using an A-rated derivatives (Hague, 2004). Finally they could arise due to quantity, location or delivery differences for commodity exposures. For example Brazilian coffee beans exposure hedged with an instrument based on Colombian coffee prices (Hague, 2004).

- Valuation error: For example when derivatives are valued based on internal models to determine fair value of derivatives. This could occur for complex, illiquid derivatives instruments that are not exchange traded. Enron provides an illustrative case study of the opportunistic application of fair value principles when managers relied on internal models to determine derivatives fair values. It could also happen for embedded derivatives.

c) Discontinued and de-designated hedges: Discontinued hedges occur when a derivatives instrument is designated as a cash flow hedge accounting but thereafter the anticipated future transaction is terminated. In this situation the deferred gains or losses are posted back to the income statement from the AOCI. De-designation of derivatives is the revocation of hedge accounting eligibility during the holding period. It can occur when a derivatives is found to be ineffective, for example, if its value falls outside the 80 to 125% permissible range of hedge effectiveness, compared to the hedge, then a reversal of derivatives gains and losses that had been recorded in the other comprehensive income statement needs to occur. This process is described as recycling of hedge accounting and tends to mainly apply to cash flow hedges. The problem with recycled hedge accounting adjustments, is that they effectively represent gains and losses relating to earlier reporting periods, and hence their inclusion can be create unforeseen and significant fluctuations in reported earning numbers.

The incremental earnings volatility due to SFAS 133 can in turn influence managerial incentives to smooth earnings using alternative means such as accruals, especially as managers tend to be averse to earnings volatility and prefer reporting smooth earnings trends (Graham et al, 2005).

Empirical evidence on the impact of SFAS 133 on earnings volatility

There is mixed empirical evidence on how SFAS 133 influences earnings volatility. Richie, Glegg and Gleason (2005) conducted a study on whether hedging (with derivatives and with operations hedges) would affect earnings volatility after implementing SFAS 133. They found that SFAS 133 does increase earnings volatility. Li and Stammerjoan (2004) find similar supporting evidence.

However, Zhang (2009) and Park (2004) find that earnings volatility remains unchanged after SFAS 133. In addition, Li and Stammerjoan (2004) note the limitation of evidence pointing to the increase in earnings volatility due to SFAS 133. They point out that earning volatility changes could be attributed to factors other than this specific accounting standard, such as the prevailing volatile macroeconomic environment.

See Table 2.3 for further details of empirical studies

2.7 HYPOTHESIS DEVELOPMENT: SFAS 133 AND INCOME SMOOTHING

Synthesizing the different strands of literature on derivatives use, earnings management and SFAS 133 effects, I review the impact of SFAS 133 on derivatives and discretionary accrual use.

2.7.1 Impact of SFAS 133 on derivatives use

As described in earlier sections 2.6.3.4, SFAS 133 imposes significant compliance costs and is likely to induce incremental earnings volatility. The question arises whether this then has an impact on derivatives use. There are different and inconclusive perspectives put forward in the literature on the impact of SFAS 133 on derivatives use for either speculative or risk management purposes, as discussed below.

SFAS 133 and derivatives use

Barnes (2002) argues that earnings volatility that arises from derivatives accounting can lead to managers choosing not to hedge. Firms with hedgeable projects could avoid hedging as a means of differentiating themselves from speculative derivatives users. The thrust of Barnes (2002) reasoning is that artificial volatility due to accounting is misleading to investors due to the information asymmetry that exists between shareholders and managers in relation to the projects that are hedgeable or not within the firm. Due to this information asymmetry, an adverse selection problem arises as investors are unable to distinguish between firms that are using derivatives for hedging from those that are using derivatives speculatively.

As a result investors will pool all firms that use derivatives and price the risk of the average volatility of hedging and speculating firms. Thus they will end up pricing non-existent risks for firms that are actually hedging and under-pricing the risk of firms that are using derivatives for speculative purposes. With the anticipation that investors are pooling together speculative and risk management derivatives and consequently over-pricing the risk of and undervaluing hedging firms, managers with hedgeable projects may opt not to hedge as a signal, so as to differentiate themselves from speculative derivatives users. On the other hand speculators, will aim to opportunistically capitalise on the lower price of risk (i.e. the pooled price of risk is lower than warranted by the risk of speculative firms), which will lead to morally hazardous behaviour because speculative firms will tend to use derivatives more extensively despite not having hedgeable projects.

Following Barnes reasoning, Shin (2004), using a formal model demonstrates that managers aim to minimise interim volatility (i.e. earnings volatility prior to termination of a derivatives contract) as opposed to terminal volatility (earnings volatility at point of termination of a derivatives contract). Cash flow hedge accounting is the most effective way of minimising interim volatility when compared to full fair value accounting. This is because it results in the deferral of gains and losses. Hence, if compelled to use fair value accounting, firms that already have a derivatives program and aim to minimise interim volatility will likely reduce the use of derivatives. Nan (2007) comes to the same conclusion that prudent risk management activities will decline due to SFAS 133. However, Nan's (2007) analytical models also show that hedge accounting qualification restriction will likely result in higher levels of speculative derivatives use.

Duffie and DeMarzo (1995), using analytical models, assess the impact of derivatives accounting on derivatives use, based on managerial risk aversion. They argue that managers are concerned with the accounting consequences of their hedging decisions and these consequences influence their choice of hedging instrument and whether they hedge at all. The use of hedging derivatives accompanied by the recognition in the income statement, through fair value accounting, will introduce interim earnings volatility that will be undesirable to managers who are risk averse. Hence, the interaction of SFAS 133 managers hedging decision may end up being dictated by the underlying managerial risk aversion.

In contrast to Barnes (2002) and Shin (2004), Pirchegger's (2006) analytical model is premised on interim volatility being desirable. The author argues that fair value accounting as required by SFAS 133, simply results in multi-period volatility because the derivatives valuation is adjusted in one period while the underlying exposure valuation is adjusted in another period. The analytical model proves that the period to period disclosure of volatility is optimal for investor perception of risk as it is effectively a risk sharing process (smaller chunks of volatility across different time periods) and is desirable from the shareholder perspective as opposed to concentrating the volatility to the period in which the exposure and hedging instruments unwind.

Empirical evidence on SFAS 133 and derivatives use

In addition to the conflicting findings in the literature on the impact of SFAS 133 on hedging and speculative use of derivatives, there is a scarcity of empirical evidence on the impact of SFAS 133 on the use of derivatives in general and risk management in particular.

The investigation of effects of SFAS 133 on either speculative or risk management purposes, is constrained by the difficulties in differentiating between speculative and prudent risk management application of derivatives. Derivatives accounting under SFAS 133 did not result in a sufficiently accurate differentiation of these activities. SFAS 133 requires separate classification of derivatives used for trading purposes and these can be assumed to represent speculative use of derivatives. However, at an aggregate level, it remains very difficult to identify the difference in speculative and risk management use of derivatives. The difficulties arise due to the poor and inconsistent disclosure on the level of derivatives that qualify for hedge accounting. These difficulties are compounded by the onerous qualification requirements that results in the exclusion of some risk management instruments (e.g. non linear contracts) from hedge accounting (i.e. unqualified hedges). Hence, unqualified hedges may erroneously be classified as speculative instruments. The sub standard disclosure and likelihood of misclassifying unqualified hedges has contributed to the paucity of empirical evidence on the impact of SFAS 133 on hedging derivatives.

Nevertheless, there are a few empirical papers investigating the impact of SFAS 133 on risk management choices, speculative choice and risk exposure of derivatives user firms. Similar to the theoretical papers there is no unanimity of these findings. Lins, Servaes and Tamayo (2007) provide international survey evidence, where they report mixed results finding that only 40% of derivatives users indicated that SFAS 133 or IAS 39 (the international equivalent) had influenced their choice of derivatives use. They find that managers reduced speculative derivatives use after the introduction of the new accounting standards. They also find that the introduction of SFAS 133 negatively affects the risk management practices and that the adoption of SFAS 133 leads to suboptimal hedging.

See Table 2.3 (for details of empirical studies)

Li and Stammerjoan (2004), studying firms that used derivatives 1996 and 2002, find that derivatives use did not change after the adoption of SFAS 133 and they contend that a plausible explanation could be that the anticipated benefits of derivatives use outweigh the concerns about incremental volatility. However, Zhang (2009) studying the impact of SFAS 133 on speculative and risk management derivatives, finds evidence of reduced hedging derivatives use. She postulates that the impact of SFAS 133 will differ depending on whether a firm is engaging in derivatives use for speculative purposes or using derivatives for risk management purposes. She expected SFAS 133 to have a major impact on ineffective hedgers, as it will result in escalation of earnings volatility compared to the pre-SFAS 133 treatment. In the variable specification, Zhang (2009) identifies speculators versus hedgers based on the retrospective impact on exposure, measured by sensitivity of stock price returns to changes in currency exchange rate, interest rate and commodity price movements. She identifies effective risk managers as those firms whose exposure to the commodity, currency and interest rate risk factors decreased after the introduction of derivatives program. In contrast, speculative firms are those whose risk factor exposure increased after the introduction of derivatives program. She finds that SFAS 133 has discouraged firms' speculative use of derivatives instruments but has not affected hedging choices. However, the interpretation of these findings could be potentially limited due to the proxies applied for speculator (ineffective hedgers) versus hedging firms. Increased exposure after the application of derivatives program could simply be due to new un-hedged exposure. The implied assumption that intention of derivatives use (speculative or hedging) at inception will remain the same throughout subsequent periods may not hold. The evidence provided by Zhang (2009) is indirect empirical evidence of the effects of SFAS 133. However, unlike Lins et al (2007), Zhang (2009) and Singh (2004) find that derivatives use for risk management is not affected by the introduction of SFAS 133.

As stated earlier the literature on the impact of SFAS 133 is inconclusive, and this could be because the stream of research is in embryonic stage and for most of extant studies, there are insufficient data points. For example, the analytical period of Singh (2004) is 2 years (2000-2001) and this was the transitional period in the adoption of SFAS 133 and hence there could be question marks on the adequacy of the coverage period. Nevertheless, based on the analytical arguments of risk pooling and it being desirable for managers to minimise the interim volatility of earnings, I postulate that SFAS 133 will lead to reduced derivatives use for risk management purposes.

Hypothesis 2.1

The adoption of SFAS 133 leads to reduced derivatives use for risk management

2.7.2 SFAS 133 and discretionary accruals

After the adoption of SFAS 133, there are several factors that could trigger the increased use of accruals. Managers could use discretionary accruals for the following reasons:

- To smooth earnings and offset the incremental earnings volatility that arises due to derivatives accounting as discussed in section 2.6.3.4;
- To capitalise on cash flow hedge accounting requirements;
- As a complement to the speculative use of derivatives.

I discuss the latter two points below

2.7.2.1 Cash flow hedge accounting and discretionary accruals

As discussed in section 2.6.3.2, cash flow hedge accounting effectively results in the deferral of derivatives gains or losses and thus should lower the incentive to use discretionary accruals so as to smooth earnings. However, as shown in section 2.4.3.2 of earnings management literature review, managerial opportunism can also influence earnings management choices. SFAS 133 provides one such opportunity through the cash flow hedge accounting requirements. For example, although ineligible, managers could elect to apply cash flow hedge accounting towards derivatives held. The financial press (Wall Street Journal- 2006) highlighted the accounting restatements that Fannie Mae, the US Government Backed Mortgage Backed Securitisation Agency, made in relation to the inappropriate application and subsequent reversal of cash flow hedge accounting. Other examples of the opportunistic use of cash flow hedge accounting are shown in:

- A Bloomberg article[36] cites the case of Freddie Mac applying cash flow hedge accounting for the derivatives used to hedge its own debt. In the process, there was the deferral of gains and losses for periods of up to 26 years.
- Flawed anticipation of hedge effectiveness: The rules of Statement 133 require the forecast of AOCI adjustments for the next 12 months. Results of the Hamlen and Largay (2005) study on the application of Statement 133 by Dow Jones constituent companies showed that there is significant, average forecast error (63%) in the AOCI adjustment, where the forecast error is measured as between anticipated and actual AOCI adjustment. The evidence of significant forecast error shows that managerial anticipation of hedge effectiveness is often inaccurate

Furthermore, Zhou (2009) provides empirical evidence showing that cash flow hedge accounting leads to opportunistic accruals. The author finds that when reported income is adjusted[37] for cash flow hedge accounting deferrals, a significant number of reported earnings increases turn into decreases. However, there is no corresponding significant evidence of reported earnings decreases turning into increases. He interprets this as being indicative of unidirectional and opportunistic earnings management.

In effect, opportunistic use of cash flow hedge accounting, leads to increased accruals. On the other hand, its genuine application should lead to reduced accruals due to reduced earnings volatility. Hence, while cash flow hedge accounting will likely influence discretionary accruals the overall impact is indeterminate. The difficulty in determining the impact of direction is compounded by the empirical difficulty of identifying whether cash flow hedge accounting eligibility and application is genuine or not.

2.7.2.2 Increase in speculative derivatives use and complementary use of derivatives

Another factor that could trigger an increase in both earnings volatility and discretionary accruals after SFAS 133 could be the increased use of derivatives for speculative purposes as postulated in the analytical model by Barnes (2002). Barnes asserts that managers are likely to capitalise on the difficulties that outsiders to the firm have in differentiating between

[36] Bloomberg article by Jonathan Weil dated December 5, 2007.
http://www.bloomberg.com/apps/news?pid=20601039&refer=columnist_weil&sid=ahoxGPj68WN0

[37] Cash flow hedge accounting deferrals are recognised in current period income

speculating and hedging firms, by increasing the speculative use of derivatives (*see discussion in section 2.7.1*). Pre-SFAS 133, the impact of this would be off the income statement and balance sheet but in the post-SFAS 133 periods any associated gains or losses will be reflected in the income statement. To offset the incremental volatility due to speculative use of derivatives, managers will likely increase the use of discretionary accruals. However, as discussed earlier there is no conclusive evidence that SFAS 133 increases speculative derivatives use and this is due to data quality it is difficult to identify for empirical purposes, the proportion of derivatives that are used for speculative purposes.

In sum, based on the combination of increased SFAS 133 associated earnings volatility, and possibly increased usage of discretionary accruals as a complement to speculative derivatives use after SFAS 133, I postulate that all things being equal, an increase in discretionary accruals is likely to occur after the adoption of SFAS 133. Hence, from the above discussion the following hypotheses are yielded.

Hypothesis 2.2

a) **The adoption of SFAS 133 leads to an overall increase in discretionary accruals.**

b) **The use of cash flow hedge accounting influences the level of discretionary accruals.**

2.7.3 SFAS 133 and the substitution relationship between discretionary accruals and derivatives use

As discussed extensively in sections 2.5.1, 2.5.2 and 2.5.3, derivatives and discretionary accruals are substitutes for the purpose of income smoothing. However, this substitution relationship could be negated if the objective is to reduce cash flow volatility, when derivatives are used speculatively and when the goal is directional earnings management. For these reasons they could be partial substitutes in a manner that is consistent with the findings[38] of Singh (2004) and Rajgopal and Pincus (2002).

At the same time, the review of derivatives accounting literature in 2.6.3.4 shows that the adoption of SFAS 133, likely increases earnings volatility and this potentially offsets the benefits of derivatives use as a means of smoothing income. This could in turn, either lower

[38] These authors find that derivatives influence discretionary accruals but not the other way round.

the use of derivatives, or result in the choice of sub-optimal derivatives instruments (i.e. ineffective hedging instruments).

In parallel, the adoption of SFAS 133 could increase the incentive to use discretionary accruals for income smoothing, as it is no longer as attractive to use derivatives. In other words, the adoption of SFAS 133 is likely to influence the extent to which accruals are a determinant of derivatives use. Based on this reasoning, I would expect a stronger negative association after SFAS 133 adoption, when accruals are the explanatory variables for derivatives use. However, according to Hypothesis 2.2, I expect accruals to also potentially offset other SFAS 133 adoption impacts; namely either the greater use of derivatives for speculative purposes or the incremental earnings volatility due to SFAS 133's features. These other factors could confound the income smoothing substitution relationship and make the expected direction of the relationship between accruals and derivatives use, to be indeterminate. These confounding effects also pose an empirical challenge of meaningfully identifying and interpreting what any observed increase in accruals represents.

Hypothesis 2.3

a) **Derivatives and discretionary accruals are substitutes for income smoothing purposes**

b) **The adoption of SFAS 133 influences the substitution relationship**

Table 2.3: Summary of empirical literature on SFAS 133 and related studies`

Author/s	Key research question/s and hypotheses	Method and findings
Barton (2001)	Does the use of financial derivatives affect the earnings management decisions? <u>Hypothesis</u> Derivatives and discretionary accruals will be negatively associated, conditional on managers' desire to maintain a desired level of earnings volatility	<u>Methods</u> Two stage least square simultaneous equations due to the assumed endogeneity of hedging and accrual management Discretionary accruals are based of modified Jones (1991) and derivatives use is measured based on the notional amount <u>Sample</u> 1994-1996 data from Fortune 500 firms <u>Key Findings</u> Derivatives and discretionary accruals are substitutes <u>Comment</u> This study was a pioneering study in many respects as it synthesized the analysis of the joint impact of derivatives use and earnings management. However, it is based on the pre-SFAS 133 period and the author identifies the research gap existing with post-SFAS 133 data

Rajgopal and Pincus (2001)	The Interaction between Accrual Management and Hedging: evidence from Oil and Gas Firms Study investigates whether oil and gas producing firms use abnormal accruals and hedging with derivatives as substitutes to manage earnings volatility. Hypothesis: Ceteris paribus, managers of oil and gas firms use hedging with derivatives and smoothing with abnormal accruals as substitute mechanisms at the margin to manage earnings volatility induced by oil and exploration risk	<u>Empirical Method</u> -Similar to Barton (2001) Uses two stage least square treating income smoothing and derivatives as endogenous variables -Based on 1993-1996 oil and gas firms <u>Key findings</u> -Study finds that there is a sequential process whereby managers of oil and gas producing firms first determine the extent to which they will use derivatives to hedge oil price risk, and then manage residual earnings volatility by trading off abnormal accruals and hedging with derivatives to smooth income <u>Comments</u> -It may be difficult to generalise findings due to the focus on a single sector. However as Adam and Fernando (2006) observe, studying a single sector has the merits of enabling a more precise measurement of the risk exposures

Li and Stammerjoan (2004)	Empirical analysis of Effects of SFAS 133 on Derivatives use and Earnings Smoothing HYPOTHESES Hypothesis 1: Ceteris paribus, the number of firms that use derivatives declined after the implementation of SFAS 133 Hypothesis 2: Ceteris paribus, cash flow volatility increased for derivatives users after the implementation of SFAS 133 Hypothesis 3: Ceteris Paribus, earnings volatility increased for derivatives users after the introduction of SFAS 133	<u>Empirical Methodology</u> • Univariate statistics- Difference of means before and after the implementation of SFAS 133 • Coefficient of variation of quarterly earnings per share <u>Sample:</u> 1997-2002 data <u>Key Findings</u> • Derivatives use did not significantly decline following the implementation of SFAS 133 • Derivatives users' cash flow volatility did not increase after SFAS 133 was introduced Derivatives users earnings volatility increased but this could be potentially attributed to factors other than the introduction of SFAS 133 <u>Comment</u> In contrast to Singh (2004) but similar to Zhang (2009), the study has the merit of being based on larger pre and post-SFAS 133 sample. However, unlike the mentioned authors, the empirical work is restricted to univariate study

Singh (2004)	The effects of SFAS 133 on the corporate use of derivatives, volatility and earnings management <u>HYPOTHESES</u> Hypothesis 1: Derivatives users are less likely to use derivatives in the period after implementation of SFAS 133 Hypothesis 2: Derivatives users have higher smoothing and have higher volatility of cash flows and earnings than non users before and after the implementation of SFAS 133 Hypothesis 3: Derivatives users that do not qualify for hedge accounting treatment have higher levels of hedging with respect to smoothing and to volatility of cash flows and earnings than other derivatives users before and after the implementation of SFAS 133	<u>Empirical Methodology</u> Using dummy variables and interaction terms to proxy for SFAS 133, the differences in coefficients after the implementation of SFAS 133 are compared to the coefficients in the period before implementation for derivatives users and a control group of non users and also within groups of derivatives users. <u>Sample:</u> 2000-2001 non -financial Fortune 500 companies. 305 firms <u>Key Findings</u> -There is no significant change in the use of derivatives after SFAS 133 -There are no significant differences in earnings volatility, cash flow volatility and income smoothing between derivatives users and non users before and after the implementation of SFAS 133

Singh (2004) continued	Hypothesis 4; Derivatives users that report a transition adjustment have higher levels of hedging with respect to smoothing and to volatility of cash flows and earnings than other derivatives users before and after implementation of SFAS 133 Hypothesis 5: Derivatives users that terminated derivatives have higher levels of hedging with respect to smoothing and to volatility of cash flows and earnings than other derivatives users before and after implementation of SFAS 133	Evidence of partial substitution of hedging with derivatives and income smoothing. Hedging is a determinant of income smoothing but income smoothing is not a determinant of hedging Within groups of derivatives users, there is some evidence that firms reporting a transition adjustment or termination of derivatives, may have smoothed income to reduce volatility <u>Comments</u> This study is focused on a short time window. It is focused on the transition period and there is likely a need for longer time horizon studies
Zhang (2009)	Effect of Derivatives Accounting Rules on Corporate Risk Management Behaviour <u>Hypotheses</u> Author hypothesizes that effect of SFAS 133 is conditional on hedge effectiveness from an accounting standpoint.	<u>Empirical approach</u> -Differentiates between speculative and hedging firms based on the changes in risk exposure after the introduction of derivatives program as inferred by Zhang (2009) -Risk exposure is measured as sensitivity of monthly stock market returns to changes in key risk factors (e.g. exchange rate, interest rate)

Zhang (2009) continued	Hypothesis 1a (null): Ceteris paribus, risk exposures in relation to interest rate, foreign exchange rate and commodity price do not change for speculative firms after the adoption of SFAS 133	<u>Sample</u> 1995-2001 <u>Key Findings</u> -Risk exposures decrease significantly for speculative firms after the adoption of SFAS 133 but not for effective hedgers -Cash flow volatility of speculative firms has a significant decreases after the adoption of SFAS 133 -Earnings volatility remains unchanged -Combined evidence points to SFAS 133 encouraging firms to engage in prudent risk management activities <u>Comments</u> -Risk exposure is unobservable and the applied proxy may result in classification error where firms are wrongly labelled as either hedgers or speculators -The approach is premised on a static categorisation of speculators and effective hedgers. Does not capture the possibility that the purpose of derivatives use could change after initiation of derivatives program

		- Approach may derive systematic and firm specific risk exposures and thus there is a likelihood of combining hedgeable and unhedgeable risk exposures
Park (2004)	Economic consequences and financial statement effects of SFAS 133 on bank holding companies -Market reactions to related SFAS 133 adoption announcements. The focus was on events that increased the likelihood of SFAS 133 adoption -Impact of SFAS 133 on earnings volatility, earnings predictability and equity volatility[39] after the adoption of SFAS 133	<u>Sample</u> 69 Bank Holding companies Sample period (1999-2003) <u>Key Findings</u> SFAS 133 did not increase earnings volatility and cash flow hedges did not increase equity volatility. There were negative stock market reactions around the date that FASB announced its plans for new accounting rules for derivatives and the date that the exposure draft for the new standard was released.
Supanvanij and Strauss (2006)	The effects of management compensation on firm hedging and whether SFAS 133 matters o What is the relationship between executive compensation and hedging and is it affected by	<u>Method</u> 1994-2000 data (198 firms) OLS and fixed effect regressions <u>Key findings</u> SFAS 133 magnifies the agency conflict i.e. the negative

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	SFAS 133 o Has SFAS 133 altered the hedging decision by more properly aligning firm performance and management compensation	relationship between hedging and management compensation SFAS 133 increases the use of derivatives when compensation is in the form of stocks
Richie, Gleason and (2006)	The effects of SFAS 133 on foreign currency exposure of US based multinational corporations Did SFAS 133 affect earnings volatility and hedging strategies of exporting firms?	<u>Sample</u> US multinationals with foreign currency exposure in Europe with data from 1996 to 2002 <u>Key Findings</u> Firms that used derivatives prior to SFAS 133 experienced an increase in earnings volatility
Huang, Zhang, Deis and Moffitt (2009)	Does artificial income smoothing and real income smoothing (through derivatives use) contribute to firm value equivalently? <u>Hypotheses</u> H1: The value of the firm is decreasing in the magnitude of abnormal accruals and increasing in the	<u>Empirical Methodology</u> Multivariate studies: Two stage least square regression with Tobin q as the proxy for firm value <u>Sample:</u> 1992-1996 non US listed financial firms. 477 firms with 1105 firm-year observations

Huang, Zhang, Deis and Moffitt (2009)-continued	magnitude of derivatives use. H2: The value erosions from abnormal accruals are more pronounced in weakly governed firms and gains derived from derivatives use are greater for firms with poor governance mechanisms H3: The magnitude of abnormal accruals is increasing in poor corporate governance whereas the magnitude of derivatives use is decreasing in poor governance structures.	<u>Key Findings</u> -Discretionary accruals are used in opportunistic fashion and mainly in firms with poor investor protection. Thus discretionary accruals do not increase firm value. On the other hand, derivatives use positively contributes to firm value <u>Comment</u> Study has insights on the differential impacts of different earning smoothing mechanisms. It is based on pre-SFAS 133 data and there is an opportunity to extend similar studies to the post-SFAS 133 period
Ahmed, Kilic and Lobo (2006)	Does Recognition versus Disclosure Matter? Evidence from value relevance of US Banks recognised and disclosed derivatives financial instruments	*Method* Assessment in changes and levels of market value and independent variables including disclosed and recognised fair values. Run regressions on two separate samples. 146 banks with 1995-2000 data is the pre-SFAS 133 sample, while 82 banks with 2001-2004 is the post-SFAS 133 data. *Result*

Ahmed, Kilic and Lobo (2006)-continued		Provides evidence that recognition of fair values under SFAS 133 is value relevant, while the disclosure through the notes of the fair value is not. This is based on there being a statistically significant and positive coefficient in the recognised amounts.
Lins, Servaes and Tamayo (2007)	Does Derivatives Accounting Affect Risk Management? International Survey Evidence New derivatives accounting standards have conditional impact on hedging behaviour of firms -Firms that are more likely to write contracts based on accounting numbers (e.g. bonuses, covenants) -Firms for which stabilising earnings is an important benefit of risk management -Firms with low institutional ownership -Firms that take active positions in speculative derivatives	<u>Method</u> -Global survey incorporating impact of SFAS 133 and IAS 39 -Sample of 354 worldwide firms <u>Key Findings</u> • Mixed evidence on impact of accounting standards on risk management. • More than 40% of respondents indicated that their risk management activities have been affected and that they curtailed risk management activities due to concerns about eligibility for hedge accounting <u>Limitations</u> • Bears limitation of survey evidence including construct validity, self selection bias and low response rate (i.e. 9%)

Zhou (2009)	Does Fair Value Accounting for Derivatives Improve Earnings Quality Study investigates the income statement effects of SFAS 133 by examining a) whether SFAS 133 improves the information content of accounting earnings and b) whether the differential accounting treatment of different categories of hedging activities under SFAS 133 induces opportunistic earnings management behaviour	<u>Methods</u> Study is based on a sample of bank holding companies during the period from 1995 through 2005. <u>Findings</u> -SFAS 133 through fair value recognition results in more informative earnings -Cash flow hedge accounting, through its deferral requirements, is applied opportunistically to avoid earnings decreases. <u>Comments</u> -Extends the work of Ahmed, Kilic and Lobo (2006) by providing evidence on the information of SFAS 133 income statement effects -The first study I am aware of with empirical evidence of cash flow hedge accounting and earnings management

2.8 CHAPTER CONCLUSION AND RESEARCH OPPORTUNITY

This chapter has conveyed that there is an emergent stream of empirical studies related to the adoption of SFAS 133. The issues covered include:

- Impact on risk management choices (Singh, 2004; Richie et al, 2006; Li and Stammerjoan, 2004; and Zhang, 2009);
- Effect of compensation (Supanvanij et al, 2006);
- Impact on earnings and cash flow volatility (Li and Stammerjoan, 2004; Richie et al, 2006; Park,2004); and
- Inter-changeability of derivatives use and accruals (Barton, 2001; Rajgopal and Pincus, 2002 and Huang et al, 2009).

These empirical studies are complementary to several analytical studies (Barnes, 2002; Nan, 2007; Shin, 2004; and Duffie and DeMarzo, 1996) postulating on the impact of SFAS 133 on hedging strategies. There is scope to extend the empirical evidence related to SFAS 133 and risk management choices on various fronts. First, there is scope to build on the very few risk management empirical studies that are based on post-SFAS 133 data. Thus it is useful to extend studies on the determinants of derivatives use.

Second, there is an opportunity for a methodological refinement of the proxies used to measure primary variables such as discretionary accruals. There is also scope to include variables omitted from similar research. For example, I include a variable for real earnings management based on abnormal investments. I also factor in the conditional impact of SFAS 133 cash flow hedge accounting requirements on discretionary accruals.

Third, while there is empirical evidence relating to the joint choice to smooth earnings using derivatives and accruals, there is an unresolved question of whether the adoption of SFAS 133 changes the extent to which derivatives and risk management are used interchangeably. In other words how does SFAS 133 alter the empirical findings of Barton (2001)? Finally there is an unaddressed research opportunity relating to the interaction of SFAS 133 recognition and measurement requirements and derivatives related footnote disclosure. As observed across several empirical papers and during the data analysis in this study, the quality of reported data is such that it is still difficult to consistently distinguish between hedgers and speculators. The impact of SFAS 133 on and the determinants of derivatives related disclosure is the second key question of this thesis. Chapter 3 provides the theoretical framework for this second question.

PART 1- THEORETICAL FRAMEWORK: DERIVATIVES RELATED DISCLOSURE

3 SFAS 133 AND DERIVATIVES DISCLOSURE

3.1 Introduction

The unifying theme of this thesis is the evaluation of how SFAS 133 influences key managerial financial reporting choices such as the decision to a) smooth observable earnings and b) to disclose information related to derivatives use. The common denominator is that both these factors can influence the perceived riskiness of reporting firms. Chapter 2 develops the theoretical framework and hypotheses in relation to the impact of SFAS 133 and earnings smoothing. However, the empirical investigation of SFAS 133 on derivatives disclosure is minimal and this gives rise to an opportunity for research opportunity. Specifically regarding the following closely related research questions

- ‘Does SFAS 133 adoption increase the level of derivatives related footnote disclosure’?
- ‘What is the interaction between SFAS 133 and the incentives to disclose derivatives related information through financial footnotes?

Below is the development of the theoretical framework and proposed hypothesis to test these questions. The chapter is structured as follows:

- Description of footnote disclosure requirements;
- Framework of SFAS 133 and footnote disclosure;
- Incentives influencing footnote disclosure of derivatives information.

3.2 Derivatives related footnote disclosure

As described in section 2.6.1, prior to the promulgation of SFAS 133, derivatives disclosure requirements were determined by different standards including SFAS 52, 80, 105, 107 and 119. SFAS 133 primarily focuses on recognition and measurement requirements and provides very limited additional guidance on disclosure requirements. It only requires some addition disclosures related to the application of hedge accounting.

SEC risk disclosure requirements

In addition to the standards promulgated by FASB, at various junctures, the SEC recommends additional disclosures. SEC proposals tend to arise due to perceived inadequacies of prevailing disclosure practices. For example there were concerns about SFAS 119. SFAS 119 mandated the disclosure of notional amounts of derivatives instruments. The notional amount of derivatives is useful information as it can convey to users information about the underlying risk exposure. However, the SEC noted that such information was often a) abbreviated b) dispersed across different parts of the financial statements and c) does not apply to all market risk sensitive instruments. This made it difficult for investors to assess how financial instruments such as derivatives affected overall risk exposure. Companies are likely to be responsive to SEC disclosure proposals because the SEC has powers to enforce the quality of financial reporting.

In response to the mentioned inadequacies, the SEC issued Financial Reporting Release No 48 (FRR 48) that mandated the disclosure of forward looking, quantitative market risk disclosures for derivatives and other financial instruments. FRR 48 requires disclosure based on market risk category (e.g. interest rate, foreign currency and commodity price risk) using any of the three following formats

- Sensitivity analysis describing the effect on earnings, cash flow or fair value from selected, hypothetical changes in underlying market prices
- Value at Risk (VAR) expressing the probability of potential loss on earnings, cash flows and fair values from underlying market changes. In addition to risk disclosure, VAR proffers various advantages. VAR measurement improves the governance of derivatives as it necessitates a systematic process of risk measurement. For financial institutions VAR measurement tends to lower the capital charge (Jorion, 2002)
- Tabular presentation of fair values and contract terms sufficient to determine market risk sensitive instruments' future cash flow amounts by expected maturity dates.

SEC requirements in combination with US GAAP specification consist of the prescribed footnote disclosure requirements. In the empirical testing, I construct a disclosure index that measures compliance with key elements of the prescribed disclosure requirements.

3.3 SFAS 133 and footnote disclosure

What is the impact of SFAS 133 on the disclosure of related derivatives information through the footnotes? This is a question of interest as I am not aware of any study that evaluates how derivatives recognition and measurement requirements influence supporting disclosure. There are several empirical studies that have addressed the determinants of derivatives disclosure but they have not done so in the context of recognition and measurement requirements. For example, Aggarwal and Simkins (2004) focus on the determinants of currency derivatives related disclosure during the period that firms were reporting under a predecessor standard SFAS 107. As described in section 2.6.1, SFAS 107 required the disclosure of derivatives fair values in the footnotes but it did not require the recognition and measurement of derivatives through the balance sheet and income statements. Dunne, Helliar, Power, Mallin, Ow-Young and Moir (2004) conduct a review of disclosures in the UK context under FRS 13. However, FRS 13 did not have fair value recognition and measurement requirements.

Hamlen and Largay (2005) conduct a descriptive study analysing the derivatives disclosures of Dow Jones constituent companies during the 2000-2001 periods (i.e. pre- and post-SFAS 133 disclosures). They show that the introduction of SFAS 133, leads to an aggregate improvement of certain elements of disclosure, but concurrently it leads to the deterioration of other elements. For example there is an improvement in the disclosure of the income effects of ineffective and/or discontinued hedges and the disclosure of the net investment in foreign operations. The influence of SFAS 133 on disclosure can be viewed from an analytical framework of whether disclosure requirements are either a substitute or a complement to recognition and measurement requirements.

3.3.1 Substitution effect

Footnote disclosure can be a substitute to recognition and measurement (Ahmed, Lobo and Kilic, 2006). This is where it is viewed as no longer necessary to include information in the income statement and balance sheet, when such information has been disclosed in the footnotes. As discussed in section 2.6.3.4, financial statement preparers are likely to be opposed[40] to recognition and measurement requirements that result in increased earnings volatility and therefore they are likely to prefer if any such information is only disclosed in the footnotes.

Another aspect of the substitution mindset occurs when the inclusion of items on the balance sheet and income statement induces the omission of other useful and related information through the footnotes. For example, if a firm no longer provides notional derivatives amounts simply because it has included the corresponding fair value on the main financial statements. Or alternatively, when the provision of footnote disclosure provides the rationale for not including items on the income statement and balance sheet (e.g. in the accounting of operating leases and pension obligations prior to SFAS 87).

[40] The opposition to recognition and measurement is evidenced by negative reaction of corporations to the promulgation of recognition and measurement of Stock options and Pension obligations. Ndubizu, Choi and Rohit (1993) found that firms that lobbied strongly against the Exposure Draft leading to SFAS no 87, Employers Accounting for Pensions, had higher earning volatility than those that did not lobby against the standard.

3.3.2 *Complementary effect*

When a recognition and measurement standard such as SFAS 133 is adopted with its increased fair value application requirements and increased complexity, footnote disclosure could be a complement. I argue that the anticipated increase in disclosure could, in part, be based on the need to reduce the perceived riskiness of reporting firms due to users misinterpreting derivatives accounting related earnings volatility.

As highlighted in the description of SFAS 133 in section 2.6.1, there are two distinctive approaches applied to derivatives accounting, namely, hedge accounting and the full fair value recognition and measurement. These can result in both increased implementation complexity and artificial earnings volatility. The complex requirements can lead to the perverse consequence of users misinterpreting the risk of reporting firms. This could in turn negate the benefits of increased transparency through recognition and measurement of derivatives instrument fair values (Gastineau, Smith and Todd, 2001). As described in section 2.6.3.4, derivatives accounting related artificial earnings volatility can arise due to:

- Unqualified hedges: hedging derivatives not eligible for hedge accounting being confused to be speculative derivatives.
- Excluded valuation portions in hedge effectiveness tests: For example, the time value portion of option contracts is not eligible for hedge accounting.

Other factors that can lead to misinterpretation of reported derivatives gains and losses are the rules that allow their deferral and recycling. Income recycling rules (i.e. transfer between income statement and other comprehensive income statement) can distort the economic meaningfulness of observed derivatives gains and losses in the income statement. Kawaller (2004) pinpoints that the hedge ineffectiveness that is observed by losses or gains passing through the income statement related to hedge accounting could in fact be misleading as an indicator of hedge effectiveness[41]. Gigler, Kanodia and Venugopalan (2007) affirm the misinterpretation risk due to the application of multiple accounting treatments under SFAS 133. They assert that a mixed attribute measurement [42]model can lead to distorted interpretation of a firm's performance at points of financial distress. Applying theoretical models, they infer that outsiders can erroneously assume a firm to be in a better position than they would have if the measurement was carried out purely on either a historical cost basis or

[41] This is due to the asymmetrical recognition of gains and losses of the hedged item. For example, the cash flow hedge accounting rules allow the recycling of under-hedges but they do not allow the same for over-hedges. Under hedge is partially effective hedge, the derivatives only offsets part of the risk exposure

[42] The mixed measurement applies to the hedge (i.e. risk exposure). Some are accounted for at amortised historical cost and others at fair value.

fair value basis. For example, this can occur due to disclosure deficiencies making it difficult for firm outsiders to infer the overall risk exposures, the un-hedged risk exposures and whether derivatives are used speculatively.

