The Pennsylvania State University

The Graduate School

Hotel, Restaurant and Institutional Management

THE EFFECTS OF SFAS 133 ON THE CORPORATE USE OF DERIVATIVES, VOLATILITY, AND EARNINGS MANAGEMENT

A Thesis in

Hotel, Restaurant and Institutional Management

by

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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

December 2004

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ABSTRACT

The implementation of Statement of Financial Accounting Standard (SFAS)133 had raised concerns about the potential impact the standard could have on firm hedging activities. Chief among these concerns has been an increase in earnings volatility and a reduction in the use of derivatives. Therefore, the purpose of this study was to investigate the effects of SFAS 133 on the use of derivatives, cash flow volatility, earnings volatility, and income smoothing one-year before and after the implementation of the standard. Data from 2000-2001 for a sample of 305 non-financial, non-regulated Fortune 500 was used to determine if the implementation of SFAS 133 had any significant effect on firm hedging activities, volatility of earnings and cash flows, and income smoothing. Using dummy variables and interaction terms to proxy for SFAS 133, the differences in the coefficients after implementation of SFAS 133 are compared to the coefficients in the period before implementation for derivative users and a control group of non-users and also within groups of derivative users. The results of this study showed no significant differences in earnings volatility, cash flow volatility, and income smoothing between derivative users and non-users before and after the implementation of SFAS 133. Results also show no significant decline in the use of derivatives after the implementation of SFAS 133. The empirical evidence does support the claims of critics and managerial concerns about the impact of the standard on volatility and hedging. Within groups of derivative users, there is some evidence that firms reporting a transition adjustment or termination of derivatives, may have smoothed income to reduce volatility. Finally, there is evidence that hedging is a positive determinant of smoothing, but smoothing is not a determinant of hedging.

Keywords: derivatives, hedging, SFAS 133, volatility, earnings management

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ACKNOWLEDGEMENTS

I would like to thank God and the Lord Jesus Christ for giving me the knowledge and ability to succeed. I dedicate this thesis to my late Mom and Dad, and to my sister Manjit, for their love, financial support, and the enormous sacrifices they made, to see me succeed. Without them, this thesis would not have been possible.

Chapter 1

Introduction

Purpose of Study

The main purpose of this study is to empirically investigate the effects of Statement of Financial Accounting Standard (SFAS) 133 on the corporate use of derivatives, volatility, and earnings management in a sample of Fortune 500 firms that face interest rate, exchange rate, and commodity risk. More specifically, this study investigates whether there has been a significant change in the use of derivatives, volatility of cash flows and earnings, and earnings management one year before and after implementation of SFAS 133 while controlling for other incentives to use derivatives and to smooth earnings.

Overview of Derivatives and Earnings Management

Market imperfections can create an environment in which firms face economic exposure to risk from fluctuations in financial prices. These financial price risks include changes in interest rates, foreign exchange rates, commodity prices, and equity prices among other price risks. Exposure to these risks is costly because it induces volatility in cash flows and earnings leading to underinvestment costs (Froot et al. 1993), bankruptcy and financial distress, managerial risk aversion (Smith and Stulz 1985), and information asymmetry (DeMarzo and Duffie 1995). If volatility is costly to a firm, then firms have

incentives to reduce their exposures to risks by reducing the volatilities of their cash flows and earnings.

Firms generally use financial instruments called derivatives to reduce the volatility of their cash flows and earnings. A derivative is defined as a financial contract whose value is derived from the price of some underlying asset or liability. When there is a change in the price of the underlying asset or liability, the value of the derivative contract will also change. Hedging involves taking a derivative position that results in a gain (loss) in the contract and a loss (gain) in the asset or liability. By trading off potential gains against potential losses, hedging will reduce the variance of a firm's cash flows. For example, a gold mining firm may hedge its exposure to unfavorable fluctuations in gold prices by entering into a futures contract to hedge the value of its gold inventory. By hedging its exposure to gold price risk, the firm will reduce the probability that its expected future cash flows will vary with gold prices. For example, if gold spot prices decrease (increase), the value of the firm's gold inventory will decrease (increase), but it will make an offsetting gain (loss) on the futures contract. Without hedging, fluctuations in gold prices will increase the variability in the firm's expected future cash flows and earnings and lower the future market value of the firm (Allayannis and Weston 2001, 2003). By using a derivative financial instrument, the firm would effectively reduce its risk of exposure to changes in the value of its assets. Because earnings are the sum of cash flows and accounting accruals, reducing the variability of cash flows (assuming no change in accruals) will reduce the volatility of earnings (Barton 2001). This suggests that managers can reduce earnings volatility by managing the

volatilities of cash flows and accruals. Hence, derivatives provide a flexible and effective means to reduce the volatility of cash flows and earnings (Stulz 2003).

Firms also have incentives to reduce the variability in earnings through "earnings management" devices called accruals. Watts and Zimmerman (1990) describe earnings management as value maximizing or opportunistic discretion exercised by managers over accounting numbers with or without restriction. An alternative definition is provided by Healy and Wahlen (1999, p. 368), who define it as a situation in which "managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers.[1]

Earnings management arises because managers have flexibility in choosing from a set of accounting policies (within the context of financial reporting) to respond to changing business circumstances. For example, by using discretionary accounting accruals, managers may time transactions so that large, one-time gains, losses or key transactions are recognized in the same period, thereby creating the impression of smooth, stable, and growing earnings over time. Discretionary accounting accruals such as provision for bad debts, which are adjustments to operating cash flows in computing earnings, involve the use of estimates and require subjective judgment, which makes accruals difficult to verify before they are realized. While hedging affects both cash flows and earnings volatility, the use of accounting accruals only affect earnings

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[1] A third definition is provided by Schipper (1989) as the "purposeful intervention in the external financial reporting process with the intent of obtaining some private gain" (p.92).

volatility. Managers have incentives to manage earnings through discretionary accruals because the value of the firm and wealth of its managers is closely tied to reported earnings (Healy 1985; Sweeney 1994; Jones 1991). This flexibility to choose from a set of accounting policies also opens up the possibility of opportunistic behavior as managers seek to mislead investors in the face of contractual, capital market, and regulatory motivations (Healy and Wahlen 1999). Consequently, earnings management erodes the quality of earnings and reduces the reliability of financial statements. Several highly publicized examples of alleged accounting irregularities and cases of fraud at Lucent, Cendant, and MicroStrategy lend support to the widespread concern about earnings management.

Motivations for Study and Statement of Problem

The dramatic growth in the use of derivatives over the last decade coupled with the recent spate of widely publicized losses has triggered debates about the risks and the proper regulation of these financial instruments. Companies that have suffered substantial losses in the derivative markets include, among others, Proctor & Gamble, Air Products & Chemicals, Gibson Greetings, and Long-Term Capital Management. The outcome of these events had given derivatives a bad reputation and had raised concerns about the usage of derivatives and the adequacy of financial reporting for these instruments.

Developing accounting and disclosure standards for derivatives has been a major challenge for the accounting profession because accounting rules have not kept pace with the financial innovations in derivatives. Although a few previous accounting standards

had provided rules on accounting for derivatives, the guidance had been largely inconsistent and incomplete because few financial instruments were specifically covered by the existing standards. In the absence of specific accounting reporting requirements, firms had also failed to voluntarily disclose hedging activities in their financial statements in a consistent manner (FASB 2001). As a result, the considerable discretion allowed in accounting for derivatives and the lack of comprehensive accounting standards have made it difficult for users of financial statements to determine what firms have or have not done with derivatives.

In 1997, the SEC mandated specific disclosures about market-risk sensitive financial instruments, including derivatives. Despite this improvement in the required disclosures, there was still much ambiguity, a lack of transparency, and inconsistency in existing accounting standards for derivatives. A new comprehensive accounting standard was needed to guide the use of derivatives, and subsequently, in 1998, the FASB adopted Statement No. 133, *Accounting for Derivative Instruments and Hedging Activities*, to provide firms with a comprehensive set of rules for all derivatives and hedging activities. The response to the Exposure Draft preceding the issuance of SFAS 133 was extremely negative because the new rules were largely complex and controversial. Hundreds of comment letters were received with almost half of the respondents concerned with balance sheet volatility and almost two-thirds concerned with earnings volatility (Barnes 2001). Statement 133 established new accounting and reporting standards for the use of financial instruments in hedging activities.[2] Under SFAS 133, firms are required to

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[2] See Appendix A for a summary of SFAS 133 Accounting for Derivatives

mark-to-market all derivatives as assets or liabilities and to report them at fair value, thus providing a balance sheet representation of the firm's assets and liabilities at their underlying economic value. However, controversy and complexity surrounding the new standard led the FASB to amend (through Statements 137 and138) and delay the standard's implementation to after June 15, 2000 for fiscal-year firms (January 2001 for calendar-year firms).

The perceived increase in reported earnings volatility has been the most significant issue raised by Statement 133. This volatility would arise from the requirement to record at fair value all hedging derivatives in each interim period and would make firms appear to be more risky. If gains and losses from adjusting derivatives to fair value are included in earnings, the volatility of earnings will increase. If derivatives are used for speculation, all gains and losses, regardless of whether they are realized or unrealized, must be included in earnings. For derivatives that meet the criteria for hedge accounting, firms are required to separate the results of using derivatives into "effective" and "ineffective" parts. For example, for a fair value hedge that is not perfect (gains and losses do not completely offset), the ineffective portion of a hedge must be recognized in current earnings. If firms use derivatives to reduce risk (assuming a hedge of cash flow), then hedge ineffectiveness from the use of derivatives will cause an increase in reported earnings volatility. The larger the magnitude of the ineffective portion of a hedge recognized in earnings, the greater would be the volatility of earnings[3].

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[3] This earnings volatility arises simply from a change in accounting and is not the result of an increase in the derivative's inherent economic risk. Consequently, it will neither impact the underlying risk position of the firm nor should it have any impact on cash flows.

The effect of adopting SFAS 133 could also lead managers to alter their real operating decisions if they perceive that investors and shareholders are unable to "look through" the reported earnings. Managers of firms that are using derivatives to hedge will be concerned about the earnings volatility that would arise from hedge ineffectiveness if their compensation were dependent on reported earnings. The recent case of accounting irregularities at Freddie Mac highlights management concerns about earnings volatility induced by SFAS 133. Senior management at Freddie Mac was concerned that SFAS 133 would make investors and lenders perceive the firm as a risky firm, and consequently, managers engaged in various earnings management practices to mitigate the effects of the standard.

If firms have incentives to reduce the reported earnings volatility, the adoption of SFAS 133 could lead to a reduction in the use of derivatives, and consequently, increase earnings management (smooth earnings) through discretionary accruals. A recent survey of 175 firms by the Association for Financial Professionals (2002) found some reduction in levels of firms' hedging activities as a result of adopting SFAS 133. The survey noted that some firms decided to forgo hedge accounting treatment on significant portions of their derivative positions either because they did not qualify or because the costs and efforts of complying with the new standard outweighed the benefits. Firms will incur significant fixed costs in setting up a risk management program in the form of computer and information systems, managerial expertise, training, and monitoring costs. The use of derivatives also involves transaction costs, which may arise when the forward price does not equal the expected spot price. Firms must be willing to pay a premium or offer a discount to shed their exposures. The difference in bid-ask spread on the spot market

versus the forward market represents a transaction cost due to hedging. For some derivatives, there are also commissions to be paid to brokers, and the lack of liquidity for some maturities and commodities in the exchanges could also make it more costly for firms to trade in derivatives. Firms will therefore tradeoff the costs and benefits of hedging.

The decision to reduce the use of derivatives or forgo hedge accounting treatment could potentially increase the volatility of cash flows and earnings because a greater portion of a firm's exposure would be unhedged. Thus, an economic consequence of the standard may well be that the accounting rules will drive the real operating decisions of managers instead of the economic reality. Whether the implementation of SFAS 133 has significantly reduced the use of derivatives, increased the volatility of cash flows and earnings, and increased earnings management is still an unresolved question.

Although Barton (2001) and Pincus and Rajgopal (2002) examined the relation between the use of derivativess and earnings management prior to SFAS 133, no empirical study to-date has investigated the effects of SFAS 133 on derivatives, volatility, and earnings management in the period before and after implementation of the Statement. Therefore, the purpose of this study is to investigate the effects of SFAS 133 on the corporate use of derivatives, volatility of cash flows and earnings, and earnings management for a period of one year before and after the implementation of Statement 133, while controlling for other incentives to use derivatives and to manage earnings. Using dummy variables within a multiple regression framework, this study compares the change in the independent variables after implementation of SFAS 133 relative to the variables before implementation for a broad sample of Fortune 500 firms.

Importance and Contributions of Study

Regulators are concerned about the impact that the new rules might have on the hedging activities of firms. This study will provide relevant information to regulators such as the SEC for a number of reasons. Earnings management and the use of derivatives has been the focus of SEC attention. Earnings management can potentially lead to misleading financial statements as illustrated by the recent cases of fraudulent reporting, the significant derivative losses incurred by several firms, and the accounting scandals that have eroded public confidence in the quality and accuracy of external financial reporting. Through several staff accounting bulletins, the SEC has attempted to prevent earnings management. The SEC also has a key role in enforcing SFAS 133 because it touches on the SEC's own agenda, which is transparency of financial statements and potential manipulation of earnings. In addition, it is the role of the SEC to control insider trading, to promote prompt disclosures, to reduce information asymmetry, and to improve the efficient operation of the securities markets. Through various speeches by SEC officials, the agency has indicated that it will review filings to ensure that firms are strictly and fully compliant with all the disclosure requirements of SFAS 133 (Bayless 2001). For example, an SEC review of 441 filings of the Fortune 500 firms in early 2001 found that 125 firms (28%) had a net impact (absolute value) greater than $10 million from the adoption of SFAS 133 (see Table 1). An estimated 32 firms out of a total of 881 firms comprising the Fortune 1000 were found to have an impact (gain or loss) greater than $100 million (Turner 2001). The SEC had also noted that some firms failed to provide quantitative disclosures about hedge ineffectiveness, and in these cases, the SEC had requested disclosure even if the impact was immaterial (SEC 2000).

Some early adopters were also forced to restate their statements for failing to fully comply with the standard (Turner 2001). Given that financial reporting is used to communicate management information to investors, analysts, and creditors among others, these actions by the SEC indicate that the results of this study would be relevant and informative to the SEC. This study would also be informative to the FASB, which sets the accounting standards that are designed to create and maintain a financial reporting environment that protects and informs investors. Statement 133 (as amended by SFAS 137, 138) has been one of the most controversial, costly, and complex standards implemented by the Board. This study will be useful to the FASB in assessing firm behavior and changes in firm responses to the standard. More specifically, the standard should enable the FASB to observe changes in the use of derivatives, evaluate the impact of the standard on the volatility of cash flows and earnings, and determine whether firms have resorted to an increasing use of discretionary accounting choices to manage earnings. This study should also help regulators determine if SFAS 133 is being implemented as intended with full disclosures on derivatives and hedging activities so that financial statement users will have relevant information to understand firm hedging strategies.

This study is timely and is the first study to-date to use SFAS 133 derivative information and provide empirical evidence regarding the effects of the standard. Healy and Wahlen (1999) argue that additional evidence is needed to determine the accounting standards that are used to manage earnings. By using control periods from before and after SFAS 133, I identify unexpected changes that are associated with changes in the standard. In addition, I consider the manner in which firms affected by the standard

might consider alternative responses to offset the financial statement effects of the rule change. Thus, my study offers the advantage of directly examining the link between accounting changes and firm responses. According to Barton (2001), it is still unclear whether managers use derivatives to reduce cash flow volatility or earnings volatility. Furthermore, no research has directly tested the relation between derivatives, earnings, and cash flow volatility (Barnes 2001). Therefore, my study provides new evidence on the relation between a firm's use of derivatives and measures of volatility.

My study will contribute to the related literature on the use of derivatives, earnings management and the economic consequences of accounting standards. It will also complement and extend the findings of Barton (2001) and Pincus and Rajgopal (2002) in documenting the relation between derivatives and earnings management.

Organization of the Study

Chapter two will review the literature relevant to the theory on the incentives to use derivatives and to manage earnings in order to reduce earnings volatility. Various incentives have been proposed, and the literature will provide a foundation for including these incentives as controls in testing the empirical model. Additionally, the chapter discusses the institutional background of the accounting regulations relevant to the use of derivatives and earnings management. Chapter three will integrate the relevant theories presented in chapter two into the empirical models that provide a basis for testing the hypotheses related to the purpose of this study. This chapter will also present a discussion of the measurement of variables, research design, and sources of data for this

study. The results and findings are discussed in chapter four, and chapter five concludes with a summary and recommendations for future research.

Table 1: Net Impact from SFAS 133 on Fortune 1000 Firms*

Net Impact (Absolute Value)	Fortune 500 firms	Fortune 501-1000 firms	Total
$0 - $10 million	316	415	731
$10 - $50 million	76	18	94
$50 - $100 million	19	5	24
$100 - $500 million	19	2	21
$500 million - $1 billion	3	-	3
$1 billion and up	8	-	8
Total	**441**	**440**	**881**

* No reasons provided by source why 119 firms were omitted from analysis. Net impact represents either a gain or a loss

Source: Turner, 2001

Chapter 2

Review of Literature

Introduction

Several theories have been proposed in the corporate finance and accounting literature to provide the reasons for hedging or to explain the role of accounting choice. Most of these theories are based on market imperfections in the Modigliani and Miller (1958) irrelevance theorems. The Modigliani and Miller (1958) irrelevance propositions suggest that hedging and accounting choices are irrelevant in the absence of market imperfections because shareholders possess the tools and information necessary to efficiently create their own risk-return profiles. However, in an imperfect market, exposure to various economic risks can be costly for a corporation implying that managers have incentives to reduce these risks. These theories suggest that managers employ hedging and accounting policy choices to maximize their own utility and/or value of the firm in ways that shareholders cannot on their own. These market imperfections also explain the incentives that motivate managers to act in ways that are either consistent or inconsistent with the firm and its owners. In this chapter, the various incentives for hedging and earnings management are discussed and the empirical evidence is reviewed and summarized in each section.

Incentives to Hedge

The corporate finance theory on hedging addresses situations where firms have incentives to hedge in order to reduce risk. These incentives can be broadly classified into five categories based on the incentives to hedge in the presence of market imperfections. The theory of risk management proposes that managers have incentives to hedge to reduce underinvestment costs (Myers 1977; Froot et al. 1993), reduce taxes, reduce costs of financial distress (Smith and Stulz 1985), avoid managerial risk (Stulz 1984; Smith and Stulz 1985), and reduce information asymmetry (DeMarzo and Duffie 1991; Breeden and Viswanathan 1998). These characteristics are relevant to this study as proxies to control for the incentives to hedge in assessing the effects of SFAS 133 on the use of derivatives.

Underinvestment costs theory. Myers (1977) characterizes a firm's investment opportunities as options and demonstrates how a positive net present value project can reduce shareholder's wealth if the gains accrue primarily to debt-holders. Consequently, shareholders have incentives to forgo positive NPV projects to avoid a wealth transfer. Without hedging, firms are more likely to pursue suboptimal investment projects. In general, research shows that firms with greater growth opportunities use more derivatives to mitigate potential underinvestment problems (Nance et al. 1993; Geczy et al. 1997; Guay 1999). However, other researchers such as Mian (1996) and Allaynnis and Ofek (2001) report a negative relation between a firm's investment opportunities and its use of derivatives while Berkman and Bradbury (1996) show little or no support for the underinvestment hypothesis.

Financial distress costs and bankruptcy. In an imperfect market, if the firm defaults on its obligations, the firm will incur direct and indirect costs of financial distress and bankruptcy. If financial distress is costly, then firms have incentives to reduce its probability (Smith and Stulz 1985). Smith and Stulz (1985) argue that hedging is one method by which a firm can reduce the volatility of its earnings. By reducing cash flow volatility, hedging decreases the probability and, thus, the expected costs of bankruptcy and financial distress by ensuring that claimholders are paid. Hedging can also increase debt capacity, which allows firms to capture a greater tax shield benefit by reducing the volatility of income (Leland 1998; Ross 1997). Empirical findings on the relationship between hedging and the cost of financial distress support the hypothesis that greater expected financial distress costs leads to greater hedging. Firms with higher debt or leverage ratios use derivatives to reduce the expected costs of financial distress and costly external financing (Guay 1999; Berkman and Bradbury 1996; Geczy et al. 1997; Gay and Nam, 1998).