The misinterpretation risk due to a) mixed attribute accounting highlighted by Gigler et al (2007) and b) the overall complexity of derivatives accounting can be mitigated by robust and informative supplementary disclosures. Financial footnote disclosure can mitigate the likelihood of user misinterpretation of accounting volatility by enabling users to piece together balance sheet, income statement gains or losses and related derivatives information. Hence it is expected that the secondary effect of SFAS 133 will be to incentivise managers to disclose more information so as to avoid misinterpretation. As a corollary to Gigler et al (2007), I hypothesize that footnote disclosure is likely to be seen by reporting firms, as a complement to recognised derivatives values, gains and losses. This postulation is consistent with Ryan's (2007) view that a multi-faceted analysis by investors, focusing on fair values and information disclosed through the notes such as sensitivity analysis, is necessary to fully understand the underlying risks and prospects of reporting firms. Intuitively, information regarding the income and balance sheet effects of derivatives coupled with other related information such as notional amounts of derivatives contracts, should have higher information content than reporting only derivatives fair values through the income statement and balance sheet. For example, the observed income and balance sheet effect coupled with risk exposure information and/or information on the level of hedge accounting applied will more likely convey a total picture on overall hedge effectiveness.

I postulate that ceteris paribus, reporting of fair value gains and losses should influence the demand for the enhancement of disclosure of related information by investors. Correspondingly, this should lead to greater disclosures. In other words, I expect that managers will consider the complementary nature of disclosure and this should outweigh their inclination to treat it as a substitute to recognition and measurement.

Hypothesis 3.1

SFAS 133 leads to an increase in the level of disclosure of related derivatives information provided by reporting managers.

3.4 Disclosure incentives before and after SFAS 133

A study of disclosures by 57 companies, conducted by Fitch Ratings in 2004, finds derivatives disclosures to be inconsistent and patchy. The mentioned inconsistencies in disclosure quality motivate the need to understand the determinants of disclosure of derivatives related information. Derivatives related footnote disclosure is a subset of overall risk disclosure. Dobler (2008), in his review of risk disclosure literature, points to the fact that incentives for risk reporting matter, even in the presence of mandatory regulation (e.g. GAAP and SEC requirements). The forward looking and uncertain nature of risk information (e.g. risk exposure) makes it easy for corporate managers to justify any inadequacies in risk related disclosure and this makes the incentives to disclose risk related information particularly important.

Observable risk disclosure levels can be anticipated by evaluating the cost versus the benefit of the required disclosures. Indeed, using theoretical models, Grossman and Hart (1981) show that if disclosure is costless and easily understood by outsiders, then there ought to be a full supply of all the private information held by corporate managers. This is because full disclosure is beneficial as it contributes to lower cost of external capital for firms by potentially reducing uncertainty related to future firm performance, risk exposures and current financial condition. Partial disclosure makes it more difficult for investors to accurately distinguish between firms with good prospects from those with poor prospects and thus they can end up systematically over-valuing poor firms and undervaluing good firms. This can result in overall capital misallocation (Verrecchia, 2004). Given the potential benefits of full disclosure, it would be expected that publicly listed organisations ought to have sufficient incentive to fully disclose their financial information.

The empirical literature (Darus and Taylor, 2006; Aggarwal and Simkins, 2004; and Chalmers and Godfrey, 2004) identifies key incentives that influence the disclosure of related derivatives information. These include capital markets and proprietary cost incentives. A key focus in the analysis of incentives in sections 3.4.1 and 3.4.2 is on capital markets and proprietary costs, as these factors can be influenced by SFAS 133. I also analyse managerial reputation, compensation and litigation cost incentives in section 3.5.

3.4.1 Capital markets incentive to disclose related derivatives information through footnotes under SFAS 133

Capital markets incentives to disclose information arise when managers believe that such disclosure will influence the firm's value. This view is based on the parallel arguments developed in relation to income smoothing in sections 2.4.3.1, in relation to information risk. Management disclosure can reduce the information asymmetry existing between managers and outsiders and also between sophisticated and less sophisticated investors. By reducing the information gaps that exist between relatively informed and uninformed investors, disclosure can improve the liquidity of a firm's shares. In addition, an increased level of disclosure reduces the cost of capital, as it lowers the information asymmetry between managers as agents and shareholders as principals and therefore reduces the perceived risk of the firm and correspondingly risk premium demanded by shareholders in their required return.

More specifically, risk disclosure can also help in the assessment of the risk profile, estimation of market value and accuracy of security price forecasts (Helliar and Dunne, 2004 and Linsley and Shrieves, 2001). By reducing information asymmetry and estimation risk, risk reporting may decrease the firm's risk premium and decrease the firm's cost of capital (e.g. Linsley and Shrives, 2000). The required risk premium can be altered by the information content of a) recognised derivatives fair value and b) related derivatives disclosure.

3.4.1.1 Utility and information content of recognised and disclosed correlated derivatives information

I infer the information content of balance sheet, income statement and footnotes information, based on value relevance studies. Value relevance empirical studies ascertain whether there is an association between the information being tested and the stock price. They are often applied as a means of inferring the usefulness of financial reporting information. Despite their widespread application, there are possible limitations to the value relevance approach. For example, even if a study does not provide value relevance evidence, it does not necessarily mean that disclosed information cannot be useful. The usefulness of disclosure information could simply be a function of the level of sophistication of users (Hooder, Koonce and McAnally, 2000). Users may simply not be paying sufficient attention to analytical significance of disclosed data. As Ahmed et al (2006) note investors may face incremental processing costs and/or cognitive processing challenges in relation to footnote information. Nevertheless, despite the mentioned limitation, value relevance studies provide a useful pointer of the benefit and the likely demand by capital markets participants of particular information sets.

3.4.1.2 Information content of recognised derivatives fair value

Ahmed et al (2006) provided evidence on the value relevance of SFAS 133. Their study assessed the differential impacts of balance sheet and income statement disclosure of derivatives fair values versus footnote disclosure of derivatives fair values, on firm value. The study provides empirical evidence, showing that balance sheet and income statement disclosure of fair values has a greater impact on firm value when compared to note disclosure of derivatives fair value. The findings of Ahmed et al (2006) suggest that balance sheet and income statements disclosures of derivatives fair value impact on stock price, while footnote disclosure does not. At first glance, the findings of Ahmed et al (2006) implies that capital markets incentives are unlikely to influence the fair value disclosure and therefore such disclosure in the footnotes does not matter both before and after the introduction of SFAS 133. However, their study focused only on the value relevance of fair values located in notes and not of other derivatives information e.g. notional amounts or sensitivity analysis information. Besides there are other studies (Barth, Beaver and Landsman, 1996; Venkatachalam, 1996) that conflict with the findings of Ahmed et al (2006) on fair value footnote disclosure. These studies find fair values of financial instruments disclosed in the notes to be value relevant, hence one cannot conclude that information through the notes has no information content for capital markets participants. The key takeaway from Ahmed et al (2006) is that having derivatives information on the balance sheet and income statement conveyed information to capital markets participants to a greater extent than having the same information in the footnotes.

3.4.1.3 Information content of related derivatives information

Capital markets incentives also apply to the disclosure of derivatives related information. Related derivatives information includes the notional derivatives amount, derivatives contract maturity and linearity, a sensitivity analysis measure such as value at risk (VAR), an identification of the sources of risk exposure, percentage of hedged exposure and level of instruments designated for hedge accounting treatment. Disclosure of this information should have information content for capital markets participants.

There is supporting empirical evidence on the information content of several of these identified components of risk disclosure. Wong (2000) finds that quantitative disclosures about notional amounts of foreign currency derivatives are associated with the information used by equity investors to assess risk exposures. Similarly, Venkatachalam (1996) finds there to be a significant association between the disclosure of notional derivatives amounts and the observed stock price. Linsmeier, Thornton, Venkatachalam and Welker (2002) provide evidence of the information content of FRR48 market risk disclosures. They hypothesize that FRR48 requirements would reduce investor uncertainty and diversity of opinion about the impact on firm value of changes in interest rate, foreign exchange and commodity prices.

They assume trading volume to be a proxy[43] for investor uncertainty and diversity of opinion (due to information gaps between investor groups). They find that when firms disclose FRR48 mandated information about their exposure to market risk factors, trading volume sensitivity to changes in the market risk factors declines, even after controlling for factors associated with trading volume. Jorion (2002) finds that disclosure of VAR (value at risk) of financial instruments across a sample of financial institutions helps predict the variability of trading revenues and therefore VAR measures are useful to capital markets participants. Looking at Oil and Gas companies, Rajgopal (1999) finds that measures of sensitivity analysis as prescribed by FRR48 are significantly associated with the stock return sensitivities to oil and gas price movements. Aggarwal and Simkins (2004) found that market to book ratios have a positive association with derivatives disclosure of fair values in the notes. In the empirical testing in chapters 6 and 7, I construct an index that includes the various components of prescribed disclosure requirements.

3.4.1.4 SFAS 133 and disclosure requirements

As proposed in section 3.3.2, the adoption of SFAS 133 fair value requirements could enhance the information content of information disclosed through the footnotes. This is because SFAS 133 increases the visibility of derivatives losses and gains and this should correspondingly increase the information content of other related derivatives information. For example, fair value gains and losses coupled with risk exposure information and/or information on the level of hedge accounting applied can potentially and more readily convey information on the hedge effectiveness. Due to the increased information of related footnote information after SFAS 133, managers will anticipate increased usefulness of notes disclosure to capital markets participants, due to the observable income and balance sheet effects of derivatives used. As a result they will have greater incentives to disclose.

Hypothesis 3.2

a) **Capital markets incentives influences disclosure of derivatives related information through the footnotes**
b) **Capital markets incentives to disclose are more significant after the adoption of SFAS 133**

[43] Bamber and Cheon (1995) document reliable associations between investor uncertainty /diversity of opinion and the observed trading volume.

3.4.2 SFAS 133 and proprietary costs

Proprietary costs of disclosure embody the adverse impact of disclosure to firms that arise from competitors, creditors or suppliers having access to the disclosed information. For example there could be an adverse impact on product markets arising from competitor actions based on disclosing commercially sensitive information. Hence, firms have an incentive not to disclose any information that managers could expect to compromise their competitive advantage. Healy and Palepu (2001), Leuz (2004) and Verrecchia (1983) point to proprietary costs as providing a key impediment to full disclosure. While capital markets incentives encourage greater disclosure, proprietary cost concerns could deter disclosure and therefore the interaction of these two incentives could influence the observed disclosures (Sridhar and Evans III, 2002).

In the context of derivatives use, the categorisation of disclosure information as proprietary probably stems from financial statement preparers anticipating an adverse impact of such disclosures on their competitive position. Knowledge of what competitors risk exposures and hedging strategies, gleaned through financial statements, could influence a firm's choice of whether to hedge or not. To understand the interaction between firm risk, hedging strategies, disclosure, and the competitor response it is useful to make reference to Nain's (2004) game theoretical, strategic interaction model[44]. This model shows that it is in a firm's interest to

[44] Nain (2004) developed a game theoretical strategic interaction model to illustrate a firm's decision making process on whether to hedge or not within a competitive industry setting. He postulates that firms ought to be sensitive to the use of derivatives within their respective industries. For example, if a firm is in an industry where competitors do not hedge, upward input cost shocks are likely to reduce the aggregate output and thereafter result in a corresponding increase in price within the industry. This is because input cost increases result in the reduced supply of goods or services. This then leads to a situation where there is a natural hedge through a price pass-through mechanism and this negates the need to use hedging instruments as a means of minimising the profit volatility. Under such circumstances where competitors do not hedge, if a firm was to hedge, it would minimise input cost volatility but yet experience undesirable profit volatility.

On the other hand if a firm is in an industry where most of its competitors hedge, then input cost shocks will not trigger corresponding price pass-through as there is no adjustment of aggregate industry output. This is because firm specific input cost increases are offset by changes in value of the hedging instrument. As a result, individual firms do not reduce their supply and there will be no corresponding reduction in the aggregate output. In such an industry setting, it is in the interest of the firm to hedge because the failure to hedge in an industry with widespread hedging practices can result in profit volatility when there is an input cost shock. This contrasts with the scenario of a firm undertaking unilateral hedging in industries with limited hedging practices, where in such a case it is the hedging choice that causes profit volatility. In addition to the game theoretical model, Nain (2004) provides supporting empirical evidence showing that exchange rate pass through depends on the extent of hedging within the industry. Consequently, individual firms are likely to be interested in their competitors hedging strategies while expecting their hedging policies to be subject to scrutiny from competitors.

A corollary of Nain's (2004) strategic interaction model is that firms are likely to pursue safety in conformity to practices within their respective industries and that hedging is likely to be either non existent or widespread in different industries. The underlying premise of this corollary is that firms will not adopt a differentiated hedging approach to its competitors as a means of managing either input cost or price volatility.

pursue a similar hedging strategy to that of its competitors within the industry. A corollary of firms pursuing similar hedging strategies is that it is also to their advantage to fully disclose their hedging strategies and risk exposures. However, Nain's (2004) model is limited as it works if all firms are price takers (i.e. they do not have pricing power) and would appear not to be valid for firms with pricing power. Such type of firms can opt to pursue differentiated hedging strategies in order to obtain competitive advantage and in turn they would likely not disclose their hedging strategies so as to make it difficult for competitors to replicate. As an example of firms of the offsetting tension on whether to disclose or not, Chalmers and Godfrey (2004) note that mining companies which normally face greater currency and commodity price risks, relative to other industries, have incentives not to reveal their hedging strategies to their competitors. On the other hand because the risk exposures of oil and gas companies tend to be well known, they would be expected to be transparent about their hedging strategy.

3.4.2.1 SFAS 133 and proprietary costs

An explanation of how SFAS 133 could influence the proprietary[45] cost concerns related to derivatives disclosure is provided by Dye (1986). He postulates that an increase in mandatory disclosure levels ought to result in an increase in related proprietary and non-proprietary disclosure. His reasoning is that if the disclosure of non-proprietary information is mandatory, there is reduced benefit from withholding related proprietary information. On the other hand, if proprietary information is included under mandatory disclosure requirements, the impact will be that all competitor firms will also have to disclose their proprietary information and thus at an aggregate level the adverse impact of disclosure is negated. Thus it would eliminate the proprietary cost of disclosing related information.

The adoption of SFAS 133 makes derivatives instrument, fair value gains and losses, more visible to financial statement users. These reported gains and losses can convey information about either the presence of underlying risk exposures or risks related to the derivatives contracts. The implication of Dye's (1986) postulation is that the greater visibility of derivatives fair value gains or losses of derivatives makes corporate managers less inclined to be opaque on their unhedged or hedged risk exposures. On this basis I expect that the adoption of SFAS 133 should increase the disclosure of related derivatives information, which hitherto might have been considered proprietary. I am not aware of any empirical

[45] Risk information e.g. risk exposure and hedging strategy (e.g. whether a firm is fully or partially hedged) can be considered proprietary in situations where such disclosure triggers unfavourable competitor or supplier responses. Suppliers can include providers of financial capital. Risk disclosure can alter the perceived riskiness and consequently the cost of capital.

evidence of the impact of proprietary costs on derivatives related disclosure after the adoption of SFAS 133.

Hypothesis 3.3

a) **Proprietary cost concerns influences the disclosure of derivatives related information through the footnotes**

b) **Proprietary cost concerns are lower after the adoption of SFAS 133**

3.5 Other determinants of disclosure

3.5.1 Organisational legitimacy and Managerial reputation

Chalmers and Rogers (2004) assert that firms disclose information so as to safeguard their reputation. A sustained reputation confers the legitimacy necessary to support their business model in the long term. This line of argument differs from capital markets and proprietary cost incentives where disclosure is based on the direct economic costs and benefits of disclosure. Chalmers et al's (2004) theoretical framework, drawn from organizational theory, is based on a blend of institutional and legitimacy organisational theories. Legitimacy is defined as the generalised perception that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions. Institutional organisational theory asserts that legitimacy is achieved by firms conforming to current conventional practices. Applying this framework to derivatives disclosure, Chalmers et al (2004), looking at Australia firms, find evidence that when confronted with societal pressures to make derivatives more transparent, managers responded in a manner that can be explained by legitimacy and institutional theories and the maintenance of the managers' and their firms' financial reporting reputations. They conduct their study over the 1992-1996 period and in their modelling of managerial reputation and legitimacy concerns; they use variables indicating whether a firm has a professional affiliation, was audited by the then Big 6 accounting firms, and is a member of the G 100. They find that concerns about firm reputation result in higher levels of disclosure.

Trueman (1986) affirms the legitimacy and firm reputation maintenance perspective, albeit focusing on individual manager reputation concerns. The author contends that there are incentives for talented managers to increase disclosure so as to differentiate themselves. Disclosure levels can influence investor perception of managers' ability to anticipate and respond to future changes in the firms' economic environment. Extending this reasoning to derivatives disclosures, I expect that managers will provide high quality disclosures so as to convey their sophistication and ability to effectively manage risk exposures. Hence, the talent signalling perspective would predict that more talented managers would disclosure more than those who are less talented. For modelling purposes, I assume organisational legitimacy and managerial reputation to be closely related.

3.5.2 Managerial compensation

Executive compensation is another determinant of disclosure. Executive compensation can influence managers' risk aversion and this can influence how managers disclose information. Chapter 2, sections 2.3.3 and 2.4.5.1, show that the agency costs arising from executive compensation, can influence corporate managers' desire to smooth firm performance through either derivatives use or discretionary accruals. The same motivation can influence their disclosure of derivatives related information with a view of influencing the perceived riskiness of their firms. Along similar lines, Healy and Palepu, (2001) argue that compensation value maximisation can influence disclosure. Managers with significant levels of stock based compensation have incentives to disclose so as to bolster the liquidity and correct any perceived under-valuation of their stock portfolio. Managers can also be in a position where they do not want to be constrained by restrictive insider trading rules and therefore may disclose all potentially price sensitive private information that they hold prior to trading of their stock holding.

As described in earlier chapters, sections 2.3.3 and 2.4.5.1, managerial compensation typically comprises of stock based compensation and stock options in addition to cash compensation. The overall value of stock compensation and in-the- money stock options tends to be sensitive to price variation, namely the delta of compensation dominates. When delta dominates stock price and firm performance volatility become undesirable. On the other hand, out-of-the-money options can induce a desire for higher volatility as this increases the value of the stock options (Supanvanij and Strauss, 2006). In other words when vega dominates managers may welcome uncertainty and volatility of firm performance.

There is limited empirical evidence linking managerial compensation and derivatives disclosure. Aggarwal and Simkins (2004) find that firms where managers have higher proportions of stock options tend to have lower levels of derivatives disclosure. They infer that this is evidence of agency costs restraining disclosure. Although they do not explicitly measure vega and delta sensitivities, it is likely that vega dominated their sample or that the sample of stock options were largely out-of-the- money.

It is necessary to qualify that the described relationship between managerial compensation and derivatives disclosure is predicated on derivatives being used for risk management purposes. If a firm is engaging in speculative use of derivatives, enhanced disclosure will only result in greater perceived riskiness. On the assumption that it is difficult to readily observe upfront, whether derivatives are used for hedging or speculation, it is hard to predict the direction of the relation between compensation and disclosure. Nevertheless, similar to other studies (Aggarwal and Simkins, 2004), managerial risk incentives are included as a determinant of disclosure.

3.5.3 Litigation cost

Disclosure of information can occur so as to avoid negative litigation consequences. Companies could disclose information due to the fear of legal sanctions should they provide either untimely or inadequate disclosures (Skinner, 1994). Unlike capital markets incentives, litigation cost concerns could deter the provision of forward looking information due to the risk of measurement error and low credibility of such information.

3.5.4 Corporate Governance

Chapter 2, section 2.4.6.1, discussed how corporate governance can influence earnings management reporting practices. The anticipated impact of an effective oversight role on firms reporting practices can be extended to risk disclosure. Stringent corporate governance structures can lead to higher levels and quality of disclosure. Another factor that could influence corporate governance and disclosure quality in the post-SFAS 133 period is the Sarbanes Oxley legislation. The Sarbanes Oxley Act (SOX) was enacted in 2002 in response to a number of high profile accounting related failures such as Enron and WorldCom. The legislation aimed to improve the corporate governance regime and internal control environment[46], and consequently to improve the overall financial reporting quality (SEC 2003 and Leech, 2005). On corporate governance, the Act addresses board composition and responsibilities, auditor independence, auditor review of internal controls and CEO and CFO certification of financial statements. The improvement in disclosure involve reporting off-balance-sheet transactions and contractual obligations, communicating information that has a material impact in a timely fashion and assessing the adequacy of internal controls (Akhigbe, Martin and Newman, 2008).

Although SOX does not prescribe specific quantitative risk disclosure requirements, it can be inferred that the enhancement of financial reporting quality will include the provision of more and better risk disclosures. SOX could also induce firms to disclose negative information, in the context of derivatives use. This could include information on risk exposures and speculative use of derivatives. Akigbhe et al (2008) find evidence to the effect that SOX led

[46] Section 404 requires companies to include an assessment of the effectiveness of the internal control over financial reporting and an auditors' attestation of the assessment in their annual reports. Section 302 requires a report on any changes in the internal control

to an increase in the perceived riskiness of firms by investors. This study controls for SOX through inclusion of the year dummy for when the change was enacted (i.e. 2002). Similar to Aggarwal and Simkins (2004), this study includes a proxy for corporate governance as a determinant of disclosure (i.e. the level of institutional ownership and corporate governance index). More discussion of this is included in 2.4.6.1.

3.5.5 Firm performance

Some theoretical models (Verrecchia, 1983) propose that good performance ought to result in increased disclosure, as firms tend to withhold negative news and disclose positive news. However other studies suggest that while performance is related to disclosure, the nature of the relation is unclear (Miller, 2002). Miller (2002) studies a set of disclosures and how these relate to earnings performance. He studies disclosure patterns as firms experience earnings increases, as earnings performance nears its end and when earnings are in decline. He finds unambiguous evidence that firms increase their disclosure levels as earnings increase. The trend is somewhat ambiguous when the earnings increase ends. During such a phase, firms with strong performance increase their long-term related disclosures while those with poor performance focusing on short-term oriented disclosures. At points of earning decline, there is a decrease in the level of disclosure.

Similar to Miller (2002), Leuz (2004) asserts that the relation between profitability and disclosure is complex and ambiguous, as it depends on the nature of the competitive landscape and the potential proprietary costs that could result. In a situation of high barriers to entry, firms are likely to disclose more than if there were lower entry barriers. Consistent with the above mentioned disclosure studies (Leuz, 2004); firm performance is included as a determinant of disclosure.

3.5.6 Firm size

Derivatives use and derivatives accounting require highly skilled personnel and sophisticated supporting technological platforms and internal processes. Leuz (2004) asserts that firm size is expected to be positively associated with disclosure levels. This is because size provides firms with economies of scale in relation to bearing the costs of disclosure i.e. costs of producing and disseminating information (Nikolaev and van Lent, 2005 and Leuz, 2004). However, larger firms also typically have a larger institutional and analyst following and such investors are better placed to derive potential cost savings for private information acquisition. This can result in large firms being in a better position to hide their proprietary information

(Leuz, 2004). Therefore, the relation between firm size and observed disclosure is ambiguous. In addition, firm size can also be a proxy for both institutional legitimacy and reputation.

3.6 Conclusion

This chapter has outlined the theoretical framework of the impact of SFAS 133 on disclosure, alongside proposing testable hypotheses. The main contribution is the focus on the interaction between SFAS 133 fair value recognition and measurement, and disclosure requirements, combined with an analysis of the incentives that influence disclosure. This line of inquiry will illuminate whether SFAS 133 fair value requirements and increased complexity resulted in footnote disclosure becoming a complement or whether there is still a substitution effect. It builds on the work of Hamlen and Largay (2005) that focuses on the SFAS 133 impact of a small sample study (i.e. 30 Dow Jones companies) over a limited time period but does not factor in the interaction of incentives and disclosure levels. It is an enhancement of Aggarwal and Simkins (2004), where the focus is on incentives in the context of SFAS 107 which only required fair values to be disclosed through the footnotes. It also extends the work of Dunne, Helliar, Power, Mallin, Ow-Young and Moir[47] (2004) who conducted a similar study in the UK context under FRS 13. However, FRS 13 did not have fair value recognition and measurement requirements.

On other derivatives footnote incentives, apart from the SFAS 133 recognition and measurement requirements, I primarily investigate the impact of capital markets and proprietary cost incentives as these incentives can be influenced by SFAS 133. The incentive postulations are premised on the increased information content under a regime that requires fair value disclosures and reduced proprietary nature of footnote disclosure information, after SFAS 133. I further control for other determinants such as managerial reputation, compensation based incentives, corporate governance (including SOX), firm performance and geographic diversification. The development of this chapter continues through chapters 6 (data, sample and research design) and 7 (empirical findings), where I also include discretionary accruals as one of the variables similar to other studies.

[47] These authors found that FRS13 resulted in a step change in the financial risk disclosure

PART 2- RESEARCH METHODOLOGY AND EMPIRICAL FINDINGS: SFAS 133 AND INCOME SMOOTHING CHOICES

4 DATA, SAMPLE SELECTION AND RESEARCH DESIGN

This chapter outlines the research methodology applied to test the impact of SFAS 133 on income smoothing choices. The empirical testing consists of a combination of parametric and non parametric univariate statistical and multivariate regression analysis of the data. The statistical tests are conducted using Stata 10 IC and SAS software. The rest of the chapter is structured as follows:

1. High level conceptual model specification (section 4.1)
2. Data (section 4.2)
3. Variable specification (section 4.3)
4. Detailed model specification (section 4.4)
5. Appendix of detailed variable definition (section 4.6)

4.1 High-level conceptual model specification

The literature review in chapters 2 has yielded several testable hypotheses. Below is a recap of the formulated hypotheses, alongside a description of the high-level conceptual testing model.

Hypothesis 2.1*: The adoption of SFAS 133 leads to the reduced use of derivatives*

The primary univariate tests conducted for this hypothesis are

- Difference in means and medians of derivatives use between pre-SFAS 133 and post-SFAS 133 observations of derivatives users.
- Pair-wise difference in means for firms with both pre- and post- SFAS 133 observations

The multivariate testing is based on the below conceptual model

Derivatives use = f (SFAS 133 dummy variable, accrual use, interaction of accrual and SFAS 133, other control variables).

Hypothesis 2.2*a: The adoption of SFAS 133 leads to an overall increase in discretionary accruals.*

Hypothesis 2.2 *b: Cash flow hedge accounting influences the level of discretionary accruals.*

The univariate tests conducted are:

- Difference in means and median, t-test and wilcoxon test, between pre and Post-SFAS 133 observations.
- Pair-wise test of discretionary accruals for firms with observations across pre- and post- SFAS 133 periods.

The multivariate conceptual formulation is as shown below

*Discretionary accruals = f (derivatives use, SFAS variable, derivatives use*Post-SFAS 133 variable, cash flow hedge accounting variable, control variables)*

Hypothesis 2.3*a: Hedging derivatives and discretionary accruals are substitutes*

Hypothesis 2.3 *b: The adoption of SFAS 133 influences the substitution relationship*

This is based on the same model as Hypothesis 2.1 and Hypothesis 2.2, but it also includes interaction variables of SFAS 133 and discretionary accruals/derivatives coefficients when they used as independent variables.

4.2 Data

This section reviews the sampling and data sources

4.2.1 Sample period

The hypotheses are tested using data from the 1999 to 2003 period. Due to some firms either missing data or not using derivatives during certain years of the sample period, the data is essentially unbalanced panel[48] data. The application of the year 2000[49] as the cut-off date is consistent with other empirical studies such as Ahmed, Kilic and Lobo (2006), Supanvanij and Strauss (2006), Park (2004) and Singh (2004) who consider the Post-SFAS 133 period to commence from the year 2001 in their model specification.

This research focuses on US data. The sample firms were selected from the 1999-2003 period in order to study the impact of SFAS 133. The focus on US data is due to the relatively rich data history available, related the disclosure of derivatives use before and after SFAS 133. SFAS 133 was introduced with effect from fiscal year starting after June 15th 2000. On the other hand, the equivalent under IFRS, IAS 39 was effective for European (including UK) companies with effect from fiscal year starting January 2005. The reason for focusing on the US is because of the limited data history of European firms due to the relatively recent introduction of IAS 39.

[48] Kennedy (2004) describes several advantages of using panel data. Panel data can be used to deal with unobservable heterogeneity across sample firms. This is firm specific variation that is constant over time. In the context of this study, unobservable heterogeneity could result due to differences in dimensions of human capital, such as treasury expertise, managerial talent and reputation, which influence the use of derivatives. Panel data captures variation across time. For instance, the point of uptake of SFAS 133, by firms can influence the use of derivatives, across time horizons. Panel data creates more variability, through combining variation across firms with variation over time, alleviating multi-collinearity problems. Finally, panel data can be used to examine issues that cannot be studied using time series or cross sectional data alone. Cross sectional data do not provide any information on time dynamics. Time series data need to be very lengthy to provide good estimates of dynamic behaviour.

[49] A potential limitation of the sample period is that the 1999 to 2000 period was a transition period and there could be early adopters during the transition period in our sample who applied SFAS 133.

4.2.2 Sample size specification

The sampling criterion is outlined in Table 4.1. The sample consists of large firms with market capitalisation greater than $1billion and sales greater $1 billion. The focus on large firms is because they are likely to be users of derivatives contracts as they can derive the economies of scale through their capacity to set up sophisticated and expensive treasury departments. The selected firms were listed on either the NYSE or NASDAQ. Sample firms had foreign sales greater than 30% of total sales as such firms would likely have significant risk exposures that necessitate the use of derivatives. The approach of selecting samples for derivatives related studies based on the criterion of an anticipated exposure is common in empirical studies (e.g. Barton, 2001). Similar to several studies, the following firms were excluded from the sample:

- Regulated firms such as financial services, as the incentives for derivatives use in these industries would differ significantly given that derivatives are extensively used for trading purposes rather than risk management.
- Foreign firms listed in the US that did not comply with US GAAP. The focus is on SFAS 133 and international firms had a different implementation date of the equivalent standard (i.e. IAS 39).
- Firms without matching key control variable data (accruals, derivatives use, managerial risk incentives).

The sampling criteria yielded 253 firms with 850 firm-years of data, out of which 681 (80%) firm-years (218 firms) had data showing derivatives use. The selected sample is used to test both research questions on the impact of SFAS 133 on a) income smoothing choices and b) footnote disclosure of related derivatives information. Of the 218 firms, 49 (22%) use derivatives through the entire sample period, 53 (24%) use derivatives for 4 years, 33 for 3 years, 42 for 2 years and 41 for 1 year (see Table 4.1-Panel C). This study with a sample of 218 hedging firms and 69 non hedging firms and 850 firm-year observations, compares well with similar empirical studies. Quoted below are a few examples of similar studies:

- Zhang et al (2009) use 1105 firm-year of observations (477 firms) with data collected from the 1992-1996 period;
- Barton (2001) uses 912 firm-year observations (312 firms) with data collected from 1994-1996 period;
- Supanvanij and Strauss (2006) sample consists of data collected from 1994 –2000 period and uses 138 hedging firms and 60 non hedging firms.

4.2.3 *Data sources*

I collected data from multiple sources. These include:

- Derivatives data: This data is hand collected. It is sourced by downloading 10 K financial statements from SEC's Edgar Thomson Research website and extracting from these the derivatives usage data. Derivatives users are identified by searching the financial documents for key words like risk management, hedging, derivatives, options, forwards/futures and swaps.

- Accounting variable and firm attributes data: Sourced from Standard and Poor's Compustat database. Using these data, I estimated several key variables such as the discretionary accruals and abnormal investments.

- Executive compensation: Standard& Poor's Execucomp database lists compensation details of constituent firms in the Standard &Poor's indices. The constituent firms are large and listed firms. Using Execucomp data, I calculated key variables such as the vega and delta of executive compensation package.

Table 4.1 Sample details

Panel A: This table delineates the sampling criteria for US listed (NYSE and NASDAQ) firms selected for the 1999-2003 period. Accounting and firm control variable data was collected from Compustat database, executive compensation data was extracted from Execu-Comp database. The derivatives data was hand collected based on downloads from SEC Edgar Thomson Research database.

Sampling criteria	Firm-year observations	Rationale/Comments
Observations (market value >$1 billion and sales> 1 billion)	7185	Large firms are likely to use derivatives. Demonstrated on ISDA 2003 website survey and empirical papers make same assumption (Rogers, 2002; Barton,2001)
Observations with foreign sales > 30% of sales	2192	Extract firms with ex ante foreign exposure same as Geczy et al(1997)
Observations after excluding financial services and utilities	2063	Financial service firms and utilities have regulatory incentives for risk management. Different writers (Cheng and Warfield, 2005; Burgstahler et al, 2003) have same approach
Observations after excluding ADR listed firms	1479	ADR listed firms comply with different accounting standards (IAS rather than US standard)
Observations with Form 10-K disclosure on derivatives usage	850	850 observations from 253 companies. These are firms reporting on whether or not they use derivatives use with the required control variables. These includes derivatives users and non users
Derivatives users	681	681 observations from 218 firms that reported derivatives use
Derivatives users	551	551 observations from 193 firms that reported notional amounts.

PANEL B (Breakdown by derivatives use)

Non derivatives user observations	169
Derivatives user observations	681
Total	850

Firms with derivatives usage data	218
Add Firms without derivatives usage data	69
	287
Less Firms with and without derivatives usage data across different years	34
Total number of firms	253

Panel B: Continued

Firms that increased derivatives use after SFAS 133	66
Firms that decreased derivatives use after SFAS 133	62
Firms with no change in derivatives use across both periods (non users)	19
Total firms with observations across pre- and Post-SFAS 133	147
Use derivatives only after SFAS 133	58
Use derivatives only before SFAS 133	36
Total number of firms that at least use derivatives	**241**
Firms missing notional values	12
Total	253

PANEL C (Breakdown of derivatives and non derivatives users)

Combined sample firms (i.e. users and non users of derivatives)

Number of firms[50]	72	67	36	36	42	253
Number of years with observations	5	4	3	2	1	
Firm-year observations	360	268	108	72	42	850

Derivatives users firms

Number of firms	49	53	33	42	41	218
Number of years with observations	5	4	3	2	1	
Firm-year observations	245	212	99	84	41	681

Non derivatives user firms

Number of firms	6	9	15	19	20	69
Number of years within sample period	5	4	3	2	1	
Firm-year observations	30	36	45	38	20	169

[50] The number of firms with 1,2,3,5 observations in the combined sample of hedgers and non hedgers differs from the sum of those of only hedge and non hedge samples. This can be explained by 34 firms that fall into both categories. Hence for example a firm with 3 years of data as a hedging firm and 2 years as a non hedging firm will migrate to being a firm with 5 years of observations under the combined sample.

4.3 Variable Specification

4.3.1 Focal variables

4.3.1.1 Hedging Derivatives

The most appropriate measure of derivatives use for risk management would be the ratio of positions in derivatives measured by notional amount to the size of risk exposures. However, risk exposure information tends to be unobservable due to the inadequate and inconsistent levels of disclosure across companies. The selected measure for derivatives usage is the scaled gross notional value (Gross notional value of derivatives/ Total Assets). The use of notional amount is an improvement from many studies that simply use a dichotomous dummy variable to differentiate derivatives users from non users. Judge (2006), Bartram, Brown and Fehle (2009), Mian (1996) and Nance, Smith and Smithson (1993) all make use of a binary variable for derivatives use.

The main argument put forward for the use of gross notional value is that there is a strong relationship between contract size and underlying risk exposure (Nguyen and Faff, 2002; Henshel and Kothari, 2001; Supanvanij and Strauss,2006). It could be argued that gross notional value does not factor in netting effect of derivatives assets and liabilities and as a result, could be considered to be overstating the liquidation value of the held derivatives instruments. Despite this shortcoming, the gross notional value is a better reflection of the quantity and underlying exposure of the derivatives contracts that management assumes. For example, for our purposes, a zero net notional value reflected from offsetting long and short derivatives positions, could potentially erroneously be misinterpreted as being equivalent to the non usage of derivatives. Gross notional values would however reflect the volume of derivatives contracts undertaken by management. It is used by several authors (Barton, 2001; Allayanis and Ofek, 2001; Singh, 2004; Ahmed et al, 2006; and Supanvanij et al, 2006). There are other studies that use net notional value to reflect offsetting contracts (Graham and Rogers, 2002; and Singh and Upneja, 2007)

Notwithstanding the improvements made through SFAS 133, it still remains difficult to accurately and consistently differentiate between risk management and speculative derivatives use. Pre-SFAS 133 there was inadequate disclosure through either balance sheet and income statement recognition and measurement and notes disclosure. After the introduction of SFAS 133, derivatives that do not qualify for the hedge accounting treatment are deemed to be speculative but these could include hedging instruments that simply do not qualify due to the stringent hedge accounting requirements. In addition, there is very poor disclosure of the notional amounts of derivatives that do or do not qualify for hedge accounting treatment and therefore it remains difficult to identify speculative use of derivatives (Zhang, 2009).

In this study, I assume that reported derivatives use is for risk management. Hence, the reported notional amount is treated as a proxy for risk management. Although as noted above, this could fail to recognise when derivatives are used for speculation and thus could lead to the overstatement of derivatives application for hedging purposes. However, this error exists even with other studies in existing empirical literature as noted by Bartram et al (2009). Using a sample of only non financial institutions, increases the likelihood that derivatives are indeed used for hedging. For the rest of the study, derivatives use is assumed to be synonymous with hedging derivatives.

4.3.1.2 Discretionary accruals

There are three types of empirical proxies applied when investigating discretionary accruals. These include:

- Specific accruals such as loan loss provisions, deferred tax charges and goodwill impairments;
- Aggregate accruals measures; and
- Directional earnings management: proxies: Proxies for the distribution[51] of earnings around a benchmark level such as zero earnings or analyst forecast

Relative to aggregate discretionary accruals estimates, specific accruals (e.g. loan loss provisions) have the advantage of not requiring guesstimates and thus are less prone to estimation error. However, taking a single type/s of accruals as a proxy for discretionary accruals, fails to capture all possible accruals employed by managers. On the other hand, directional earnings management proxies are more suited to studies that focus on target earnings level rather than income smoothing questions, for example those that represent how accruals are influenced by bonus targets. For these reasons, I consider it appropriate to mainly focus on an aggregate accrual

[51] For example use of accounting discretion to avoid reporting negative earning surprises can be measured by frequency around a benchmark level.

estimate as the proxy for income smoothing. This proxy is widely used approach in earnings management empirical literature, these include Jiraporn et al, 2008 and Barton 2001.