Tax incentive theory. Smith and Schulz (1985) show that volatility is costly for firms with convex tax functions. They argue that hedging can reduce the expected tax liability for a firm facing a progressive tax structure over the range of possible income outcomes. Firms with more of their incomes in the progressive region of the tax schedule will thus have greater tax-based incentives to hedge. Tax preference items such as tax-loss carry-forwards also introduce convexities in the corporate tax schedule and make a firm's marginal tax rate more variable. If firms do not hedge their cash flows or if income falls below some level, the utilization of these tax preference items may be lost,

which reduces their present value. While Nance et al. (1993) provide evidence of a positive relationship between measures of the tax convexity and derivative use; Geczy et al., (1997) and Mian (1996) fail to support the tax hypothesis. Graham and Smith (1999) document that existing NOLs provide a tax disincentive to hedge for companies with expected losses but provide an incentive to hedge for companies that expect to be profitable.

Managerial risk aversion. According to Stulz (1984), corporate hedging stems from managerial risk aversion. Managers have a substantial amount of capital and wealth invested in the firm and would therefore be concerned about bearing an excessive amount of risk. Managers will often prefer to hedge because of their own risk aversion. Smith and Stulz (1985) demonstrate that when a risk-averse manager owns a large number of the firm's shares or options, the manager's expected utility of wealth will be significantly affected by the variance of the firm's expected profits. If managerial compensation depends on the stock price, volatility in the stock price will affect their compensation plan. Hedging can reduce the volatility of managerial compensation by reducing firm risk. Schrand and Unal (1998) find evidence that hedging decreases with managerial option ownership, and Tufano (1996) shows that hedging increases with managerial shareholdings, findings that are consistent with the hypothesis outlined above. However, other studies (Geczy et al. 1997; Haushalter 2000; Graham and Rogers 2002) find no evidence that managerial risk aversion or shareholdings affect corporate hedging.

Information asymmetry theory. Informational asymmetries can exist between managers and shareholders when managers have more information about the firm's activities than shareholders (DeMarzo and Duffie 1991; Breeden and Viswanathan 1998). Demarzo and Duffie (1995) show that hedging can improve the informational content of a firm' earnings as a signal of management ability and project quality by reducing the amount of noise or uncertainty about the firm's activities. In addition, Breeden and Viswanathan (1998) argue that high quality managers have incentives to hedge away uncertainty about their performance so that the market can more precisely infer their ability. If firms owned primarily by institutions face less information asymmetry of the type assumed above, theory implies that high institutional ownership firms should hedge less. Geczy et al. (1997) and Graham and Rogers (2002) find that firms with high institutional ownership are more likely to hedge with derivatives, findings that are inconsistent with DeMarzo and Duffie's information asymmetry explanation for hedging. In contrast, DaDalt et al. (2001) find evidence that both the use of derivatives and the extent of derivative usage is associated with lower asymmetric information, which supports the information asymmetry theory that hedging reduces uncertainty about the firm’s earnings.

In summary, it appears that while some of the empirical findings are consistent with theory, other studies have yielded inconsistent and mixed results. First, the use of survey data in earlier studies (Bodnar et al. 1995; Nance et al. 1993) introduces a response bias, and the binary dependent variable used in the studies does not represent the extent to which firms’ hedge. Second, studies that examined data from the early 1990s may suffer from measurement error because of inadequate reporting requirements

on corporate hedging activities. The absence of a comprehensive framework for recognition and disclosure of derivative instruments further exacerbated the problem. Consequently, the adoption of SFAS 133 should provide more relevant, reliable, and accurate disclosure data on derivatives and reduce the measurement error evident in prior research. Third, a failure to control for the underlying risk exposures faced by many firms may also preclude researchers from documenting an empirical relationship (Guay 1998). For example, Wong (2000) attributed his weak findings primarily to his failure to control the underlying risk exposures in his sample.

Finally, firms can manage risks in alternative ways through operational and financial strategies instead of relying solely on derivatives. The use of alternative forms of risk management is a conscious choice made by firms and may be part of the firm's overall risk management strategy, which introduces an endogeneity bias in previous research.

Economic Consequences and Incentives to Manage Earnings

This study is related to economic consequence studies, which investigate the effects of mandated accounting changes. Efficient market theory implies that accounting policy changes will not matter because future cash flows and the market value of the firm will not be affected by policies which lack any cash flow effects. This implies that if firms fully disclose their accounting policies, then investors will see through the changes and not be fooled by the volatility in reported earnings caused by a book change in accounting policy. In contrast, the concept of economic consequences proposes that accounting policies and changes in policies matter to management despite the absence of

any cash flow effects. According to the economic consequences argument, accounting policies matter to managers. If management compensation is dependent on earnings, then managers will object to accounting policies that reduce the ability of earnings to reflect their performance (Scott 2003). Thus, investors will be concerned if managers make real operating changes in response to changes in accounting standards. If managers make real changes in response to SFAS 133, such an observation will bolster the economic consequences argument.

Event study methodology has been commonly used to study the economic consequences of accounting standards by assessing the impact on stock prices. In a study of the impact of SFAS 19 on oil and gas firms, Lev (1979) provides evidence of a stock market reaction to a mandated accounting policy change that lacked any cash flow effects. Lev found significant negative market reaction to the shares of firms that had been using full-cost accounting but would be required to switch to successful efforts accounting under SFAS 19. Lys (1984) also confirmed a negative stock price reaction to the anticipated increase in earnings volatility from SFAS 19. His results indicated a bond covenant effect and suggested that the proposed elimination of full cost accounting would increase default risk. Other studies have examined the effect of accounting standards by focusing on financial statement variables to draw inferences about managerial responses to accounting changes. For example, Imhoff and Thomas (1988) assessed the effect of lease capitalization required by SFAS 13 and concluded that capital leases, as a source of financing, declined sharply after the standard. Most firms chose not to renegotiate or defaulted on their lease contracts besides engaging in other actions to mitigate the effects of the standard on their operations. These economic consequence studies show that

changes in accounting policies have the potential to influence the real operating decisions of managers.

Watts and Zimmerman (1986) proposed a positive accounting theory (PAT) to explain factors that influenced the accounting choices of managers, and to gauge their reactions to new accounting standards. They proposed that accounting choice of managers in imperfect markets are driven by agency costs associated with debt and management compensation contracts and contracting costs in the political process. More specifically, the theory proposed three hypotheses concerning accounting choice: the bonus plan hypothesis, the debt covenant hypothesis, and the political cost hypothesis. The bonus plan hypothesis proposed that managers of firms with bonus plans are more likely to choose accounting policies that increase current reported earnings in order to increase their compensation (Healy 1985). According to the debt covenant hypothesis, the closer the firm is to violating debt covenants, the more likely the manager will choose income increasing accounting policies to avoid the violation of debt agreements (Sweeney 1994). Finally, the greater the political costs faced by the firm, the more likely it is that the manager will choose accounting policies that decrease reported earnings (Jones 1991).

Empirical research on PAT in the late 1980s and 1990s has focused more on detecting earnings management to understand the reason and the manner in which managers manage their earnings and the consequences of their behavior. Researchers have employed three common research designs to investigate the incidence of earnings management. These designs are based on total or aggregate accruals, specific accruals, and the distribution of earnings around specific benchmarks. The aggregate accrual

models proposed by Jones (1991) and the modified Jones model (Dechow et al. 1995) are, by far, the most widely used models for detecting earnings management. Researchers decompose total accruals into non-discretionary (normal) accruals and discretionary (abnormal or unexpected) accruals and then examine the behavior of these accruals to provide evidence of earnings management (Jones 1991; Dechow et al. 1995; DeFond and Jiambalvo 1994; Kasznik 1999). A number of studies have also focused on the behavior of specific accruals in a specific industry such as loan loss provisions (McNichols and Wilson 1998) and casualty insurance claim loss reserves (Petroni 1992). Instead of examining accruals, other researchers have investigated the frequency distribution of reported earnings at certain intervals or specified benchmarks to draw inferences about earnings management (Burgstahler and Dichev 1997; Degeorge et al. 1999).

There are a number of related studies that provide evidence that managers have incentives to engage in earnings management. Because earnings are the sum of accruals and cash flows, a reduction in the volatility of cash flows will lead to a reduction in the volatility of earnings (Barton 2001). Therefore, managers are more likely to manage accruals to offset the volatility in cash flows, so the time-series variation in reported earnings is reduced (Ronen and Sadan 1981; Hunt et al. 1996; Zarowin, 2002). Lambert (1984) demonstrates that agency costs of management compensation contracts can induce risk-averse managers to smooth reported earnings. Barnea et al. (1975) and Hand (1989) suggest that smoothing is a vehicle for management to convey information about future earnings expectations. Managers may also perceive that investors will prefer to pay more for a firm with smoother earnings (Ronen and Sadan 1981). Dye (1988) argues that

managers manipulate earnings to influence investors' perceptions. Trueman and Titman (1988) propose that income smoothing is beneficial to firms because it dampens the volatility of reported earnings and reduces the firm's cost of capital. On the other hand, higher volatility in income will increase financial distress costs if claimholders perceive a higher risk of default (Smith and Stulz 1985). Badrinath et al. (1989) also argue that institutional investors prefer to invest in firms with smoother earnings and avoid those firms with high earnings volatility because they are perceived as risky firms. Therefore, managers also have incentives to smooth earnings because earnings volatility will increase perceived risk and will affect the cost of capital needed to fund new investment opportunities (Beaver et al. 1970). Minton and Schrand (1999) provide the link to cash flow volatility and investment by showing that firms with high earnings and high cash flow volatility have higher costs of external financing. These firms are more likely to smooth earnings to reduce the possibility of default. Finally, Barnes (2001) provides evidence that accounting earnings volatility will lead to lower market values, implying that firms have opportunities to increase shareholder value by smoothing earnings.

Other researchers have examined motivations to smooth earnings, to influence market valuation, and to avoid debt covenant violations or declines in earnings. Studies by Teoh et al. (1998a, 1998b, 1998c) and Sloan (1996) suggest that the market is fooled by earnings management practices. In contrast, Subramanyam (1996) finds evidence that the stock market responded positively to discretionary accruals consistent with managers using income smoothing to reveal inside information about future earnings. In a related study, Zarowin (2002) shows that greater discretionary smoothing is associated with more informative stock prices. Myers and Skinner (1997) document that managers have

incentives to maintain increases in quarterly earnings per share (EPS), and in doing so, reduce earnings volatility and increase their firms' stock market valuation. Similarly, Barth et al. (1999) also find that firms with patterns of increasing earnings enjoy higher price earning multiples and are valued more highly than other control firms. Finally, managers manage reported earnings to avoid debt covenant violations (DeFond and Jiambalvo 1994; Sweeney 1994), to avoid legal action and loss of reputation (Kasznik 1999), and to avoid negative earnings surprises (Burgstahler and Dichev 1999; Degeorge et al. 1999).

Thus far, it has been difficult for researchers to detect earnings management with convincing evidence. Most studies estimate discretionary accruals with a degree of error because the discretionary accrual component of total accruals that result from managerial discretion is largely unobservable and difficult to distinguish from non-discretionary accruals that result from changes in the firm's operating performance. Simulation tests by Dechow et al. (1995) show that despite being well-specified, aggregate accrual models of detecting earnings management generate low power. In addition, the models can be misspecified by the omission of relevant variables. For example, if measurement error in the discretionary accrual estimate is correlated with the partitioning variable (used to split the sample), then findings in aggregate accrual studies of earnings management will be biased (McNichols and Wilson 1988). Dechow et al. (1995), Kasznik (1999), and McNichols (2000) show that discretionary accruals estimates are correlated with earnings performance and growth.[4] Collins and Hribar (2000) show that the balance sheet

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[4] For a further discussion of research design issues in earnings management studies, see McNichols (2000)

approach used in many earnings management studies have measured accruals and cash flows with error. Because of the problem of measurement error and difficulties identified in previous studies, this study will use more recent approaches to measure income smoothing. More specifically, smoothing ratios will be used to capture the concept of income smoothing by expressing the relation between variations in income relative to variation in cash flows (Myers and Skinner 1999; Zarowin 2002; Leuz et al. 2001; Barton 2001; Pincus and Rajgopal 2002; Bowen et al. 2002).

The economic consequence studies that employ the event study methodology to study security price effects have also been shown to face a number of problems. Accounting regulation changes generally have long event windows that make it difficult to control variables for confounding effects and also to identify event periods that are clearly unanticipated. As a result, the event period uncertainties cause these studies to have low power. Furthermore, calendar event clustering will produce biased results due to cross-correlations of residuals. Using an event study also implies that firm behavior can be determined solely by its stock price effect, thus ruling out alternative explanations for the findings. Instead of an event study approach and given that an investigation of the security price effects of SFAS 133 is beyond the scope of this study, I will employ a multiple regression approach to assess the effects of accounting standards, in particular SFAS 133. The methodology employed here uses control periods and control firms from before and after the standard to minimize the effects of other contemporaneous changes as well as to identify unexpected changes associated with the changes in accounting standards.

Relation between Derivatives and Earnings Management

More recently, research has suggested that the choice to use derivatives and discretionary accruals is either a joint decision or a sequential decision. This line of research is central to the purpose of this study and will serve to complement and extend the two main studies in this area by Barton (2001) and Pincus and Rajgopal (2002). Barton (2001) investigated the effects of derivatives use on earnings management for a sample of 304 Fortune 500 firms facing interest rate and foreign currency risk. Barton finds that the magnitude of derivatives notional amounts is negatively related with the magnitude of discretionary accruals. He concludes that derivatives and discretionary accruals are the result of a joint decision, and they are used as partial substitutes to affect earnings volatility, to reduce agency costs, to reduce income taxes, to reduce information asymmetry, and to increase managerial wealth. In supplemental tests, he also provides evidence that shows derivative users having significantly lower volatile cash flows and total accruals as compared to non-users. Furthermore, he reports that non-derivative users are marginally more likely to violate GAAP by aggressively managing accruals than users. However, he is unable to rule out that the decision to use derivatives and manage accruals is sequentially determined.

Barton's (2001) results of a simultaneous process are different from Pincus and Rajgopal (2002) who provide evidence of a sequential process. Using a sample of oil and gas firms and a simultaneous regression model similar to Barton's, they investigate whether firms use discretionary accruals and derivatives as substitutes to manage earnings volatility. Pincus and Rajgopal (2002) conclude that 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 earnings volatility by trading off discretionary accruals and hedging to smooth income. While their results show no evidence that the extent of smoothing is a significant determinant of the extent of hedging, they find the extent of hedging is a significant determinant of the extent of smoothing. Pincus and Rajgopal (2002) suggest measurement error in Barton's measure or low power in their tests as possible reasons for the conflicting findings and call for further research in this area.

In summary, it appears the extant research has made only modest progress and has yet to provide convincing evidence of the widespread existence of earnings management (Fields et al., 2001). This is because researchers have faced tests of low power and econometric problems of measurement error, omitted variable, and self-selection bias. Although some evidence has been documented on the incentives to manage earnings, Healy and Wahlen (1999) argue that additional evidence is needed to determine the accounting standards that are used to manage earnings. Given the most recent accounting scandals and legislative actions to curb earnings management, earnings management will continue to be an important area of research interest, implying that further research is warranted to make any progress. With the mandatory adoption of SFAS 133, research has yet to be presented on the impact of SFAS 133 on the hedging and earnings management activities of firms. Therefore, my study will complement and extend prior research in this area and present new evidence on the impact of SFAS 133 on the use of derivatives, volatility of cash flows and earnings, and income smoothing.

Institutional Background on Accounting Regulations and Disclosures

The accounting guidelines and disclosures are relevant to the purpose of this study because these guidelines influence the derivative information that managers choose to disclose in financial statements. Furthermore, disclosures on the use of derivatives will be necessary to measure the extent of derivative use and the changes in the use of derivatives subsequent to SFAS 133. This information will be gathered from a firm's annual financial statements and footnotes in the 10-K filing with the SEC.

The accounting guidance for derivative instruments and hedging activities under existing guidelines had been largely incomplete prior to the issuance of Statement 133. There was still much inconsistency in financial reporting and lack of transparency since not all derivatives were recognized in financial statements. The existence of multiple standards also meant that derivatives were measured and reported at amounts that differed considerably. Firms also had difficulty in applying standards because of a lack of a single comprehensive standard. Furthermore, the inadequate disclosures and information on hedging strategies made it difficult to determine the effects of derivatives in financial statements. Consequently, concerns about the inadequacy and inconsistency of financial reporting and publicity surrounding large derivative losses, finally, led the FASB to develop a comprehensive set of guidelines for derivatives.

The adoption of Statement 133 will enable investors and financial statement users to assess the magnitude of the effect of a firm's hedging activities on its profitability and volatility. In addition, investors and financial statement users will benefit from improved disclosures of a firm's use of derivatives, providing them with relevant information to evaluate the amounts, the timing, and the uncertainty of future returns on their

investments. The SEC and the FASB are hoping to reduce information asymmetry in capital markets, to help investors make good investment decisions, and to improve the proper operations of the securities markets by requiring firms to report derivatives at their fair values and supplemented by full disclosures. The reporting of fair values under SFAS 133, therefore, represents an important step in moving financial statements toward a measurement perspective. A summary of the reporting and disclosure requirements of SFAS 133 is included in Appendix A while an example of derivatives disclosure by Maytag Corporation is included in Appendix B.

Chapter 3

Methodology

Introduction

The main purpose of this study is to investigate the effects of SFAS 133 on the corporate use of derivatives, on volatility of earnings and cash flows, and on earnings management. This study focuses on a sample of Fortune 500 firms that face interest rate, exchange rate, and commodity risk, while controlling for other incentives to hedge and to manage (smooth) earnings. A pooled cross-sectional panel design is used to investigate the effects one-year before and after implementation of SFAS 133. My sample includes a control group of non-derivative users that I use to compare differences between derivative users and non-users. This chapter provides a discussion of the proposed hypotheses, research design and statistical tests for the hypotheses. In addition, the sample selection procedures and sources of data are described.

Formulation of Hypotheses

The adoption of SFAS 133 has raised concerns about the effects of the standard on firm hedging activities and the perceived increase in reported earnings volatility. Opponents to SFAS 133 argue that the high cost of implementation and ongoing monitoring as well as the complexity of complying with the standard will outweigh the benefits of using derivatives and, consequently, affect their decision to use derivatives. Statement 133 could either affect the decision to use derivatives or reduce the extent of

using derivatives. Some of my sample firms stopped using derivatives after the implementation of the standard while other sample firms reduced the extent of using derivatives. Bodnar et al (1998) find that an estimated 25% of respondents in their study indicate that SFAS 133 would reduce their use of derivatives. A more recent survey by the Association of Financial Professionals (2002) suggested that some respondents reduced their use of derivatives because of the excessive burden imposed by the standard. If managers find derivatives to be costly tools for managing earnings volatility, then Statement 133 will affect not only the decision to use derivatives but also the extent of hedging. Therefore, to determine whether the implementation of SFAS 133 has affected the decision to use of derivatives, I propose the following hypothesis (in alternative form):

Hypothesis 1: *Derivative users are less likely to use derivatives in the period after implementation of SFAS 133*

The effect of SFAS 133 on the extent of using derivatives is investigated in the following section where I focus on differences between derivative users. Even if firms do not reduce their use of derivatives, the implementation of SFAS 133 will still increase earnings volatility because of hedge ineffectiveness. However, there would be no change in earnings volatility if accruals are used to smooth earnings. The perceived increase in reported earnings volatility has been the most significant issue raised by opponents of SFAS 133. Opponents argue that SFAS 133 will increase the volatility of equity and reported earnings if gains and losses from derivatives are included in earnings. This

increase in earnings volatility would arise from the requirement to carry derivatives at their fair value because changes in fair values would be adjusted at each balance sheet date and recognized in earnings when they occur. According to Smith and Stulz (1985), higher volatility in income will increase financial distress costs if claimholders perceive a higher risk of default. Barnes (2001) provides evidence that earnings volatility will result in lower market values, implying that firms have incentives to reduce volatility. If earnings volatility is more costly than cash flow volatility, then managers have incentives to reduce volatility by smoothing earnings with accruals rather than derivatives. Managers could also change their real operating decisions if they perceive that investors and shareholders are unable to "see through" the reported earnings volatility. Consequently, critics argue that in these circumstances, volatility will force managers to focus less on employing effective hedging strategies and more on smoothing earnings through accruals and other less efficient risk management tools. As a result, SFAS 133 could end up driving the risk management decisions of managers instead of the economic reality. The example of Freddie Mac is a case in point: senior management at Freddie Mac was principally concerned with achieving a steady pattern of nonvolatile growth in earnings, so the firm devoted considerable resources in implementing derivative strategies to wipe out a gain of $1.4 billion. These actions were designed primarily to mitigate the impact of SFAS 133.