Determination of aggregate discretionary accruals

Total accruals can be decomposed into discretionary or abnormal accruals (i.e. estimates that require managerial judgement but susceptible into managerial manipulation e. bad loan estimates) and non discretionary accruals (normally based on transactions and not relying on managerial judgements e.g. initial recognition of credit sales based on actual sales). Due to the high incidence of accrual accounting decisions that are based on managerial estimates, the aggregate level of discretionary accruals is unobservable and thus can only be estimated. The Jones (1991) model is the most frequently applied approach in recent capital markets based financial reporting research as it has been found to have the highest power of test[52] (Dechow, 1996). DeChow et al (1995) did a power of test simulation of the different models and found that the Jones (1991) model exhibited the most power in detecting discretionary accruals. More recently in empirical accounting research, variants of the Jones (1991) model have been widely used. Similar to Barton (2001), Klein (2002) and Jiraporn et al (2008), I use a version of Jones (1991) model. In the appendix to this chapter (section 4.6.1), I explain in detail the determination and refinements of the modified accrual proxy.

Alternative discretionary accrual variable

There have been various other empirical proxies for discretionary accruals. These include the Healy (1985) model[53] which assumes that the level of non discretionary accruals during a period is the same as the total accruals in the preceding accounting period; the Dechow and Sloan (1991) model[54] which postulates the existence of a representative level of accruals within an industry group and thereafter determines the representative level based on the median total accrual of firms within the same industry. Other studies (Singh, 2004; and Huang et al, 2009) have used the ratio of standard deviation of firm's quarterly earnings before abnormal accruals divided by the standard deviation of quarterly earnings.

[52] Power of test, simply means that it has the highest predictive ability as it is least likely to classify normal accruals as abnormal accruals. In other words, it is the least prone to making classification error

[53] NDA=TACC prior period

[54] $NDA_t = \alpha_1 + \alpha_2$ median (TA_t), Median (TA_t) – the median value of total accruals scaled by lagged assets for all non-sample firms in the 2 – digit SIC code

As an alternative, I use Dechow and Sloan (1991) model that is based on measuring the normal accrual level as the median of total accruals scaled by total assets, within a 4 digit SIC industry classification. Total accruals is derived by taking the difference between net income before extraordinary items and the operating cash flow of firms, as reported in the Compustat database. I expect more precision in an estimate based on 4 rather than 2 digit SIC code, expecting that firms' within such a category are likely to have more closely resembling characteristics.

4.3.1.3 SFAS 133 dummy

I use a dummy variable to differentiate the pre- and post-SFAS 133 periods. Pre-SFAS 133 is 1999 to 2000 while post-SFAS 133 is 2001 to 2003.

4.3.1.4 Cash flow hedge accounting dummy

As discussed in the formulation of Hypothesis 2.2b, SFAS 133 has a conditional impact on earnings volatility and by extension earnings management, depending on the application of cash flow hedge accounting requirements. Cash flow hedge accounting is allowed under SFAS 133 and results in the deferral of gains and losses through the OCI statement and this lowers current period net income volatility (see section 2.6.3.2). Therefore, I expect that the incremental derivatives accounting earnings volatility will depend on the extent to which derivatives users elect to apply the cash flow hedge accounting treatment.

I include a dichotomous variable to identify whether or not a hedging firm uses cash flow hedge accounting. The application of a dichotomous variable rather than continuous variable is due to the poor and inconsistent disclosure of notional amounts related to cash flow hedge accounting. Many firms disclose that they use cash flow hedges, but fail to provide the corresponding details of their underlying risk exposures. In addition, with the deferral and recycling of cash flow hedge accounting gains and losses, alongside the netting of reported amounts, it is difficult to determine a suitable alternative proxy for the application of cash flow hedge accounting.

4.3.2 *Other independent control variables for both derivatives use and discretionary accruals*

4.3.2.1 Real Earnings Management

In order to smooth earnings, managers can alter their operating and investment decisions as discussed in 2.4.2.1. The use of operating and/or investment decisions to smooth earnings is also referred to in the literature as real earnings management. I expect there to be a negative and significant association between real earnings management and discretionary accruals as they can be substitutes towards the goal of income smoothing.

I introduce a novel proxy to measure abnormal investment levels. The determination of abnormal investment is based on initially estimating the expected investment level for each firm-year observation. The determination of an expected investment level is based on the assumption that firms within the same industry category, should have similar levels of investment, and that only certain differentiating firm attributes should drive within industry variation. This differentiating firm attributes include the increase in sales, the tangible asset intensity and sales growth percentage. This approach is similar to that taken to determine the discretionary accruals estimate by Jones (1991). Cohen and Zarowin (2008), also apply this type of approach to determine abnormal cash flow from operations. They determine the normal cash from operations, based on regressing discretionary expenses and production costs within an industry grouping.

Investment level is measured as capital expenditure divided by sales. Expected or normal investment is determined using Equation 4.1. This equation is applied to firms within the same industry category (i.e. 2 digit SIC category). The normal investment is the predicted value for each firm and the abnormal investment is the difference between the observed investment and normal investment. The absolute/unsigned value of the abnormal investment is then applied as a proxy for income smoothing through investments. A non-directional proxy is appropriate given that the focus is investments used to smooth income.

Equation 4.1

$$\text{Capital expenditure/Sales} = \theta_1(1/TA_{it-1}) + \theta_1(PPE_{it}/TA_{it-1}) + \theta_2\{(\Delta REV_{it} - \Delta REC_{it})/TA_{it-1}\} + \theta_3(\text{Sales growth rate}_{it}) + \upsilon_{it}$$

- TA_{it-1} is the beginning of period total assets

- PPE is gross property, plant and equipment, included to control for normal depreciation expense
- (ΔREV_{it}- ΔREC_{it})- change in cash sales

4.3.2.2 Shareholder value control variables

As discussed in sections 2.3.1 and 2.4.4.1, shareholder value maximisation incentives can influence the decision to smooth earnings. These include a) reducing expected costs of financial distress b) lowering information asymmetry and c) reducing the expected tax liabilities. I expound on the related variables below:

Reducing expected costs of financial distress

The probability of and loss associated with financial distress is positively associated with the level of borrowing undertaken by a firm, as discussed in section 2.3.1.1. There is widespread application in empirical literature of different proxies for leverage and financial distress. Similar to Judge (2006) and many other studies, I use debt/total assets as the leverage proxy. As an alternative, I use debt service coverage (Debt/ Operating cash flow), due to the fact that it is commonly applied by credit market investors to proxy for the level of indebtedness and thereafter the likelihood of a firm being in financial distress.

Graham and Rogers (2002) note that proxies that are based on leverage could pose problems of endogeneity.[55] Despite this situation, I treat leverage as an exogenous variable as it is mainly a control variable and not a core variable in the testable hypothesis. Treating it as an exogenous variables helps to keep the models tractable. It is worth noting that leverage can also be a proxy for the incentives to smooth earnings so as to avoid covenant violations (Chalmers et al, 2004). It too could be a proxy for underlying interest rate exposure (Judge, 2006).

Information asymmetry

As discussed in sections 2.3.1.3 and 2.4.3.1, there is lower perceived risk and uncertainty associated with smooth earnings. As a result, firms with smooth earnings are likely to be more frequently traded, liquid and correspondingly more closely followed by a larger number of analysts, as they likely have lower forecast error. The variable used to measure the liquidity is the

[55] Endogeneity arises as the debt level increases probability of financial distress and necessitates the need for financial hedging. Financial hedging, on the other hand, reduces the volatility of cash flows and earnings and this reduces the perceived risk of the firm and results in increased debt capacity as external lenders are more willing to lend to firms that they deem to be less risky.

natural logarithm of trading volume of shares. The more traded a firm is, the lower is the level of assumed information asymmetry. I implicitly assume that the frequency of trading of a firm's shares is linked to the level of coverage by institutional investors and thereafter the information asymmetry between informed and uninformed investors. Linsmeier et al (2002) and Bamber and Cheon (1995) have applied the proxy in the same fashion. Bamber and Cheon (1995) document reliable associations between trading volume and investors' uncertainty and diversity of opinion. However, I take cognisance that trading volume is potentially a noisy proxy for information asymmetry between investors for various reasons. To begin, Linsmeier et al (2002) note that investors' trade for reasons other than their uncertainty or diversity of opinion. For example they could trade for the purposes of rebalancing their portfolios or for liquidity reasons.

Second, trading volume could also be a proxy for firm size. Therefore I conduct diagnostics tests (i.e. variance inflation factors (VIF)) to ensure that there is no multicollinearity related estimation error, and where appropriate I exclude either this or the alternative firm size variable from the testing models.

Reducing expected tax liabilities

Section 2.3.1.2 discusses the convexity of tax function and how this influences the expected tax liabilities. A commonly used measure of the tax function convexity is the scaled tax losses carry forwards Tax Loss Carry Forwards/Total Assets. Tax loss carry forwards are used as they provide tax shields; this is because they are assumed to be extending the convex portion of tax function (Stulz, 1996; and Graham and Rogers,2002).

4.3.2.3 Managerial risk incentives

Vega and delta

Guay (1999) proposes the use of the sensitivities to volatility (vega) and stock price (delta) as proxies for managerial risk incentives. The description of the method used to calculate vega and delta is included in the appendix – section 4.6.1 and the conceptual discussion is in section 2.3.3.

An increase in the vega of the stock option component of compensations, makes a firm's financial performance volatility to be desirable. The implication of convex pay- performance sensitivity is a reduction in managerial risk aversion. When managers are less risk averse, earnings volatility in fact becomes desirable, from the manager's standpoint. This in turn should lead to reduced hedging (Supanvanij et al, 2006). It should also lead to reduced use of discretionary accruals or derivatives use as the incentive to smooth earnings decreases. An increase in delta should lead to increased managerial risk aversion. Guay (1999) has proposed the use of delta and this has been a common measure of risk avoidance incentive in recent empirical papers (Supanvanij and Strauss, 2006; Rogers, 2002; Core and Guay 2002; Knopf, Nam and Thornton 2002).

Vega and delta are scaled by cash pay to facilitate econometric modelling. As Rogers (2002) notes the absolute dollar vega and delta are also a function of firm size, given that larger firms are able to grant more options. I use variables that control for firm size as one of the control variables. Hence scaling is necessary to minimise the problem of multi-collinearity caused by the correlation of independent variables.

Executive cash pay

As discussed in section 2.3.3.3, the greater the cash compensation that can be invested outside the firm, the more likely it will be that the CEO holds a diversified wealth portfolio, and the lower the risk aversion that he/she is likely to bear. The current period cash compensation is a suitable proxy for risk aversion, as it represents the proportion of compensation demanded by managers, which is not sensitive to stock price volatility (Coles, Daniel and Naveen, 2005).

4.3.2.4 Corporate governance

As discussed in sections 2.3.4.1 and 2.4.6.1, corporate governance mechanisms influence both prudent use of derivatives and the level of accounting discretion. I apply the percentage of institutional ownership as did Huang et al (2009) and Rogers (2002). I also use the managerial share ownership percentage and a dummy variable for executives with interlocking relationships. Inclusion of corporate governance variables is an improvement to the literature because several similar studies omit this type of variables. Both Barton (2001) and Singh (2004) do not control for corporate governance.

While I control for corporate governance, I have concerns about the quality and completeness of such data and recognise that this could be a source of measurement error or even still, the models could retain problems associated with unobservable heterogeneity related to corporate governance variables. The corporate governance environment consists of multiple dimensions and modelling specific attributes such as institutional ownership can fail to capture the overall corporate governance effectiveness (Jiang et al, 2008). Recent literature, Bowen, Rajgopal and Venkatachalam (2008) and Jiang et al (2008) makes use of more complete and better proxies such as composite corporate governance indices Gov-Score and Gov Index. However, I was constrained to doing the same due to data access constraints for the period related to my sample. For example the Gov-Score Index[56], available from the Investor Responsibility Research Center (IRRC), only had data with effect from 2003.

4.3.3 Derivatives Discriminating variables

The control variables that are unique for derivatives usage are the underinvestment, operational hedging, internal liquidity levels, risk exposure and size effect. These are also considered as instrumental variable candidates in the models that correct for endogeneity (see section 4.4.2.2.)

4.3.3.1 Avoiding underinvestment due to growth options

As discussed in section 2.3.1.4, firms with growth opportunities face larger opportunity costs whenever underinvestment occurs. This is due to their concerns about internal liquidity and access to costly external capital markets (Froot et al, 1993). I use the Price to Book ratio as a proxy for firms with growth options. The higher the price to book ratio, the higher will be the implied growth options and correspondingly the underlying positive net present value projects. For such firms there is a greater need to avoid underinvestment. Firms with high Market to Book ratios are more likely to hedge so as to minimise underinvestment (Judge, 2006). In other words, a positive association is expected between the price to book ratio and hedging derivatives. This proxy is also used by Bartram and Bodnar (2007).

4.3.3.2 Operational hedging

As discussed in section 2.3.4.2, operational hedging is a mechanism of managing long term economic or operational currency exposure. Despite being long term in nature, operational hedging can be used in some instances either as a substitute or even as a complement to the use of currency derivatives. The level of geographic diversification can be used as a proxy for the operational hedging choices. I use number of foreign divisions or business units as a proxy for the extent of operational hedging. The underlying assumption is that the operations in foreign divisions are set up to offset exchange rate fluctuation risk. On the basis of a substitution

[56] Gov Score is a composite index consisting of 51 internal and external characteristics that are individual measures of corporate governance.

relationship, the expected sign of the regression test is negative. However, if operational hedging is a complement, then the expected sign is positive.

4.3.3.3 Liquidity

As discussed in section 2.3.1.4, firms with higher levels of internal liquidity are less likely to be concerned about the volatility of cash flow, when compared with firms that are strapped for cash and therefore such firms are less likely to have to use derivatives. In other words, there should be a negative association between liquidity levels and derivatives used. However, cash holdings can also be a consequence of over/under investment. When cash held is a consequence of over/under investment then it is likely to be positively associated with derivatives use. Due to the countervailing interaction between investment, liquidity levels and derivatives use, the expected sign is indeterminate. I use the quick ratio (i.e. (cash +debtors)/current liabilities), as a proxy for liquidity. This proxy is also used by Marsden and Provost (2005) and Lin and Smith (2007).

4.3.3.4 Other Determinants

Other determinants include risk exposure and size of firms.

Risk exposure

Similar to a number of studies, I use the percentage of foreign sales to proxy for financial price exposure. Singh and Upneja (2007), Judges (2006), Allayanis and Ofek (2001), Geczy, Minton and Schrand (1997) and Lel (2006) employ the same variable.

Size effect

Large firms have the level of risk exposure that makes it viable to employ hedging strategies based on derivatives (see section 2.3.4.3). They are also likely to enjoy the economies of scale and scope from implementing such programs (Culp and Miller, 2002). I use the natural logarithm of total assets as a proxy for size.

4.3.4 Discretionary accruals discriminating variables

The independent control variables that are unique to discretionary accruals are the operating cash flow and bonus. These are also considered as candidate instrumental variables for models that correct for endogeneity (see section 4.4.2.2 for further discussion).

4.3.4.1 Operating Cash Flow

Similar to Barton (2001), I include operating cash flow as a control variable for discretionary accruals. Poor operating cash flow is expected to incentivise income increasing accruals, while strong operating cash flow is expected not to (Lobo and Zhou, 2006). Strictly speaking on that basis, a negative association would be expected (Jiang et al, 2008). However, it can be argued that even firms with strong operating cash flows, may undertake income decreasing accruals so as to smooth period to period earnings. Hence if strong positive operating cash flows lead to income decreasing accruals while negative operating cash flows lead to income increasing accruals, there will be a positive association.

I further construct a categorical variable that incorporates various factors that could incentivise either income increasing or decreasing accruals. These include the following conditions:

- Net income percentage change is negative; or
- Net income is negative; or
- Operating cash flow is negative; or
- Operating cash flow is positive but net income is negative.

4.3.4.2 Bonus

As discussed in section 2.4.5.2, several authors (Healy, 1985; Balsam,1998; and Burgstahler and Dichev,1997) show bonus compensation can create incentives for either income increasing or income decreasing accruals. Similar to Balsam (1998) and Carter, Lynch and Zechman (2005), I use proportion of bonus in total compensation as the bonus related risk incentive. However, this is an imperfect proxy as it does not capture the directionality of incentives to use accruals. To do so requires firm specific data on bonus structures, so as to enable modelling around the bonus targets. This type of data is not available for this study.

4.3.4.3 Dividend payout

As discussed in section 2.4.4.1, Daniel, Denis and Naveen (2007) find high earnings management in high dividend payout firms. They propose that this is due to upwards directional earnings management so as to meet dividend targets. Similar to Barton (2001), I use dividend payout ratio as a proxy.

4.3.4.4 Auditor expertise

As discussed in section 2.4.6.1, auditors are part of the overall corporate governance framework and have an influence on the use of discretionary accruals. Similar to Bowen, Rajgopal and Venkatachalam (2008), to determine auditor expertise and relate this to accounting discretion as motivated in section, I sort all firms by two digit SIC codes and set the dummy to one (zero) if the audit firm for a particular company audits more than 15% (<15%) of firms in two digit SIC code.

4.4 Multivariate model considerations

The sample consists of unbalanced panel data spanning from 1999 to 2003. In determining the multivariate testing model, there are several important dimensions to consider. The first is whether or not the individual firm effects arising from panel data, necessitate a deviation from the typically applied pooled OLS regression approach. Second, is the determination of the best approach to identify and resolve the endogeneity of key independent variables. Below is a detailed description of the test procedures.

4.4.1 Individual Effects

4.4.1.1 Poolability of data

A primary consideration is the poolability of the panel data sample, in other words whether it is appropriate to run a pooled OLS regression. Yafee (2003) evaluates three possible approaches to panel data related regressions. The first approach, the constant coefficient approach, assumes that there is no time or cross sectional effect in the panel data, treats the data as pooled data and solves the regression using the OLS in a fashion similar to any other study of cross sectional data. However Koop (2008) argues that applying pooled OLS can results in serious estimation error of the regression slope coefficient, and is thus often inappropriate for panel data as it excludes individual firm effects.

The combined sample of hedging and non hedging firms consists of 253 firms. Of these, only 72 firms have data through the 5 year sample period. On the other hand, 42 firms have a single observation. Based on the few data points (average 3) per firm, alongside, the relatively short time period of 5 years for a total of 253 firms, the question arises as to whether the individual firm effects expected from panel data would in fact be significant. If individual effects are significant, a pooled OLS can result in significant misstatement and thus it is only appropriate to use the pooled OLS regression if individual effects are insignificant. The poolability test is achieved by running a fixed effect model and thereafter conducting an F test to ascertain whether all individual firm intercepts are zero (O'Connell, 2007). This is premised on the fixed effect approach being equivalent to the OLS, except that it includes intercepts for all firms.

4.4.1.2 Fixed effect versus random effect

Apart from pooled OLS, the other two key approaches to panel regression are the fixed effect and random effect models. The fixed effect model assumes that there is a constant slope (i.e. parameter estimates of the independent variables) but allows for variation in the intercept of individual units, in this case the sample firms. Hence the fixed effect will have varying intercepts for each company. On the other hand, the random effect captures individual firm differences through the error term as opposed to the intercept.

The fixed effects approach requires the inclusion of a dummy variable for each observation. This approach is describes at the least squares dummy variable (LSDV) approach. However LSDV has several shortcomings. It excludes all time invariant independent variables. Hence a variable such as the number of geographically dispersed business units that is expected to be a determinant of derivatives use, would be omitted from the model. It also is inefficient as it includes very many parameters (i.e. the number of firms plus the number of independent variables) and loses many degrees of freedom (1/T). When T=1, 2 or 3, this compromise on degrees of freedom is costly. In the sample 72 of the 253 firms have either 2 or 3 observations and 42 have a single observation.

On the other hand, the alternative panel data model, the random effects, does not result in a similar loss of degrees of freedom as is the case with the fixed effect. The random effect is more efficient due to its preservation of degrees of freedom. To determine which of these models should be applied, the Hausman test of whether the parameters are significantly different. Due to the significant loss of precision of the model under a fixed effect, I narrow[57] down the selection to either random effect panel regression or pooled OLS. The random effect is acceptable if the data is drawn from a random sample and is not for example from a group of companies. It also is preferred to the OLS, in so far as the individual effects exist in the error term.

[57] To determine between random effect and pooled OLS, the Breusch Lagrange multiplier test is applied and the null hypothesis of there being no individual effects is rejected. Hence the key model is the random effects model.

4.4.1.3 Panel data regression-Summary

In a nutshell, the key considerations include whether there is evidence that intercepts are significant (i.e. for fixed effect versus pooled OLS), whether the individual error term is zero (pooled OLS versus random effect) and a Hausman test of whether there is a systematic difference in coefficients between the random effects and fixed effects models. The proof of systematic differences in coefficients under the Hausman test, would imply the correlation between error term and regressors in the random effect model. If there is a correlation, then the random effect is not appropriate. On the other hand, if there is no correlation between the disturbance term and the independent variables, then the random effect model is preferred as it is more parsimonious (Yafee, 2003). The use of dummy variables, under fixed effect model tends to compromise the efficiency/parsimony of the model (i.e. including more variables increases the variance of the sample estimator distribution) due to the huge number of regressors (i.e. each firm effectively has a dummy variable). The fixed effects model is also undesirable as it excludes time invariant variables. For example it will exclude variables such as the number of business units as this is unlikely to change during the 5 year sample horizon.

4.4.2 Endogeneity

Another source of measurement error is the problem of endogeneity[58] of independent variables. I primarily assume endogeneity arises from the simultaneity or joint determination of hedging derivatives and discretionary accrual use. As discussed in the theoretical framework, discretionary accruals and derivatives usage are assumed to be jointly determined. The problem of endogeneity leads to inconsistent[59] and biased[60] estimates.

Endogeneity is a matter that has been receiving great attention in recent accounting research. Larcker and Rusticus (2008) in providing a critique on resolution of endogeneity, reviewed 42 studies published in *Journal of Accounting Research*, *Journal of Accounting and Economics* and

[58] One of the core violations of OLS regression arises when independent variables are correlated with the error term. This presents the problem of endogeneity. Nikolaev and van Lent (2005), also identify the main sources of the endogeneity problem in econometric modelling. The main sources being *omitted variables*, *firm specific* heterogeneity and *simultaneity.* The assumption of this research is that the problem of endogeneity primarily arises from *simultaneity.* However, The problem with endogenous variables as independent variables in the model specification could arise due to them having a high correlation to the disturbance term. For example the derivatives value, used as an independent variable in the discretionary accrual specification, will have a strong correlation with the error term. This problem leads to inconsistent and biased estimates.

[59] Large samples do not create greater estimation efficiency

[60] The expected value of the sample is not equal to the value of the population

the *Accounting Review*, conducted 1995-2005 period. However, as these authors find, most of these studies fail to provide an adequate explanation on the rationale underpinning the chosen approaches of resolve endogeneity and the likely accompanying limitations. Larcker and Rusticus (2008) emphasize the need for empirical researchers to carefully consider and outline basis of model selection, especially given that an inappropriate resolution approach such as the choice of inappropriate instruments, simply amplifies the measurement error. As Baum (2007) describes *'the cure can be worse than the disease'*.

Below is an outline of the test selection procedure. The building blocks to selecting the model include:

- Understanding and testing the sources of endogeneity of the independent variables;
- Selection the right solution to resolving endogeneity, including instrument selection, and assessing strength and validity for the 2SLS model;
- Models testing including whether 2SLS model is identified, and checking for heteroskedascity.

4.4.2.1 Sources of Model Endogeneity

Chenhall and Moers (2007) emphasize the need to have a clear understanding of the sources of endogeneity based on underlying economic theory rather than as an artefact of econometric models. The theoretical framework, section 2.5.1, shows that derivatives and discretionary accruals are jointly determined and influenced by an overlapping set of determinants and this is a source of endogeneity. As a first step, there is need is to test the assertion of endogeneity of derivatives use as an independent variable for discretionary accrual as the dependent variable and vice versa (i.e. simultaneity based endogeneity).

Apart from the simultaneity of derivatives and discretionary accrual use, there could be other factors that introduce endogeneity. For example compensation could be endogenous to derivatives use (Supanvanij and Strauss, 2006 and Guay, 2002). Also given that the objective is to smooth income, unusual investment levels or operational hedging decisions made for this purpose could imply that these variables are endogenous. However, the likelihood and severity of inference error can be compounded by modelling many variables as endogenous. Assuming endogeneity for every variable can lead to significant loss of efficiency and produces biased results. Hence for model tractability, I confine the model to endogeneity arising from derivatives and discretionary accruals use. Nikolaev (2005) proposed that the endogeneity of primary variables should be the focus and a sensitivity analysis based on multiple models is a suitable way of getting satisfaction about the reliability of the regressions.

I cannot preclude that endogeneity could arise due to omitted unobservable variables (e.g. level of treasury expertise) as well as due to measurement error amongst the selected variables. This risk is mitigated by aiming to fully specify the model and with the assumption that firm specific characteristics, such as total assets and firm performance, proxy for some aspects of unobservable firm heterogeneity. The use of industry and year dummy variables captures industry and time fixed effects and also minimises measurement error due to omitted variables.

4.4.2.2 Solution to the endogeneity problem

There are various approaches to resolving endogeneity. Kennedy (2003) divides the approaches into two main categories, namely the single equation method and the systems equation method. The single equation methods, also described as limited information models in econometric literature, entail the solution of each equation of the system of simultaneous equations separately. On the other hand, the systems equation or full information method solves the system of equations simultaneously (Kennedy, 2003).

Single equation methods: the 2SLS approach

The single equation method includes the indirect least squares and the instrumental variable approach. The single equation model options are described below

- Indirect least squares- a different set of equations, which sets the endogenous variable as a linear function of the exogenous variables. For example, both a system of two equations with derivatives and discretionary accruals only as dependent variables would be set. These set of equations is described as the reduced form of equations. Thereafter, the OLS approach is used to determine the regression parameter estimates. The empirical challenge of the indirect least squares approach, is then determining the original or structural equation parameters. The process of determining the original structural equation parameters is known in economic literature as ‘identification.
- Another single equation approach is the use of instrumental variables approach. Instrumental variables are used as substitutes to the endogenous variables in the model specification. An instrumental variable is highly correlated to the endogenous variable but is not influenced by

or correlated to the disturbance term in the regression specification. The use of instrumental variables results in consistent but not unbiased estimates. The empirical challenge, however, tends to be the identification of appropriate instrumental variables.

A special application of the instrument variable approach is the use of the two stages least square (2SLS) regression approach. The 2SLS approach makes the assumption that the exogenous variables are suitable candidates to be used as instrumental variables. As the name implies, the 2SLS is run in two stages. The first stage of the solution entails determining predicted values of the endogenous variables using the exogenous independent variables. The first stage is similar to determining reduced form equations in the indirect least squares method. The second stage of the regression then uses the predicted endogenous variable value as an instrumental variable, in addition to the exogenous variables. The regression parameter estimates are then both consistent and unbiased. Kennedy (2003) describes the 2SLS method as robust (insensitive to other estimating problems such as multi-collinearity and other specification problems). He also mentions that it has the advantage of low computational cost. Due to the advantages of robustness, low computational cost, and not needing to identify the structural form equation solutions, this study applies the 2SLS regression (i.e. separate equation 2SLS method.).

As Kennedy (2003) points out there are other methods, such as the limited information/maximum likelihood, the 3SLS (a full information extension of the 2SLS) and full information maximum likelihood. The 3SLS method is used in the robustness testing.

4.4.2.3 2SLS- Model evaluation

Instrument variable selection

One of the principal approaches of resolving endogeneity is the use of instrument variables, under the 2SLS approach. Instrument variables are a key input to the identification of a suitable reduced form equation. Flawed identification simply leads to model mis-specification. The use of the 2SLS approach is widespread in accounting research. Larcker and Rusticus (2008) review, finds that 15 of 42 studies apply single equation 2SLS and 20 of 42 apply the simultaneous equations. The instrument variable approach is susceptible to error arising from a) difficulties in identifying instruments b) selection of weak instruments that are endogenous or weakly correlated to the exogenous independent variable and c) correlation of instruments to error term. It is often a significant empirical challenge to identify instrument variables that are valid[61] and strong[62]. Instrument variables that are endogenous or have weak association with the endogenous variable can result in biased and inconsistent parameter estimates. Hence, instrument variable validity and strength are necessary attributes for the model specification.

For an instrument variable to be valid, it must be correlated to the endogenous variable and also be orthogonal to the error process (Baum, Schaffer and Stillman, 2003). The correlation to the endogenous variable is determined by assessing the results of the first stage that consists of the endogenous independent variable being modelled as the dependent variable with the instruments and other variables as independent variables. The partial F-test and R-squared are used to determine the strength of the instruments. If the F-test is greater than 10 then the instrument is considered strong as recommended by (Baum et al, 2003). Weak instruments lead to biased results concurrent to the loss of efficiency that goes with the switch from OLS to instrument variable solution. Hence if instruments are weak, the parsimonious model (i.e. OLS) should be preferred. For this study, instrument variable candidates are those identified as discriminating determinants of derivatives use and discretionary accruals as discussed in sections 4.3.3 and 4.3.4.

2SLS model assessment-Other considerations

Over-identification: For effective identification or determination of an appropriate reduced form model, each endogenous variable should have at least one instrument variable. For the 2SLS IV, the Sargan and Bassman statistics are used to test over-identification based on a null hypothesis of instrument validity and identified.

OLS versus 2SLS: The Hausman test helps to determine whether the 2SLS approach should be preferred to the OLS. If OLS parameter estimates are significantly different from 2SLS it is considered to be inconsistent and 2SLS is preferred. If not OLS is preferred as it is more efficient. Wooldridge (2003), notes that the asymptotic variance of the IV estimator, is larger than the asymptotic variance of the OLS estimator. The Hausman test ascertains whether endogeneity actually exists in the model.

[61] Validity has several components a) non zero correlation with independent endogenous variable b)uncorrelated with error terms c) uncorrelated with dependent variable except through the endogenous variable and d) monotonicity (it increases as the endogenous variable increases)

[62] Strength implies it has a high correlation with the endogenous variable

Heteroskedasticity: Another key decision is whether 2SLS model is heteroskedastic[63]. Fundamentally, heteroskedasticity creates problem of flawed coefficient standard errors and t-tests. As a detection test, as prescribed by Baum et al (2003), I apply the Pagan Hall test.

4.4.3 Detailed empirical model specification

4.4.3.1 Determinants of derivatives use

Equation 4.2 is based on derivatives use, measured by the notional amount as the dependent variable.

Equation 4.2

$$DRNV = \alpha + \beta_1 133DUM + \beta_2 DAC + \beta_3 133DUM*DAC + \beta_4 ABINV + \beta_5 TAXLOSS + \beta_6 PTOB + \beta_7 LEV + \beta_8 QRATIO + \beta_9 LNASSETS + \beta_{10} GEOG\_DIV + \beta_{11} FSALES + \beta_{12} VEGA + \beta_{13} DELTA + \beta_{14} CSHPAYPER + \beta_{15} INSTOWN + \beta_{16-} INDDUM + \beta\ YRDUM$$

Table 4.2: Summary of multivariate testing procedures for determinants of derivatives use

Phase	Key steps
Model determination	• Assess the fixed effect, pooled OLS and random effect models • Test endogeneity of discretionary accrual as an explanatory variable • Test of instrument variable validity and strength • Test endogeneity of model (Hausman test)
Sample testing approach	• Run censored regression on combined sample of derivatives and non derivatives users • Run regression on sample of derivatives users that have disclosed notional amounts
Robustness tests	• 2SLS models • Tobit/Probit regression

63 One of the assumptions of the classical linear regression model is that disturbance terms have the same variance and are not correlated. The violation of this assumption leads to the problem of heteroskedasticity. The problem of heteroskedasticity leads to biased estimates and also compromises efficiency and hence the parameter estimates are incorrect.

4.4.3.2 Determinants of discretionary accruals

DAC= α + β 1 133DUM + β 2 CHDUM + β 3 DRNV + β 4 133*DRNV + β 5 ABINV + β 6 R&D + β 7TAXLOSS + β 8 LEV + β 9 LN_TRADVOL+ β 10 DIV_POUT + β 11OPCSHFLOW + β 12 VEGA + β 13 DELTA + β 14 CSHPAY + β 15 BONUS_PERC+ β 16 INSTOWN + β 17 MGR SHROWN + β 18 AUDEXP + β 19 INTERLOCK + β 20-INDDUM + β YRDUM

Table 4.3: Summary of multivariate test procedures for determinants of discretionary accruals

Phase	Key steps
Model determination	• Assess the fixed effect, random effect and pooled OLS models • Test for endogeneity of derivatives as an explanatory variable • Test instrument variables strength and validity • Test endogeneity of model (Hausman test)
Sample testing approach	• Run regression on sample of derivatives users that have disclosed notional amounts • Run regression on sample that combines derivatives and non derivatives users
Robustness tests	• 2SLS models simultaneous

4.5 Conclusion

This chapter has defined the sample and outlined the methodology to test the impact of SFAS 133 on the decision to smooth earnings using derivatives and discretionary accruals.

I have included the definition of the dependent and independent variables, linking them to the theoretical framework in chapter 2. I have highlighted the key methodological challenges including the endogeneity problem due to the simultaneity of the decision by managers to either use derivatives use or discretionary accrual use as a means of smoothing earnings. Endogeneity can lead to biased and inconsistent results. Thereafter, I have highlighted the approaches proposed in econometric literature to mitigate the endogeneity problem.

I further discuss the methodological decision of the appropriate model to cater for individual effects that could bias the results. The sample consists of unbalanced panel data and therefore would require panel regression and this necessitates the choice of whether to run random or fixed effects model. I describe the reasoning guiding the model determination. Also outlined is the approach for the robustness testing. Chapter 5 contains the findings of the empirical tests conducted.

4.6 Appendix –Research design

4.6.1 Detailed variable definition

Discretionary accruals: Modified Jones

The Jones (1991) model was developed by Jennifer Jones as part of her contribution to an investigation by the US Trade International Trade Commissions (Bruce and Bradshaw, 2004) on firms that were evading tax. The Jones model is essentially implemented in two stages. In the first stage, an estimate of non-discretionary or normal accruals is made. The first step is to calculate the total or aggregate accruals of the firm. This can be determined from either the income statement or balance sheet. Total accruals can be derived from the:

- income statement, by taking the difference between the operating cash flow during a period and reported earnings (Barton, 2001).
- balance sheet; by taking the difference between changes in assets and changes in liabilities, during a particular period.

The determination of total aggregate accruals is a top down approach, rather than a bottom up aggregation of every conceivable specific accrual. A bottom up approach would be time consuming and most likely inaccurate as it may not be exhaustive or may not capture all the possible entries. Hence the top down approaches of inferring accruals tends to prevail in empirical research. A number of empirical papers (Barton, 2001; Cheng and Warfield, 2005; Gao and Shrieves, 2002) prefer deriving the total accrual figure from the income statement as it entails making a calculation using only the two figures, as opposed to using the balance sheet, due to the need to deal with multiple lines of liabilities and assets. I adopt the income statement based derivation of total accruals.

The core assumption of the first stage of the Jones (1991) model, modified by Dechow (1996), is that the expected level of accruals or normal accruals of any firm is determined by the underlying economic characteristics of the firm. Hence, the level of a) changes in cash revenue during a period (*increases in revenue should correspond to an increase in the level of non discretionary accruals as it likely also corresponds to an increase in the level of working capital items that necessitate accrual accounting*) and b) the level of Property Plant and equipment (*this influences* *depreciation levels. Depreciation is often the largest income decreasing accrual in the income statement*) (Bruce and Bradshaw, 2004; Dechow (1995)). Using an OLS regression procedure, as formalised in equation 2 below, a forecast of expected accruals is made, with the derived total accruals as the dependent variable and cash revenues and levels of property, plant and equipment as independent variables. To predict expected accruals, there is the option of either using the same firm's time series data or doing a cross sectional estimate based on firms with similar characteristics. Due to constraints in obtaining sufficient time series data for the same firm (e.g.10 years of data) and due to desirability of making the estimate during the same time period, so as to capture the prevailing economic impact on firm performance, it is preferable to do a cross sectional estimate of firms with similar characteristics. On this basis, the estimate is done using firms in the industry grouping during the same year. The industry classification is the 2 digit SIC code to ensure sufficient estimation points. The dependent and independent variables are divided by the lagging value of total assets or total assets vale at the beginning of the period. This is done to scale the estimates and cater for differences in size of firms in the regression. The predicted or fitted value of total accruals, from the regression below, is assumed to be the level of non discretionary or normal accruals

Equation 4.3

$$TAC_{it}/TA_{it-1} = \theta_1(1/TA_{it-1}) + \theta_2\{(\Delta REV_{it} - \Delta REC_{it})/TA_{it-1}\} + \theta_3(PPE_{it}/TA_{it-1}) + \upsilon_{it}$$

- TAC_{it} is total accruals measured as earnings before extraordinary items and discontinued operations less operating cash flows
- TA_{it-1} is the beginning of period total assets
- ΔREV_{it} is change in revenue from year t-1 to year t,
- ΔREC_{it} is change in accounts receivable from year t-1 to year t,
- $\Delta REV_{it} - \Delta REC_{it}$ represents the change in cash revenues
- PPE is gross property, plant and equipment, included to control for normal depreciation expense

The second stage of the estimation process is done by subtracting the normal accruals estimate derived above from the total accruals. This yields an estimate of non discretionary accruals. In other words the residual or abnormal component of total accruals is deemed to be discretionary.

Refinements to the Modified Jones Model

To refine[64] the discretionary accrual estimate, the forward looking model adjusts the revenue factor that is used in the modified Jones (1991) model. Phillips, Pincus and Rego (2003) proposed some refinements to the mentioned Jones (1991) model. The key difference is that in the refined model, normal or non discretionary accruals are assumed to vary with the level of changes in cash sales plus expected changes in credit sales, rather than only changes in cash sales. To determine expected changes in credit sales, a regression of changes in credit sales as dependent variable and changes in sales as the independent variable is done for firms in the same industry (2 digit SIC code) category and year. A fitted value of change in credit sales is thereafter determined, after a winsorisation[65] process that ensures that the predicted credit sales falls within a particular range of a firm's actual credit sales changes. The expected credit sales figure is then included in the change in cash sales estimate i.e. $((\Delta REV_{it} - \Delta REC_{it}) + (\Delta CS_{it}))$. Phillips, Pincus and Rego (2003) introduce additional independent variables that are deemed to be related with an increase in normal level of accruals

- Sales growth rate
- Lagging total accruals

The model takes the form shown in equation 5 below. This is the regression used to determine the normal or non discretionary accrual estimate and thereafter to infer the discretionary accrual estimate.