On the other hand, standard setters argue that SFAS 133 will improve the accuracy and quality of financial reporting and will create more transparency, consistency, comparability, and understanding of firm hedging strategies associated with derivatives. Standard setters hope that financial statement users will be able to assess

whether a firm is hedging or speculating and to determine its effects on the firm's profitability and volatility. By making derivatives more visible in the financial statements, standard setters argue that reporting derivatives at their fair value will provide a true reflection of the firm's assets and liabilities at their underlying economic value. If firms are indeed hedging, efficient market theory implies that there should be no direct economic implications because sufficiently detailed disclosures by firms will allow investors to conclude that the increased earnings volatility has no adverse impact on cash flow volatility. Consequently, investors will deduce that the earnings volatility is simply a change in accounting and not an increase in the derivative's inherent economic risk. Therefore, neither the underlying risk position of the firm nor its cash flows should be affected by the implementation of the new standard. Under this scenario, managerial concerns about reported earnings volatility would have no relevance. Therefore, to determine if SFAS 133 had any effect on income smoothing and volatility of cash flows and earnings, I propose the following hypothesis (in alternative form):

Hypothesis 2: *Derivative users have higher smoothing and have higher volatility of cash flows and earnings than non-users before and after implementation of SFAS 133*

The impact of SFAS 133 on firms is likely to differ across derivative users depending on the extent to which they use derivatives and whether they qualify for hedge accounting treatment. Derivatives that fail to meet or qualify for hedge accounting treatment are treated as speculative derivatives with their gains and losses recognized in current earnings. Firms will not qualify for hedge accounting if they hold speculative or

trading derivatives, if the hedge is not highly effective, or if the hedged item, instrument or financial risk does not qualify under SFAS 133. Earnings volatility for firms holding these derivatives will increase because the gains and losses on these derivatives are immediately recognized in earnings in the same period. As a result, firms that do not qualify for hedge accounting will have greater incentives and will be more likely to smooth earnings to reduce the reported earnings volatility induced by SFAS 133. Alternatively, some firms may forgo hedge accounting treatment on derivatives because the cost and effort in complying with the standard outweighs the benefits of applying hedge accounting. Therefore, to investigate differences among derivative users in the extent of hedging, I propose the following hypothesis (in alternative form):

Hypothesis 3: *Derivative 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 derivative users before and after implementation of SFAS 133*

One implication of the new standard is that investors will find it difficult to distinguish between firms that are indeed hedging and those that are speculating. If firms are using derivatives for legitimate hedging purposes but fail to qualify or choose to forgo hedge accounting treatment, then investors will be unable to distinguish them from firms that are indeed speculating. If investors cannot distinguish between hedging firms and speculating firms, then managerial concerns about earnings volatility would be relevant. Barnes (2001) shows that, under this scenario, low quality firms will have incentives to use derivatives for speculation if the gain in share price from being pooled together with

high quality firms exceeds the increase in risk from speculation. Thus in order to distinguish themselves from firms that are indeed speculating, managers have to make voluntary, non-mandated disclosures of all relevant information in financial statements about the risk exposures faced by the firm and the manner in which the firm is hedging against those specific risk exposures (even though it may choose to forgo hedge accounting or fail to qualify for hedge accounting).

Many firms had reported an initial impact of SFAS 133 upon its implementation. The initial application of SFAS 133 was treated as a transition adjustment which is equal to the difference between the previous carrying amounts of derivative and the derivative fair values upon adoption of the standard. The transition adjustment was made because existing derivative positions did not meet the requirements of SFAS 133. Firms reported the transition adjustment as the cumulative effect of a change in accounting principle in earnings with an adjustment to equity in Other Comprehensive Income or to earnings, depending on whether the existing hedges were cash flow or fair value hedges. In some cases, these restating firms recorded the adjustment in both equity and in earnings; while in other cases, no material impact was reported. It is more likely that SFAS 133 had a greater effect on volatility and smoothing of restating firms than on non-restating firms. If a firm is extensively involved in hedging activities and if a number of these activities fail to meet the requirements of the standard, then volatility is likely to be higher for firms that reported a transition adjustment in the period after implementation compared to the period before. Thus, these restating firms will have greater incentives to manage earnings to reduce volatility compared to other derivative users. Therefore, to investigate the effect of SFAS 133 on restating firms, the following hypothesis is proposed:

Hypothesis 4*: Derivative 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 derivative users before and after implementation of SFAS 133*

Bodnar et al. (1998) found that a quarter of the respondents in their study indicated that SFAS 133 would reduce their use of derivatives and change the type of hedging instruments used. For example, in accounting for hedging relationships that involve options, SFAS 133 permits only an option's intrinsic value to be used in assessing hedge ineffectiveness. The change in time value of an option will generally be reported in earnings with no offsetting fair value adjustment. Consequently, reported earnings volatility will increase, making the use of options less desirable. The use of interest rate swaps could also increase earnings volatility if the swap fails to qualify for the shortcut treatment because one or more matching conditions of the swap is violated. Firms that are concerned about earnings volatility could reduce the use of swaps if they fail to qualify for the shortcut treatment. Alternatively, firms may terminate existing swaps if they fail to meet the criteria for the shortcut treatment. Holding all else constant, terminating swaps without entering into new contracts to replace the swaps will increase cash flow volatility and earnings volatility from the unhedged exposure. To determine whether the termination of derivatives in response to SFAS 133 had any effect on the use of derivatives, the following hypothesis is proposed (in alternative form):

Hypothesis 5*: Derivative users that terminated derivatives have higher levels of hedging with respect to smoothing and to volatility of cash flows and earnings than other derivative users before and after implementation of SFAS 133.*

This study investigates whether there is any real impact of SFAS 133 on the use of derivatives, cash flow volatility, earnings volatility, and income smoothing, while controlling for other incentives to hedge and to smooth earnings. The results of this study will determine: (1) whether the increase in volatility of earnings and cash flows is the result of an accounting change, (2) whether SFAS 133 reduced the use of derivatives (a real change) per se, and (3) whether there is an increase in earnings management (income smoothing) in response to the increase in volatility. The implication of SFAS 133 may well be that managers will end up making real operating changes in firms if they perceive that investors are unable to "see through" the reported earnings volatility. If management compensation is dependent on earnings, then a steadily increasing stream of earnings may be disrupted by the additional volatility induced by SFAS 133, forcing managers to reduce the use of derivatives or to adopt other means to avoid/reduce the volatility in earnings.

Measurement of Derivatives

Derivatives are measured using total notional values. Prior research has used total or aggregate notional values as the measure of derivatives (Allayannis and Ofek 2001; Guay 1999; Barton 2001). More specifically, derivatives are defined as the aggregate total notional value of all reported derivative contracts held for non-trading purposes

outstanding at the end of the fiscal year for each firm and scaled by the market value of assets at the end of the fiscal year.

Measurement of Income Smoothing (Accruals)

Earnings management via accruals is measured using an income-smoothing ratio. This ratio is measured as the standard deviation of quarterly operating cash flows divided by standard deviation of quarterly earnings (Hunt et al. 1997; Pincus and Rajgopal 2002; Zarowin 2002; Leuz et al. 2001; Bowen et al. 2002). A ratio in excess of one indicates more variation in operating cash flows relative to variation in earnings, which suggests income smoothing by accruals to offset variation in cash flows. Because this ratio does not distinguish between managed and non-managed accruals and therefore may fail to independently capture discretionary smoothing, an alternative measure of smoothing will be computed. This ratio is measured as the standard deviation of quarterly earnings before discretionary accruals are divided by the standard deviation of quarterly earnings (Barton 2001; Pincus and Rajgopal 2002; Zarowin 2002). Earnings before discretionary accruals are defined as operating cash flows plus non-discretionary accruals, scaled by total assets of the previous quarter. A smoothing ratio in excess of one indicates more variability in earnings before discretionary accruals than in earnings after discretionary accruals, consistent with income smoothing. This measure assumes that managers use discretionary accruals to smooth pre-managed earnings into reported income. The cross-section version of the Jones (1991) model is used to estimate non-discretionary accruals for each firm by 2-digit SIC code for each year.

Measures of Volatility

Measures of volatility are computed to assess the effects of SFAS 133 on the volatility of earnings and cash flows. Following prior research (Barton 2001; Minton and Schrand 1999; Barnes 2001), volatility is measured by the coefficient of variation of earnings and cash flows over four quarters before and after adoption of SFAS 133. The coefficient of variation in earnings (cash flows) is defined as the standard deviation of quarterly earnings (cash flows) divided by the absolute value of the mean. Inclusion of the coefficient of variation for cash flow volatility in the empirical models serves not only as a variable of interest but also as a control measure to isolate the impact of earnings volatility from accruals and as a short-term measure of firm risk (Barnes 2001).

Measurement of Control Variables: All Equations

This study includes several proxy variables to control for the effects of factors that prior research has shown to affect the decision to hedge and incentives to smooth earnings.

Leverage: Firms with high debt or financial covenants have an incentive to use derivatives to reduce the expected costs of financial distress (Geczy et al. 1997; Guay 1999). Prior research has suggested that managers choose accounting methods to reduce the likelihood of debt covenant violations (Holthausen and Leftwich 1983; Watts and Zimmerman 1986). Firms with outstanding bank debt are used in this study to proxy for financial distress and proximity to debt covenant violation. Bank debt is measured using

a dummy variable that equals to one for firms with outstanding bank debt during the fiscal year, and to zero otherwise.

Underinvestment costs: Firms with higher growth opportunities are expected to make a greater use of hedging to mitigate the underinvestment problem. It may also be the case that firms with high growth opportunities are more likely to manipulate earnings because they are more likely to experience larger accruals (McNichols 2000). Consistent with previous research, the book-to-market ratio will be used to proxy for a firm's underinvestment problem. This ratio is measured as the book value of equity divided by the market value of equity.