Equation 4.4

$$TAC_{it}/TA_{it-1} = \theta_1(1/TA_{it-1}) + \theta_2\{(\Delta REV_{it} - \Delta REC_{it}) + (\Delta CS_{it}))/TA_{it-1}\} + \theta_3(PPE_{it}/TA_{it-1}) + \theta_4(\text{Sales growth rate}_{it}) + \theta_5(TAC_{it-1}/TA_{it-2}) + \upsilon_{it}$$

- TAC_{it} is total accruals measured as earnings before extraordinary items and discontinued operations less operating cash flows
- TA_{it-1} is the beginning of period total assets

64 Modified Jones models estimates discretionary accruals with considerable imprecision that could result in misclassification of normal accruals as discretionary accruals (DeChow et al, 1995). This can be due to omitted variables in the equation determining normal accrual level.

65 The discretionary credit sales estimates are constrained to a) being a positive factor of observed credit sales (at least 20% of credit sales) and b) to not exceeding the level of observed credit sales

- ΔREV_{it} is change in revenue from year t-1 to year t,
- ΔREC_{it} is change in accounts receivable from year t-1 to year t,
- ΔREV_{it}- ΔREC_{it} represents the change in cash revenues
- PPE is gross property, plant and equipment, included to control for normal depreciation expense
- ΔCS_{it} expected change in credit sales

As discussed, the use of the Jones (1991) model and its variants is common in contemporary empirical accounting research. Studies (Cheng and Warfield, 2005; Barton, 2001; Gao and Shrieves,2002) all make use of the described estimation procedure. All these studies, acknowledge that measurement error could arise from the use of this model. The errors could occur when normal accruals are wrongly classified as discretionary accruals or discretionary accruals are classified as normal accruals. Specification errors for example could arise from the use of firms with the same 2 digit SIC code[66] with the assumption that firms have similar characteristics.

To minimise extreme outliers, after determining an estimate of discretionary accruals, I apply the following winsorisation procedures:

- Non discretionary accrual estimates are constrained from exceeding total accruals by 80% or from being lower than 20% of observed total accruals. This is a judgemental adjustment introduced in this study in order to minimise the likelihood of extreme estimates.
- To further minimise the risk of miss-classification, in observations where no discretionary accruals would be expected (e.g. net income level is positive and the percentage change in net income does not differ significantly from the percentage change in cash flow), then the discretionary accrual estimate is reduced to 80% of the estimate.

The estimation of discretionary accruals was done using the full sample of firms listed on the NASDAQ and NYSE (7185 firms, and approx 23, 000 firm-year combinations during the 1998-2003 period. 1998 data was used to determine lagging accruals for 1999). Firm-year combinations, within the same 2 SIC category, consisting of less than 10 observations were excluded from the regression estimate to avoid estimation errors. Firms with missing data, ADR listed companies, financial services and utilities were then excluded. The dataset of extracted

[66] Use of 2 digit SIC code is primarily motivated by the likelihood of using sufficient data points in the regression process

discretionary accruals data was then matched to firm sample as specified in the sampling criteria in Table 1. 1427 firm-years (363 firms) had matching discretionary accrual data.

Determining vega and delta sensitivities

The calculation of vega and delta is done using compensation data collected from Execucomp. Execucomp discloses compensation data for a number of high level executives within its constituent firms. Core and Guay (2002) use the partial derivatives of the dividend adjusted Black-Scholes model to calculate vega and delta. Rajgopal and Shelvin (2002) are critical of the Black Scholes method of calculating executive stock options, mainly due to the constraints in the trading of these options. The Black Scholes model is likely to overstate the value of the options and correspondingly overstate the vega and delta sensitivities. Despite the shortcoming in valuation, Triki (2005) and Rogers (2002) pinpoint the attractiveness of the Core and Guay (2002) estimation procedure of vega and delta, namely that it is structured to deal with incomplete information (e.g. absence of exercise price and expiry date of options not granted during the year) and that corresponds to the data disclosed in proxy statements and the Execucomp database.

While some studies (Core and Guay, 2000) focus on CEO pay, I use the average figure of the disclosed executive compensation per firm-year as the proxy variable. The average executive compensation is assumed to be representative of the incentives of the top management team rather than of the CEO as an individual. This approach is assumed that this will likely be a more accurate pointer of the risk management choices.

Core and Guay (2002), Guay (1999), provide the method to calculate Delta and Vega measures.

<u>Estimating Delta and Vega of a single option</u>

Option value is based on Black-Scholes European option pricing formula (Black and Scholes, 1973), as modified by Merton (1973) to account for dividend payouts.

Option value= $Se^{-dT}N(d_1) - Xe^{-rT}N(d_2)$

Where $d_1 = \dfrac{\ln(S_0 / X) + (r - d + \sigma^2 / 2)T}{\sigma\sqrt{T}}$

$$d_2 = \frac{\ln(S_0 / X) + (r - d - \sigma^2 / 2)T}{\sigma\sqrt{T}}$$

S = price of the underlying stock

X = exercise price of the option

T = time to maturity

R = ln (1+ risk-free rate)

D = ln (1+ dividend rate), where the expected dividend rate is the per-share dividends

σ = annualised volatility

N ( ) = cumulative probability function for the normal distribution

Delta = the sensitivity of the option value with respect to a 1% change in stock price

= [∂ (option value) / ∂ (stock price)] $\times$ (stock price/100)

$= e^{-dT} N(d_1) \times (S/100)$

Vega = the sensitivity of the option value with respect to a 0.01 change in stock volatility

= [∂ (option value) / ∂ (stock volatility)] $\times$ 0.01

= $e^{-dT} N'(d_1) \times S\sqrt{T} \times 0.01$

$N'(d_1)$ is the normal density function. I multiply the sensitivity and Delta by the number of options to obtain the total dollar values of the change in CEO's wealth that will result from a 1% change in stock price and 0.01 changes in stock volatility.

<u>Estimating Delta and Vega of portfolio of options</u>

I calculate fiscal year end value and sensitivities of executives' option portfolios using the Core and Guay (2002) approximation method. Regarding US data, I use ExecuComp data, which gives the realisable value, i.e., the potential gains from exercising all options on the fiscal year end price, and the number of options separately for both exercisable and unexercisable options and also details of the current year's option grant.

- For the current year's grant, I compute the Black-Scholes value and sensitivities using the above formulae.
- For previously granted options, I compute the Black-Scholes value and sensitivities (Delta and Vega) separately for vested and unvested options.
  - Compute the average exercise price separately for the portfolio of exercisable options and unexercisable options. First, I divide the realisable value by the number of options, which gives the average of (stock price-exercise price). I then subtract the number from the stock price to obtain the average exercise price.
  - For exercisable options, I set the time to maturity as three years less than the time to maturity of the current year's options grants, or 6 years if no grant was made in the

current year[67]. Hence if time to maturity is 8 years for current option grants, I set time to maturity of previously granted options as 5 years.

- For unexercisable options, I set the time to maturity equal to one year less than the time to maturity of the current year's options grants, or 9 years if no grant was made in the current year.
- Calculate the Black-Scholes option value, delta, and vega using the average exercise price and time to maturity.

Compute the delta of the CEO's portfolio of stocks and options by adding the Delta of restricted stock and shares held by the CEO to the Delta of his options portfolio.

The vega of the manager's portfolio of stock and options = vega of new options granted +vega of all exercisable option held + vega of all unexercisable options held

[67] Vesting period is between 3 and 5 years. Execucomp does not provide details of previously granted options. Hence a guesstimate is necessary. This is consistent with approach in other empirical studies Core and Guay (2002), Coles et al (2006) and Guay (1999).

Table 4.4 Definition of variables

Variable	Definition and construct measured
Focal variables	
DRNV	Notional amount/Total assets- Measures extent of derivatives use. The notional amount is a proxy for risk exposure and is hand collected from Form 10-K statements downloaded from the SEC Edgar's database. The notional amount is scaled by total assets.
FVALUE	Derivatives fair value/Total assets-Alternative measure of derivatives use. This data is hand collected from Form 10-K statements downloaded from the SEC Edgar's database. The fair value is scaled by total assets.
DAC	The proxy for discretionary accruals is derived. It is based on determining what should be a normal level of accrual use based on the revenue generated, asset intensity as defined in the Jones (1991) estimate modified by Phillips and Rego (2003) factors (i.e. sales growth rate and normal credit sales levels). A detailed description of the formulation is in section. The measure is unsigned and scaled by total assets. The inputs into the determination are sales (data item #12), property plant and equipment (data item #7), total assets (data item #6), net income (data item #18) and operating cash flow(data item #308). The Compustat unit of measure for these variables is $millions.
133DUM	SFAS 133 dummy variable equals 1 for Post-SFAS 133 data and 0 for Pre-SFAS 133 data (i.e. 1999 and 2000(0), 2001,2002, 2003 (1))
133*DAC	Interaction variable (DAC*133DUM)
133*DRNV	Interaction variable (DRNV*133DUM)
CHGDUM	Cash flow hedge accounting dummy. This is equal to 1 if derivatives user discloses use of cash flow hedge accounting and 0 if it does not. Hand collected from annual statements

USER	Derivatives user dummy (1 for derivatives user, 0 for non derivatives users). Hand collected from annual statements
Control variables for derivatives use and discretionary accruals	
ABINV	Abnormal Investment- This is a derived measure based on the deviation from the predicted capital expenditure level. The input is capital expenditure (data item#128)/sales (data item#12) and a regression is run to predict what would be expected based on industry characteristics (see section 4.3.2) . The level of investment is a proxy for the use of expenditure as a mechanism of income smoothing i.e. real earning management choices by altering cash flows. It could also be a proxy for the extent to which the underinvestment problem exists (see section 2.3.1.4) and therefore creates need for income smoothing.
R&D	Research and development expenditure (compustat data item #46)/Total assets - (compustat item #9)/Total assets (compustat item #6). This is a proxy for underinvestment, it also is a proxy for the use of expenditure as a means of smoothing earnings
TAXLOSS	The scaled tax loss carry forward, Tax loss carry forward/total assets (Compustat data #52/#6). This is a proxy for the convexity of tax schedule and this reduces the expected future tax liabilities (see section 2.3.1.2)
LEV	Long term debt (compustat item #9)/Total assets (compustat item #6) – Leverage is a proxy for firm's incentives to reduce probability and expected costs financial distress and the likelihood to need to smooth earnings to do so. Leverage also proxies for interest rate exposure that can lead to using derivatives for hedging purposes and the incentive to manage earnings to avoid covenant violations. The leverage is scaled by total assets
VEGA	Vega/Cash Pay- Vega is a proxy for sensitivity to volatility and is a measure of managerial risk aversion. It is measured as the average dollar change in value of the top management

	stock and option portfolio for a dollar 1% change in standard deviation of stock returns. Vega is scaled by cash pay. This data is obtained from Execucomp. Vega = Vega of new options granted during year+ vega of all exercisable options held+ vega of all unexercisable options held
DELTA	Delta/Cash Pay- Delta is a proxy for sensitivity to changes in stock price and is a measure of managerial risk aversion. It is measured as the average dollar change in value of the top management stock and option portfolio for a dollar 1% change in stock price. Delta is scaled by cash pay. This data is obtained from Execucomp. Delta = Delta of new options granted during year+ delta of all exercisable options held+ delta of all unexercisable options held
CSHPAY	Cash Pay/Total compensation- controls for managerial risk aversion due to personal wealth diversification. This is based on total compensation. Total compensation= Cash salary + Bonus + stock granted + stock options granted This data is obtained from Execucomp.
INST_OWN	Percentage of institutional ownership- Proxy for corporate governance. Sourced from compustat
MGR_SHRS	Managerial ownership as a percentage of stock holdings as at year end. This data is obtained from Execucomp.
INTERLOCK	Dummy variable for where executives are subject to interlocking relationship. Variable is equal to one when interlocking relationship exists (1), otherwise it is equals to zero. This data is obtained from Execucomp.

INDDUM	Industry dummy- Across 6 key broad industry categories namely mining, manufacturing, transaction, trading, services and other. This is based on aggregation of SIC codes recorded in Compustat. This caters for unobservable variation.
YRDUM	Year dummy. This caters for impact of any unobservable macroeconomic factors that could have influenced the use of derivatives by US companies. For example, the introduction of the Euro in 2001 could have reduced the overall foreign currency exposure of US exporter/importer firms due to their being fewer transaction currencies.
Discretionary accrual variables	
OP_CSHFLOW	Operating cash flow (data item#328)/Total assets (data item#6). Used to control for risk of misclassification of discretionary accruals when extreme operating cash flows are in place. Barton (2001) applied this variable in similar fashion.
DIV_POUT	Dividend payout (Dividend/Income before extraordinary items)- Compustat #21/#20.
BONUS_PERC	Proportion of average bonus paid per executive/Total compensation paid per executive. Total compensation is measured as the sum of salary, bonus, annual compensation, manager's stock ownership, and in-the-money exercisable and unvested options. This data is obtained from Execucomp
LN_TRADVOL	Logarithm of trading volume. (Average annual volume of shares traded) Trading volume. This is sourced from Compustat
AUDEXP	Sorted all firms by two digit SIC codes and set the dummy to one (zero) if the audit firm for a particular company audits more than 15% (<15%) of firms in two digit SIC code.

	Bowen, Rajgopal and Venkatachalam (2008) applied this variable in similar fashion.
Derivatives variables	
GEOG_DIV	Number of geographically spread business units is a proxy for operational hedging
PTOB	Price to Book ratio is a proxy for the presence of growth options and likelihood of hedging so as to avoid the underinvestment problem (see section 2.3.1.4). Firm's price per share divided by book value per share, as at fiscal year-end (i.e. compustat data item#60/(#199*#25))
LNASSETS	Logarithm of total assets (Compustat #6) is a proxy for size effect
QRATIO	Quick ratio- (quick assets divided by total liabilities) (i.e. Compustat data (#1+#2)/#5). This is proxy for liquidity
FSALES	Percentage of foreign sales (Foreign sales/Total sales) for each firm-year is a proxy for financial price exposure and is extracted from Compustat Geographic Segments File.

5 EMPIRICAL RESULTS: IMPACT OF SFAS 133 ON INCOME SMOOTHING

5.1 Introduction

This chapter reports the empirical results of testing the impact of SFAS 133 on income smoothing through the use of discretionary accruals and derivatives. The testing is based on the methodological approach outlined in chapter 4. The results discussion is structured at follows:

1. Descriptive and univariate statistics (section 5.2);
2. Multivariate analysis (section 5.3); and
3. Robustness tests (section 5.3.5).

5.2 Descriptive and univariate statistics

5.2.1 Derivatives use

Hypothesis 2.1 states that SFAS 133 leads to reduced derivatives use. While Hypothesis 2.3 states that derivatives and discretionary accruals are substitutes for income smoothing. Therefore it is useful to assess whether there is a difference in derivatives use in the pre- and post-SFAS 133 periods. On the same basis, I assess derivatives use characteristics between high and low accrual user observations. In addition, assessing the usage of different derivatives types, across different time periods, as well as derivatives usage amounts and types across different industries helps to build an overall picture of patterns of derivatives use. This set of tests complements the multivariate testing.

Hence, the following univariate and descriptive statistics are provided:

- Mean and median for the full sample[68] of derivatives users;
- Extent of application of cash flow hedge accounting. This is determined based on the frequency of a dummy variable identifier;
- Stratified by period: Difference in mean and median values of pre- and post-SFAS 133 derivatives user observations;
- Stratified by level of accruals: Difference in mean and median values of low and high accrual observations;

[68] Excludes firms with missing notional amounts and extreme values (i.e. notional amount greater than total assets)

- Derivatives usage patterns by industry: (mean and median of derivatives use per industry category, difference of proportion of instrument type before and after SFAS 133, instrument type and derivatives amount per industry grouping).

5.2.1.1 Derivatives Use: Full sample mean and median

The aggregate mean of derivatives use (i.e. notional amount / total assets) of the sample, after excluding extreme values, is 0.116 (see Table 5.1). This compares well with the findings of other studies such as Singh (2004) - mean of 0.084, Huang et al (2009) - mean of 0.102, Park (2004) - mean of 0.11 and Ahmed et al (2006) -mean of 0.092.

Table 5.1-Derivatives use: Mean and median values of derivatives users

Reported values are based on scaled notional derivatives (i.e. notional amount/total assets). Derivatives users are the firm year with reported notional amounts of derivatives but excluding outliers (i.e. 551 firm-year observations).

	Mean	Median	Std deviation	Observations[69]
Derivatives users	0.116	0.083	0.125	551

Cash flow hedge accounting

As discussed in section 4.3.1, I use a dummy variable due to inconsistent disclosure of notional amounts associated with derivatives use. Results reported in Table 5.2 show that 32% of derivative users use cash flow hedge accounting in Post-SFAS 133 period. This compares well with Singh (2004) who found approximately 50% of his sample firms were eligible for hedge accounting.

Table 5.2-Derivatives use: Related dummy variable statistics

	Cash flow hedge accounting	Hedging firms	Percentage
Post-SFAS 133 observations	140	436	32%
Pre-SFAS 133 observations	11	245	4.5%
Total	151	681	22%

11(4.5%) of the 245 firms in the pre-SFAS 133 observations disclose cash flow hedge accounting.

[69] Excludes firms with missing notional and extreme values (i.e. scaled notional>1)

5.2.1.2 Derivatives usage: Difference in means and median values: stratified samples

I test the difference between means and medians of a) separate pre- and post-SFAS 133 observations and b) separate low and high accrual observations. The differentiation between low and high accrual firms is based on the median of the overall sample (i.e. high accrual firms are firms whose discretionary accruals are greater than 2.8% of total assets).

Difference between means of Pre- and Post-SFAS 133 observations

The univariate results in

Table 5.3 shows that there are significant differences of means and medians in the scaled derivatives notional amount between the pre-SFAS 133 (mean of 0.140 and median of 0.093) and post-SFAS 133 (mean of 0.109 and median of 0.074) observations. These results, based on a sample of derivatives users, show a significant decline in the level of derivatives use after the adoption of SFAS 133. I find similar evidence based on a sample that includes both users and non-users of derivatives. These findings are supportive of Hypothesis 2.1 that expects derivatives use to reduce after SFAS 133 is adopted.

Table 5.3 - Derivatives use: Difference between mean and median values of separate Pre- and Post-SFAS 133 observations

Reported values are based on scaled notional derivatives (i.e. notional amount/total assets). Derivatives users excluded observations with missing notional amounts and notional amount outliers (i.e. 551 firm-year observations). Similarly, the sample of users and non-users derivatives of 720 firm year observations excludes missing notional amounts and notional amount outliers.

Derivatives users				Derivatives and non-derivatives users		
	Mean	Median	Count	Mean	Median	Count
Pre-SFAS 133	0.140	0.093	218	0.110	0.061	277
Post-SFAS 133	0.109	0.074	333	0.076	0.042	443
T-stat	3.27			3.38		
Z-stat		2.60			2.56	

Pair-wise differences

However, when investigating whether there is an increase or decrease per individual firm the reduction in derivatives use is not evident. Table 5.4 - Panel A shows the results from the 253 firms in the sample, 58 (22%) used derivatives only during the post-SFAS 133 period, while 36 (14%)[70] used derivatives only prior to SFAS 133 and not after. This suggests that they stopped

[70] Similarly, Singh (2004) finds that 9% of the sample stopped using derivatives.

using derivatives. Of firms that had observations in both periods, 66 (26%) increased, while 62 (24.5%) decreased their derivatives use. In addition, I test the difference between means of the 138 firms that have observations in both pre- and post-SFAS 133 periods (i.e. *paired firms*) and these results are reported in Table 5.4 Panel B There is no significant difference when the test is based on average annual usage in either of these periods (i.e. a single annual average per firm for each of these two periods). However, there is a significant reduction when all observations related to the paired firms are used. This is consistent with the results based on the full sample (i.e. paired and non-paired firms).

Table 5.4 – Derivatives use: Trends before and after SFAS 133

Panel A: Trends in Derivatives Use

Firms that increased derivatives use after SFAS 133	66
Firms that decreased derivatives use after SFAS 133	62
Firms with no change in derivatives use across both periods (non users)	19
Total firms with observations across pre- and Post-SFAS 133	147
Use derivatives only after SFAS 133	58
Use derivatives only before SFAS 133	36
Total number of firms that at least use derivatives	**241**
Add Firms missing notional values	12
Total Sample Firme	253

Panel B Difference in means and medians-Paired firms

Reported values are based on scaled notional derivatives (i.e. notional amount/total assets). This is based on 138 firms that had observations across the pre- and post-SFAS 133 periods.

	Grouped[71] mean	Mean	Median	Count
Pre-SFAS 133	0.101	0.108	0.056	227
Post-SFAS 133	0.086	0.080	0.041	353
Difference	0.015	0.028		
T-test	0.98	2.64		
Z-test	0.35		1.60	
Paired number of firms[72]	138			

[71] This is based on the mean of average usage per firm both before and after SFAS 133. It only includes firms with observations across both periods

[72] Excludes firms with extreme values (i.e. scaled notional>1) and those with missing notional amounts. 138 derivatives and non derivatives users firms with data across both periods

5.2.1.3 Derivatives usage: Difference in means – classified by low and high accrual observations

The results (see Table 5.5) also show that firms classified as low discretionary accrual firms (i.e. below median) have higher levels of derivatives use relative to high level discretionary accrual firms. Using samples of only derivatives users, low accrual firms have a notional amount mean of 0.13 and median of 0.087, while high accrual firms have a mean of 0.1 and median of 0.074. A similar finding is derived when the sample consists of both users and non users of derivatives. These findings support Hypothesis 2.3, which states that derivatives and accruals are used as income smoothing substitutes.

Table 5.5-Derivatives use: Difference between mean and median values of separate low accrual and high accrual observations

Reported values are based on scaled notional derivatives (i.e. notional amount/total assets). Derivatives users excluded observations with missing notional amounts and notional amount outliers (i.e. 551 firm-year observations). Similarly, the sample of users and non-users derivatives of 720 firm year observations excludes missing notional amounts and notional amount outliers.

Derivatives users				Users and non-users of derivatives		
	Mean	Median	Firm-year observations	Mean	Median	Firm-year observations
Low discretionary accrual	0.130	0.087	287	0.105	0.063	354
High discretionary accrual	0.100	0.074	264	0.074	0.036	366
T-stat	2.57			3.50		
Z-stat		2.47			3.75	

5.2.1.4 Frequency of Derivatives types across periods

Across the sample, 81% (681 of the 850 firms) use derivatives. Table 5.6 contains results of the frequency of use of different derivatives instrument. Currency forwards (70%) are the most frequently used derivatives amongst all observations, with currency swaps (6%) being the least frequently used. The frequency of commodity derivatives (14%) is much lower than either interest rate derivatives (46%) or currency derivatives (at least 70%)[73]. It is possible that the more widespread use of currency derivatives is simply a by-product of the sampling criteria, which is based on likelihood of sample firms foreign currency exposure (i.e. foreign sales percentage >30%). However, the high usage of currency derivatives and low usage of commodity derivatives is consistent with some other studies. Lins et al's (2007) survey finds that 83% and 49% of their respondent companies use currency derivatives and commodity derivatives respectively. However, their survey reveals a higher utilisation of interest derivatives (74%).

The results show that a significant decrease in the use of currency options occurred after adoption of SFAS 133. A statistically significant decline of proportions from 18% to 11% occurred across the two periods (before and after the adoption of SFAS 133). This observed decline is consistent with the anticipation, by Lins et al (2007) that difficulties in qualifying for hedge accounting, for non linear contracts such as options, leads to their lower usage. It could also be due to the overall trend of decrease in use of currency derivatives. The proportion of currency swaps reduced from 8% to 5%. This could be a reflection of the reduction in currency exposure. Richie et al (2006) observed that the introduction of the Euro coincided with the introduction of SFAS 133 and this could have lead to a reduction in exposures of US firms to multiple European currencies and correspondingly reduced the need to use currency derivatives.

In contrast to currency derivatives, there is an observed increase in interest rate derivatives. This could potentially be explained by the easier qualification for hedge accounting treatment of interest rate swaps. These are eligible for what is described as the shortcut method that does not necessitate the stringent prospective assessment of likely hedge effectiveness. Managers are expected to prefer using such instruments because they easily qualify for hedge accounting. Clearly there is a pattern to the application of different derivatives instruments and the analysis of determinants of derivatives instrument type is a potential area for further empirical study.

[73] This is inferred from the numbers that use currency forwards. It will be greater if the number of firms that use either forwards or options or swaps is considered.

Table 5.6 Derivatives instrument types across periods

Derivatives type between Pre- and Post- SFAS 133

Table outlines the percentage frequency of derivatives use per year based on the analysis of total sample of users and non-users of derivatives. This is based on full sample of 850 firm year observations. Derivatives users are firms that reported either the notional or fair value amount of derivatives use.

Year	Firm-year observations	Derivatives users	Non users of derivatives	Currency forwards	Currency options	Currency swaps
Pre-SFAS 133	304	81%	19%	72%	18%	8%
Post-SFAS 133	546	80%	20%	69%	11%	5%
Total	850	80%	20%	70%	13%	6%
Difference of proportions (t-stat)		0.35	- 0.35	0.92	2.87	1.76
Significance level					***	*

***Significance at 1%, ** Significance at 5%,* Significance at 10%

Panel B (Continued) Derivatives type between Pre- and Post- SFAS 133

Year	Interest rate	Commodity
Pre-SFAS 133	42%	15%
Post-SFAS 133	48%	14%
Total	46%	14%
Difference of proportions (t-stat)	- 1.68	0.40
Significance level	*	

***Significance at 1%, ** Significance at 5%,* Significance at 10%

5.2.1.5 Derivatives use: Industry trends

The analysis is based on six broad key industry categories. The results showing derivatives use by industry are contained in Table 5.7 and this reveals a pattern of variation in usage across industries. This is to be expected as different industries have different business risk exposures. As discussed in 3.4.2, Nain (2004) contended that the interaction of risk exposures, competitive structure and strategic interaction between competitors, would likely dictate the pattern of observed derivatives usage within an industry. The notional amount shows that manufacturing industry firms are heavy users of derivatives, while mining and trading industry firms have lower usage. This compares well with the univariate analysis of Supanvanij and Strauss (2006). They found manufacturing companies to be heavy users of derivatives, while wholesale and retail trade, mining and health were less frequent users of derivatives. Regarding derivatives instrument types, mining companies are heavy users of commodity derivatives (42%), which is to be expected. All the other sectors predominantly use currency forwards and this is coupled with a significant use of interest rate swap contracts.

Table 5.7-Derivatives use across key industry categories

Panel A Derivatives use by industry category.

Based on scaled notional derivatives (i.e. notional amount/total assets) and excludes outliers

Industry	Mean	Median	Frequency
Mining	0.04	0.01	37
Manufacturing	0.10	0.06	567
Transaction	0.11	0.05	5
Trading	0.06	0.03	19
Services	0.07	0.05	88
Other	0.08	0.07	4

Panel B- Derivatives types applied across key industry groups

Industry	Hedge	Currency forward	Currency option	Currency swap	Interest rate swap	Commodity	Count
Mining	76%	36%	10%	0%	50%	42%	50
Manufacturing	81%	73%	13%	7%	46%	14%	658
Transaction	100%	83%	17%	0%	33%	33%	6
Trading	93%	67%	30%	0%	70%	7%	30
Services	70%	63%	11%	5%	30%	0%	99
Other	100%	100%	14%	29%	100%	57%	7

Overall, these tests pick up some trends but there remains a need for additional empirical evidence on the determinants of the level of different derivatives use within industry, so as to further explain the observed variation across industries. The same can be said of determinants of application of different derivatives instruments. However, this falls outside the scope of this study and it is an area that calls for further empirical investigation as discussed in chapter 8.

5.2.2 Discretionary accruals

Given that discretionary accrual is a focal variable in assessing the impact of SFAS 133, it is useful to assess how SFAS 133 influences the levels of accruals. In addition, given the substitution hypothesis, it is useful to assess whether the decision to use derivatives influences the level of application of discretionary accruals. The following descriptive and univariate statistics are provided for discretionary accruals:

- Mean and median of full sample;
- Difference in mean and median values between pre- and post- SFAS 133 derivatives user observations;
- Difference in mean and median values between derivatives user and non user observations.

5.2.2.1 Discretionary accruals: Means and Medians of full sample

The discretionary accrual mean of the sample firms is 0.041 or 4.1% of total assets, with a median of 2.8% (see Table 5.8). This is in comparison with Huang et al's (2009) sample (mean of 6.3% and median of 4.4%) Barton's (2001) sample (mean of 1.9% and median of 3.4%). The total accrual mean is 8.1% with a median of 6.4%.

Table 5.8-Discretionary accruals: Mean and median values of full sample (i.e. derivatives users and non users)

Reported values are based on unsigned scaled discretionary accruals (i.e. unsigned discretionary accruals/total assets) and are based on full sample of 850 firm year observations.

	Discretionary accruals		Total accruals		
Category	Mean	Median	Mean	Median	Firm-year observations
Combined derivatives and non derivatives users	0.041	0.028	0.081	0.064	850

5.2.2.2 Discretionary accruals: Difference between means and median tests

Difference between means and median of separate Pre- and Post- SFAS 133 observations

I reviewed the difference between the means and median of separate pre- and post- SFAS 133 period observations. Table 5.9 outlines the results, which show a statistically significant increase in the level of discretionary accruals. Using the sample of derivatives users, the mean of discretionary accruals has a statistically significant increase from 3.2% to 4.2%. Using the combined sample, the mean of discretionary accruals has a statistically significant increase from 3.6% to 4.3%. These results support Hypothesis 2.2 that SFAS 133 leads to an increase in discretionary accruals.

Table 5.9-Discretionary accruals: Difference between means and medians of separate Pre and Post-SFAS 133 observations

Panel A-Partitioned findings between separate samples of a) derivatives users and b) users and non users of derivatives

Reported values are based on unsigned scaled discretionary accruals (i.e. unsigned discretionary accruals/total assets). Derivatives users are the firm year with evidence of derivatives use through either reported notional amounts or fair values (i.e. 681 firm-year observations). The sample of users and non-users derivatives consists of 850 firm year observations. Unlike derivatives measures, there are no dropped observations due to missing or extreme amounts. In determining the discretionary accruals, values are winsorized to minimise the impact of outliers.

Derivatives users				Users and non users of derivatives		
	Discretionary accruals			Discretionary accruals		
Category	Mean	Median	Firm-year observations	Mean	Median	Firm-year observations
Pre-SFAS 133	0.032	0.024	245	0.036	0.024	304
Post-SFAS 133	0.042	0.030	436	0.043	0.031	546
T-test	-3.06			-2.23		
Z-test		2.96			-3.04	

Paired Sample

I repeat the tests using 166 firms that have observations across both pre- and post- SFAS 133 periods (i.e. paired firms). Of these firms, 100 increased and 66 decreased their average annual level of discretionary accruals. There is no significant difference based on the t-test when the test is based on average annual usage in either of these periods (i.e. a single annual average per firm for each of these two periods). But, there is a significant difference when the Wilcoxon z test is used and the same when all observations related to the paired firms are used. (see Table 5.10- Panel B).

Table 5.10 - Discretionary accruals: Paired difference of means between pre-and post-SFAS 133 observations

Panel A Difference in means and medians- paired observations

Reported values are based on unsigned scaled discretionary accruals (i.e. unsigned discretionary accruals/total assets. This is based on 166 firms with observations across the pre- and post-SFAS 133 periods.

	Mean	Median
Pre-SFAS 133	0.0356	0.024
Post-SFAS 133	0.0412	0.03
T-test	1.79	
Z-test		2.54

Panel B Difference in means and medians- based on average use per firm before and after SFAS 133

Pre-SFAS 133 mean of paired observations	0.037
Post-SFAS 133 mean of paired observations	0.041
Difference	- 0.004
T-test	1.19
Z-test	2.56
Firms that increased discretionary accruals after SFAS 133	100
Firms that decreased discretionary accruals after SFAS 133	66
Firms with observations across pre and Post-SFAS 133	166

Discretionary accruals amount: Difference in means and medians (classified by derivatives users and non users)

I analyse the difference in means and medians of discretionary and total accruals, between observations stratified by users and non users of derivatives. The results in Table 5.11 show that non users have a statistically significant higher level of accrual usage. Non users have 5.1% of total assets as discretionary accruals, while derivatives users have 3.8% of total assets. This finding supports Hypothesis 2.3 on substitution of derivatives and accruals. Furthermore, in combination with univariate findings on derivatives in section 5.2.1, these findings point to the likelihood of managers having preference for accruals as a means of smoothing earnings, after SFAS 133 adoption.

Table 5.11 Difference in means and medians between users and non users of derivatives

Reported values are based on unsigned scaled discretionary accruals (i.e. unsigned discretionary accruals/total assets). Derivatives users are the firm year with evidence of derivatives use through either reported notional amounts or fair values (i.e. 681 firm-year observations). In determining the discretionary accruals, values are winsorized to minimise the impact of outliers.

Category	Mean	Median	Count
Non users of derivatives	0.051	0.036	169
Derivatives users	0.038	0.027	681
T-test	3.23		
Wilcoxon Z-test		3.17	

5.2.3 Control variables

Independent control variables are proxies for the determinants of derivatives use and discretionary accruals. The stratification of means and medians of the independent control variable by derivatives and the extent of use of discretionary accruals sheds some light on which control variables are likely to be associated with the focal variables. Results of the following tests of independent control variables are reported:

- Mean and median;
- Difference in the mean and median values between derivatives users and non derivatives users; and
- Difference in mean and median values between low (i.e. below full sample median) and high accrual users (i.e. above full sample median).

In addition, the control variables; delta, leverage, dividend payout and price to book ratio, have significant outlier amounts[74]. These specific variables are winsorised at the 99% confidence level, so as to minimise the effect of extreme observations in the empirical modelling. Table 5.12 (Panels A, B and C) outline the descriptive statistics related to the other control variables.

5.2.3.1 Control variables- Full Sample mean and median

Table 5.12 (Panel A) contains results of the full sample. The results shed light on overall data attributes. Some variables namely, R&D and managerial share ownership percentage have a median value of 0. This could be due to missing variables or it could effectively mean that firms that do not report these variables had zero values for them. If it is due to missing variables, this could be a source of error in the inferences made in the multivariate models. The total assets median of $3.96 billion is much lower than the mean $11.6 billion and this shows a skewed distribution across the sample. However the logarithmic transformation of total assets brings the mean (8.4) and median (8.28) closer together. As described in 4.6.1, the logarithmic transformation is used as a proxy for firm size.

[74] Based on descriptive statistics of percentile, max and min (not reported)

As a supplemental test, I test but do not report on the quarterly earnings volatility of firms before and after SFAS 133 adoption. I find univariate evidence of increases in quarterly earnings volatility.

5.2.3.2 Control variables: Stratification by Users and Non Users of Derivatives

Table 5.12 (Panel B) contains the control variables stratified by users and non users of derivatives. Relative to non users, derivatives users have:

a) *Higher Price to Book ratios:* this finding is consistent with the notion that firms with higher growth opportunities and higher cost of underinvestment are more likely to use derivatives, as discussed in 2.3.1.4.
b) *Higher leverage:* this is consistent with the notion that firms with higher levels of debt are more likely to use derivatives to reduce earnings volatility, their perceived riskiness and expected costs of financial distress, as discussed in 2.3.1.1. The higher leverage can also be explained by the increased likelihood of firms issuing debt, concurrently using derivatives, so as to minimise the cost of debt capital. As explained in 2.3.1.4, debt capital providers are likely to impose tighter covenants and demand higher spreads, due to their anticipation of asset substitution (i.e. engage in high risk investments that lower the risk adjusted return for debt-holders). However, having a risk management program in tandem with external financing plans alleviates this concern and reduces the cost of capital.
c) *Higher bonuses and lower delta:* the observation of these compensation dimensions do not conform to theoretical expectations discussed in 2.3.3 that managers with a higher delta should be more likely to use derivatives
d) *Higher total assets*: this is consistent with larger firms being more likely to use derivatives. Large firms do enjoy economies of scale whilst incurring costs of derivatives instruments usage (Culp and Miller, 2002). See 2.3.4.3 for further discussion.
e) *Lower levels of liquidity:* this is consistent with the expectation that derivatives use lowers concerns about having to raise external financing and thus have to conserve cash (Myers and Majluf, 1984). See 2.3.1.4 for further discussion.
f) *Higher dividend payouts:* despite the observed differences, there is no study I am aware of that provide a conceptual justification of dividends influencing derivatives use.
g) *Higher percentage of foreign sales:* this is consistent with the expectation that firms with a higher exposure to currency risk should use greater levels of derivatives.

5.2.3.3 Control variables: Stratification by High and Low accruals firms

Table 5.12 (Panel C) contains the control variables stratified by high and low accrual use. Relative to low accrual firms, high accrual firms have the following characteristics

a) *Higher trading volumes of their shares:* this is consistent with accruals being used with capital markets considerations in mind, as discussed in section 2.4.3. This would most likely be supported by the information hypothesis of accruals, where accruals are used to convey private information. This reduces the information asymmetry between informed and uninformed investors and leads to higher levels of stock trading and this is manifested by a higher turnover of shares as captured by the share trading volume.

b) *Higher level of abnormal investments and higher research and expenditure levels*: this is consistent with alternative mechanisms of income smoothing (e.g. operating and investment decisions) being used as substitutes.

c) Higher levels of liquidity: there is however, no conceptual explanation for this observation that I am aware of.

d) *Lower proportion of cash pay and bonuses as a percentage of total compensation*: as articulated in section 2.3.3.3, executives with lower cash pay are likely to be more risk averse, as their personal wealth is more likely to be concentrated in their employer firms. This will lead them to employ higher level of accruals so as to smooth earnings

Table 5.12-Control Variables Descriptive Statistics

Panel A- Control variable statistics for full sample

The mean and median values are based on full sample of 850 observations of users and non users of derivatives.

Variable Definition-TAXLOSS-Tax loss carry forward/Total assets, LN (TRADVOL) - Logarithm (Trading volume), DIV_POUT-Dividends paid/Income before extraordinary items, LEV- Debt/Total assets, ABINV- Unsigned Over/under investment (Capital expenditure/Sales)- relative to predicted value, UNDER INV-Underinvestment relative to predicted value , R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, QUICKRATIO-(Current assets-Inventory)/Current liabilities, LNTASSETS- Log (Total assets), ASSET INTENSITY- Property plant and equipment/Total assets, FSALES-Foreign sales/Sales, VEGA- ($change in stock and stock options value for 0.01 change in stock price volatility)/Cash Pay, DELTA- ($change in stock and stock options value for 0.01 change in stock price)/Cash Pay , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV- Geographical diversification, number of key regions with foreign operations, ASSETS-Total balance sheet assets at fiscal year end, OPCASHFLOW-Annual Cash flow from operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding, AUDEXP-Dummy for auditor with industry expertise, INTERLOCK-Dummy for Executives with interlocking relationships.