Information asymmetry: Hedging can reduce the information asymmetry in earnings and increase its usefulness by providing information about the firm's earnings capacity. Prior research has suggested that firms with smooth and stable cash flows or with less volatile earnings, are more likely to be followed by analysts (Minton and Schrand 1999; Barton 2001). Therefore, the greater the number of analysts following the firm, the lower will be the information asymmetry and the incentive to hedge. However, firms with larger analyst following may also have a greater incentive to hedge to minimize earnings surprises (Geczy et al. 1997). The logarithm of the number of analysts following the firm in each year is used to proxy for information asymmetry in this study.

Income taxes: Managers have incentives hedge to lower the volatility of taxable income so as to reduce expected taxes (Smith and Stulz 1985). Previous research on

accounting choice has presented evidence that firms make accounting choices in order to reduce their tax burden (Gunther 1994; Dhaliwal et al. 1994). Graham and Smith (1999) provide evidence that existing NOLs provide a tax incentive to hedge for firms that expect to be profitable. Following Pincus and Rajgopal (2002), a dummy variable is used to proxy for the tax incentive to hedge and to manage earnings. The dummy variable is equal to one in the fiscal year when the firm is profitable and has NOL carryforwards, and is zero otherwise.

Managerial risk aversion: If managers own a large portion of the firm's wealth in the form of stock options, then they have incentives to alter earnings and cash flow volatility (Smith and Stulz 1985). Managers have incentives to either increase or decrease the volatility of earnings depending on the sensitivity of their options to stock volatility or level of stock prices (Barton 2001). There is evidence showing that firms that report continuous growth in earnings are priced at a premium to other firms and more likely to engage in earnings management to sustain their growth and increase management compensation (Myers and Skinner 1999; Barth et al. 1999; Barton 2001). I measure managerial risk aversion as the logarithm of the total number of CEO stock options outstanding at the end of the fiscal year.

Firm size: Economies of scale are an increasing function of firm size, and the significant costs and expertise required for a hedging program suggest that larger firms are more likely to hedge than smaller firms (Guay 1999; Allayannis and Ofek 2001; Graham and Rogers 2002). Firm size has also been a significant variable explaining firm

accounting choices (Holthausen and Leftwich 1983; Watts and Zimmerman 1986). Firm size is measured as the logarithm of the firm's book value of assets.

Diversification: Firms can also hedge in alternative ways without the use of derivatives. For example, firms can hedge naturally through diversification and can consequently, reduce the volatility of their earnings and cash flows (Smith and Stulz 1985). As an additional control variable, I measure total product diversification using the entropy index which was proposed by Palepu (1985) and was used in previous research (Barton 2001; Guay and Kothari 2001). The entropy index is defined as $\Sigma P_i \ln(1/P_i)$ where P_i is the total net sales of product i scaled by the total net sales of the firm.[5] Thus the index ranges from zero for an undiversified firm to a value of over two for a diversified firm.

Exposure Coefficients: If a firm faces exposures to interest rates, exchange rates, and commodity price risk, then the failure to control for underlying risk exposures could lead to difficulties in documenting an empirical relationship (Guay 1999). Petersen and Thiagarajan (2000) also argue for the need to control for a firm's underlying risk exposure. Therefore, I control the risk exposures by computing three exposure coefficients (interest rate, exchange rate, and commodity prices) for each firm over a five-year period from 1997 to 2001 and including them as additional explanatory variables in my regressions. I regress changes in a firm's quarterly cash flows on

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[5] First compute weights Pi (product i net sales/total net sales). Second take the log of (1/Pi) and multiply by the weights. Finally sum the numbers to obtain a total entropy measure.

changes in the 6-month LIBOR rate, on the Federal Reserve Board's Nominal Dollar Index, and on the Producer Price Index for All Commodities.[6] More specifically, the multiple regression model for each firm takes the following form:

$$\Delta CF_t/TA_{t-1} = \alpha + \beta_1 \Delta Libor_t/Libor_{t-1} + \beta_2 \Delta FX_t/FX_{t-1} + \beta_2 \Delta PPI_t/PPI_{t-1} + Qtr_t + \varepsilon \quad (1)$$

where ΔCF/TA is the quarterly change in income before depreciation scaled by total assets of the previous quarter, β is the beta or exposure coefficient, Libor is the 6-month London Interbank Offer Rate (Libor), FX is the Federal Reserve's Nominal Dollar Index, PPI is the Producer Price Index for All Commodities, Qtr is a seasonal dummy variable that is equal to one if quarter t and zero otherwise, and $_{t,\ t-1}$ refers to the current and previous quarter.

Industry dummy: This study includes a dummy variable to proxy for industry membership by a 2-digit SIC code year in order to control for the influence of industry effects since firms in some industries may use derivatives to a greater extent than firms in other industries.

Research Design

To test the first hypothesis, I compare the characteristics of a sample of derivative users to a control sample of non-derivative users. If firms reduce their use of derivatives,

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[6] See Graham and Rogers 2002; Faulkender 2002; Hentschel and Kothari 2001; Guay and Kothari 2001 for similar procedures

then I expect that derivative users should exhibit more evidence of a decline in the decision to use derivatives in the period after implementation compared to control firms. To implement the research design I use a probit model to regress derivative use on the incentive to smooth earnings, volatility, and control variables that proxy for the incentive to use derivatives. These control variables will proxy for underinvestment costs, financial distress, tax incentives, managerial risk aversion, and information asymmetry based on prior research on theoretical risk management. In addition, a dummy variable is included to proxy for the period after implementation of SFAS 133. More specifically, the probit regression will take the following form:

$$\begin{aligned} User_{it} = {} & b_0 + b_1 EVol + b_2 CFVol + b_3 Smooth_{it} + b_4 After_t + b_5 BDebt_{it} + \\ & b_6 B/M\ Ratio_{it} + b_7 Analyst._{it} + b_8 Tax_{it} + b_9 Options_{it} + b_{10} Size_{it} + \\ & + b_{11} Divers_{it} + b_{12} Libor + b_{13} FX + b_{14} PPI + b_{15} Industry_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

A definition of the variables used in this study is provided in Appendix C. Because of the two year delay in implementing SFAS 133 which gave firms additional time to prepare for its adoption, it is possible that firms may have made the transition to the standard two years prior to its implementation instead of the year before. To test for this possibility of a change in firm behavior in the use of derivatives, I will run a second probit regression in which I will compare firm response in the period-after relative to the period two years prior to the implementation.

To test the second hypothesis, three separate multivariate regression models will be used to determine the effects of SFAS 133 on the volatility of cash flows, volatility of earnings, and income smoothing. I compare the coefficients of the independent variables

after implementation relative to the coefficients before implementation for derivative users and non-users. In addition, I include two dummy variables and interact them with the volatility and smoothing variables. One dummy variable is used to classify firms into derivative users and non-users, and the second dummy variable is used to proxy for the period after implementation of SFAS 133. The regression models use control periods from before and after the new standard to identify unexpected changes that are associated with the rule changes. In addition, a control sample of non-derivative users provides an additional level of control to minimize the effects of other contemporaneous changes that may affect the sample firms. More specifically, the multiple regressions models are defined in the following form:

$$\begin{aligned} CFVol_{it} = {} & b_0 + b_1 EVol_{it} + b_2 Smooth_{it} + b_3 After_t + b_4 User_{it} + b_5 BDebt_{it} + \\ & b_6 B/M\ Ratio_{it} + b_7 Analyst_{it} + b_8 Tax_{it} + b_9 Options_{it} + b_{10} Size_{it} \\ & + b_{11} Divers_{it} + b_{12} Libor + b_{13} FX + b_{14} PPI + b_{15} Industry_{it} + b_{16} After*User_{it} \\ & + b_{17} EVol*After*User_{it} + b_{18} Smooth*After*User_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

$$\begin{aligned} EVol_{it} = {} & b_0 + b_1 CFVol_{it} + b_2 Smooth_{it} + b_3 After_t + b_4 User_{it} + b_5 BDebt_{it} + \\ & b_6 B/M\ Ratio_{it} + b_7 Analyst_{it} + b_8 Tax_{it} + b_9 Options_{it} + b_{10} Size_{it} + \\ & b_{11} Divers_{it} + b_{12} Libor + b_{13} FX + b_{14} PPI + b_{15} Industry_{it} + b_{16} After*User_{it} + \\ & b_{17} CFVol*After*User_{it} + b_{18} Smooth*After*User_{it} + \varepsilon_{it} \end{aligned} \quad (4)$$

$$\begin{aligned} Smooth_{it} = {} & b_0 + b_1 EVol_{it} + b_2 CFVol_{it} + b_3 Afte_{it} + b_4 User_{it} + b_5 BDebt_{it} + \\ & b_6 B/M\ Ratio_{it} + b_7 Analyst_{it} + b_8 Tax_{it} + b_9 Options_{it} + b_{10} Size_{it} + \\ & b_{11} Divers_{it} + b_{12} Libor + b_{13} FX + b_{14} PPI + b_{15} Industry_{it} + b_{16} After*User_{it} + \\ & b_{17} EVol*After*User_{it} + b_{18} CFVol*After*User_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

Managers have incentives to reduce earnings volatility by managing the volatilities of cash flows (through derivatives) and accruals. According to Barton (2001), both derivatives and accruals are costly and imperfect tools to manage volatility, suggesting that managers will substitute between them to reduce volatility. If earnings

volatility (cash flow volatility) is more costly than cash flow volatility (earnings volatility), then managers will have stronger incentives to reduce earnings volatility by using accruals (derivatives) rather than derivatives (accruals) to smooth earnings. I expect derivative users to have higher volatilities in cash flows and earnings than non-users in the period after implementation relative to the period before implementation. In addition, derivative users will have greater incentives to smooth earnings with accruals to manage volatility induced by hedge ineffectiveness.