Continuous variables	**Mean**	**Median**
Capital markets incentive proxies		
TAXLOSS	0.03	0.00
LN_TRADVOL	5.91	5.84
DIV_POUT	0.14	0.02
LEV	0.191	0.188
ABNORMAL INV	0.03	0.02
UNDER INV	-0.016	-0.0045
R&D	-0.002	0.00
PTOB	4.53	3.08
QRATIO	1.31	1.04
Managerial Compensation		
VEGA	0.34	0.204
DELTA	0.43	0.40
BONUS_PERC	0.14	0.12
CASHPAY_PERC	0.24	0.22
Corporate Governance		
INST_OWN	0.78	0.80
MGR SHROWN	0.013	0.00
Firm attributes		
GEOG DIV	5.45	5.00
FSALES	0.49	0.46
LOGASSETS	8.40	8.28
ASSET INTENSITY	0.28	0.23
ASSETS ($ million)	11,643	3,962
OPCASHFLOW	0.12	0.11
Dichotomous variables	***Total***	***Percentage***
AUDEXP	329	39%
INTERLOCK	27	3.2%
NUMBER OF UNDERINVESTED FIRMS	502	59%

***Significance at 1%, ** Significance at 5%,* Significance at 10%

Panel B-Control variable differences stratified by users and non users of derivatives

Variable Definition- TAXLOSS-Tax loss carry forward/Total assets, LN (TRADVOL) - Logarithm (Trading volume), DIV_POUT-Dividends paid/Income before extraordinary items, LEV- Debt/Total assets, ABINV-Over/under investment (Capital expenditure/Sales), R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, QUICKRATIO-(Current assets-Inventory)/Current liabilities, LNTASSETS- Log (Total assets), ASSET INTENSITY-Property plant and equipment/Total assets, FSALES-Foreign sales/Sales, VEGA- change in stock and stock options value for 0.01 change in stock price volatility, DELTA- change in stock and stock options value for 0.01 change in stock price , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV- Geographical diversification, number of key regions with foreign operations, ASSETS-Total balance sheet assets at fiscal year end, OPCASHFLOW-Annual Cash flow from operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding.

	Non derivatives users	Non derivatives users		Derivatives users	Derivatives users			
	Mean	Median	Count	Mean	Median	Count	T-stat	Wilcoxon z-stat
Capital markets incentive proxies								
TAXLOSS	0.02	0.00	169	0.03	0.00	681		
LN_TRADVOL	5.80	5.85	169	5.93	5.84	681		
DIV_POUT	0.10	- 0.00	169	0.15	0.03	681	***	***
LEV	0.163	0.16	169	0.199	0.196	681	***	***
ABNORMAL INV	0.0436	0.00 18	168	0.00 28	0.0016	671	**	
R&D	-0.0014	0.00	162	-0.0022	0.00	669		
PTOB	3.73	3.10	166	4.74	3.07	674	***	
QRATIO	1.71	1.36	166	1.21	0.96	674	***	***
Managerial Compensation								
VEGA	0.27	0.17	169	0.37	0.21	681		
DELTA	0.46	0.45	169	0.43	0.39	681	***	***
BONUS_PERC	0.12	0.11	169	0.14	0.12	681	**	**
CASHPAY_PERC	0.27	0.22	169	0.37	0.22	676		
Corporate Governance								
INST_OWN	0.78	0.80	166	0.77	0.81	674		
MGR SHROWN	0.019	0.00	169	0.011	0.00	681		
Firm attributes								
GEOG UNITS	5.44	5.00	169	5.45	5.00	681		
FSALES	0.47	0.44	169	0.50	0.47	681	*	***
LOGASSETS	7.77	7.59	169	8.55	8.41	681	***	***
ASSET INTENSITY	0.25	0.19	169	0.28	0.24	681	**	***
ASSETS ($ million)	6,148	1,985	169	13,007	4,500	681	***	***
OPCASHFLOW	0.12	0.11	169	0.12	0.11	681		

***Significance at 1%, ** Significance at 5%,* Significance at 10% based on Wilcoxon z-stat

Panel C- Control variable differences stratified by low and high accrual firms

Variable definition- TAXLOSS-Tax loss carry forward/Total assets, LN (TRADVOL) - Logarithm (Trading volume), DIV_POUT-Dividends paid/Income before extraordinary items, LEV- Debt/Total assets, ABINV-Over/under investment (Capital expenditure/Sales), R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, QUICKRATIO-(Current assets-Inventory)/Current liabilities, LNTASSETS- Log (Total assets), ASSET INTENSITY-Property plant and equipment/Total assets, FSALES-Foreign sales/Sales, VEGA- change in stock and stock options value for 0.01 change in stock price volatility, DELTA- change in stock and stock options value for 0.01 change in stock price , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV- Geographical diversification, number of key regions with foreign operations, ASSETS-Total balance sheet assets at fiscal year end, OPCASHFLOW-Annual Cash flow from operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding.

	Low accrual Mean	Low accrual Median	Count	High accrual Mean	High accrual Median	Count	T-stat	Wilcoxon z-stat
Capital markets incentive proxies								
TAXLOSS	0.03	0.00	417	0.03	0.00	433		
LN_TRADVOL	5.74	5.65	417	6.07	6.03	433	***	***
DIV_POUT	0.14	0.02	417	0.14	0.01	433		*
LEV	0.196	1.82	417	0.47	1.32	433		
ABNORMAL INV	0.025	0.015	410	0.037	0.019	429	***	***
R&D	-0.001	0.00	407	-0.003	0.00	424	**	**
PTOB	4.56	3.20	417	4.51	2.91	433		
QRATIO	1.20	0.97	409	1.42	1.09	426	***	***
Managerial Compensation								
VEGA	0.37	0.20	417	0.33	0.21	433		
DELTA	0.43	0.38	417	0.44	0.43	433		
BONUS_PERC	0.15	0.13	417	0.13	0.11	433	***	***
CASHPAY_PERC	0.25	0.23	417	0.23	0.21	433	***	**
Corporate Governance								
INST_OWN	0.78	0.80	410	0.77	0.80	430		
MGR SHROWN	0.012	0.00	417	0.014	0.00	433		**
Firm attributes								
GEOG UNITS	5.52	5	417	5.38	5	433		
FSALES	0.49	0.46	417	0.49	0.46	433		
LOGASSETS	8.41	8.30	417	8.38	8.22	433		
ASSET INTENSITY	0.27	0.22	417	0.28	0.24	433		
ASSETS ($ million)	10,738	4,024	417	12,516	3,702	433		
OPCASHFLOW	0.11	0.10	417	0.13	0.12	433	***	***

***Significance at 1%, ** Significance at 5%,* Significance at 10% based on Wilcoxon z-stat

5.3 Multivariate testing

5.3.1 Multivariate model selection- SFAS 133 and derivatives use

The determinants of derivatives use are modelled based on Equation 5.1. In the testing, for comparative purposes, I run models with and without the interaction term between the SFAS 133 dummy variable (133DUM) and the discretionary accrual proxy (DAC).

Equation 5.1

DRNV= α + β_1 133DUM + β_2 DAC + β_3 133DUM *DAC + β_4 ABINV + β_5TAXLOSS + β_6 PTOB+ β_7 LEV + β_8 QRATIO + β_9 LNASSETS + β_{10} GEOG_DIV + β_{11} FSALES + β_{12} VEGA + β_{13}DELTA + β_{14} CSHPAYPER + β_{15} INSTOWN + β_{16} MGR SHROWN + β_{17} INTERLOCK β_{19-} INDDUM + β YRDUM

To determine the appropriate regression model, I evaluate the influence of panel data individual firm effects and endogeneity on the overall regression. This is based on the criteria discussed in section 4.4. This informs the choice between different possible regressions models (i.e. pooled OLS, panel fixed effect, panel random effect and 2SLS). The key model diagnostic results that underpin the selected models are described further below:

5.3.1.1 Individual firm effects

Unobservable heterogeneity of individual firms or firm fixed effects, are potentially part of the variables omitted in the model specification. Possible inference errors arising from omitted variables could be minimised by having a fully specified model or suitable proxies that represent the omitted variables. These include industry and time dummy variables as these capture industry and time fixed effects. I have specified this model including the full range of determinants (i.e. 17 variables excluding industry and year dummies), identified in the conceptual framework (section 2.3), as well as the time and industry dummy variables.

Therefore, I assume that the pooled OLS regression should have minimised the impact of omitted variables. However, I conduct a range of econometric diagnostic tests to ascertain the existence of individual effects. These include:

- The F-test to ascertain whether there are differences of intercepts due to firms. The F-test has a critical value of 4.21 (p-value of 0), leading to the rejection of the null hypothesis that all firm intercepts have zero value. This is interpreted as evidence that individual firm fixed effects are significant. However, the fixed effect regression omits industry and other time invariant[75] variables, such as number of geographic segments and therefore may simply be failing to capture heterogeneity that could be captured by the industry dummy.

- Test of whether individual firm differences are captured in the error term. The Breusch Lagrange multiplier, testing the null hypothesis of variance of firm specific error being zero, has a chi squared value of 135.76 (p-value of 0). I therefore reject the null hypothesis that there is no individual firm effect in the error term.

- The Hausman test of whether coefficients of the random effect and fixed effect are systematically different has a chi-squared value of 23.24 (p-value - 0.142). The null hypothesis is that there are no differences in coefficients. Hence, I do not reject the null hypothesis and infer that the random effect approach is preferable to the fixed effect model, and is more parsimonious.

Based on the above diagnostics, the exogenous pooled OLS and random effect GLS models are the primary models. A combination of these models provides both consistent and efficient estimations of association of the determinants of derivatives.

5.3.1.2 Endogeneity assessment

As discussed in 4.4.2.1, endogeneity arises due to the simultaneity of discretionary accruals and is solved using the 2SLS model. The determination of appropriateness of the 2SLS is based on the tests of endogeneity of discretionary accruals as an endogenous explanatory variable. This is in addition to tests on the selected instruments' strength and validity, over-identification and homoskedasticity of the model.

The Durbin Hausman Wu[76] (results not reported) shows discretionary accruals are endogenous.
As discussed in section 4.3.4, the instrument variables for the 2SLS model are operating cash flow and a constructed categorical variable for the likelihood of discretionary accruals. Operating cash flow is expected to be associated with discretionary accruals and is also applied as an instrument variable by Barton (2001). The categorical variable is constructed including

[75] Does not vary over the testing time period for each company

[76] Durbin Wu Hausman test- Is applied when one is testing whether the independent variable is endogenous. This entails the regression of the endogenous variable on other exogenous variables as well as the selected instrument variables and determination of the residual. Thereafter the residual is included one of the regressors in the original equation. If the residual has a significant coefficient then this is proof of endogeneity.

indicators for whether either net income percentage change or net income is negative, so as to capture income increasing incentives. It also has a component for positive operating cash flow to capture income decreasing incentives.

The instrument variable strength, measured by the Cragg-Donald F –test has a value of 28.55 (p-value -0) and a partial R-squared of 10.94% in the first stage regression. This leads to the rejection of the null hypothesis of weak instruments. The Sargan statistic of 1.96 (p-value 0.1606), means the null hypothesis that the model is over-identified cannot be rejected. The Pagan-Hall statistic (30.16-p-value 0.218) leads to the failure to reject the null hypothesis of homoskedasticity and inference that there is no problem of heteroskedasticity in the 2SLS model. Hence the results of the 2SLS model are consistent and the model can be relied on.

Evaluation of 2SLS versus OLS

As my findings suggest that the 2SLS model can be relied upon for assessing the determinants of derivatives use, I further test whether the coefficients differ from those of the pooled OLS model. To do this I conduct a Hausman test assessing whether the coefficients of the exogenous OLS/random effect models differ from those derived from the 2SLS models. The Hausman test chi-squared of 0.03 (OLS) and 0.47 (random effect), has p value of 1. Therefore I do not reject the null hypothesis that the coefficients of the exogenous and 2SLS models' are the same. For this reason the pooled OLS is preferred as it is a more consistent model. Nevertheless, I report the 2SLS results, in Table 5.14, as part of the robustness testing.

5.3.1.3 Censored regression

An important factor influencing the modelling is the need to distinguish *the determinants of the decision to hedge* from *the determinants of extent of hedging for derivatives users*. As noted by various authors (Barton, 2001; Singh and Upneja, 2007; and Judge, 2006), these are separate decisions and the determinants will be correspondingly different. Only 80% (681 of the 850 firm-year observations) of selected sample reported derivatives use. Even for firms that reported the use derivatives, 85 were missing the dependent variable (i.e. notional values). Hence, for the combined sample, the dependent variable will be censored (i.e. left censored at zero) because the notional amount is zero for non derivatives users and for derivatives users with missing values. I run a censored (tobit) regression, for the combined sample of users and non users of derivatives, but exclude any derivatives users that had missing notional amount. The derivatives notional value as dependent variable is left censored for firms that do not hedge. This effectively allows the modelling of determinants of whether to use derivatives. The censored regression supplements the above mentioned tests (i.e. 2SLS, pooled OLS and random effect panel regressions), as these focus on the extent of derivatives use among observations of derivatives users. As an additional robustness test of the determinants of decision to hedge, I run a logistic regression using a dummy variable for the decision of whether to use derivatives or not, as the dependent variable. The logistic regression is based on the sample of users and non users of derivatives.

Summary- model selection

Based on the above diagnostics, I effectively run 10 regression models, including the pooled OLS, random effects model, censored regression, 2SLS and logistic regression. The results are reported in Table 5.13, Table 5.14, Table 5.15, Table 5.16 and Table 5.16.

5.3.2 Derivatives use-Multivariate results

5.3.2.1 SFAS 133 and derivatives use

There is some evidence supporting Hypothesis 2.1 that the adoption of SFAS 133 leads to reduced derivatives use**.** There is significant negative association in only four of the ten regression models. The significant findings are in the both pooled OLS and random effect that include an interaction variable. The evidence is not robust across all the different models and hence is inconclusive.

This partial supporting evidence is consistent with the theoretical expectations of reduced derivatives use after SFAS 133. As discussed in section 2.7.1, Barnes (2002), Shin (2004) and Nan (2007), using analytical models, propose that derivatives use for risk management would decline after SFAS 133. Barnes (2002) posits that firms with hedgeable projects will aim to distinguish themselves from speculating firms that are likely to increase derivatives use. This is due to anticipated difficulties that outsiders such as investors would face when attempting to differentiate hedgers and speculators. Another explanation for expected derivatives reduction is that managers aim to minimise interim rather than terminal earnings volatility and SFAS increases interim earnings volatility (Shin, 2004). In contrast to the analytical models, other empirical findings on how SFAS 133 impacts on derivatives use are mixed. Li and Stammerjoan (2004) find that derivatives use did not decline after SFAS 133, and they suggest that the benefits of derivatives use should outweigh the concerns related to its accounting method. Similarly, Singh (2004) does not find conclusive evidence of reduced derivatives use. On the other hand, based on survey evidence, Lins et al (2007) conclude that effective risk management was curtailed as many firms were concerned about qualifying for hedge accounting. Zhang (2009) comes to the conclusion that SFAS 133 leads to reduced speculative activities and more prudent risk management. Her study is however based on indirect evidence[77].

5.3.2.2 Impact of discretionary accruals on derivatives use (Substitution) relationship

The use of accruals is expected to influence derivatives use (Barton, 2001). Results show a significant negative association in seven of ten models. The supporting evidence is robust across different models including pooled OLS, 2SLS, censored regression and random effect models. This finding is similar to Barton (2001) but differs from Singh (2004) and Huang et al (2009). The latter authors found that whereas derivatives had a significant negative association with discretionary accruals as the dependent variable, there was no evidence that discretionary accruals had a similar association with derivatives use as the dependent variable. Overall, these findings support the Hypothesis 2.3a, which states that hedging derivatives and discretionary accruals are substitutes.

In order to test whether the substitution relationship differs through the pre- and Post-SFAS 133 periods, I include an interaction variable between SFAS 133 and Discretionary accrual proxy (i.e. as independent control variable), in some of the reported models. Thereafter, I perform the chow test for the joint significance of the dummy and the interaction variable. While the SFAS 133 dummy and the discretionary accrual coefficients are negative and significant, the interaction term is positive and significant. The F-test leads to the rejection of the interaction term coefficient being equal to zero. I conclude both the intercept and slope are significant in the models. This finding sheds light on the difference in the discretionary accrual coefficients across the pre- and post-SFAS 133 periods. It points to the reducing impact of accruals on derivatives use after SFAS 133 adoption. For example in Table 5.13- Panel A, the coefficient of discretionary accruals post- SFAS 133 is effectively ($\beta_2 + \beta_3$)) or -0.06 (-6%) while it is -1.069 (β_2) in the pre-SFAS 133 period.

[77] As discussed in 2.7.1, her study was based on changes in risk exposure of firms she designated as speculators. The designation was not based on disclosed derivatives use

There are various plausible explanations for the reduced impact accruals as an independent variable of derivatives use after SFAS 133. To begin, accruals may be required as a complement, to offset the increased earnings volatility due to derivatives accounting, and this would offset the substitution effect. Another factor that could make discretionary accruals complement rather than substitute derivatives use, could be that the adoption of SFAS 133 led to an increase in speculative use of derivatives as discussed in section 2.7.1. Nan's (2007), Shin (2004) and Barnes (2002) analytical model suggests that SFAS 133 would reduce prudent risk management activities, but increase the speculative use of derivatives. It could be that firms classified as having risk management derivatives in this study, are in fact speculative derivatives users. However, as noted earlier, it remains a difficult empirical challenge to differentiate speculative and risk management derivatives, due to the quality of available disclosures. Besides the empirical findings in this study on the relationship between SFAS 133 and derivatives use, do not give any pointer on whether either the risk management or speculative derivatives use, increases or decreases.

In parallel, the adoption of SFAS 133 could increase the incentive to use discretionary accruals for income smoothing, as it is no longer as attractive to use derivatives. In other words, the adoption of SFAS 133 is likely to influence the extent to which accruals are a determinant of derivatives use. Based on this reasoning, I expected a stronger negative association after SFAS 133 adoption, when accruals are the explanatory variables for derivatives use. However, either the use of speculative derivatives or incremental volatility due to SFAS 133's features can induce the increased use of accruals in a manner that confounds the income smoothing substitution relationship. These confounding effects pose the empirical challenge of meaningfully identifying and interpreting what any observed increase in accruals represents.

5.3.2.3 Other determinants of derivatives use

As Triki (2005) suggested, there is a need to extend the risk management empirical evidence that is based on improvements in derivatives accounting due to SFAS 133 and other disclosure enhancements. Hence studies that are based on post-SFAS 133 data are a contribution, albeit being confirmatory in nature. There is significant evidence of association with abnormal investment, price to book ratio, liquidity within the firm, size effect, diversification through foreign operations, and leverage. An elaboration of these findings is made below.

Real earnings management (Abnormal Investment)

The level of abnormal capital expenditure levels is applied as the proxy for over/under investment and it has a significant negative association across all the related models. However, a careful interpretation is required. As intended, this proxy could represent investment decisions as a means of income smoothing. However, it could partially represent the incentive to use derivatives to alleviate the under investment problem, due to concerns about available cash (Froot, Scharfstein, and Stein, 1993). The partial representation occurs when the proxy relates to firm under-investment.

Investment avoidance (Incentive to avoid underinvestment)

Price to Book ratio and the level of research and development (R&D) are used as proxies for the extent to which firms avoid investment as discussed in 4.6.1. Price to Book ratio reflects the extent to which there are growth opportunities. There is robust evidence of a positive significant association of the Price to Book ratio as a regressor, across all the related models. This conforms to the expectation that firms with growth opportunities are likely to hedge so as to minimise the opportunity cost of underinvestment (Froot et al, 1993). However the R&D ratio (R&D /total assets) has a negative association in four of the ten models. The unexpected sign on R&D could simply be a result of R&D expenditure being reported with a minus sign in the data used for the regression[78].

[78] Hence an increase in R&D/Total assets (e.g. from -0.05% to -0.10) would be measured as a -0.05% change. Hence a negative association is in real terms actually a positive association.

Liquidity conservation

Liquidity, as measured by the quick ratio, has a significant negative association in only the censored and tobit regression models. This implies that liquidity is likely to be a determinant of whether to use derivatives rather than the extent of their use. This finding conforms to the proposition that hedging and availability of cash or liquidity are substitutes. Liquidity can alleviate the under-investment problem (Minton and Schrand, 1998). It can also reduce the perceived riskiness and probability of financial distress (Nance, 1993). All these perspectives are discussed in 2.3.1.

Leverage

Leverage is a proxy for the probability of financial distress and interest rate exposure has a positive significant association. The higher the leverage, the higher the probability of financial distress, the higher the interest rate exposure and therefore the higher the likelihood of corporate managers using derivatives. Hence, this finding is consistent with the expected sign and with the finding of the univariate testing of control variables as described in section 5.2.3.2.

There is some limited and weak evidence of managerial risk incentives as a determinant. Vega has a positive association in the 2SLS, censored and tobit regression models (i.e. 4 of 10 related models). This is inconsistent with the expected negative sign and it could be a reflection of un-modelled endogeneity. In addition there is no evidence of either delta or cash pay percentage being associated with derivatives use. As discussed earlier, the endogeneity of variables that are not primary can be ignored in the interests of model tractability and to minimise the risk of measurement error due to instrument variables. Furthermore, there is some evidence that managerial share ownership is in the random effect and censored regression models (i.e. 3 out of 10). Institutional ownership has a positive significant association in the censored and tobit regression models. This indicates that institutional ownership may be more of a factor in determining the decision to use derivatives but not on the extent of usage.

Regarding other firm specific regressors, there is some evidence of association for firm size (measured by the logarithm of total assets) and the percentage of foreign sales. Both firm size and percentage of foreign sales are significant in the censored and tobit regression, indicating that they are likely to be mainly determinants of the decision to use derivatives and not extent of use.

Table 5.13: Multivariate regressions on determinants of derivatives use

MODEL SPECIFICATION

DRNV= α + β_1 133DUM + β_2 DAC + β_3 133DUM *DAC + β_4 ABINV + β_5TAXLOSS + β_6 PTOB+ β_7 LEV + β_8 QRATIO + β_9 LNASSETS + β_{10} GEOG_DIV + β_{11} FSALES + β_{12} VEGA + β_{13}DELTA + β_{14} CSHPAYPER + β_{15} INSTOWN + β_{16} MGR SHROWN + β_{17} INTERLOCK β_{19-} INDDUM + β YRDUM

Panel A-Derivatives determinants-Pooled OLS regression

Pooled OLS regression of DRNV as the dependent variable is based on 516 observations of derivatives users with reported notional amounts that have all control variable data. VIF factor is less than 10 for all variables and hence no concern on multi-collinearity. Year dummy are not significant. Dropped manufacturing industry dummy due to multi-collinearity, and thereafter only the trade industry is significant. The reported standard errors and t-stats are heteroskedasticity robust. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. The Chow test of joint significance of the interaction term (133DUM* DAC) and 133DUM, shows that both the slope and intercept are significant. The Chow test with an F- value of 4.57 (p-value of 0.0108); leads to rejection of the null hypothesis that β_1 and β_3 are zero, in Model 2.

Variable Definition- DRNV-Notional amount of derivatives/Total asset, 133DUM- SFAS 133 dummy variable, DAC- Discretionary accruals, ABINV- (Capital expenditure/Sales)-Over/under investment based on predicted, R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, TAXLOSS-Tax loss carry forward/Total assets, LEV- Debt/Total assets, QUICKRATIO-(Current Assets-Inventory)/Current Liabilities, LNTASSETS- Log (Total assets), FSALES-Foreign sales/Sales, VEGA- ($change in stock and stock options value for 0.01 change in stock price volatility)/Cash Pay, DELTA- ($ change in stock and stock options value for 0.01 change in stock price)/Cash Pay , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV- Geographical diversification, number of key regions with foreign operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding, INTERLOCK-Dummy variable for Executives with interlocking relationships, INDDUM-Industry dummy, YRDUM-Year dummy.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	0.090	(1.28)	0.117	(1.61)
FOCAL VARIABLES	133DUM	-0.024	(-1.28)	-0.055**	(-2.25)
	DAC	-0.253**	(-2.58)	-1.069***	(-3.67)
	133*DAC			1.009***	(3.04)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.457***	(-2.78)	-0.487***	(-2.79)
MARKET INCENTIVE VARIABLES	R&D	-0.445	(-0.65)	-0.470	(-1.13)
	TAXLOSS	-0.037	(-0.90)	-0.043	(-1.06)
	PTOB	0.002*	(1.89)	0.002*	(1.81)
	LEV	0.089*	(1.83)	0.092*	(1.90)
	QUICKRATIO	-0.001	(-0.09)	-0.001	(-0.17)
	LNASSETS	0.005	(0.86)	0.005	(0.86)
	GEOG DIV	-0.005	(-1.08)	-0.005	(-1.06)
	FSALES	-0.007	(-0.15)	-0.006	(-0.13)
MANAGERIAL RISK INCENTIVES	VEGA	0.019	(0.55)	0.021	(0.66)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.005	(-0.16)	-0.002	(-0.06)
	PERC CASHPAY	-0.011	(-0.21)	-0.017	(-0.34)
	INST OWN	0.012	(0.33)	0.008	(0.23)
	MGR SHROWN	-0.110	(-1.22)	-0.107	(-1.21)
	INTERLOCK	0.033	(0.60)	0.031	(0.59)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	Observations	516		516	
	ADJUSTED R-SQUARED	5.9%		7.6%	
	F-value	2.53***		2.57***	

***Significance at 1%, ** Significance at 5%,* Significance at 10%

Panel B- Derivatives Determinants Random effect panel regressions

Random effect GLS models- This is based on the same variables and sample as panel A. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. The Chow test of joint significance of the interaction term (133DUM* DAC) and 133DUM, shows that both the slope and intercept are significant. The Chow test, F- value of 9.57 (p-value of 0.0084), leads to rejection of null hypothesis that β_1 and β_3 are zero, in Model 2.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	0.126	(1.44)	0.135	(1.55)
FOCAL VARIABLES	133DUM	-0.020	(-1.53)	-0.037**	(-2.39)
	DAC	-0.101	(-1.33)	-0.585***	(-3.32)
	133*DAC			0.587***	(3.04)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.243**	(-2.37)	-0.249**	(-2.35)
MARKET INCENTIVE VARIABLES	R&D	-0.404**	(-2.15)	-0.410**	(-2.49)
	TAXLOSS	0.035	(0.87)	0.033	(0.83)
	PTOB	0.002**	(2.03)	0.003**	(2.14)
	LEV	0.118**	(2.04)	0.118**	(2.05)
	QUICKRATIO	-0.007	(-1.00)	-0.007	(-0.96)
	LNASSETS	0.001	(0.11)	0.001	(0.16)
	GEOG DIV	-0.001	(-0.25)	-0.001	(-0.19)
	FSALES	-0.005	(-0.08)	-0.010	(-0.14)
MANAGERIAL RISK INCENTIVES	VEGA	0.005	(0.24)	0.006	(0.31)
&CORPORATE GOVERNANCE VARIABLES	DELTA	0.001	(0.05)	0.002	(0.06)
	PERC CASHPAY	-0.028	(-0.58)	-0.032	(-0.68)
	INST OWN	-0.013	(-0.28)	-0.013	(-0.27)
	MGR SHROWN	-0.172***	(-2.62)	-0.163**	(-2.48)
	INTERLOCK	0.026	(0.66)	0.028	(0.74)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	Observations	516		516	
	R-squared	7.5%		9.1%	
	Wald	54.49***		62.21***	

***Significance at 1%, ** Significance at 5%,* Significance at 10%

Table 5.14: Derivatives determinants (Two stage least squares (2SLS) regression)

This is based on the same variables **Table 5.13**-Panel A. Discretionary accruals' is treated as an endogenous variable. Operating cash flow and a constructed categorical dummy variable are the instrument variables. The Cragg-Donald test –F value of 28.55 and partial R-squared (10.94%) statistics of first stage regression provide evidence of instrument strength and validity. The Sargan statistic of 1.96 (p-value of 0.1606) is evidence that the model is over-identified. The Pagan Hall statistic of 30.16 (p-value- 0.218) shows that there is no problem of heteroskedasticity and thus the 2SLS model can be relied on. This regression is based on observations of derivative users (i.e. 516 firm year observations). The same results are obtained with a sample that includes users and non users of derivatives.

		DRNV	T-stat
	INTERCEPT	0.100	(1.23)
FOCAL VARIABLES	133DUM	-0.015	(-0.83)
	DAC	-1.098***	(-2.63)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.342*	(-1.96)
MARKET INCENTIVE VARIABLES	R&D	-0.884**	(-2.16)
	TAXLOSS	0.004	(0.06)
	PTOB	0.003**	(2.17)
	LEV	0.090*	(1.92)
	QUICKRATIO	0.002	(0.34)
	LNASSETS	0.006	(1.09)
	GEOG DIV	-0.002	(-0.46)
	FSALES	-0.013	(-0.30)
MANAGERIAL RISK INCENTIVES	VEGA	0.016*	(1.81)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.014	(-0.41)
	PERC CASHPAY	-0.024	(-0.47)
	INST OWN	-0.002	(-0.04)
	MGR SHROWN	-0.108	(-0.87)
	INTERLOCK	0.045	(1.34)
OTHER	INDUSTRY DUMMY	Yes	Yes
	YEAR DUMMY	Yes	Yes
	N	516	
	F	2.26***	

***Significance at 1%, ** Significance at 5%,* Significance at 10%

Table 5.15 Derivatives determinants (Censored Regression)

Panel A: Determinants of Derivatives usage based on pooled OLS censored regression

Pooled OLS regression of DRNV as the dependent variable is based on 673 observations of derivatives users with reported notional amounts and non users. VIF factor is less than 10 for all variables and hence no concern on multi-collinearity. Year dummy are not significant. Only the trade industry is significant. The reported standard errors and t-stats are heteroskedasticity robust. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. The Chow test of joint significance of the interaction term (133DUM* DAC) and 133DUM, shows that both the slope and intercept are significant. The Chow test, F- value of 8.74 (p-value of 0.0002), leads to rejection of null hypothesis that β_1 and β_3 are zero, in Model 2.

Variable Definition- DRNV-Notional amount of derivatives/Total asset, 133DUM- SFAS 133 dummy variable, DAC- Discretionary accruals, ABINV- (Capital expenditure/Sales)-Over/under investment based on predicted capital expenditure/sales, R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, TAXLOSS-Tax loss carry forward/Total assets, LEV- Debt/Total assets, QUICKRATIO-(Current Assets-Inventory)/Current Liabilities, LNTASSETS- Log (Total assets), FSALES-Foreign sales/Sales, VEGA- ($change in stock and stock options value for 0.01 change in stock price volatility)/Cash Pay, DELTA- ($ change in stock and stock options value for 0.01 change in stock price)/Cash Pay , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV- Geographical diversification, number of key regions with foreign operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding, INTERLOCK-Dummy variable for Executives with interlocking relationships, INDDUM-Industry dummy, YRDUM-Year dummy.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	-0.154**	(-2.10)	-0.122*	(-1.66)
FOCAL VARIABLES	133DUM	-0.028	(-1.55)	-0.062***	(-2.93)
	DAC	-0.325***	(-2.98)	-1.167***	(-5.03)
	133*DAC			1.087***	(4.15)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.451***	(-3.01)	-0.479***	(-3.05)
MARKET INCENTIVE VARIABLES	R&D	-0.534*	(-1.91)	-0.551**	(-2.45)
	TAXLOSS	0.034	(0.83)	0.025	(0.60)
	PTOB	0.005***	(4.45)	0.005***	(4.42)
	LEV	0.104**	(2.10)	0.108**	(2.19)
	QUICKRATIO	-0.013*	(-1.85)	-0.014*	(-1.90)
	LNASSETS	0.021***	(3.55)	0.021***	(3.51)
	GEOG DIV	-0.008*	(-1.75)	-0.007*	(-1.68)
	FSALES	0.076*	(1.81)	0.071*	(1.68)
MANAGERIAL RISK INCENTIVES	VEGA	0.033**	(2.04)	0.035**	(2.42)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.037	(-1.18)	-0.034	(-1.09)
	PERC CASHPAY	-0.010	(-0.21)	-0.015	(-0.32)
	INST OWN	0.079**	(2.14)	0.078**	(2.12)
	MGR SHROWN	-0.131*	(-1.65)	-0.120	(-1.52)
	INTERLOCK	0.010	(0.25)	0.005	(0.14)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	Observations	673		673	
	F-value	5.27***		4.98***	
	Log Pseudo-likelihood	194.86***		200.18***	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

Panel B –Derivatives determinants (Random Effect GLS censored regression)

This is based on the same variable and data defined in Panel A. The reported standard errors and t-stats are heteroskedasticity robust. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. The Chow test of joint significance of the interaction term (133DUM* DAC) and 133DUM, shows that both the slope and intercept are significant. The Chow test, F- value of 15.35 (p-value of 0.0005), leads to rejection of null hypothesis that β_1 and β_3 are zero, in Model 2.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	-0.144	(-1.26)	-0.131	(-1.15)
FOCAL VARIABLES	133DUM	-0.031**	(-2.45)	-0.053***	(-3.65)
	DAC	-0.120	(-1.11)	-0.682***	(-3.17)
	133*DAC			0.710***	(3.09)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.289**	(-2.36)	-0.292**	(-2.39)
MARKET INCENTIVE VARIABLES	R&D	-0.358	(-1.27)	-0.361	(-1.29)
	TAXLOSS	0.067	(1.13)	0.063	(1.07)
	PTOB	0.004***	(3.38)	0.005***	(3.59)
	LEV	0.124**	(2.44)	0.124**	(2.46)
	QUICKRATIO	-0.015**	(-2.28)	-0.015**	(-2.18)
	LNASSETS	0.020**	(2.45)	0.020**	(2.48)
	GEOG DIV	-0.001	(-0.20)	-0.001	(-0.11)
	FSALES	0.022	(0.41)	0.010	(0.20)
MANAGERIAL RISK INCENTIVES	VEGA	0.005	(0.70)	0.007	(0.88)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.002	(-0.05)	-0.002	(-0.06)
	PERC CASHPAY	0.004	(0.09)	-0.001	(-0.03)
	INST OWN	0.055	(0.85)	0.058	(0.90)
	MGR SHROWN	-0.180	(-1.64)	-0.169	(-1.55)
	INTERLOCK	0.013	(0.43)	0.014	(0.49)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	Observations	673		673	
	Log Likelihood	306.38***		311.25***	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

Table 5.16-Derivatives use determinants (Tobit regression model)

This is based on the same variables defined in Table 5.15-Panel A. The data is the full sample of users and non users of derivatives (i.e. 850 observations). 793 observations are due to firms with missing control variable data.

		HEDGE	T-stat
	INTERCEPT	-0.376	(-1.49)
FOCAL VARIABLES	133DUM	-0.018	(-0.33)
	DAC	-0.603	(-1.41)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	-0.958**	(-2.22)
MARKET INCENTIVE VARIABLES	R&D	-0.995	(-1.31)
	TAXLOSS	0.316*	(1.87)
	PTOB	0.016***	(4.76)
	LEV	0.202	(1.32)
	QUICKRATIO	-0.074***	(-3.11)
	LNASSETS	0.097***	(5.52)
	GEOG DIV	-0.018	(-1.25)
	FSALES	0.345***	(2.68)
MANAGERIAL RISK INCENTIVES	VEGA	0.086***	(3.90)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.182*	(-1.88)
	PERC CASHPAY	0.071	(0.48)
	INST OWN	0.395***	(3.12)
	MGR SHROWN	0.114	(0.35)
	INTERLOCK	-0.063	(-0.55)
OTHER	INDUSTRY DUMMY	Yes	
	YEAR DUMMY	Yes	
	Observations	793	
	F-value	4.74***	
	Pseudo R-squared	9.72%	
	Log Pseudo-likelihood	-584.65***	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

5.3.3 Multivariate model selection-SFAS 133 and Discretionary accruals

The model of discretionary accrual is specified in Equation 5.2.

Equation 5.2

DAC= α + β 1 133DUM + β 2 CHDUM + β 3 DRNV + β 4 133*DRNV + β 5 ABINV + β 6 R&D + β 7TAXLOSS + β 8 LEV + β 9 LN_TRADVOL+ β 10 DIV_POUT + β 11OPCSHFLOW + β 12 VEGA + β 13 DELTA + β 14 CSHPAY + β 15 BONUS_PERC+ β 16 INSTOWN + β 17 MGR SHROWN + β 18 AUDEXP + β 19 INTERLOCK + β 20-INDDUM + β YRDUM

Similar to the derivatives determinants model selection described in section 5.3.1, the key model considerations are the requirements to overcome inference problems associated with endogeneity and individual effects. The diagnostic results that underpin the selected models are described further below:

5.3.3.1 Individual firm effects

I have specified the model based on the full range of determinants (i.e. 19 variables) identified in the conceptual framework in section 2.4. I also include time and industry dummy variables to help capture unobserved heterogeneity. Therefore, I assume that the pooled OLS regression should have minimised the impact of omitted variables. However, I conduct a range of econometric diagnostic tests to ascertain the existence of individual effects. These include:

- *Individual firm differences in intercept*: The F-test of the fixed effects model is 1.45 (p value of 0.0005) and the null hypothesis of all individual firm intercepts being equal to zero is rejected. However similar to the derivatives determinants model selection in section 5.3.1.1, fixed effect regression drops industry dummy variables, and may simply be failing to capture heterogeneity captured by the industry dummy.

- *Individual firm differences in error term:* The Breusch Lagrange multiplier test has a chi-squared value of 7.65 (p value 0.0057). This leads to the rejection of the null hypothesis of the variance of individual firm error term being equal to zero. The random effect approach is appropriate as there is evidence of unobserved heterogeneity in the error term.

- *Difference in random effect and fixed effect coefficients:* The Hausman test of differences in coefficient estimates between the random effect and fixed effect models, yields a chi-squared value of 23.09 (p-value- 0.1113). Hence the null hypothesis of there being no difference in coefficients cannot be rejected. In this case, the random effect is preferred, as it is more efficient due to fewer variables and conserves degrees of freedom.

5.3.3.2 Endogeneity assessment

Based on the discussed simultaneity, I consider derivatives use as an endogenous explanatory variable, in the 2SLS. The instrument variables are the size effect (logarithm of total assets), number of foreign operations and Price to Book ratio. The Pagan Hall statistic of 28.78 (p-value of 0.3715) shows no problem with heteroskedasticity[79] and the Sargan statistic shows the model is over-identified (0.437- p value of 0.804 and null hypothesis of over-identification of model. However, the Instrument validity and strength tests reveal weak instruments. In the first stage regression, the Cragg-Donald F-statistic is 4.91 (p-value 0.0022) and partial R-squared is 2.19%. The F-statistic is well below the Stock and Yego critical value of 10 and I conclude the instruments are weak. Hence I do not report 2SLS findings for discretionary accruals as a dependent variable.

Based on the above diagnostics of individual effects and endogeneity, I use the pooled OLS and random effect GLS models as the primary models because they are likely to provide more consistent/efficient estimations of association of the determinants of discretionary accruals. I effectively run seven regression models and the results are in Table 5.17.

5.3.4 Multivariate Results- Discretionary accruals

5.3.4.1 SFAS 133 and discretionary accruals

In the reported results, there is consistent and robust evidence of the SFAS 133 dummy being associated with the use of discretionary accruals. There is significant association in all the seven regression models (see Table 5.17). This result differs from Singh (2004) who finds no evidence of income smoothing due to SFAS 133. However, Singh (2004) uses a different proxy for income smoothing. Whereas I use the absolute magnitude, he uses the ratio of standard deviation of a firm's quarterly earnings before abnormal accruals divided, by the standard deviation of yearly quarterly earnings.

[79] Reject Null hypothesis of homoskedasticity

Section 2.7.2 discusses why SFAS 133 is expected to lead to the increased use of accruals due to an expected increase in derivatives accounting related earnings volatility[80]. An increase in earnings volatility occurs due to a) hedges that do not qualify for hedge accounting b) interim hedge ineffectiveness of hedge accounting items and c) gains and losses from discontinued hedges that have to be recognized in the income statement (Park, 2004 and Trombley, 2003).

In addition, the fair value application requirement increases the probability of the opportunistic[81] application of accruals. A further factor that could escalate discretionary accruals could be the increased use of derivatives for speculative purposes, as postulated in the analytical model by Barnes (2002) and Nan (2007). Barnes asserts that managers are likely to capitalise on the difficulties that outsiders to the firm have in differentiating between speculating and hedging firms, by increasing the speculative use of derivatives. Pre-SFAS 133, the impact of this would be excluded from the income statement and balance sheet. To offset the incremental volatility due to speculative use of derivatives, managers are likely increase the use of discretionary accruals.

Cash flow hedge accounting:

To test Hypothesis 2.2b {**The use of cash flow hedge accounting influences the level of discretionary accruals}**, I control for the application of cash flow hedge accounting, using a dummy variable. There is evidence of a significant negative association (at a 1% and 5% significance level) in all the seven models. It is consistent in the full sample and in the sample of only derivatives users. This implies that the application of cash flow hedge accounting reduces discretionary accruals. This could be explained by cash flow hedge accounting resulting in, the deferral of derivatives instrument gains or losses through the OCI, and a reduction in net income volatility. Correspondingly, this reduces the need to use accruals and therefore a negative association is to be expected. There is limited empirical evidence about the impact of cash flow hedge accounting on earnings volatility and earnings management. This could be due to the poor disclosure of cash flow hedge accounting data e.g. the notional amounts associated with cash flow hedge accounting. The only two studies, I am aware of are; Park (2004) who finds that cash flow hedges do not affect equity volatility and Zhou (2009) who finds that cash flow hedge accounting leads to an increase in opportunistic accruals. Hence this study provides indirect evidence that

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[80] Supplemental tests of earnings volatility (not reported) show that they did increase after SFAS 133 was introduced

[81] Opportunistic accruals could occur when managers have to determine fair value based on internal models in the absence of observable trading prices as was vivid in the case of Enron. This could occur with over the counter derivatives instruments.. Earning smoothing can occur when managers manipulate the timing and amount of recognized cash flow hedges. They can manipulate the deferral of cash flow hedges gains and losses through the Accumulated Other Comprehensive Income (AOCI) and the subsequent recycling of these gains and losses from the AOCI to the Income statement.

cash flow hedge accounting reduces earnings volatility. This finding differs from Park (2004) who finds that SFAS 133 adoption does not have an effect on equity[82] volatility.

5.3.4.2 Impact of derivatives use on accruals (substitution relationship)

The impact of discretionary accruals on derivatives use (i.e. derivatives dependent variable) is discussed in section 5.3.2.2. This section reviews the reverse impact and shows that there is evidence of significant negative association in five of seven models. There is weaker evidence when the sample consists of only derivatives users. This is the case in two of the seven models where derivatives use is not a significant independent variable. This finding would appear to indicate that the substitution relationship is more pronounced when considering both the decision to use derivatives and extent of derivatives use. Overall, the results support the substitution hypothesis and are consistent with the finding of Barton (2001), Singh (2004) and Huang et al (2009). As discussed on derivatives determinants, Singh (2004) does not find that accruals affect derivatives use, but that derivatives use affects accruals. He therefore concludes that there is a partial substitution relationship.

I include an interaction variable of the SFAS 133 dummy variable and derivatives use in the some of the models. This is to assess whether the impact of derivatives use on accruals changes after SFAS 133 adoption. Thereafter I run the chow test of joint significance of the SFAS 133 dummy and the interaction variable. The interaction variable is not significant and I conclude that SFAS 133 does not affect how derivatives influence the use of accruals.

5.3.4.3 Other determinants of discretionary accruals

Information asymmetry and other capital markets incentives

The logarithm of trading volume has a positive significant association. This variable is a proxy for information asymmetry, as stocks that have low information asymmetry between investors tend to be more widely traded and thus more liquid (see 2.4.3.1. and 4.3.2.2 for further discussion). Smooth earnings, which can be realised through accruals, contribute to reduced information asymmetry. Therefore the positive association can be explained. However, logarithm of trading volume is also a proxy for firm size and the positive association could be explained by larger firms have higher level of accruals.

[82] Cash flow hedge accounting results in derivatives gains and losses being posted to other comprehensive income and this in turn influences the equity account directly.

Managerial risk preferences

The vega has a significant negative association (eight of the ten regression models at a 1% significance level) as expected. However the delta coefficient is not significant. As discussed in the theoretical framework, vega of the executive compensation package embody their sensitivity to firm performance volatility. A higher vega will imply managers would find firm performance including earnings volatility to be desirable and therefore lower the likelihood of income smoothing; in other words a negative association is expected. The percentage of cash pay is an additional proxy for managerial risk preference. It captures managers capacity to diversify their wealth from their employers and thus not to be concerned about the impact that their employer firm performance volatility will have on their personal wealth (i.e. an expected negative association). The results show a significant negative association in eight of the ten regression models, at 5 and 10% significance. This is consistent with the theoretical expectation.

Table 5.17 Multivariate Regressions on Discretionary Accrual Determinants

DAC= α + β 1 133DUM + β 2 CHDUM + β 3 DRNV + β 4 133*DRNV + β 5 ABINV + β 6 R&D + β 7TAXLOSS + β 8 LEV + β 9 LN_TRADVOL+ β 10 DIV_POUT + β 11OPCSHFLOW + β 12 VEGA + β 13 DELTA + β 14 CSHPAY + β 15 BONUS_PERC+ β 16 INSTOWN + β 17 MGR SHROWN + β 18 AUDEXP + β 19 INTERLOCK + β 20-INDDUM + β YRDUM

Panel A: Determinants based on full sample (pooled OLS)

Pooled OLS regression of DAC as the dependent variable is based on 685 observations of both derivatives and non derivatives users. Model 2 includes the interaction variable of discretionary accruals. T-stats are based on robust standard errors. VIF factor is less than 10 for all variables and hence no concern on multi-collinearity. Year and industry dummies are not significant. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. I conduct the Chow test on joint significance of the interaction term (133DUM* DRNV) and 133DUM. The Chow test, F- value of 2.04 (p-value of 0.1309), shows that the null hypothesis that β 1 and β 4 are both zero, in Model 2, cannot be rejected.

Variable Definition- DRNV-Notional amount of derivatives/Total asset, 133DUM- SFAS 133 dummy variable, DAC- Absolute Discretionary accruals/Total assets, ABINV- (Capital expenditure/Sales)-Over/under investment based on predicted capital expenditure/sales, R&D-Research and development expense/Total assets, PTOB- Price per share/Book value per share as at fiscal year end, TAXLOSS-Tax loss carry forward/Total assets, LEV- Debt/Total assets, QUICKRATIO-(Current Assets-Inventory)/Current Liabilities, LNTASSETS- Log (Total assets), FSALES-Foreign sales/Sales, VEGA- ($change in stock and stock options value for 0.01 change in stock price volatility)/Cash Pay, DELTA- ($ change in stock and stock options value for 0.01 change in stock price)/Cash Pay , PERC CASHPAY-Cash Pay/Total compensation, FSALES- Foreign sales/sales, GEOG_DIV-Geographical diversification, number of key regions with foreign operations, INST OWN-Institutional ownership percentage, MGR SHROWN- Manager shareholding/Total stock holding, AUDEXP-Dummy for auditor with industry expertise, INTERLOCK-Dummy variable for Executives with interlocking relationships, INDDUM-Industry dummy, YRDUM-Year dummy.

		Model1	T-stat	Model 2	T-stat
	INTERCEPT	-0.006	(-0.36)	-0.007	(-0.38)
FOCAL VARIABLES	133DUM	0.011**	(2.02)	0.011*	(1.88)
	DRNV	-0.033***	(-2.92)	-0.032**	(-2.27)
	133*DRNV			-0.003	(-0.12)
	CFHEGDE	-0.013***	(-3.22)	-0.013***	(-3.13)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	0.036	(0.89)	0.036	(0.89)
MARKET INCENTIVE VARIABLES	R&D	-0.551	(-1.63)	-0.552	(-1.63)
	TAXLOSS	0.039	(1.35)	0.039	(1.35)
	LNTRADVOL	0.007***	(4.07)	0.007***	(4.07)
	LEV	0.002	(0.16)	0.003	(0.17)
	DIVPOUT	0.002	(0.29)	0.002	(0.28)
	OPCSHFLOW	0.105***	(3.13)	0.105***	(3.14)
MANAGERIAL RISK INCENTIVES	VEGA	-0.004	(-1.51)	-0.005	(-1.51)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.026**	(-2.04)	-0.026**	(-2.03)
	BONUS PERC	-0.001	(-0.11)	-0.001	(-0.11)
	INST OWN	-0.006	(-0.34)	-0.006	(-0.33)
	PERC CASHPAY	-0.024	(-1.61)	-0.024	(-1.59)
	MGR SHROWN	0.040	(0.70)	0.040	(0.70)
	AUDEXP	0.002	(0.70)	0.002	(0.70)
	INTERLOCK	0.022	(1.54)	0.022	(1.53)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	NUMBER OF OBSERVATIONS	685		685	
	ADJUSTED R-SQUARED	15%		15%	
	F-value***	3.96***		3.80***	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

Panel B- Random effect GLS regressions

This is based same sample and variables defined in the pooled OLS model reported in Panel A. For comparative purposes, Model 1 excludes but Model 2 includes an interaction variable. I conduct the Chow test on joint significance of the interaction term (133DUM* DRNV) and 133DUM. The Chow test, F- value of 3.77 (p-value of 0.1519), shows that the null hypothesis that β_1 and β_4 are both zero, in Model 2, cannot be rejected.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	-0.006	(-0.31)	-0.006	(-0.33)
FOCAL VARIABLES	133DUM	0.010*	(1.94)	0.010*	(1.80)
	DRNV	-0.029***	(-2.66)	-0.028**	(-2.18)
	133*DRNV			-0.003	(-0.16)
	CFHEGDE	-0.012***	(-2.97)	-0.012***	(-2.91)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	0.034	(1.04)	0.034	(1.04)
MARKET INCENTIVE VARIABLES	R&D	-0.550***	(-4.40)	-0.552***	(-4.39)
	TAXLOSS	0.042	(1.44)	0.042	(1.44)
	LNTRADVOL	0.007***	(3.53)	0.007***	(3.53)
	LEV	0.001	(0.04)	0.001	(0.05)
	DIVPOUT	0.002	(0.33)	0.002	(0.32)
	OPCSHFLOW	0.109***	(3.16)	0.109***	(3.16)
MANAGERIAL RISK INCENTIVES	VEGA	-0.004*	(-1.67)	-0.004*	(-1.66)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.026**	(-2.11)	-0.026**	(-2.10)
	BONUS PERC	0.002	(0.15)	0.002	(0.15)
	INST OWN	-0.006	(-0.38)	-0.006	(-0.38)
	PERC CASHPAY	-0.025*	(-1.69)	-0.025*	(-1.67)
	MGR SHROWN	0.040	(1.06)	0.040	(1.06)
	AUDEXP	0.003	(0.71)	0.003	(0.71)
	INTERLOCK	0.021	(1.42)	0.021	(1.41)
OTHER	INDUSTRY DUMMY	Yes		Yes	
	YEAR DUMMY	Yes		Yes	
	NUMBER OF OBSERVATIONS	685		685	
	WALD STATISTIC***	109.14***		109.07***	
	R-SQUARED	18.13%		18.13%	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

Panel C: Discretionary accrual determinants (Sample of only derivatives user observations)

These results are based on derivatives users (i.e. 527 firm year observations). The variables are as defined in Panel A. Model 1 and 2 are pooled OLS regression models, while Model 3 is a random effect regression model. T-stats are based on robust standard errors. VIF factor is less than 10 for all variables and hence no concern on multi-collinearity. Year and industry dummies are not significant. . For comparative purposes, Model 1 excludes but Model 2 and 3 include an interaction variable. I conduct the Chow test on joint significance of the interaction term (133DUM* DRNV) and 133DUM. The Chow test, F- value of 3.06 (p-value of 0.0479), shows that the null hypothesis that β 1 and β 4 are both zero, in Model 2, is rejected. Similarly, the F- value of 6.61 (p-value of 0.0367), shows that the null hypothesis that β 1 and β 4 are both zero, in Model 2, is rejected.

		Model 1	T-stat	Model 2	T-stat	Model 3	T-stat
	INTERCEPT	-0.022	(-1.08)	-0.024	(-1.18)	-0.023	(-1.11)
FOCAL VARIABLES	133DUM	0.014**	(2.40)	0.016**	(2.46)	0.015**	(2.56)
	DRNV	-0.025**	(-2.21)	-0.019	(-1.48)	-0.017	(-1.52)
	133*DRNV			-0.017	(-0.75)	-0.017	(-0.79)
	CFHEGDE	-0.012***	(-2.65)	-0.011***	(-2.59)	-0.011**	(-2.55)
ECONOMIC CHARACTERISTIC&CAPITAL	ABINV	0.097	(1.29)	0.096	(1.29)	0.094	(1.34)
MARKET INCENTIVE VARIABLES	R&D	-0.536	(-1.12)	-0.544	(-1.12)	-0.543***	(-3.86)
	TAXLOSS	0.038	(1.20)	0.037	(1.17)	0.039	(1.26)
	LNTRADVOL	0.008***	(3.72)	0.008***	(3.73)	0.007***	(3.51)
	LEV	0.028*	(1.65)	0.029*	(1.70)	0.028	(1.62)
	DIVPOUT	0.004	(0.58)	0.003	(0.56)	0.003	(0.55)
	OPCSHFLOW	0.119***	(3.20)	0.120***	(3.24)	0.124***	(3.35)
MANAGERIAL RISK INCENTIVES	VEGA	-0.003	(-1.18)	-0.004	(-1.26)	-0.003	(-1.44)
&CORPORATE GOVERNANCE VARIABLES	DELTA	-0.023*	(-1.69)	-0.023*	(-1.68)	-0.022*	(-1.69)
	BONUS PERC	-0.003	(-0.23)	-0.002	(-0.20)	-0.002	(-0.13)
	INST OWN	0.003	(0.18)	0.004	(0.22)	0.005	(0.27)
	PERC CASHPAY	-0.019	(-1.22)	-0.018	(-1.15)	-0.020	(-1.35)
	MGR SHROWN	0.012	(0.24)	0.011	(0.23)	0.015	(0.47)
	AUDEXP	-0.001	(-0.37)	-0.001	(-0.37)	-0.001	(-0.27)
	INTERLOCK	0.014	(1.13)	0.014	(1.15)	0.014	(1.23)
OTHER	INDUSTRY DUMMY	Yes		Yes		Yes	
	YEAR DUMMY	Yes		Yes		Yes	
	NUMBER OF OBSERVATIONS	527		527		527	
	ADJUSTED R-SQUARED	17.8%		17.7%			
	F-TEST***	2.74***		2.67***			
	R SQUARED					21.6%	
	WALD STATISTIC***					89.27***	

*** Significance at 1%, **Significance at 5%, * Significance at 10%

5.3.5 Robustness tests

Alternative models and samples

5.3.5.1 Derivatives use

There is already an element of robustness checking in the initial regressions as they are based on multiple models and samples. These include 10 regressions for derivatives determinants (OLS, random effect, censored regression and the 2SLS models and logistic model).

In the above regressions, different samples are applied, including the combined sample of derivatives and non derivatives users, and a sample of only derivatives users. As discussed in section 5.3.2, these models and samples, show the significant negative association of discretionary accruals and evidence of substitution between derivatives and discretionary accruals.

Self-Selection bias

Errors associated with unobservable heterogeneity have been discussed. I further control for such errors due to self selection bias. Self selection could arise in relation to the 80% observations reporting derivatives use. There could be unobservable factors influencing the use of derivatives. Self selection can lead to biased estimates and misleading inferences. Heckman's (1976) two stage procedure is used to correct for self selection. In the first stage, the probability of hedging with derivatives is determined and from it the inverse mills ratio is derived. The probability is derived based on the predicted value of a probit regression, based on a binary variable for the decision to hedge as the dependent variable. The Mills ratio[83] is the ratio of the probability density function over the cumulative density function of the predicted probability of hedging from the probit regression. The inverse mills ratio is then used as an independent variable in the derivatives model specification based on the sample of derivatives users. In robustness testing, I control for self selection bias by including the inverse mills ratio (results not reported) and still come to the same reported conclusions.

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[83] Inverse Mills ratio

- z_{it} (the prediction of each firm-year's logistic regression index function)
- Standard normal density of z_{it} - ϕ (z_{it})
- The normal cumulative probability of z_{it} - φ (z_{it})
- Inverse Mills ratio - ϕ (z_{it})/ φ (z_{it})

Logistic regression

Further to the above, I run a logistic regression based on a dummy variable for derivatives use. The limited dependent variable regressions primarily test the determinants of the decision to hedge, as this could differ from the extent of hedging. The results of the logistic regression are reported in Table 5.16. From the results there is no evidence that SFAS 133 influenced the decision on whether to hedge or not. I also find that discretionary accruals do not have a significant association with the decision to hedge. However, using a dummy variable as a proxy for derivatives use is a lot less reliable as a proxy for extent of derivatives use, than using the notional amount and these results are less reliable than those from the censored regression models.

Endogeneity

I primarily used the limited information model, 2SLS separate equation model with instrument variables, to cater for the endogenous relationship of discretionary accruals and derivatives use. As a robustness test, I run the full information models (i.e. 2SLS and 3SLS simultaneous equation models) for the sample of derivatives users. The results (not reported) are consistent with the reported 2SLS findings.

5.3.5.2 Discretionary accruals

The tests consist of seven regression models for discretionary accrual determinants (OLS and random effect models). In the above regressions different samples are applied, including the combined sample of derivatives and non derivatives users, and a sample of only derivatives users. As discussed in section 5.3.2, across these models and samples, the key results on the tests of a) impact of SFAS 133 on discretionary accruals and b) substitution with derivatives, are robust.

Alternative variables

For discretionary accruals, I use observed total accruals as an alternative. I also use an estimate of abnormal accruals based on the median of industry, based on a 4 digit SIC code, as the normal accrual for each firm. The results (not reported) are consistent with the main models. The results in relation to other determinants of derivatives and discretionary accruals are also fairly consistent. As discussed earlier these results conform to theoretical expectations.

5.4 Conclusion

This chapter has tested the hypotheses of the first question. The primary findings are that there is supporting univariate but limited multivariate evidence in relation to the first hypothesis of the adoption of SFAS 133 leading to reduced derivatives use. There is both supporting univariate and multivariate evidence of the adoption of SFAS 133 leading to an increased use of discretionary accruals. There is supporting evidence that the application of cash flow hedge accounting reduces the extent of use of discretionary accruals and that there is a substitution relationship between discretionary accruals and derivatives use. Finally that the adoption of SFAS 133 leads to the reduced impact of accruals on derivatives use but not vice versa. A further analysis of the implication of these findings is provided in chapter 8.

PART 3 -RESEARCH METHODOLOGY AND EMPIRICAL FINDINGS: SFAS 133 AND DERIVATIVES RELATED DISCLOSURE

6 RESEARCH DESIGN

This chapter describes the research design related to the second thesis question. It principally includes the high level model specification and definition of variables. The data considerations are similar to that of the first question, outlined in chapter 4 (sections 4.2 and 4.4). Regarding the multivariate models, an evaluation of the individual effects associated with panel data is the primary consideration. From the theoretical framework, there is no basis of assuming problems of endogeneity. The rest of the chapter is as follows:

- High level model specification in section 6.1,
- Detailed variable definition in section 6.2; and
- Detailed empirical model specification in section 6.3.

6.1 High Level Model specification

In theoretical framework in chapter 3, the following hypotheses were developed:

Hypothesis 3.1: SFAS 133 leads to an increase in the level of disclosure of related derivatives information provided by reporting managers.

Hypothesis 3.2a: Capital markets incentives influences disclosure

Hypothesis 3.2b: Capital markets incentives are more significant after the introduction of SFAS 133

Hypothesis 3.3a: Proprietary cost concerns influences the level of disclosure

Hypothesis 3.3b: Proprietary cost concerns are lower after the adoption of SFAS 133

These hypotheses are tested using a combination of multivariate and univariate tests.

Univariate testing

The testing comprises the following:

- Disclosure index: Difference in proportions of individual component of disclosure that are included in the index, in the pre- and post -SFAS 133 observations;

- Disclosure index: Difference in means and medians stratified by pre- and post -SFAS 133 observations;
- Mean and median values of control variables for derivatives user observations; and
- Mean and median values of control variables, stratified by low and high disclosure observations.

Multivariate testing

- Disclosure index= f (SFAS 133 variable, Capital markets incentive proxy, Proprietary cost proxy, Other Control variables)

6.2 Variable specification

6.2.1 Dependent variable: Disclosure Index

The disclosure of related derivatives information is primarily measured using a self constructed index comprising eight factors. The approach of using a self-constructed index, as a proxy for disclosure quality, is common in empirical disclosure literature. For example, the AIMR index has been applied in a stream of studies including the Lobo and Zhou (2001) studies on the relationship between earnings management and corporate disclosure. Self constructed indices have been extensively used across a range of accounting and risk disclosure studies (Berretta and Bozzolan, 2006; Linsley and Shrieves, 2006; Chalmers and Godfrey, 2004; and Aggarwal and Simkins, 2004).

Index construction

The components selected for inclusion in the index represent a subset of the overall prescribed disclosure requirements through US GAAP and SEC requirements. The constructed index effectively measures compliance with the collective body of disclosure requirements (i.e. Pre-SFAS 133, SFAS 133 and SEC requirements). Included in the derivatives information disclosure index are factors where there is supporting empirical evidence on their information content as discussed in section 3.4.1.3. These include notional amounts (Wong, 2000 and Venkatachalam, 1996), sensitivity analysis and value at risk (Jorion, 2002; Rajgopal, 1999). I also make reference to the factors included in similar studies (Darus and Taylor, 2006; Chalmers and Godfrey, 2004 and Aggarwal and Simkins,

2004) and the disclosure elements contained in the 2004 Fitch Ratings report[84] on derivatives disclosure. The index consists of 8 quantitative factors.

The focus on quantitative information is consistent with the risk disclosure improvements highlighted by the SEC's FRR48. As stated in sections 2.6.1and 3.2, FRR48 requires the disclosure of sensitivity and value at risk analysis information. The disclosure components included in the index are assumed to be representative of overall US GAAP and SEC quantitative disclosure requirements at the time of reporting (i.e. 1999-2003).

Table 6.1: Components of derivatives disclosure compliance index (DDI)

Disclosure measure (Disc component) 1 if reported, 0 otherwise	**Reason for inclusion**	**Supporting empirical studies (see Section 3.4.1)**
Gross notional amount	Measures risk exposure	Wong (2000), Venkatachalam (1996)
Currencies being hedged (€,$,£)	Measures risk exposure	
Amount designated for hedge accounting	Is a proxy for risk management effectiveness	
Disaggregated and tabular presentation format	Represents understandability of risk related information	Linsmeier et al (2002) and Rajgopal (1999)
Sources of risk exposure (e.g. foreign debt, assets)	Measures risk exposure	
Sensitivity analysis or value at risk disclosure	Measures risk exposure and risk management effectiveness	Jorion (2000), Linsmeier et al (2002) and Rajgopal (1999)
Income effects (i.e. realised and unrealised gains and losses)	Is a proxy for risk management effectiveness	
Disclose derivatives fair value in note	A proxy for risk exposure	Barth, Beaver and Landsman (1996), Venkatachalam (1996) and Ahmed et al (2006)

For each of the components in Table 6.1, 1 is assigned if a firm discloses and 0 if it does not. The disclosure index (Disc Index) is computed as shown in Equation 6.1

Equation 6.1

Disc Index= (∑ (Disclosure components)) / 8

Quality versus Quantity measurement

[84] Fitch Rating Credit Policy Special Report: November 9th, 2004, Hedge Accounting and Derivatives Study for Corporates: Disclosure, Hedge Accounting and Restatement Risk.

As Berretta and Bozzolan (2004) point out, the use of indices as a proxy for disclosure quality could be potentially flawed if the quantity of disclosure items is taken to be necessarily synonymous with quality of disclosure. However, as Botosan (2004) and Chalmers and Godfrey (2004) point out, determining the quality of information is very difficult, especially given that any meaningful quality judgement, would have to factor in the utility of information to users. Information quality assessment can be complicated by users having differing preferences due to the diversity in application of information as well as their sophistication. Any index that weights components, so as to reflect quality, would ideally have to do so from a relative ranking of usefulness of different components of information. This ranking should be provided by a representative sample of financial reporting expert users e.g. buy or sell side analysts. Given the difficulties in constructing a quality weighted index, within the time and financial constraints of this research, I use an unweighted index. For the same reasons, many studies opt to focus on unweighted indices (Aggarwal and Simkins, 2004; Chalmers et al (2004); and Berretta and Bozzolan, 2006).

Index construction in comparative studies and limitations of index

By definition, self constructed indices tend to differ across studies and it is useful to have a sense of the basis of construction of disclosure indices across similar studies. In this regards, I primarily elaborate on the indices constructed by Aggarwal and Simkins (2004) and Chalmers and Godfrey (2004). Table 6.2 outlines the components of the index of comparative studies. Abraham and Cox, 2007, Linsley and Shrives, 2006 and Darus and Taylor, 2006 also construct risk disclosure indices, but they include risk dimensions that are beyond the scope of this study.

Aggarwal and Simkins (2004) include 5 quantitative factors and 1 qualitative factor (i.e. explanation of why they hedge risk). However, unlike in this study, they do not include sensitivity analysis and the sources of risk exposure. Instead they include maturity description, which is a source of risk exposure. Chalmers and Godfrey (2004) do not include sensitivity analysis, but include the disclosure of counterparty details, maturity and credit risk exposure. The requirements for the disclosure of counterparty details and credit risk exposure have only been recently required[85] under US GAAP and therefore are not included in this study.

[85] SFAS 161, issued in 2008

Table 6.2: Index components of Comparative studies

Aggarwal and Simkins (2004)	Chalmers and Godfrey (2004)

• Reason for the qualitative use of derivatives
• Notional amount
• Type of instruments used for hedging
• Disaggregated information on contracts
• Individual currencies hedged
• Maturity of contracts
	• Various components of qualitative description of hedging policy
	   o Description of hedging policy
	   o Objectives for holding or issuing derivatives financial statements
	   o Accounting policies and methods adopted for derivatives instruments other than foreign currency hedges
	   o Policy in giving collateral, security and credit arrangements
	   o How they monitor and control risk associated with derivatives
	   o Financial controls in place to monitor risk
	• Notional amount
	• Disaggregated presentation
	• Counterparty details
	• Credit risk exposure
	• Maturity of contracts

Both these comparative studies do not weight the components of the index. In other words, each component of the index is assigned a value of 1 if disclosed and 0 if not. Aggarwal and Simkins (2004) further divide the index into five subcategories, ranging from ‘poor’ (i.e. only 1 component is disclosed) to ‘excellent’ (i.e. at least 5 components are disclosed) and use a five level dummy variable, as the dependent variable in an ordered logistic regression model. On the other hand, Chalmers and Godfrey sum the components available and divide this by the number of possible disclosure categories (i.e. 14 (6 qualitative, 8 quantitative)) to come up with a disclosure index. This study’s approach to disclosure variable definition is similar to Chalmers et al’s. However, for robustness testing, I construct a 3 level categorical dummy variable to be used as a dependent variable in an ordered logistic regression.

The use of a self constructed disclosure index has inherent limitations. These could include the omission of disclosures made outside the annual reports. Managers have the option of disclosing risk exposures through press releases and analyst conference calls. In the construction of the index, this study does not take into account any such disclosures that have been made. Another limitation is that a self constructed index, may be difficult for other researchers to easily replicate.

6.2.2 Focal Independent variables

6.2.2.1 Pre- and Post- SFAS 133 period

To test the above mentioned hypotheses a dummy variable is used. The dummy variable is specified as 1 for the post 2000 (after adoption of SFAS 133) period and 0 for the period before. Based on Hypothesis 3.1 (see section 3.3), SFAS 133 is expected to increase the level of disclosure of derivatives related information, hence the relationship between the SFAS 133 dummy and derivatives disclosure is expected to be positive and significant.

6.2.2.2 Capital markets Incentives

Information asymmetry/Trading volume

This study includes the logarithm of trading volume as a proxy for the liquidity of a firm's stock. Improved disclosure increases the liquidity of the firm stock and there is an assumption that a more liquid stock is likely to have lower information asymmetry between informed and uninformed investors (Bamber and Cheon, 1995 and Linsmeier et al, 2002). I therefore assume a positive association between trading volume and liquidity.

Chalmers and Godfrey (2004) also propose the use of analyst coverage as a proxy for determining the information asymmetry but due to lack of access to I/B/E/S they apply a press coverage construct as an alternative for information asymmetry. For the same reason of lack of data access, I do not use consensus and level of analyst coverage as an alternative variable.

Leverage

As noted by Chalmers and Godfrey (2004), leverage (debt/total assets) can capture the incentive to disclose information to reduce costs associated with debt financing[86]. Therefore it is included as an additional capital markets proxy. Guo (2004) provides evidence showing that disclosure influences the perceived riskiness in a fashion that impacts on the cost of debt and the expected risk of default. The author finds that after controlling for other market risk

[86] However, the empirical test of Chalmers and Godfrey (2004) does not find a significant association between leverage and disclosure.

factors, disclosure increases the cost of debt for firms that are either using derivatives speculatively or having ineffective hedges. However, it decreases these for effective hedging firms. Hence one can infer that firms that are using derivatives for risk management purposes would be likely to provide more derivatives disclosure corresponding to increasing levels of debt. On the other hand, firms that use derivatives for speculation would disclose less. Given the difficulties in differentiating between speculators and hedgers, in any precise fashion due to data quality, the direction of impact of leverage is indeterminate.

Although leverage is applied as an incentive to disclose for capital markets purposes, it can also be a proxy for other motives e.g. political costs (Aggarwal and Simkins, 2004) and therefore necessitates the careful interpretation of results. It nevertheless is commonly used an independent variable in disclosure research (Leuz, 2004).

6.2.2.3 Proprietary cost incentives

To measure proprietary cost incentives, I use variables that have been applied in previous empirical studies as well as selecting new variables. I use percentage of industry sales or market share as a proxy variable for industry leadership. Admati and Pfleiderer (2000) note that industry leadership could influence disclosure as firms in such a position would be aiming to maintain their competitive and strategic advantage.

As an additional proxy, I construct a dummy variable based on whether a firm is a top 10 industry leader[87], within the two-digit SIC industry category, and its net profit margin is greater than 10%. This is an improvement on Aggarwal and Simkins (2004), who use a competitiveness indicator based on low mark up factors identified by Campa and Godfrey (1995). It is an improvement because it allows a firm specific evaluation rather than assuming all firms within a particular industry have proprietary costs. Overall, this study effectively applies more variables for proprietary cost ` than did either Chalmers et al or Aggarwal et al.

[87] I construct a proxy based on industry leadership ranking (Top 10 in sales and total assets within the two-digit SIC code industry) and apply a dummy variable differentiating the industry leaders (i.e. Top 10 or not). Top 10 due to the large number of firms falling within two-digit SIC codes considering the coverage of NYSE and NASDAQ. This is similar to Aggarwal and Simkins (2004) who assess whether firms are in the top 3 fortune 500 classification categories. I do not use the fortune 500 ranking, due to data access constraints, I determine the industry leaders based on the computation of sales and total assets ranking in the Compustat database.

I expect proprietary costs to be negatively associated. However, for the constructed proxy that includes the element of industry leadership, the impact on disclosure could be ambiguous. Industry leaders may have proprietary concerns and lower their levels of disclosure so as to protect their competitive advantage (Admati and Pfleiderer, 2000). But this could be offset by them also having concerns about their reputation, relative to their peers, and therefore proactively providing more risk disclosures.

6.2.3 Other Independent control variables

6.2.3.1 Managerial reputation

Managerial talent and reputation is an intangible asset that is very difficult to directly measure. Managerial talent is often anecdotally inferred based on an ex post valuation of firm performance. Even then such an approach is subject to erroneous attribution, because managers can get either credit or blame for factors that they did not control and which influence firm performance. In the Australian context, Chalmers and Godfrey (2004) used membership of G100 (Largest, affiliation to the treasury management industry body (ASCT) and whether auditors are represented in standard setting bodies (i.e. then Big 6 or not), to represent reputation and legitimacy motives.

Due to difficulties in observing and measuring managerial talent and reputation, I make the assumption that their compensation level reflects the labour market's pricing of their abilities and that this must include and be based on their reputation. Their compensation is based on their perceived talent. Therefore, a ranking[88] of compensation of top management should reflect their relative reputation. I use the annual salary ranking from the Execucomp database[89] to be a proxy for managerial talent. I then construct a talent dummy variable, if executives are in the top 100, then talent dummy is equals to 1, otherwise it is equals to 0.

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[88] Compustat/Execucomp gives ranking of top 5 managers

[89] The number of firms is based on a sample of large firms that reported compensation in the Execucomp database (*1999- 1954 firms, 2000- 1846 firms, 2001-1799 firms, 2002-1830 firms, and 2003-1856 firms*).

6.2.3.2 Managerial Compensation

Managerial risk incentives are measured based on vega and delta of stock compensation. These variables are described in and defined in sections 2.3.3 and 4.6.1.

6.2.3.3 Litigation risk

Verecchia (2004) is sceptical about this particular hypothesis on the basis of its low testability. Nevertheless, I use a dummy variable that differentiates high from low litigation risk industries. This variable is also applied by Jiang, Lee and Anandarajan (2008) in the context of an earnings management study. I am not aware of any derivatives disclosure studies that have employed a similar dummy variable and therefore this is another contribution.

6.2.3.4 Firm Performance

Similar to Miller (2002) and Leuz (2004), I use the return on assets (ROA) during each fiscal year as a proxy for firm performance. While there are other measures of firm performance such as stock price, the focus on return on assets is appropriate as it is a performance metric that is more directly controllable by management, as is derivatives disclosure. Hence there is likely to be greater interaction between choices that are more readily influenced by management. ROA can be directly influenced through earnings management, operating and investment choices. As stated in section 3.5.5, it is unclear whether firm performance will be positively or negatively associated with derivatives disclosure.

As an additional proxy, I also include sales and earnings growth as a measure of performance. These variables are also applied by Aggarwal and Simkins (2004).

6.2.3.5 Foreign operations-Geographic diversification

Multinational firms may face greater disclosure pressures compared to domestic firms. For some jurisdictions, this could be so as to adhere to internationally accepted disclosure practices (Leuz, 2004). But this line of argument probably does not hold for US companies reporting on US GAAP. The number of geographic segments is a proxy for the multinational scale of the model business and is a proxy for exposure.

6.2.3.6 Risk exposure

Dobbler (2008) and Jung and Kwon (1998) state that the disclosure level is influenced by the information endowment on risk management that corporate managers possess. It can be inferred that the information endowment depends on risk exposure. I use the percentage of foreign sales/sales as the proxy for the underlying risk exposure. As an additional proxy, I use the notional amount of derivatives for risk exposures. To do so I use the sample of firms that report notional derivatives use and exclude the notional amount indicator as one of the components of the index as they will be no difference in this component across any of the applied observations.

6.2.3.7 Firm Size

As discussed in the research design for the first question (4.6.1), the logarithm of total assets is an appropriate proxy for firm size.

6.2.3.8 Discretionary accruals

Lobo and Zhou (2001) find evidence of a negative association between earnings management and voluntary disclosure of information. Firms that are engaging is smoothing of earnings are unlikely to concurrently be very transparent (Hunton, Libby and Mazza, 2006) and vice versa. I apply the refined modified Jones (1991) (described in detail in sections 4.3 and 4.6.1).

To summarise, Table 6.3 contains all the variables and their definitions.

Table 6.3 Summary of variables

Variable	**Definition and construct measured**
Focal variables	
DISC INDEX	Self constructed index determined based on 8 components as described in section 6.2.1
133DUM	SFAS 133 dummy variable equals 1 for Post-SFAS 133 data and 0 for Pre-SFAS 133 data (i.e. 1999 and 2000(0), 2001,2002, 2003 (1))

Capital markets Incentives and firm characteristics	
LN_TRADVOL	Logarithm of trading volume. Trading volume
133 TRADVOL	Interaction variable between trading volume and the introduction of SFAS 133
PTOB	Price to Book ratio is a capital markets incentive. Firm's price per share divided by book value per share, as at fiscal year-end (i.e. compustat data item#60/(#199*#25))
LEV	Long term debt (compustat item #9)/Total assets (compustat item #6) – Leverage is a proxy for firm's incentives to reduce probability and expected costs financial distress and the likelihood to need to smooth earnings to do so. Leverage also proxies for interest rate exposure that can lead to using derivatives for hedging purposes and the incentive to manage earnings to avoid covenant violations. The leverage is scaled by total assets
DRNV	Notional amount/Total assets- Measures extent of derivatives use. The notional amount is a proxy for risk exposure and is hand collected from Form 10-K statements downloaded from the SEC Edgar's database. The notional amount is scaled by total assets.
DAC	The proxy for discretionary accruals is derived. It is based on determining what should be a normal level of accrual use based on the revenue generated, asset intensity as defined in the Jones (1991) estimate modified by Phillips and Rego (2003) factors (i.e. sales growth rate and normal credit sales levels). A detailed description of the formulation is in section. The measure is unsigned and scaled by total assets.