To test the third hypothesis, the notional value of derivatives is regressed on volatility of cash flows, earnings, and accruals, while controlling for other incentives to hedge and to manage earnings. Again, two dummy variables are included in the model to proxy for the period after SFAS 133 and to designate firms that do not qualify for hedge accounting. These dummy variables are used to compare the differences in the coefficients of the independent variables after implementation of SFAS 133 relative to the coefficients before SFAS 133 for both firm types. More specifically, this regression takes the following form:

$$\begin{aligned} Deriv_{it} = {} & \gamma_0 + \gamma_1 CFVol_{it} + \gamma_2 EVol_{it} + \gamma_3 Smooth_{it} + \gamma_4 After_t + \gamma_5 DNQ_{it} + \\ & \gamma_6 BDebt_{it} + \gamma_7 B/M\ Ratio_{it} + \gamma_8 Analyst_{it} + \gamma_9 Tax_{it} + \gamma_{10} Options_{it} \\ & + \gamma_{11} Size_{it} + \gamma_{12} Divers_{it} + \gamma_{13} Libor + \gamma_{14} FX + \gamma_{15} PPI + \gamma_{16} Industry_{it} + \\ & \gamma_{17} CFVol*After_{it} + \gamma_{18} EVol*After_{it} + \gamma_{19} Smooth*After_{it} + \\ & \gamma_{20} CFVol*DNQ*After_{it} + \gamma_{21} EVol*DNQ*After_{it} + \\ & \gamma_{22} Smooth*DNQ*After_{it} + \nu_{it} \end{aligned} \quad (6)$$

Prior research has failed to document the relation between derivatives and earnings and cash flow volatility and/or failed to determine whether firms use derivatives in to response an increase in earnings volatility. I expect firms that do not qualify for

hedge accounting treatment (hold some speculative derivatives) to have higher volatility in cash flows and earnings than firms that qualify for hedge accounting. In addition, I expect these firms to have greater incentives to smooth earnings than other firms to offset the volatility induced by speculation. Because derivative use is only observed for firms that choose to use derivatives (left-censored), I use Heckman's (1979) selection model to control for sample selection bias. In the first stage, a binomial probit model is used to predict the probability of the decision to use derivatives and to generate the Inverse Mills Ratio (IMR). In the second-stage, using a truncated regression on the observed derivative users, derivatives are regressed on the independent variables and the IMR, which proxies for the sample selection bias. To test the sensitivity of my results, I rerun the model to compare the period two years prior to implementation with the period after.

The testing of Hypothesis 4 is the same as Hypothesis 3; however, a dummy variable is used to designate firms that disclosed a transition adjustment to SFAS 133. A dummy variable that equals one is used for firms that disclosed a transition adjustment, which is otherwise zero. I expect transition adjustment firms to have higher smoothing and volatility compared to other derivative users. These firms also have greater incentives to smooth earnings and to reduce volatility than other derivative users in the period after implementation. Finally, Hypothesis 5 will be tested to determine if the termination of derivatives in response to SFAS 133 had any impact on the explanatory variables. Using the same basic model as in previous tests, I include a dummy variable to proxy for firms that terminated derivatives and I interact the dummy variable with the smoothing and volatility variables. I expect firms that terminated derivatives to have

higher volatility of cash flows and earnings and greater incentives to smooth earnings in the period after implementation.

Sample Selection and Sources of Data

The sample for this study was chosen from a list of all Fortune 500 firms in the April 2003 issue of *Fortune* magazine. From an initial list of 500 firms, financial firms, utilities, and telecommunication firms were excluded from the sample because of the special regulatory environment and accounting regulations faced by these firms. I eliminated firms that were non-publicly traded, subsidiaries, private firms, partnerships, cooperatives, acquired firms, and also those under Chapter 11 bankruptcy within the sample period from 1999 to 2001.

Annual and quarterly financial statement data was obtained from Standard & Poors' *Compustat* database for the period from 1999 to 2001: two years prior and one year after the official implementation date of SFAS 133 in June 2000. I obtained data on bank debt by reading the debt disclosures of sample firms from their annual 10-K reports filed with the SEC from 1999-2001. Information on ownership and executive compensation data was gathered from Compustat's *Execucomp* database, and data on the number of analysts monitoring the firm was obtained from the Institutional Brokers Estimate System (IBES) database in Compustat. For obtaining executive compensation data missing from the Execucomp database, I read proxy reports filed with the SEC in the *Edgar* database. After eliminating firms with missing financial data, I was left with a final sample of 305 firms. A summary of the sample composition is presented in Table 2.

I gathered derivative data by reading the market risk and derivative disclosures in the 1999-2001 annual 10-K filings included in the SEC's *Edgar* database, *Lexis-Nexis Academic Universe* database, and company websites (in cases when such reports were unavailable in the databases). While firms are not required to disclose notional values, there were a sufficient number of firms that disclosed notional values. Because of data limitations, I report aggregated notional values of interest rate, foreign currency, commodity, and other derivatives. There also appears to be much inconsistency in the disclosures because many firms stopped disclosing notional or fair values in 2001, and other firms that had no prior disclosures, subsequently, began to disclose such information following the adoption of the standard. Of the 305 firms, there were 30 derivative users that had no disclosures of notional/fair values in consecutive years from 2000-2001 before and after adoption of the standard (Appendix D). Therefore, where applicable, I exclude these firms in models where notional values appear as the dependent variable in my regressions. Finally, I used product and geographic segment data from Compustat Segments File to compute a measure of diversification and the ratio of foreign sales to total sales, and data on interest rates, foreign currency index, and commodity index, was obtained from Global Insight/DRI databases in Compustat.

Chapter 4

Results and Findings

Introduction

This chapter presents the results and findings of my analyses using a multivariate regression model approach to test the hypotheses formulated in chapter three. I first provide and discuss the descriptive statistics, which is followed by a univariate analysis (both parametric and non-parametric tests of differences) and then focus on the multiple regressions to determine whether the implementation of SFAS 133 had any effect on the volatility of cash flows, earnings, income smoothing, and the use of derivatives. I also test the sensitivity and robustness of my results using alternative variables and specifications.

Descriptive Statistics

Table 3, Panel A provides general descriptive data for the sample firms. Of the 305 firms, 86% or 261 firms were found to be derivative users, having used derivatives in the period 1999-2001; this is an indication that larger Fortune 500 firms are more likely to use derivatives (Barton 2001). It is notable that 97% of derivative users adopted the standard after its official implementation date in 2001, reflecting the initial concern and controversy over its potential impact. Interest rate (88%) and foreign currency risks (74%) are the two most common types of risks hedged by sample firms followed by commodity risk and equity risk. At least 75% of derivative users hedge two or more

types of risks, particularly interest rate and foreign currency risk. Forwards (77%) and swaps (89%) are the dominant derivative instruments used by derivative users. Over three-fourths of derivative users use two or more instruments to hedge these risks. One-fifth of users were determined to have discontinued or terminated the use of derivatives, interest rate swaps in particular, prior to the implementation date or in the year of implementation. Many derivative users disclosed the rebalancing of their debt portfolio and the failure to meet hedge accounting criteria, as reasons for the termination. An estimated 4% (9 firms) of firms that were using derivatives prior to implementation discontinued or terminated their use upon adoption of SFAS 133 and did not use them in the following two years. In meeting the requirements of SFAS 133, 51% of users indicated their derivatives qualified for hedge accounting. More importantly, 47% of users held some derivatives that did not qualify for hedge accounting in addition to their qualifying derivatives. Six firms disclosed that all of their derivatives were designated as non-hedges (speculative under SFAS 133). Most of these non-qualifying derivatives were forward contracts that firms used to hedge the risk of their receivables and payables denominated in foreign currencies. In a number of cases, sample firms noted that their intention in holding these non-qualifying derivatives were for purposes other than trading or speculation. Only 14 users (5%) disclosed that they held derivatives for trading, and of these, only one firm disclosed that it held derivatives for speculation. It is notable that SFAS 133 does not make a distinction between derivatives held for trading, speculation, or purposes other than hedging. If a derivative is not designated as a hedge, then it is treated as a speculative derivative, which essentially means that almost half of derivative

users are partially speculating regardless of their intention for holding these derivatives. Appendix D provides a sampling of these disclosures made by my sample firms.

More than half (56%) of derivative users reported an initial impact of SFAS 133, which was reported as a transition adjustment. The transition adjustment was generally reported as a cumulative effect type change in accounting principle with an adjustment to earnings (fair value hedges) or to equity (AOCI for cash flow hedges) or both. A larger number of firms reported a transition adjustment to equity as opposed to earnings, which is an indication that firms are either hedging their cash flows against exposures to risk or seeking to avoid running it through earnings. The results in Table 3, Panel C show the overall mean (median) adjustment to earnings (after-tax) was a loss of $25.6 million ($3.3 million). On the other hand, the overall mean (median) adjustment to equity (after-tax) was a loss of $42.3 million ($7.4 million). Notional values of derivatives are summarized annually in Panel B (excluding 30 users without consecutive observations). The mean (median) notional amounts hedged by derivative users have increased slightly from $1.1 billion ($412 million) to $1.3 billion ($575 million). In untabulated results, the absolute net fair value of derivatives has also increased over the same period from a mean of $70 million to $95 million; however, volatility in these fair values across firms is high.

Table 3, Panel C provides additional descriptive statistics on the relevant variables in the empirical models. The results show an increase in mean earnings volatility and cash flow volatility between 2000 and 2001. However, median earnings and cash flow volatility is relatively unchanged. There is a large difference between the mean and median values due to outliers, which skews the distribution to the right. The mean and median income-smoothing ratio (standard deviation of quarterly cash flows /quarterly

income before extraordinary items) is greater than one, suggesting that sample firms are smoothing earnings to reduce earning volatility.[7]

Additional descriptive statistics show the average sample firm is large, holds mean (median) assets of $14.4 billion ($6.9 billion), generates $13.9 billion ($6.9 billion) in net sales, and earns $640 million ($226 million) in income before extraordinary items. Firms, in general, have high growth opportunities as reflected in the lower mean and median book-to-market ratio. An estimated 83 firms (27%) are profitable with tax loss carry forwards and 221 firms (70%) have outstanding bank debt. The average CEO held about 2.6 million in outstanding stock options while an average of 20 analysts monitored the sample firms. Finally, the diversification measure shows a mean entropy index of 0.56, reflecting some diversification among sample firms.