	The inputs into the determination are sales (data item #12), property plant and equipment (data item #7), total assets (data item #6), net income (data item #18) and operating cash flow (data item #308). The Compustat unit of measure for these variables is $millions.
GEOG_DIV	Number of geographically spread business units. This is extracted from Compustat Geographic Segments File.
LNASSETS	Logarithm of total assets (Compustat #6) is a proxy for size effect
FSALES	Percentage of foreign sales (Foreign sales/Total sales) for each firm-year is a proxy for financial price exposure and is extracted from Compustat Geographic Segments File.
ROA	Return on assets during fiscal year. Measured as net income (data item #18)/total assets (data item#6)
GROWTH	Sales annual growth (data item #12)
Proprietary cost measures	
MKT SHARE	Market share (Sales/Industry Sales) Industry sales = Sum of sales of all firms within four digit SIC code category
PROP COST DUMMY	Constructed based on industry leadership and profit margin. If a firm is ranked in the top 10, within the two digit SIC code industry classification, based on sales and total assets, and has a profit margin (net income-data item #8/sales-data item #13) of greater than 10%, then prop cost dummy is equals to 1, otherwise it is equals to zero
TALENT DUMMY	Talent dummy is determined based on the ranking of compensation paid to a reporting firm's executives. If a

	firm's executives are in the top 100 in the annual ranking of total compensation paid out to executives as recorded in the Execucomp database, then talent dummy = 1 otherwise talent dummy=0
Managerial Risk Incentives and corporate governance	
VEGA	Vega/Cash Pay- Vega is a proxy for sensitivity to volatility and is a measure of managerial risk aversion. It is measured as the average dollar change in value of the top management stock and option portfolio for a dollar 1% change in standard deviation of stock returns. Vega is scaled by cash pay. This data is obtained from Execucomp. Vega = Vega of new options granted during year+ vega of all exercisable options held+ vega of all unexercisable options held
DELTA	Delta/Cash Pay- Delta is a proxy for sensitivity to changes in stock price and is a measure of managerial risk aversion. It is measured as the average dollar change in value of the top management stock and option portfolio for a dollar 1% change in stock price. Delta is scaled by cash pay. This data is obtained from Execucomp. Delta = Delta of new options granted during year+ delta of all exercisable options held+ delta of all unexercisable options held
CSHPAY PER	Cash Pay/Total compensation- controls for managerial risk aversion due to personal wealth diversification. This is based on total compensation (Cash+Bonus+ share

	based compensation granted during a fiscal year). This data is obtained from Execucomp.
LIT RISK	Dummy variable for litigation risk. A value of 1 if the firm operates in a high litigation industry and 0 otherwise (high litigation industries are industries with SIC codes of 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374). This approach is taken by Jiang, Lee and Anandarajan (2008)
INST_OWN	Percentage of institutional ownership- Proxy for corporate governance
MGR_SHRS	Managerial ownership as a percentage of stock holdings as at year end. This data is obtained from Execucomp.
INTERLOCK	Dummy variable for where executives are subject to interlocking relationship. Variable is equal to one when interlocking relationship exists (1), otherwise it is equals to zero. This data is obtained from Execucomp.
AUDEXP	Sorted all firms by two digit SIC codes and set the dummy to one (zero) if the audit firm for a particular company audits more than 15% (<15%) of firms in two digit SIC code. Bowen, Rajgopal and Venkatachalam (2008) applied this variable in similar fashion.
INDDUM	Industry dummy- Across 6 key broad industry categories namely mining, manufacturing, transaction, trading, services and other. This is based on aggregation of SIC codes recorded in Compustat. This caters for unobservable variation.
YRDUM	Year dummy. This caters for impact of any unobservable macroeconomic factors that could have influenced disclosure. For example, the introduction of Sarbanes Oxley is controlled for by having a 2002 year dummy variable.

6.3 Detailed model specification

The testing comprises of panel regression, based on the specification in Equation 6.2 below, using 1999-2003 data.

Equation 6.2

DISC_INDEX= α + β 1 133DUM + β 2 LN TRADVOL + + β 3 133DUM*LN TRADVOL+ β 4 LEV + β 5 FSALES + β 6 DAC + β 7 ROA + β 8 GEOG_DIV + β 9 LNTASSETS+ β 10GROWTH+ β 11 MKT SHARE + β 12 PROP COST DUMMY + β 13TALENT DUMMY + β 14 VEGA + β 15 DELTA + β 16CSHPAY PER + β 17 LIT RISK + β 18 MGR SHROWN + β 19INSTOWN + β 20 AUD EXP + β 21 INTERLOCK + β 22- INDDUM + β YRDUM.

Robustness tests

I estimate the above model using alternative variables for the dependent and independent variables. This study includes 21 variables as well as industry and time dummy variables to capture industry and time fixed effects. It effectively includes more variables than most similar studies. Only, Aggarwal and Simkins (2004) apply a broad set of variables (i.e.14) comparable to those applied for this study.

Hamlen and Largay (2005) studying DJIA disclosure before and after SFAS 133, do not study incentives at all. Most UK studies of risk disclosure do not even include incentives of disclosure. The studies that do so by focusing on only a subset of the disclosure determinants included in this study. Abraham and Cox (2007) mainly focus on corporate governance variables plus size, leverage and risk (measured by variance). Chalmers and Godfrey (2004) focus on reputation and legitimacy (ASCT affiliation, Big 6 auditor and G100), in addition to size and dummy variables on membership of mining industry, having reported news item, whether a new share issue was made in proceeding year and leverage. Hence, the overall approach of this study is robust in number of variables and this limits the likelihood of flawed inference due to omitted variables.

For alternative model testing, I apply the approach taken by Aggarwal and Simkins (2004) who define disclosure based on 5 scale categories and thereafter perform ordered logistic regressions. I divide the disclosure into 3 categories and conduct ordered logistic tests.

6.4 Conclusion

This chapter has outlined the research design to test the impact of SFAS 133 on derivatives related disclosure. The chapter lays out the methodology and variable definitions. The primary empirical contribution will be the application of a self constructed disclosure index that includes SFAS 133 data. To my knowledge there is no similar large sample study based on SFAS 133. However, there is a limitation of the index as it is based on a subset of selected prescribed requirements and this selection introduces an element of subjectivity. It also may be difficult to replicate this study due to the index being self-constructed. The index also bears the limitation of being a purely quantity index as it not weighted for the quality or impact of specific disclosed information components.

In addition to predominantly using proxies applied by other empirical studies, the study includes a number of novel proxies for the managerial talent, proprietary cost and litigation cost incentives. The empirical findings are described in chapter 7.

7 EMPIRICAL FINDINGS-SFAS 133 AND DISCLOSURE

This chapter reviews the univariate and multivariate empirical findings, in relation to the impact of SFAS 133 adoption and related incentives on disclosure. It is based on the methodology described in chapter 6.

7.1 Univariate tests and descriptive statistics

The reported univariate results consist of:

- Disclosure index: Difference in proportions of disclosure index constituents between pre- and post- SFAS 133 observations;
- Disclosure index: Difference in means and medians between the pre-and post-SFAS 133 observations;
- Control variables: Difference in Means and medians between observations stratified by low and high disclosure categories.

These tests reflect the impact of SFAS 133 on the disclosure of derivatives related information, as well as how disclosure may be influenced by the explanatory control variables.

7.1.1 Difference of proportion of index constituents

Table 7.1 contains a comparison of frequency of key disclosure components across the pre- and post-SFAS 133 periods. The results show variation in disclosure levels across multiple categories before and after the adoption of SFAS 133. It shows an improvement in certain categories but this is offset by decline across other categories. In others words, there is partial improvement and partial deterioration of derivatives disclosures. These findings resonate with those of Hamlen and Largay[90] (2005). A similar trend of partial improvement/partial deterioration is reported in a Fitch ratings' (2004) study of the disclosure practices of 57 companies.

[90] Their study is on derivatives footnote disclosure by the 30 DJIA companies before and after SFAS 133.

The disaggregated analysis of disclosure index constituents shows a statistically significant decline in the disclosure of notional derivatives amounts. 93% of pre-SFAS 133 versus 81% of post-SFAS 133 observations disclosed this amount. These results are consistent with Hamlen and Largay (2005). They find that 18 of the 30 DJIA companies stop reporting notional derivatives amounts. The decline in reported notional amounts could be simply due to notional amounts not being mandatory disclosure after SFAS 133. However, most companies still opt to report notional amounts (i.e. 81%) after SFAS 133 adoption. This indicates that they deemed such information to be still useful for disclosure purposes.

There is statistically significant increase in the reporting of impact of derivatives use, on income and balance sheet. 40% of pre-SFAS 133 firms do so, in contrast to 61% of Post-SFAS 133 firms. There is also a significant increase in proportions of firms disclosing their derivatives fair value amount in the footnotes. There is increase from 74% (pre-SFAS 133) to 81% thereafter. Similarly, there is increased disclosure of amounts designated for cash flow hedge accounting purposes as well (i.e. from 4% pre-SFAS 133 to 31% post-SFAS 133). These findings are consistent with Hamlen and Largay (2005). They find that only 3 out of the 30 firms reported income effects in the pre-SFAS 133 period, while 25 did so after. The observed increase in disclosure of fair value and income effects support Hypothesis 3.1 of SFAS 133 increasing note disclosure. However, as noted, there are offsetting declines in other aspects of disclosure (e.g. notional amounts).

There are no statistically significant differences in proportion of disclosure of respective currencies hedged**,** sources of risk exposure and firms providing disaggregated tabular presentation is easy for users to comprehend. At the same time, there is poor disclosure both before and after SFAS 133 of the sensitivity analysis and value at risk analysis information. 9% of pre-SFAS 133 sample firms versus 8% of post-SFAS 133 sample firms provided the required data, showing low compliance with the SEC requirements under FR48.

Overall, there is some improvement in 4 out of the 8 components of the disclosure index, after SFAS 133. There is improvement in disclosure of amounts treated as cash flow hedges, sources of risk exposure (50% Post-SFAS 133 versus 46% Pre-SFAS 133), impact of derivatives on reported financial results (61% versus 40%) and fair value in notes (81% versus 74%). There is a significant decline in proportions of notional amounts and insignificant decline in proportions of currencies hedged, disaggregated and tabular presentation and sensitivity analysis/value at risk disclosure. Unlike this study, Hamlen and Largay (2005) find that no significant change in the proportion of firms reporting fair value. Of the 30 DJIA firms that they study, 14 report fair values before and after SFAS 133, 6 report them for the first time after SFAS 133, while 4 stop reporting them after SFAS 133. They also consider other components of disclosure that I do not, namely that the disclosure of hedges of net investment in foreign operations increased. On the other hand, as described in section 6.2.1, I primarily focus on elements where there is empirical evidence of value relevance such as the notional amount, sensitivity analysis and fair values.

Table 7.1 Disclosure index-Difference of proportions of constituents

The frequency and proportion of components is based on 681 firm-year observations (1999-2003). The difference of proportion is between the pre-SFAS 133 period (up to year 1999 and 2000) and the Post-SFAS 133 period (i.e. 2001-2003).

Disclosure Component	**Pre-SFAS 133**	**Post-SFAS 133**	**Pre-SFAS 133**	**Post-SFAS 133**	**Significance**
Disclose currencies being hedged (€,$,£ etc)	152	262	62%	60%	
Disclose amount treated designated as cash flow hedges***	11	136	4%	31%	***
Presents disaggregated/tabular presentation (Easy to identify derivatives value)	162	272	66%	62%	
Disclose sources of risk exposure (e.g. foreign debt or foreign assets, liabilities)	113	218	46%	50%	
Disclose sensitivity analysis or value at risk disclosure	21	36	9%	8%	
Disclose impact on reported financial results (realised and unrealised gain/loss)***	97	264	40%	61%	***
Disclose notional amount in notes***	229	354	93%	81%	***
Disclose fair value in notes***	182	354	74%	81%	**
Number of observations	245	436			

*(10% significance), ** (5% significance), *** (1% significance)

7.1.2 Alternative proxy

As an alternative dependent variable for disclosure, I construct a categorical disclosure level variable, dividing the disclosure into three categories, low, moderate and high. This approach is similar to that taken by Aggarwal and Simkins (2004). For pre-SFAS 133, low (1) = 0 to 2 factors, moderate (2) 3 factors, high (3) = 4 or more factors. For post-SFAS 133 period, SFAS 133, low (1) = 0 to 2 factors, moderate (2) 3 to 4 factors, high (3) = 5 or more factors. Table 7.2 shows the results of components of disclosure across firms. Based on these categorisation 15% of sample observations are low disclosure, 26% are high disclosure and the rest (59%) are moderate disclosure.

Table 7.2: Quality of disclosure breakdown

Category	Factors	Firm-year observations	Percentage
Low	0 to 2	105	15%
Moderate	3 to 5	401	59%
High	6 to 8	175	26%
Total		681	

7.1.3 Difference in means and medians of disclosure index across the pre and Post-SFAS 133 observations

Table 7.3 show the difference in means and medians of the disclosure index across the pre- and post- SFAS 133 observations. In this table, I show the results of two constructions of the disclosure index (Disc index). Disc index includes all the 8 factors identified in the variable definition discussion of the index. Disc index 2 excludes[91] the notional amount.

Table 7.3-Disclosure index univariate and descriptive statistics

Panel A: Difference in means and medians of disclosure indices.

Disc index 1 includes all the 8 components identified in the variable definition. Disc index 2 excludes the notional amount but includes the other 7 components of Disc index 1. The mean and median values are based on the 681, 1999-2003 firm-year observations of derivatives users.

	Observations	DISCINDEX1	DISCINDEX1	DISCINDEX2	DISCINDEX2
		Mean	Median	Mean	Median
All	681	0.53	0.50	0.48	0.43
Pre-SFAS 133	245	0.49	0.50	0.43	0.43
Post-SFAS 133	436	0.54	0.50	0.51	0.57
T-test		3.39		4.51	
Wilcoxon z-test			3.17		4.14

Panel B: Disclosure index per year

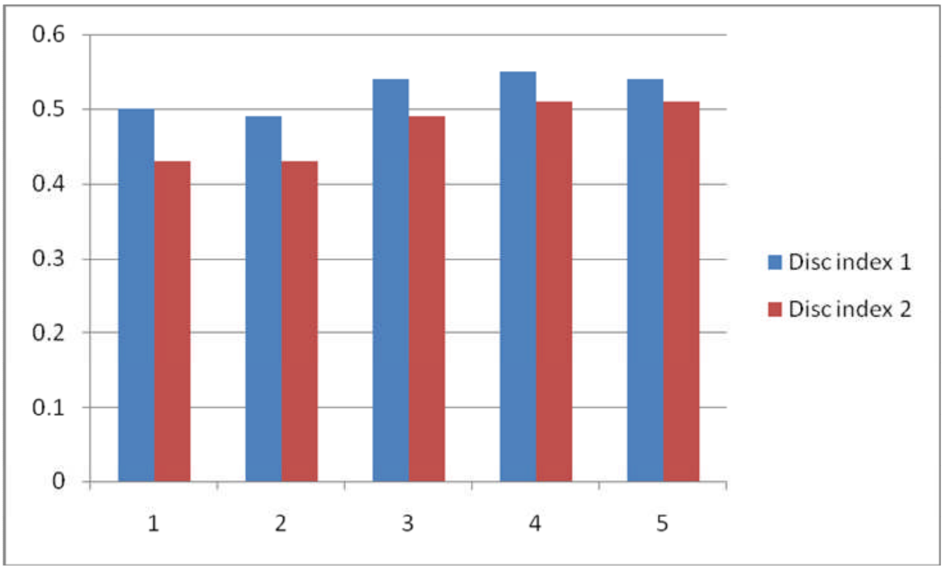
Year	Disc index 1	Disc index 2	Frequency
1999	0.50	0.43	112
2000	0.49	0.43	133
2001	0.54	0.49	132
2002	0.55	0.51	153
2003	0.54	0.51	151

91 I exclude the notional amount in order to include the level of derivatives use as an independent variable in some of the testing models. The notional amount of derivatives use is a proxy for underlying risk exposure as discussed in sections 6.2.2 and 4.3.1.

Disc index 1 and Disc index 2 have statistically significant increases after SFAS 133 and this supports Hypothesis 3.1of SFAS 133 increasing disclosure. The increase in the index that excludes notional amount is understandable, as notional amount is one component where there is significant decline as shown in Table 7.1

In addition to differentiating the pre- and post- SFAS 133 impact on disclosure index components, I analyse whether there is an upward trending or steadily increasing pattern of disclosure levels. I find that while there is a discrete increase in Disc index 1 and Disc Index 2 after SFAS 133 adoption, there is no observable upward trend in the period preceding and after SFAS 133 (see Figure 7.1 below). This differs from the finding of Darus and Taylor (2006), who in a study of Australian companies' financial instruments disclosure levels, find an upward drift of disclosure. This they propose that this is in the anticipation and enactment of mandatory disclosure requirements.

Figure 7.1: Chart of disclosure index across reporting periods



7.1.4 Difference in means and medians of disclosure index across industry

Table 7.4 shows that there are differences in disclosure quality across industries. There are high levels of disclosure in the mining, manufacturing and services industries. The lowest disclosure index value is in the trading industry. The variation of disclosure across industries support's Nain's (2004) postulation that companies tend to be influenced by the hedging practices of peers in their respective industries. Hence, if industry is a factor on the hedging decision and there is variation of hedging practices across industry, it can be inferred that disclosure of hedging will also vary by industry. The high level of disclosure of mining industry firms could be explained by there being more derivatives related information (e.g. risk exposure) in this industry. Chalmers and Godfrey (2004), contend that managers of firms operating in markets subject to volatile commodity prices (e.g. oil and mining industries) have greater incentives to protect themselves from unfavourable price movements by engaging in hedging activities.

Table 7.4-Disclosure by key industry categories

Disc index 1 includes all the 8 components identified in the variable definition. Disc index 2 excludes the notional amount but includes the other 7 components of Disc index 1. The mean and median values are based on the 681, 1999-2003 firm-year observations of derivatives users. Industry categories on based on broad SIC categories.

Industry category	Observations	Disc index 1		Disc index 2	
		Mean	Median	Mean	Median
Mining	38	0.56	0.63	0.53	0.64
Manufacturing	533	0.53	0.50	0.48	0.43
Transactions	6	0.46	0.50	0.40	0.43
Trading	28	0.37	0.38	0.31	0.29
Services	69	0.54	0.50	0.49	0.57
Other	7	0.41	0.50	0.39	0.43

7.1.5 Difference in means and medians of independent control variables

Stratified by low/high disclosure

Table 7.6 shows that relative to low disclosure firms, high disclosure firms have the following significant differences:

- Higher stock trading volume (logarithm of trading volume). This is consistent with higher levels of disclosure, reducing the information asymmetry between informed and uninformed investors on reporting firms. This in turn leads to higher levels of trading (Bamber and Cheon, 1995).
- Higher market share, as measured by percentage of industry sales by the reporting firm. Indicating that industry leaders tend to disclose more than their smaller counterparts. This is backed by the finding that they also have a higher proportion of firms with an indicator of high proprietary costs (i.e. industry leader and high net income margin).

- Higher total assets. This could be due to larger firms enjoying economies of scale in incurring information processing costs associated with disclosure, as discussed in section 3.5.6.
- Higher proportion of managers characterized as highly talented, based on being in the top 100 annual compensation ranking of approximately 2000 Execucomp firms. This is consistent with the theoretical expectations that more talented managers disclose more, as discussed in section 3.5.1.
- Higher Vega- Managerial risk incentive is measured by vega (i.e. the sensitivity to volatility). The expectation is that higher sensitivity to volatility should result in lower disclosures, given that disclosure should lower the uncertainty. However, as discussed in section 3.5.2, the impact of compensation is ambiguous as disclosure may simply result in increased risk perception, especially if it reveals unhedged exposures or confirms the use of derivatives for speculative purposes.
- Higher proportion of experienced auditors. As described in the variable definition, expert auditors are those that cover at least 15% of firms within the SIC industry category. This is consistent with the expectation that expert auditors are better equipped to enforce higher level of corporate disclosure.

Table 7.5 Control variable univariate statistics

Panel A -Continuous variables

Variable definition-LN (TRADVOL) - Logarithm (Annual average stock trading volume), LEV- Debt/Total assets, PtoB- Price to Book ratio as at fiscal year end, MKT SHARE- Sales/Industry sales (4 digit SIC code), COMPRK- Annual compensation ranking/ Number of Firms used in annual ranking, ROA- return on assets (Net Income/Total assets), FSALES- Foreign sales/sales, LNTASSETS- Log (Total assets), DAC- Absolute value of discretionary accruals/Total assets, GEOG_DIV- Number of key regions with operations, DERIV-Notional amount of derivatives/Total assets, VEGA- change in stock and stock options value for 0.01 change in stock price volatility, DELTA- change in stock and stock options value for 0.01 change in stock price , CSH-PAY- Cash pay /Total Compensation , INST OWN-Institutional ownership, MGR SHROWN- Manager share holding/Market value of shares as at fiscal year end.. This is based on the 681 firm-year observations (1999-2003) that report derivatives use.

		Mean	Median
CAPITAL MARKETS AND FIRM	LN(TRAD VOL)	5.93	5.84
ECONOMIC ATTRIBUTES	LEV	0.20	0.20
	PTOB	4.74	3.07
	MKT SHARE	0.06	0.04
	INVESTMENT	0.07	0.05
	ASSET INTENSITY	0.28	0.24
	COMP RANK	0.30	0.26
	ROA	0.05	0.05
	FSALES	0.50	0.47
	LN(TASSETS)	8.55	8.41
	DAC	0.04	0.03
	GEOG DIV	5.45	5.00
COMPENSATION AND	VEGA	0.37	0.21
CORPORATE GOVERNANCE	DELTA	0.43	0.40
	BONUS PERC	0.14	0.12
	CASH PAY PERC	0.24	0.22
	INST OWN	0.77	0.81
	MGR SHROWN	0.01	-

Panel B - Categorical variables

Variables- INDLEADER- Industry leadership indicator (i.e. top 5 by assets size and sales in two digit SIC code classification), Prop cost dummy (equals to 1 if ranked as top 10 in average sales and total within two digit SIC industry category and with margin (net income/sales)>10%, 0 otherwise), Talent dummy- (equals to 1, if average executive compensation is among top 100 of entire Execucomp database), Litrisk- equals 1 if in industry that is categorized as having high litigation risk, Interlock dummy- equals to 1 if executives have interlocking relationships, Audexp- equals to 1 if auditor has expertise, measured as auditing >15% of firms within two digit SIC code industry category.

Industry leadership	167	25%
Prop cost dummy	85	12%
Talent dummy	103	15%
Lit risk dummy	48	7%
Interlock dummy	20	3%
Aud exp dummy	288	42%

Table 7.6 -Difference in mean and median between low and high disclosure firms

Panel A Continuous variables

Variable definition-LN (TRADVOL) - Logarithm (Annual average stock trading volume), LEV- Debt/Total assets, PtoB- Price to Book ratio as at fiscal year end, MKT SHARE- Sales/Industry sales (4 digit SIC code), COMPRK- Annual compensation ranking/ Number of Firms used in annual ranking, ROA-return on assets (Net Income/Total assets), FSALES-Foreign sales/sales, LNTASSETS- Log (Total assets), DAC- Absolute value of discretionary accruals/Total assets, GEOG_DIV- Number of key regions with operations, DERIV-Notional amount of derivatives/Total assets, VEGA- change in stock and stock options value for 0.01 change in stock price volatility, DELTA- change in stock and stock options value for 0.01 change in stock price , CSH-PAY- Cash pay /Total Compensation , INST OWN-Institutional ownership, MGR SHROWN-Manager share holding/Market value of shares as at fiscal year end. This is based on the 681 firm-year observations (1999-2003) that report derivatives use.

		Low		High			
		386		295		T-stat	Z-stat
CAPITAL MARKETS AND FIRM		Mean	Median	Mean	Median	Significance	
ECONOMIC ATTRIBUTES	LN(TRAD VOL)	5.76	5.62	6.17	6.13	***	***
	LEV	0.20	0.20	0.20	0.19		
	PTOB	4.87	3.20	4.56	2.95		
	MKT SHARE	0.06	0.04	0.07	0.05		**
	COMP RANK	0.32	0.29	0.26	0.22	***	***
	ROA	0.05	0.06	0.04	0.05		
	FSALES	0.49	0.46	0.51	0.47		
	LN(TASSETS)	8.42	8.20	8.73	8.64	***	***
	DAC	0.04	0.03	0.04	0.03		
COMPENSATION AND	GEOG DIV	5.46	5.00	5.45	5.00		
CORPORATE GOVERNANCE	VEGA	0.31	0.19	0.45	0.23	***	***
	DELTA	0.44	0.40	0.42	0.40		
	CASH PAY PERC	0.24	0.23	0.23	0.21		
	INST OWN	0.78	0.80	0.77	0.81		
	MGR SHROWN	0.01	-	0.01	-		**

Panel B- Categorical variables

INDLEADER- Industry leadership indicator (i.e. top 5 by assets size and sales in two digit SIC code classification), Prop cost dummy (equals to 1 if ranked as top 10 in average sales and total within two digit SIC industry category and with margin (net income/sales)>10%, 0 otherwise), Talent dummy- (equals to 1, if average executive compensation is among top 100 of entire Execucomp database), Litrisk- equals 1 if in industry that is categorized as having high litigation risk, Interlock dummy- equals to 1 if executives have interlocking relationships, Audexp- equals to 1 if auditor has expertise, measured as auditing >15% of firms within two digit SIC code industry category.

	Low disclosure	High disclosure		
	386	295	T-stat	Z-stat
Industry leadership	20.5%	29.8%	***	***
Prop cost dummy	10.6%	14.9%	*	*
Talent dummy	11.1%	20.3%	***	***
Lit risk dummy	7.3%	6.8%		
Interlock dummy	3.1%	2.7%		
Aud exp dummy	38.1%	47.8%	***	***

7.2 Multivariate Testing

In the multivariate testing, the main consideration is the individual effects in determining the appropriate regression for the data. The testing of the impact of SFAS 133 on income smoothing, focused on the problem of endogeneity. However, for this question, there is no theoretical basis of assuming endogeneity, between the constructed disclosure index and the primary control variables of SFAS 133 dummy and the incentive variables. Lobo and Zhou (2001) suggest that the inclusion of discretionary accruals as an independent variable when determining disclosure can result in endogeneity. However, discretionary accruals' is not considered to be a primary variable for this question. This model tested is as below in Equation 7.1

Equation 7.1

$$\text{DISC\_INDEX} = \alpha + \beta_1\,\text{133DUM} + \beta_2\,\text{LN TRADVOL} + \beta_3\,\text{133DUM*LN TRADVOL} + \beta_4\,\text{LEV} + \beta_5\,\text{FSALES} + \beta_6\,\text{DAC} + \beta_7\,\text{ROA} + \beta_8\,\text{GEOG\_DIV} + \beta_9\,\text{LNTASSETS} + \beta_{10}\text{GROWTH} + \beta_{11}\,\text{MKT SHARE} + \beta_{12}\,\text{PROP COST DUMMY} + \beta_{13}\text{TALENT DUMMY} + \beta_{14}\,\text{VEGA} + \beta_{15}\,\text{DELTA} + \beta_{16}\text{CSHPAY PER} + \beta_{17}\,\text{LIT RISK} + \beta_{18}\,\text{MGR SHROWN} + \beta_{19}\text{INSTOWN} + \beta_{20}\,\text{AUD EXP} + \beta_{21}\,\text{INTERLOCK} + \beta_{22}\text{- INDDUM} + \beta\ \text{YRDUM.}$$

7.2.1 Model Selection

To determine the appropriate regression model, I focus on minimising errors that could arise due to omitted variables and due to unobservable heterogeneity from the panel data. The problem of omitted variables is to some measure already minimised as I have included 21 variables including those that capture firm specific attributes such as firm size. In addition, the model includes industry and time dummy variables to control for industry and time fixed effects. From an econometric perspective, I conduct the F-test, Breusch Lagrange and Hausman tests, to further ascertain the most appropriate model. The F-test of differences in intercepts, the Breusch Lagrange test of differences in error term and the Hausman test of whether there are differences in coefficient of the random effect and fixed effect, leads me to choosing the pooled OLS and random effect regressions. The Hausman test has a chi-squared value-14.50 (p value of 0.56), hence I cannot reject null hypothesis of there being no systematic difference of coefficients of the fixed and random effect models. Therefore, the reported multivariate results are based on the pooled OLS and random effect. I test but do not report the panel fixed effect models.

7.2.2 Multivariate empirical findings

7.2.2.1 Impact of SFAS 133 adoption on disclosure

Hypothesis 3.1 states that the disclosure of related derivatives information should increase after the adoption of SFAS 133. I therefore would expect a positive association and find significant evidence of this in all the reported models. As argued in the hypothesis development, SFAS 133 adoption should incentivise managers to disclose complementary derivatives information. SFAS 133 makes more visible derivatives gains and losses, and increases earnings volatility. Part of this volatility could be artificial due to hedges and hedging instruments that do not qualify for hedge accounting treatments. Hence managers would be expected to disclose more information so as to avoid investors misinterpreting the true risk. The results in Table 7.7 show a significant positive association between the SFAS 133 dummy and the disclosure index and this is consistent with Hypothesis 3.1. This finding is consistent with the descriptive studies of Hamlen and Largay (2005) who found that DJIA-30 companies generally increased their disclosures after adopting SFAS 133.

7.2.2.2 Other determinants of derivatives related disclosure

Capitals markets incentives

According to Hypothesis 3.2, capital markets incentives ought to influence the level of derivatives footnote disclosure and SFAS 133's adoption ought to have increased the capital markets incentives to disclose. The proxies used for capital markets incentives are trading volume, price to book and leverage. It is expected that these capital markets proxies have a positive association with observed derivatives related disclosure levels.

From the results, there is evidence of a significant positive association between trading volume and derivatives disclosure. However, the other capital markets proxies, including leverage and price to book ratio (unreported), do not yield significant evidence of association. The findings on Price to Book ratio differs from those of Aggarwal and Simkins (2004), who found that market to book value, had a positive association with disclosure.

I also include an interaction term to test Hypothesis 3.2b that capital incentives lead to higher levels of derivatives related disclosure after SFAS 133 adoption. This interaction has a significant negative association (see Table 7.7-Panel B). In addition the chow test for joint significance of both the SFAS 133 dummy (i.e. intercept) and interaction term (i.e. impact on slope), leads to the rejection of the null hypothesis of both terms being equal to zero. The finding shows that after SFAS 133, the coefficient of the logarithm of trading volume is 0.011 (i.e. $\beta_2 + \beta_3$). This is in contrast to 0.030 before SFAS 133 (i.e. β_2), implying capital market incentives weaken after the adoption of SFAS 133. However, this finding is contrary to the hypothesis' expectation but I consider it to be inconclusive as it is weak evidence. It is only significant at a 10% confidence level.

Proprietary cost incentives

According to Hypothesis 3.3; proprietary costs influence derivatives footnote disclosure levels, and proprietary costs concerns are lower after the adoption of SFAS 133. The multivariate regression model tests apply different proxies; including market share (firm sales/industry sales) and a self constructed proxy[92] for proprietary costs. The results do not

[92] (i.e. Top 5 in asset sales and revenue within two digit SIC code industry classification, plus having a profit margin of greater than 10%).

show any significant association with the disclosure, from either the proprietary cost proxy coefficients or their interaction terms with the SFAS 133 dummy variable.

Managerial risk incentives

There is some limited evidence of a positive association of vega and negative association of delta. As discussed in section 3.5.2, the impact of managerial risk incentives is ambiguous, as it is difficult to know whether derivatives are used for hedging or speculative purposes and this determines whether disclosure increases the perceived riskiness of the reporting firms.

Managerial reputation

As discussed, providing a high level of disclosure could be a way to convey sophistication to investors and thus more talented managers are expected to be inclined to disclose more information (Trueman, 1986). I expected managerial talent signalling incentives to influence the level of derivatives footnote disclosure before and after the introduction of SFAS 133. Using a talent dummy variable (where I identify if a firm is in the top 100 of annual compensation rankings), I find no evidence of association with disclosure[93].

Litigation risk

There is some evidence that litigation is negatively associated with disclosure. There is a significant negative association in three of the six models. This can be explained by the forward looking nature of derivatives related information and the fear of lawsuits in relation to such type of information.

Discretionary accruals

There is evidence of a significant negative association between discretionary accruals and the level of disclosure. Unlike the first key question in this thesis, the primary focus of the second question was not on the impact of discretionary accrual. However, Lobo and Zhou (2001), establish that there is a negative association based on the notion that firms that engage in discretionary accruals are likely to be less transparent.

93 An alternative variable to talent dummy (i.e. salary ranking/Number of firms). The number of firms is based a sample of large firms that reported compensation in Execucomp (1999- 1954 firms, 2000- 1846 firms, 2001-1799 firms, 2002-1830 firms, 2003-1856 firms). This ranking ratio means that higher paid managers will have a lower ratio. Hence a negative association is expected between this ratio and the disclosure index. There is strong evidence across the multivariate models of a negative significant association between managerial talent and the disclosure levels. This finding conforms to the theoretical expectation.

Notional derivatives amount

The notional amount is included as a proxy for risk exposure. There is a positive association between the notional amount and the disclosure index. The notional amount is a proxy for underlying derivatives related risk exposure and the implication is that firms with higher exposure are inclined to disclose more.

Corporate governance

There is a positive association of percentage of institutional ownership. This conforms to the expectation that higher level of corporate governance encourages higher levels of disclosure. Aggarwal and Simkins (2004) controlled for institutional ownership, but did not find it to be significant. Auditor expertise is positively associated in five of the six models and this suggests that expert auditors are better equipped to enforce disclosures.

Table 7.7 Multivariate regression- Determinants of disclosure

DISC_INDEX= α + β_1 133DUM + β_2 LN TRADVOL + β_3 133DUM*LN TRADVOL+ β_4 LEV + β_5 FSALES + β_6 DAC + β_7 ROA + β_8 GEOG_DIV + β_9 LNTASSETS+ β_{10}GROWTH+ β_{11} MKT SHARE + β_{12} PROP COST DUMMY + β_{13}TALENT DUMMY + β_{14} VEGA + β_{15} DELTA + β_{16}CSHPAY PER + β_{17} LIT RISK + β_{18} MGR SHROWN + β_{19}INSTOWN + β_{20} AUD EXP + β_{21} INTERLOCK + β_{22}- INDDUM + β YRDUM.

Panel A- Regression without interaction terms

Model 1 is a pooled OLS regressions and model 2 is the random effect GLS panel regression. The pooled OLS is based on robust standard errors. VIF factor is less than 10 for all variables indicating no problem with multicollinearity. the analysis is based on 681 observations of derivatives users

Variable definition- 133DUMMY- SFAS 133 dummy (1 after year 2000, 0 otherwise), LN (TRADVOL) - Logarithm (Annual average stock trading volume), LEV- Debt/Total assets, FSALES- Foreign sales/sales, DAC- Absolute value of discretionary accruals/Total assets, ROA-return on assets (Net Income/Total assets), GEOG_DIV- Number of key regions with operations, LNTASSETS- Log (Total assets), DERIV-Notional amount of derivatives/Total assets, MKT SHARE- Sales/Industry sales (4 digit SIC code), PROP COST DUMMY (equals to 1 if ranked as top 10 in average sales and total within two digit SIC industry category and with margin (net income/sales)>10%, 0 otherwise), TALENT DUMMY- (equals to 1, if average executive compensation is among top 100 of entire Execucomp database), VEGA- $change in stock and stock options value for 0.01 change in stock price volatility/$ Cash Pay, DELTA- $change in stock and stock options value for 0.01 change in stock price /$Cash Pay, CSH-PAY- Cash pay /Total Compensation , INST OWN- Institutional ownership, MGR SHROWN-Manager share holding/Market value of shares as at fiscal year end. LITRISK- equals 1 if in industry that is categorized as having high litigation risk, INTERLOCK dummy- equals to 1 if executives have interlocking relationships, AUD EXP- equals to 1 if auditor has expertise, measured as auditing >15% of firms within two digit SIC code industry category. Detailed variable definition is provided in section 6.2 .

		Model 1	T-stat	Model 3	T-stat
	INTERCEPT	0.354***	(4.23)	0.289***	(2.63)
SFAS 133 IMPACT	133DUMMY	0.056**	(2.35)	0.049***	(3.26)
CAPITAL MARKETS INCENTIVES	LN(TRAD VOL)	0.017**	(1.99)	0.018*	(1.75)
ECONOMIC CHARACTERISTICS	LEV	0.090	(1.34)	0.079	(1.17)
	FSALES	-0.021	(-0.39)	0.061	(0.96)
	DAC	-0.437**	(-2.15)	0.057	(0.41)
	ROA	-0.010	(-0.10)	0.125*	(1.84)
	GEOG DIV	-0.005	(-0.67)	-0.005	(-0.51)
	LNTASSETS	0.009	(0.88)	0.012	(0.88)
	GROWTH	-0.040	(-1.17)	-0.007	(-0.31)
PROPRIETARY COST AND REPUTATION	MKT SHARE	0.053	(0.38)	0.066	(0.38)
&REPUTATION	PROP COST DUMMY	0.017	(0.65)	-0.016	(-0.58)
	TALENT DUMMY	0.029	(1.14)	0.006	(0.32)
MANAGERIAL RISK INCENTIVES	VEGA	0.021**	(2.18)	0.011*	(1.69)
	DELTA	-0.081*	(-1.78)	-0.037	(-1.05)
	CSH_PAY PER	-0.100	(-1.41)	-0.023	(-0.53)
LITIGATION RISK	LIT RISK	-0.111**	(-2.29)	-0.094	(-1.02)
CORPORATE GOVERNANCE	MGR SHROWN	0.205	(0.76)	-0.098	(-1.07)
	INST OWN	0.117**	(1.98)	0.070	(0.85)
	AUD EXP	0.034**	(2.11)	0.044**	(2.01)
	INTERLOCK	-0.034	(-0.64)	-0.040	(-0.85)
	Industry dummy	Yes		Yes	
	Year Dummy	Yes		Yes	
	N	669		669	
	Adjusted R-squared	8.1%			
	R-squared			9.2%	
	F	3.64***			
	Wald			69.64***	

*** Significance at 1% ** Significance at 5%*Significance at 10%

Panel B- Pooled OLS Regressions with interaction terms

This is based on same sample as Panel A. Model 1 includes only the capital market interaction term (133DUM*TRADVOL). Model 2 also includes interaction terms for proprietary cost (133DUM*MKT SHARE). The same set of variables defined in Panel A. In addition, I include INV (Capital expenditure/Sales) and an interaction term 133DUM*INV, as a proxy for proprietary costs. Only capital market interaction term is significant. The chow test for joint significance-resulted in a F-statistic of 4.05 (p-value of 0.0178). This leads to rejection of null hypothesis of both the slope and intercept being zero. The pooled OLS is based on robust standard errors. VIF factor is less than 10 for all variables indicating no problem with multicollinearity.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	0.217*	(1.83)	0.215*	(1.80)
SFAS 133 IMPACT	133DUMMY	0.168**	(2.44)	0.163**	(2.25)
CAPITAL MARKET INCENTIVES	LN(TRAD VOL)	0.030***	(2.74)	0.031***	(2.80)
ECONOMIC CHARACTERISTICS	133*TRADVOL	-0.019*	(-1.78)	-0.019*	(-1.74)
	LEV	0.095	(1.42)	0.102	(1.53)
	FSALES	-0.021	(-0.39)	-0.022	(-0.42)
	DAC	-0.436**	(-2.14)	-0.391*	(-1.90)
	ROA	-0.027	(-0.28)	-0.030	(-0.31)
	GEOG DIV	-0.005	(-0.73)	-0.005	(-0.71)
	LNTASSETS	0.009	(0.81)	0.009	(0.81)
	GROWTH	-0.043	(-1.25)	-0.041	(-1.17)
PROPRIETARY COST AND REPUTATION	MKT SHARE	0.050	(0.36)	-0.024	(-0.11)
&REPUTATION	133DUM*MKT SHARE			0.035	(0.14)
	PROP COST DUMMY	0.020	(0.78)	0.027	(1.04)
	INV			-0.201	(-1.09)
	133DUM*INV			-0.041	(-0.19)
MANAGERIAL RISK INCENTIVES	TALENT DUMMY	0.030	(1.19)	0.031	(1.27)
	VEGA	0.021**	(2.31)	0.020**	(2.28)
	DELTA	-0.082*	(-1.78)	-0.080*	(-1.74)
	CSH_PAY	-0.097	(-1.35)	-0.088	(-1.21)
LITIGATION RISK	LIT RISK	-0.110**	(-2.30)	-0.108**	(-2.26)
CORPORATE GOVERNANCE	MGR SHROWN	0.212	(0.74)	0.217	(0.73)
	INST OWN	0.122**	(2.03)	0.127**	(2.09)
	AUD EXP	0.033**	(2.07)	0.034**	(2.13)
	INTERLOCK	-0.035	(-0.67)	-0.033	(-0.64)
	Industry dummy	Yes		Yes	
	Year Dummy	Yes		Yes	
	Observations	669		669	
	Adjusted R-squared	8.6%		8.7%	
	F-test	3.621***		3.273***	

*** Significance at 1% ** Significance at 5%*Significance at 10%

7.2.3 Robustness Testing

Alternative model

For robustness testing purposes, I construct another index that excludes a measure for whether firms disclose the notional amount as the dependent variable, and includes the notional amount as one of the explanatory variables. Notional amount in this case is a proxy for risk exposure. The results reported in Table 7.8 and Table 7.9, support only the hypothesis of SFAS 133 adoption influencing disclosure. The other consistent result is that discretionary accruals are negatively associated and audit expertise has a positive association.

In addition to applying the disclosure index as the dependent variable, I categorise disclosures into a 3 level ordinal variable (i.e. low, moderate and high), and thereafter conduct an ordered logistic regression. The ordered logistic regression is an extension of the logistic regression that is applied to dependent binary variables. This approach is applied by Aggarwal and Simkins (2004) and I primarily use it as an additional test as I assume it to be less precise than applying a continuous variable for disclosure. The results of the impact of SFAS 133 on disclosure are consistent with those in the main model. Other consistent findings are that litigation risk has a negative association, discretionary accruals' has a significant negative association and the level of institutional ownership has a significant positive association.

Table 7.8- Regression- Based on alternative disclosure index

Model 1 is a pooled OLS regression while model 2 is the random effect GLS panel regression. The pooled OLS is based on robust standard errors. VIF factor is less than 10 for all variables indicating no problem with multicollinearity. The analysis is based on 541 observations of derivatives users with reported notional amounts and without missing control variables data. Regression is based on Disc Index 2 that excludes the notional amount from the index.

Variable definition- 133DUMMY- SFAS 133 dummy (1 after year 2000, 0 otherwise), LN (TRADVOL) - Logarithm (Annual average stock trading volume), LEV- Debt/Total assets, FSALES- Foreign sales/sales, DAC- Absolute value of discretionary accruals/Total assets, ROA-return on assets (Net Income/Total assets), GEOG_DIV- Number of key regions with operations, LNTASSETS- Log (Total assets), DERIV-Notional amount of derivatives/Total assets, MKT SHARE- Sales/Industry sales (4 digit SIC code), PROP COST DUMMY (equals to 1 if ranked as top 10 in average sales and total within two digit SIC industry category and with margin (net income/sales)>10%, 0 otherwise), TALENT DUMMY- (equals to 1, if average executive compensation is among top 100 of entire Execucomp database), VEGA- $change in stock and stock options value for 0.01 change in stock price volatility/$ Cash Pay, DELTA- $change in stock and stock options value for 0.01 change in stock price /$Cash Pay, CSH-PAY- Cash pay /Total Compensation , INST OWN-Institutional ownership, MGR SHROWN- Manager share holding/Market value of shares as at fiscal year end. LITRISK- equals 1 if in industry that is categorized as having high litigation risk, INTERLOCK dummy- equals to 1 if executives have interlocking relationships, AUD EXP- equals to 1 if auditor has expertise, measured as auditing >15% of firms within two digit SIC code industry category. Detailed variable definition is provided in section 6.2.

		Model 1	T-stat	Model 2	T-stat
	INTERCEPT	0.354***	(4.23)	0.278***	(3.02)
SFAS 133 IMPACT	133DUMMY	0.097***	(3.22)	0.096***	(5.27)
CAPITAL MARKETS INCENTIVES	LN(TRAD VOL)	0.013	(1.32)	0.011	(0.93)
ECONOMIC CHARACTERISTICS	LEV	0.031	(0.35)	0.019	(0.23)
	FSALES	0.041	(0.64)	0.116	(1.48)
	DAC	-0.498*	(-1.83)	0.109	(0.61)
	ROA	0.009	(0.07)	0.165**	(2.08)
	GEOG DIV	-0.010	(-1.18)	-0.008	(-0.68)
	LNTASSETS	0.023*	(1.77)	0.028	(1.60)
	GROWTH	-0.034	(-0.83)	-0.015	(-0.52)
	DRNV	0.208***	(2.67)	0.172**	(2.03)
PROPRIETARY COST AND REPUTATION	MKT SHARE	0.057	(0.34)	0.038	(0.18)
&REPUTATION	PROP COST DUMMY	0.036	(1.05)	-0.032	(-0.89)
	TALENT DUMMY	0.041	(1.34)	0.011	(0.48)
	VEGA	0.018	(1.61)	0.011*	(1.90)
MANAGERIAL RISK INCENTIVES	DELTA	-0.138**	(-2.56)	-0.040	(-0.95)
	CSH_PAY	-0.103	(-1.08)	-0.000	(-0.00)
LITIGATION RISK	LIT RISK	-0.052	(-0.83)	-0.045	(-0.35)
CORPORATE GOVERNANCE	MGR SHROWN	0.089	(0.34)	-0.152*	(-1.72)
	INST OWN	0.105	(1.56)	0.082	(0.85)
	AUD EXP	0.042**	(2.16)	0.051*	(1.92)
	INTERLOCK	-0.004	(-0.07)	-0.010	(-0.23)
	Industry dummy	Yes		Yes	
	Year Dummy	Yes		Yes	
	N	541		541	
	Adjusted R-squared	10.6%			
	R-squared			11.94%	
	F	3.85***			
	Wald			115.86***	

*** Significance at 1% ** Significance at 5%*Significance at 10%

Table 7.9 Regression- Alternative model (Ordered logistic regression)

The regression is based on 669 observations from the derivatives users that have all the control variables data.

Variable definition- DISCDUMMY- 3 level categorical variable as defined in 6.2.1, 133DUMMY- SFAS 133 dummy (1 after year 2000, 0 otherwise), LN (TRADVOL) - Logarithm (Annual average stock trading volume), LEV- Debt/Total assets, FSALES- Foreign sales/sales, DAC- Absolute value of discretionary accruals/Total assets, ROA-return on assets (Net Income/Total assets), GEOG_DIV- Number of key regions with operations, LNTASSETS- Log (Total assets), DERIV-Notional amount of derivatives/Total assets, MKT SHARE- Sales/Industry sales (4 digit SIC code), PROP COST DUMMY (equals to 1 if ranked as top 10 in average sales and total within two digit SIC industry category and with margin (net income/sales)>10%, 0 otherwise), TALENT DUMMY- (equals to 1, if average executive compensation is among top 100 of entire Execucomp database), VEGA- $change in stock and stock options value for 0.01 change in stock price volatility/$ Cash Pay, DELTA- $change in stock and stock options value for 0.01 change in stock price /$Cash Pay, CSH-PAY- Cash pay /Total Compensation , INST OWN-Institutional ownership, MGR SHROWN-Manager share holding/Market value of shares as at fiscal year end. LITRISK- equals 1 if in industry that is categorized as having high litigation risk, INTERLOCK dummy- equals to 1 if executives have interlocking relationships, AUD EXP- equals to 1 if auditor has expertise, measured as auditing >15% of firms within two digit SIC code industry category. Detailed variable definition is provided in section 6.2

		DISCDUMMY	T-Stat
	INTERCEPT	0.883	(0.67)
SFAS 133 IMPACT	133DUMMY	0.656**	(2.45)
CAPITAL MARKETS INCENTIVES	LN(TRAD VOL)	0.117	(1.24)
ECONOMIC CHARACTERISTICS	LEV	1.158*	(1.65)
	FSALES	-0.764	(-1.36)
	DAC	-4.676**	(-2.04)
	ROA	1.170	(1.12)
	GEOG DIV	-0.020	(-0.28)
	LNTASSETS	0.139	(1.14)
	GROWTH	-0.567	(-1.47)
PROPRIETARY COST AND REPUTATION	MKT SHARE	-1.922	(-1.22)
&REPUTATION	PROP COST DUMMY	0.053	(0.17)
	TALENT DUMMY	0.230	(0.83)
MANAGERIAL RISK INCENTIVES	VEGA	0.135	(1.11)
	DELTA	-0.012	(-0.02)
	CSH_PAY	-0.473	(-0.59)
LITIGATION RISK	LIT RISK	-1.008*	(-1.88)
CORPORATE GOVERNANCE	MGR SHROWN	2.217	(0.96)
	INST OWN	1.419**	(2.10)
	AUD EXP	0.222	(1.26)
	INTERLOCK	0.082	(0.13)
	Industry dummy	Yes	
	Year Dummy	Yes	
	N	669	
	Wald	68.9***	
	Log pseudo-likelihood	564.95	

*** Significance at 1% ** Significance at 5%*Significance at 10%

7.3 Conclusion

The primary findings of the empirical testing is that there is univariate and multivariate evidence supporting the hypothesis of SFAS 133 recognition and measurement requirements leading to an increased disclosure of derivatives related information. There is also supporting evidence of capital market incentives influencing derivatives disclosure and very limited evidence of SFAS 133 influencing the impact of capital market incentives on disclosure. However, there is no evidence of the impact of proprietary cost incentives on disclosure. The conclusions are further discussed in chapter 8.

PART 4-CONCLUSION AND REFERENCES

8 CONCLUSION

8.1 Thesis Objective

This thesis studies the impact of the controversial and complex derivatives accounting policy SFAS 133 on income smoothing and disclosure of derivatives related information through the footnotes. The two primary research questions posed and investigated are:

- What is the impact of SFAS 133 on income smoothing using derivatives and discretionary accruals?

- What is the impact of SFAS 133 and related incentives on disclosure of derivatives related information?

The study has been structured as follows. Firstly, the study develops a theoretical framework based on extant empirical and analytical studies. This is a precursor to the univariate and multivariate empirical testing of 1999 to 2003 data from 253 US firms. In the theoretical framework development (chapter 2), I discuss the genesis and key features of SFAS 133 in addition to the determinants of the two key income smoothing choices of derivatives use and discretionary accruals. These include capital markets, managerial risk and corporate governance determinants. Chapter 3 further outlines a theoretical framework of how SFAS 133 fair value recognition requirements can influence disclosure of related information through the footnotes. It lays out the argument that the extent to which notes are complementary to recognition and measurement requirements should outweigh the extent to which they may be considered substitutes. It further describes the literature on disclosure incentives, including capital markets, proprietary, managerial talent, compensation and litigation cost. Chapter 4 describes the data and research design for the question of the impact of SFAS 133 on income smoothing choices. It especially highlights the approaches taken to mitigate the panel data individual effects and the problems associated with model endogeneity. Chapter 5 contains the univariate and multivariate results tables and the analysis of these results. Chapter 6 describes the data and research design for the question of the impact of SFAS 133 on disclosure of derivatives related information. Chapter 7 contains the univariate and multivariate results tables and the analysis of these results. The rest of this chapter describes the key findings, contribution, limitations of the study and areas for further research.

8.2 Summary of Findings

The empirical findings shed light on the impact of SFAS 133 on derivatives use, discretionary accruals, and the extent to which they are substitutes.

8.2.1 SFAS 133 and income smoothing

The key empirical findings are that there is a substitution relationship between derivatives use and discretionary accruals as income smoothing mechanisms. The findings also show that after SFAS 133, discretionary accruals increase and the substitution relationship with derivatives use weakens. An elaboration of these is provided below.

8.2.1.1 Derivatives use

As discussed in section 2.7.1, the analytical models primarily form the basis of expecting SFAS 133 adoption to lead to reduce derivatives use. Barnes (2002), Shin (2004) and Nan (2007), analytical models posit that firms will lower the prudent use of derivatives for risk management purposes. In contrast to the analytical models, there is scanty and ambiguous empirical evidence on the impact of SFAS 133 on derivatives use.

The univariate evidence in 5.2.1 supports the hypothesized relationship. However, there is only some partial multivariate evidence supporting the hypothesized impact. This evidence does not appear to be robust across models and hence is considered inconclusive. The weak empirical evidence in part arises due to poor and inconsistent derivatives data quality as this makes it difficult to differentiate between derivatives used for either speculative or hedging purposes. In this and other studies that have investigated the same aspect, there is a risk of misclassification of derivatives use, where what is considered to be hedging derivatives could in fact be speculative derivatives.

8.2.1.2 Discretionary Accruals

On the other hand, there is robust multivariate evidence of SFAS 133 leading to the increase of discretionary accruals. This is backed by the univariate evidence reported in 5.2.2. These findings are consistent with the expectation that SFAS 133 leads to increased earnings volatility. In this study, supplemental tests of quarterly earnings volatility shows that it increases after SFAS 133 is adopted. An increase in earnings volatility occurs due to a) hedges that do not qualify for hedge accounting b) interim hedge ineffectiveness of hedge accounting items and c) gains and losses from discontinued hedges that have to be recognized in the income statement (Park, 2004 and Trombley, 2003). In addition, the fair value application requirement increases the probability of the opportunistic[94] application of accruals. A further factor that could contribute to higher levels of discretionary accruals, post-SFAS 133, could be that managers increased the use of derivatives for speculative purposes as postulated in the analytical model by Barnes (2002) and Nan (2007). However, such an increase has not been conclusively verified in this and other empirical studies. As noted the impact of SFAS 133 on derivatives is inconclusive, which in part due to the difficulty in accurately differentiating speculative from prudent derivatives application.

8.2.1.3 Impact of Cash flow hedge accounting on discretionary accruals

Cash flow hedge accounting defers the recognition of derivatives instrument gains or losses through the income statement and reduces the net income volatility. This in turn reduces the need to use accruals and therefore a negative association is to be expected. I control for the application of cash flow hedge accounting, using a dummy variable. I find consistent and robust evidence of cash flow hedge accounting reducing discretionary accruals. This is a conceptual contribution as there is hardly[95] any empirical evidence on the impact of cash flow hedge accounting on earnings volatility and earnings management. The only two studies, I am aware of are; Park (2004) who finds that cash flow hedges do not affect equity volatility and Zhou (2009) who finds that cash flow hedge accounting leads to an increase in

[94] Opportunistic accruals could occur when managers have to determine fair value based on internal models in the absence of observable trading prices as was vivid in the case of Enron. This could occur with over the counter derivatives instruments.. Earning smoothing can also occur when managers manipulate the timing and amount of recognized cash flow hedges. They can manipulate the deferral of cash flow hedges gains and losses through the Accumulated Other Comprehensive Income (AOCI) and the subsequent recycling of these gains and losses from the AOCI to the Income statement.

[95] This could be due to the poor disclosure of cash flow hedge accounting data e.g. the notional amounts associated with cash flow hedge accounting.

opportunistic accruals. Hence this study provides indirect evidence that cash flow hedge accounting reduces earnings volatility and the finding differs from Park (2004).

8.2.1.4 Impact of SFAS 133 on the substitution of derivatives and discretionary accruals

I hypothesize that derivatives use and discretionary accruals are substitutes. As expected there is evidence that derivatives use influences discretionary accruals. The univariate findings, discussed in sections 5.2.1 and 5.2.2, support the substitution hypothesis. However, the multivariate empirical findings show evidence, which is not robust across all models, of a negative association of discretionary accruals as an explanatory variable for derivatives use. Nevertheless, the finding of a negative association in some of the models such as the pooled OLS exogenous models is similar to Barton's (2001) finding. However, it differs from Singh's (2004) and Huang et al's (2009) findings. The latter authors found that whereas derivatives had a significant negative association with discretionary accruals as the dependent variable, there was no evidence that discretionary accruals had a similar association with derivatives use as the dependent variable.

The inclusion of an interaction variable between the SFAS 133 dummy variable and discretionary accrual proxy, when testing the determinants of derivatives use, and the conducting of the chow test for the joint significance, shows that the interaction variable has a positive significant relationship. While the SFAS 133 dummy and the discretionary accrual coefficients are negative and significant, the interaction term is positive and significant. This finding suggests a reduced impact of accruals on derivatives use after SFAS 133 adoption, which could also be interpreted as a weakening substitution relationship. This weakened substitution relationship could be due to accruals being used as complements to derivatives use after SFAS 133 adoption.

I similarly tested the impact of derivatives use on discretionary accruals (i.e. discretionary accrual is dependent variable and derivatives use is independent variable). There is evidence of significant negative association in five of seven models. There is weaker evidence when the sample consists of only derivatives users. This is the case in two of the seven models where derivatives use is not a significant independent variable. This finding would appear to indicate that the substitution relationship is more pronounced when considering both the decision to use derivatives and the extent of derivatives use. When an interaction of SFAS 133 and derivatives use is included in the model, it is found not to be significant.

Combining these findings, I conclude that SFAS 133 adoption weakens the extent to which accruals influence derivatives use, but not the other way round. This latter finding suggests a partial substitution relationship exists after SFAS 133 and lends itself to a number of plausible explanations. These include accruals being complements rather than substitutes to derivatives use, after SFAS 133. SFAS 133 could trigger either increased earnings volatility or the greater use of speculative derivatives. Either of these could then induce the increased use of accruals in a manner that confounds the income smoothing substitution relationship.

Despite the substitution relationship, the use of derivatives to smooth income is more akin to economic reality, as derivatives use also influence cash flow and fundamental economic volatility. Thus the finding that managers increase their use of accruals in general, after SFAS 133, suggests that SFAS 133 adoption results in choices that are less beneficial to shareholders. I come to this conclusion based on the empirical evidence of Huang, Deis, Zhang and Moffit (2009). Their study shows that for income smoothing purposes, derivatives enhance shareholder value to a greater extent than the use of accruals. Hence I infer from the results that the higher level of accruals after SFAS 133 is likely to be less to the benefit of shareholders.

Overall, these findings are supportive of Hypothesis 2.3, namely:

- The substitution relationship between derivatives use and discretionary accruals; and
- SFAS 133 adoption influences the substitution relationship.

8.2.2 Summary of empirical findings (SFAS 133 on disclosure of derivatives related information)

Hypothesis 3.1 states that the disclosure of related derivatives information should increase after the adoption of SFAS 133. I therefore expected and find a significant positive association in all the models. As argued during the hypothesis development, SFAS 133 adoption should provide incentives for managers to disclose complementary derivatives information. SFAS 133 makes more visible derivatives gains and losses, as well as increasing earnings volatility. Part of this volatility could be artificial due to hedges and hedging instruments that do not qualify for hedge accounting treatments. Hence managers would be expected to disclose more information so as to avoid investors misinterpreting reported fair value gains or losses. The result shows a significant positive association between SFAS 133 dummy and the disclosure index, which is consistent with hypothesis 1. This finding is also consistent with that of Hamlen and Largay (2005) who found that DJIA-30 companies generally increased their disclosures after adopting SFAS 133. Similarly, using UK data, Dunne et al (2004) found that the introduction of FRS 13 led to increased derivatives disclosure. Though, unlike SFAS 133, FRS 13 is primarily a derivatives disclosure rather than recognition and measurement standard. At the same time, Darus and Taylor (2006) find an upward drift of voluntary disclosure levels both on the anticipation and introduction of mandatory derivatives disclosure requirements using Australian data.

The results also show a significant positive association of capital markets incentives when these are measured by the logarithm of share trading volume. However, there is no evidence of association of proprietary costs. The results further show that auditor expertise and the level of derivatives use have a positive association with the derivatives disclosure index. On the other hand, litigation risk and discretionary accrual levels have a negative association.

8.2.3 Contribution- Conceptual

The questions addressed in this research enrich different strands of extant accounting and corporate finance literature. Hence, the study has a cross disciplinary character as it covers the domains of risk management, which falls under corporate finance, and earnings management and disclosure, which falls under external financial accounting theory. An integrated empirical investigation of SFAS 133 is expected to be useful to both the academic community and accounting policy makers, especially given its complexity alongside its anticipated consequences on risk management choices. SFAS 133 recognition and measurement requirements necessitate the fair value reporting of all derivatives instruments and this confers a higher level of transparency of firm risk exposures. This also impacts on earnings volatility and is also more likely to yield managerial behavioural consequences.

By undertaking a study on the impact of SFAS 133 on income smoothing, there is scope to extend the empirical evidence related to SFAS 133 on various fronts. First, there is scope for a conceptual contribution through looking at two different determinants of income smoothing that are potentially impacted on by the derivatives accounting policy. Hentschel and Kothari (2001), note that derivatives use is just one aspect of overall corporate risk management. However, the literature on income smoothing tends to focus on single mechanisms of doing so. For example, they have tended to separately focus on derivatives use and discretionary accruals. Barton (2001), Rajgopal and Pincus (2002) and Singh (2004) depart from this trend, through their study of derivatives use and earnings management as jointly determined risk management choices. This study builds on their work. In addition it builds on the very few risk management empirical studies that are actually based on post-SFAS 133 data. This study achieves this by using 1999 to 2003 data and extends the work of Singh (2004) who considered the impact of SFAS 133 on earnings management, earnings volatility and derivatives use but only covered the 2000-2001 periods. I also am not aware of any empirical evidence on the impact of SFAS 133 on the income smoothing substitution or on the conditional impact of cash flow hedge accounting on discretionary accruals. This study fills that gap.

Further to income smoothing, the study of SFAS 133 on disclosure, builds a collective picture of how different reporting practices can be influenced by accounting policy. Due to the focus on disclosure, a key contribution of this study is to evaluate whether improvement in recognition and measurement through the main financial statements can encourage or deter the provision of supplementary disclosure information. I propose a framework of how SFAS 133 can influence disclosure. In particular the study aims to understand whether footnote disclosure is a complement or a substitute to recognised derivatives fair value gains and losses. The study also evaluates the different determinants of disclosure and how these interact with SFAS 133. The primary incentives investigated are capital markets and proprietary cost incentives as it is possible based on the literature, to postulate how SFAS 133 can alter these particular incentives. The inclusion of disclosure incentives in the context of SFAS 133 is a conceptual contribution as it extends the work of Aggarwal and Simkins (2004) who conducted a similar study with a focus on the predecessor standard SFAS 107. However, SFAS 107 does not cover recognition and measurement requirements of derivatives.

In sum, this study shows that SFAS 133 adoption has potentially adverse consequences on income smoothing choices, but at the same time has positive consequences through encouraging disclosures that lower the information asymmetry on underlying risk exposures.

8.2.4 Contribution- methodological

8.2.4.1 Model specification

This study analyses and aims to mitigate individual effects that arise due to panel data. In my results, I report random effect generalized least square model tests in addition to the pooled OLS. I also test but do not report the panel regression fixed effects model. The only other related studies that appear to cater for panel data individual effects are Singh (2004) and Supanvanij and Strauss (2006), which both report fixed effects panel regression results in addition to the pooled OLS.

I further consider the problem of endogeneity and apply a qualifying test procedure prior to applying the 2SLS, which is one of the principal methods of resolving endogeneity. In the spirit of Larcker and Rusticus (2008), this study aims to always ensure that the cure is not worse than the disease. Specifically, I only apply the 2SLS to the derivatives determinants model because I was able to establish the instrument variable strength and validity for this model. For the stated reason I do not report the 2SLS of the discretionary accrual determinant model.

8.2.4.2 Variable enhancement

Bartram (2009) asserts that the inconclusiveness of the literature on the determinants of derivatives use could be due to flawed models, inappropriate proxies and inadequate resolution of endogeneity related issues. There is scope to use better proxies, including those used as proxies for discretionary accruals and derivatives use, as well as proxies for their determinants. There is also scope to include variables omitted from similar research. For example Barton (2001) does not include corporate governance effects. Based on a comprehensive and integrated review of the literature on determinants of derivatives and discretionary accrual use, I endeavour to build a model based on a more complete and updated set of variables. This includes corporate governance, abnormal investments and a variable for the conditional impact of SFAS 133 cash flow hedge accounting requirements on discretionary accruals. The determination of abnormal investments (i.e. capital expenditure/sales) is based on a model that is similar to that applied to determining abnormal discretionary accruals and cash flow from operations. It predicts the normal investment based on the revenue, tangible assets and sales growth characteristics of firms within a two digit SIC code category. I consider the difference between the predicted and actual investment to be the abnormal investment. In the context of extant literature, the determination of abnormal investments, as described, is a novel approach. The inclusion of this proxy has further merit of taking into consideration multiple mechanisms of smoothing earnings (i.e. derivatives use, discretionary accruals and investment levels).

On the disclosure question, I have a self constructed disclosure index, which is based on components that are prescribed by existing regulation (e.g. SEC FRR48 and US GAAP). Similarly, I introduce new proxies for proprietary cost measurement, managerial talent and litigation cost.

8.2.5 Contribution to practice

Implication for Policy Makers

The empirical findings on the impact of SFAS 133 on income smoothing would suggest to policy makers that SFAS 133 leads to less prudent and value enhancing risk management activities. However, the results also indicate that disclosure of derivatives related information is likely to have increased after SFAS 133 and this could be lowering the risk perception of reporting firms. The disclosure investigation is a step forward in enhancing the understanding of factors that influence derivatives and general risk disclosure. The shortfalls[96] of derivatives disclosure are recognised in the financial accounting literature (Dobler, 2008; Berretta and Bozzolan, 2006) and by the accounting standard setters (i.e. FASB and IASB). Furthermore, there will always be useful information that managers can disclose, beyond what is mandated. Understanding and where possible managing the incentives shaping disclosure choices is an important aspect to encouraging full corporate disclosure.

While this study focuses on SFAS 133, the findings and insights on its consequences are relevant for IFRS standards. IAS 39 is to a large extent based on similar ideas to SFAS 133 (Hague, 2004). Its corresponding complexity and the unintended consequences of such complexity have been the subject of regulatory scrutiny. It is also a source of ongoing concern for different financial reporting stakeholders. Hence a study that provides evidence

[96] The realisation of the disclosure shortfalls by the FASB has led to the promulgation of a new standard, SFAS 161 in the US that aims to improve the disclosure dimension of derivatives accounting.

of either positive or negative consequences of SFAS 133 can enhance the evaluation and subsequently form a basis of amending both US and IFRS financial instrument accounting.

8.3 Limitations of study

8.3.1 SFAS 133 on income smoothing- Limitations

In this study, I have modelled derivatives and discretionary accrual use as the principal income smoothing choices. I have factored in abnormal investments and investment in foreign operations as other means of smoothing income. However, due to data access limitations, I have excluded other mechanisms of hedging, such as securitisation and product diversification. Nevertheless, my overall approach is an improvement from other earnings management studies as it factors in abnormal investment and looks at two key decisions on an interchangeable basis. There remains scope to extend the family of studies of joint risk management determination beyond derivatives use and accruals.

Measurement error could arise due to the discretionary accrual proxy. Despite the refinements made to the modified Jones (1991) in this study, there remains a significant risk of abnormal accruals being misclassified. In addition, the data on derivatives use was hand collected and given the volume and inconsistent pattern of disclosures, there could be capture error in relation to amount of derivatives used. However, the univariate descriptive statistics of the focal variables and comparison to similar studies, as discussed in sections 5.2.1, 5.2.2, 7.1, show that the data is consistent with and of the same order of magnitude as other studies.

Another factor that could contribute to measurement error is the miss-classification of speculative derivatives as risk management or income smoothing derivatives. Similar to Lins et al, 2007 and many authors, I face the empirical difficulty of differentiating between speculative and risk management derivatives use. Therefore I could have failed to identify situations of speculative derivatives use where derivatives use and accruals should be complements and not substitutes.

Other sources of measurement error could arise due to the estimates of abnormal investments and managerial risk incentives of delta and vega. The risk incentives of delta and vega could be overstated when they are calculated using the partial derivatives from the Black Scholes model (Triki, 2005; and Rajgopal and Shelvin, 2002). Executive stock options are not frequently traded and hence do not fulfil one of the key conditions for the Black and Scholes option valuation methods. Another factor that could be leading to the over-statement of risk incentives, arise due to the limited disclosure on type of exercisable and non-exercisable options. The calculation of risk incentives is done using the total sum of exercisable and non-exercisable options. The approach of using all disclosed options approach may not be appropriate. In addition, the exercise price and time to maturity of exercisable and non-exercisable options are not disclosed and some simplifying assumptions proposed by Core and Guay (2002) are used to proxy for these key option valuation parameters. Measurement error could also arise from some of the independent control variables that lack sufficient and high quality data. The corporate governance and earnings volatility data in particular has this problem.

While I controlled for corporate governance using institutional ownership, managerial share ownership, quality of auditors and year as a proxy for SOX, I have concerns about the quality of data. This could be a source of measurement error and could result in a situation where there is still un-modelled, unobservable heterogeneity despite the inclusion of corporate governance variables in the multivariate specification. The ideal approach is to model corporate governance using a composite index such as the Gov-Index or Gov-Score (Jiang, Lee and Anandarajan, 2008). Gov-score data is not readily available for the sample horizon of this research. Although, this is not a primary variable, future studies could be refined by the use of better corporate governance proxies.

As Bartram and Aretz (2009) note the problem of endogeneity and inappropriate proxies' plagues derivatives and risk management empirical literature. While I have catered for endogeneity related to simultaneity of derivatives use and discretionary accruals, there are other sources of endogeneity such as leverage and executive compensation in relation to derivatives use. There is scope for the investigation and application of models that can appropriately and parsimoniously deal with multiple endogeneity, possibly the use of structural equation modelling. Bartram et al (2009) also pinpoints the non linearity of some control variables such as the proxy for growth opportunities. Growth opportunities create incentives to hedge as discussed in section 2.3.1.4. At the same time firms with more assets in place or lower growth opportunities, face bigger free cash flow problems and face stronger incentives to hedge (Morellec and Smith, 2007).

8.3.2 SFAS 133 on disclosure- Limitations

The study design, which is based on a self constructed index, has several limitations. Namely:

- The disclosure index may exclude information content on firm risk exposure and risk management that has been disclosed outside the financial statements.
- The index value is highly sensitive to the addition or deletion of components. This could be a source of measurement error. However, the number of factors included in the index compares well with the construction of a similar disclosure index by Aggarwal and Simkins (2004). For further empirical studies, it may be useful to extend the number of factors in the index so as to minimise the likelihood of measurement errors.
- Replicability: given that the index is subjectively constructed, in terms of index constituents, it may be difficult for other studies to replicate the findings.

In testing the impact of SFAS 133 on disclosure, I assumed that there was no endogeneity. However, this is likely only true in relation to the focal variables. For example, Lobo and Zhou (2001) assert that disclosure and earnings management are endogenous, but discretionary accruals is not a focal variable for the second question.

8.4 Areas for Further Research

The study has highlighted potential areas for further research. These include:

Extend and refine derivatives usage measurement

There is an opportunity to further extend the sample beyond the year 2003, as this study is based on early stage SFAS 133 data. There is also an opportunity to extend the study to incorporate non US and international data. Under IFRS, financial instrument recognition and measurement requirements are specified in IAS 39 (recently changed to IFRS9). The financial instrument risk disclosure requirements are specified under IFRS 7. IFRS 7 was enacted with effect from 1st January 2007. IFRS7 is a principle based standard that in essence provides more managerial discretion on the level of disclosure. This makes it all the more likely that there will be lower compliance with prescribed risk disclosures and it makes it all the more interesting to understand the incentives that shape disclosure for such standards.

Throughout this thesis, I have highlighted the difficulties in distinguishing between speculative and hedging derivatives. In addition, I have used a dummy variable to model the use of cash flow hedge accounting. There is scope for further studies that use more refined and continuous variable data of derivatives use and cash flow hedge accounting. The quality of derivatives data could have been poor due to the early stages of adoption, but with increased familiarity and better enforcement it is likely to have improved in the post 2003 period.

Multiple determinants of income smoothing

Consistent with the direction of this study, there is scope to concurrently evaluate multiple mechanisms of smoothing income and their interaction. Modelling economic operating and investment decisions, alongside operational hedging, and using derivatives and discretionary accruals, will be a more complete study. Risk management literature has tended to focus exclusively on derivatives use. However, as Hentschel and Kothari (2001) found, derivatives use is just one part of the arsenal of risk management tools, available to corporate managers.

Improved econometric modelling

As discussed in the limitations and highlighted by Bartram and Aretz (2009), there is scope to improve models so as to cater for the multiple endogeneity of the determinants of derivatives use. Investment, risk management and financing determinants are most likely endogenous. Improved modelling approaches could include the application of structural equation modelling and approaches that cater for the non linearity of some of the determinants of derivatives use.

Investigate Impact of Industry

The univariate results (see Table 5.7 and Table 7.4), point to industry being an important factor in disclosure choice. However, more work could be done to identify and incorporate the specific industry structural factors that influence disclosure and derivatives use. Such studies will be building on the work of Nain (2004) that focused on derivatives use at industry levels. Different studies, such as Chalmers and Godfrey (2004), do factor in industry, using a dummy variable, but dummy variables do not sufficiently illuminate on the causality of industry structure and observed disclosure or derivatives use.

Assess Impact of derivatives types

The univariate results (Table 5.6) point to there being variation in derivatives types. Further studies can be taken to further understand the factors that influence derivatives types.

Refine Derivatives information disclosure index

The disclosure index could be enhanced to include information that would be useful yet was not prescribed at the time by either of these standard setting authorities. Despite the overall recognition and measurement improvements entailed in the recognition of derivatives fair value under SFAS 133, the prescribed literature does not make mandatory all disclosure of items. Such types of disclosure would be helpful in understanding both the risk exposure and risk management effectiveness (Kawaller, 2004; Hamlen and Largay, 2005; Ryan, 2007 and Gastineau, Smith and Todd, 2001). Ryan (2007) proposes a yardstick reference when evaluating derivatives disclosures. This is based on the below stated four questions that users of financial reports are trying to answer, when looking at a reporting entity:

1. *What are the aggregate exposures?*
    - *What are the magnitude and nature (including sensitivity) of its aggregate exposure to changes in market prices?*
    - *What are the remaining lives of these exposures?*

2. *What derivatives does a company use to modify the risk of its aggregate exposures?*
    - *Is it economically hedging or speculating?*
    - *Is any hedge or speculation one sided or two sided?*
    - *Is it attempting to modify fair value or cash flow variability? If cash flow variability, does this make sense?*
    - *Are the amounts, sensitivities and maturities of its derivatives reasonable given its risk exposure?*

3. *What are the threats to hedge effectiveness?*
    - *Non linearity?*
    - *Basis risk?*
    - *Unknown Exposure*

4. *How does the entity account for its derivatives and hedging?*

- *Do its derivatives qualify as accounting hedges?*
- *If so, are they fair value hedges or cash flow hedges?*
- *What are the limitations of the accounting?*

Based on the usefulness framework of Ryan (2007), the following would be useful additional disclosures as proposed by Gastineau et al (2001)

- Underlying risk exposure reflected in the derivatives notional amounts.
- Unhedged exposures
- Details of the type of instruments, their maturity, linearity
- Counterparty risk exposure
- Criteria of election of hedge accounting
- Level of application of hedge accounting

Similarly, Wong (2000) while studying the question of whether the disclosure of notional amounts of derivatives contracts had information content for equity investors put forward proposals to increase the usefulness of disclosures including

- Improving disclosures about firm inherent business risk that is matched by derivatives use
- Disaggregation of notional and fair value amount by long/short positions taken, major currency, class of instrument, time to maturity and leverage
- Separate disclosure of derivatives gains and losses.

The prescribed disclosure and recognition measurement standards answer some of the questions posed by Ryan (2007) but they do not answer the questions pertaining to risk exposures, threats to hedge effectiveness and counterparty risk. Therein lays the opportunity for enhancement of disclosures. Concurrently there will be scope for studies that focus on the incentives underpinning the disclosure of these additional useful components.

Extend studies on interaction between derivatives disclosure and earnings management

For the second question, I controlled for discretionary accruals, albeit not as a focal variable. The results show a significant negative association. However, as Lobo and Zhou note this relationship could be endogenous. Hence, this is another issue for further empirical investigation.

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