Univariate Analysis

Table 4 presents a univariate comparison of differences between derivative users and non-users on the independent and dependent variables. Both parametric (Pearson) and non-parametric (Wilcoxon) tests of differences are used to compare the differences.[8] The non-parametric results of the tests of differences are more informative and are likely to declare a difference especially when the data is skewed or when outliers are present in the data. Based on the non-parametric tests, derivative users appear to have slightly lower earning volatility and lower cash flow volatility than non-users. Unlike Barton

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[7] Dropping 10% of the highest and lowest observations results in an increase in the trimmed mean value from 1.31 for 2000 to 1.62 for 2001

[8] The results are similar without winsorization.

(2001), I find significant differences in earnings volatility, but no difference in cash flow volatility and income smoothing between users and non-users. Derivative users are more likely to hedge if they have outstanding bank debt and net operating loss carry-forwards. User firms are also larger than non-users and thus subject to external monitoring by a larger number of analysts, which may constrain their ability to smooth earnings or increase the pressure on firms to report predictable earnings. Finally, user firms are significantly more diversified than non-user firms

Table 5 shows the correlations between the dependent and independent variables. A number of the independent variables are significantly correlated with the dependent variables (earnings volatility, cash flow volatility and income smoothing). The significant positive correlation (Spearman) between cash flow volatility and income smoothing suggests that an increase in volatility will increase smoothing as firms use accruals to smooth cash flows into earnings. Earnings volatility, as measured by the coefficient of variation, is significantly and positively correlated with income smoothing, suggesting that managers are likely to make greater use of smoothing to manage volatility. Hedging is also positively and significantly related to bank debt, implying that firms with bank debt are more likely to hedge to avoid covenant violations. The negative relation between the book-to-market ratio and hedging suggests that firms with high growth opportunities are more likely to face underinvestment problems. My results also show firm size to be significantly and highly correlated with a number of variables, particularly, the book-to-market ratio, number of analysts, CEO outstanding options, and diversification. Because my sample comprises a small number of non-derivative users, I am unable to match firms by size and industry-a limitation of my study. Nevertheless, to

address concerns with potential multicollinearity, I test my results using Variance Inflation Factors (VIF) and find that multicollinearity is not driving my results. None of the VIF values exceed a value of 10 in all of my regressions, and essentially mitigates any concerns about multicollinearity. To reduce the influence of outliers, all variables except the dummy variables, analyst, options, and firm size are winsorized at the 1% and 99% levels. To control for possible heteroskedasticity, I also report White (1980) heteroskedasticity robust t-statistics.

Multivariate Analysis

Table 6 presents the probit regression results of Hypothesis 1 in which I regress derivative use on the volatility, smoothing, and explanatory variables that proxy for the incentives to hedge. Model 1 is a probit regression over a two-year interval, one year before and one year after the implementation of SFAS 133, and Model 2 extends the analysis over a three-year period (two years before and one year after). The probit models explain about 31% of the variation in the dependent variables and correctly classify 84% of the observations.

The results for both models support the risk-management theories and indicate that the decision to use derivatives is significantly related to several of the proxies for the incentives to hedge. I find no significant differences in earnings volatility and cash flow volatility between users and non-users in their decision to use derivatives. I do not find any conclusive evidence that derivative users are less likely to use derivatives in the period after implementation of SFAS 133. The coefficient on the period after implementation is insignificant in Model 1 and marginally significant in Model 2. Thus,

Statement 133 does not influence or affect the decision to use derivatives at the 5% significance level. With regards to the control variables, derivative users are also more likely to have bank debt than non-users and, therefore, more likely to manage earnings to avoid covenant violations. It should also be noted that my sample includes firms that hedge exposures even though they have no bank debt. (In many cases, these firms were hedging public debt). Firms with higher growth opportunities (low book-to-market ratios) are more likely to hedge, supporting the underinvestment cost theory. In addition, consistent with the information asymmetry explanation for hedging, firms with higher analyst following are less likely to hedge. My results also support Smith and Stulz's (1985) tax explanation for hedging. I find a significantly positive relation between the use of derivatives and taxes, which supports the argument made by Graham and Smith (1999) that firms with existing net operating loss carryforwards have an incentive to hedge if they expect to be profitable. Managers with large option holdings are also more likely to hedge their interest in the firm, supporting the managerial risk aversion theory. Firm size, as proxied by the book value of assets, is significant and positively related to the use of derivatives, suggesting that scale economies in implementing a hedging program is more likely to induce larger firms to use derivatives. These results are also consistent with findings from prior derivative research (Pincus and Rajgopal 2002; Barton 2001; Guay 1999; Geczy et al. 1997). Finally, there is some evidence that firms exposed to interest and commodity risk are more likely to use derivatives to hedge their risk.

The results of the second hypothesis are presented in Table 7 Panels A-C. In all the models, I regress the earnings volatility, cash flow volatility, and income smoothing

variables on a set of explanatory variables that proxy for the incentives to hedge and a set of indicator variables that proxy for derivative users and the period after implementation of SFAS 133. I then compare the coefficients of the interaction terms to determine if there are any significant differences in the dependent variables with respect to the explanatory variables. For comparative purposes, I run two sets of regressions, one with and the other without the interaction variables.

In general, I find no conclusive evidence to support the effect of SFAS 133 on earnings volatility, cash flow volatility, and income smoothing for my sample firms. Proponents of SFAS 133 have argued that the standard should have no effect on cash flow volatility because the standard only changes the method of accounting and therefore, does not affect the underlying cash flows. However, the results in Panel A appear to suggest that cash flow volatility is higher for derivative users in the period after implementation compared to non-users in the period before. I perform a Chow test for joint significant of the interactions terms but fail to find any significant differences, suggesting that the best model allows for an intercept difference only ($F_{5, 523} = 0.97$; p value = 0.438). The statistically positive coefficient on income smoothing in Model 1 suggests that firms engage in a higher level of smoothing to reduce variation in cash flows. Holding all else constant, if income is smoothed by variation in accruals offsetting variation in cash flows, then a higher smoothing ratio implies higher variation in cash flows relative to net income and, therefore, a higher level of income smoothing. The positive relation between smoothing and cash flow volatility also suggests the possibility of a mechanical correlation between income smoothing and cash flow volatility because the numerator in the smoothing ratio (standard deviation of cash flows) is similar to the

numerator in the coefficient of variation for cash flow volatility. Therefore, in my sensitivity analysis, I include the correlation between the changes in cash flows and changes in accruals as an additional proxy for income smoothing (Zarowin 2002; Myers and Skinner 1999).

In the second set of regressions in Panel B of Table 7, I find no conclusive support for the hypothesis that SFAS 133 has any effect on earnings volatility. There is a lack of significance on all interaction variables at the 5% significance level. Although earnings volatility has increased in the period after implementation, the evidence is weak to suggest that the difference in earnings volatility is lower for users in the period after implementation compared to non-users in the period before. A Chow test for joint significance of the dummy variables and interaction terms also fails to detect any structural change in the coefficients before and after implementation of the standard.

With regards to the control variables, firms that have bank debt are more likely to smooth earnings to reduce earnings volatility and avoid covenant violations. The significant negative coefficient on the tax variable supports the tax explanation of Smith and Stulz (1985) and Graham and Smith (1999) that firms have a greater tax induced incentive to hedge to reduce earnings volatility and lower expected taxes. Overall, my results in Panel B suggest no significant differences between derivative users and non-users that would indicate a negative impact of SFAS 133.

The results of my third set of regressions are presented in Table 7 Panel C. Again, I find weak evidence of significant differences in income smoothing between users and non-users. However, a Chow test of the dummy variables and interaction terms suggests that the variables are jointly significant (5, 510=5.50; p-value=0.000),

suggesting that derivative users and non-users do have different slopes even though the individual coefficients on the interaction terms may be insignificant. The coefficient on cash flow volatility is positive and statistically significant; this suggests that an increase in cash flow volatility (possibly from termination of derivatives, less hedging or speculation) will cause an increase in smoothing, which implies a higher variation in cash flows relative to net income. The difference in smoothing relative to cash flow volatility is higher for users in the period after implementation compared to non-users in the period before, implying that firms may be using accruals as either complementary tools or substitutes in affecting volatility. I also find that the book-to-market ratio as a proxy for growth opportunities provides an incentive to smooth earnings. Beaver et al. (1970) argue that managers have incentives to smooth earnings because higher earnings volatility will increase perceived risk and affect the cost of capital needed to fund new growth opportunities. Exchange rate exposure is marginally significant and negatively related to income smoothing, implying that smoothing reduces exposure.

In my sensitivity analysis, I rerun the regressions by extending the analysis over three years, two years before and one year after implementation of SFAS 133. The results of this sensitivity analysis are presented in Table 7 Panels D-F. Again, my results are qualitatively similar, as I find no conclusive evidence of any significant differences between users and non-users to support Hypothesis 2. In Panel E, additionally I find diversification to be significant, implying the beneficial effect of reducing earnings volatility. Because pooled OLS may suffer from omitted variable bias, I will employ a fixed-effects model as an alternative specification to test the robustness of my results.

In the second part of my multivariate analysis, I focus on investigating differences among a sub-sample of derivative users to test Hypotheses 3-5. I regress the notional amount of derivatives on a set of explanatory variables, (including interaction variables) to determine if there are any significant differences induced by the implementation of SFAS 133. Because derivative use is only observed for firms that use derivatives, my results could be biased by sample selection. Therefore, I use Heckman's (1979) two-step estimation model to correct for sample selection bias. In the first step, I run a binomial probit model (selection equation) on the entire sample of firms to predict the probability of using derivatives and to generate the Inverse Mills ratio (IMR), which proxies for the estimated expected error. In the second step, using only a sub-sample of derivative users that disclose notional values, I regress notional values on the explanatory variables and the IMR as an additional explanatory variable to remove the error. I use the t statistic to test the IMR coefficient for the existence of sample selection bias (Ho: p=0). If there is no evidence of sample selection bias, then pooled OLS regression is used to test my hypotheses. Wooldridge (2000) notes that in order to distinguish sample selection bias with convincing results, there must be an exclusion criterion in which a variable that affects selection but yields no effect on the dependent variable (in equation of interest) is included in the first stage probit model, but excluded in the second stage regression. I use the tax variable as my exclusion criterion based on the tax explanation theory that firms have greater incentives to hedge if they have tax loss carry-forwards and expect to be profitable; however, the incentive to hedge should have no effect on the extent of hedging. The results in Table 8 (t-value on Mills ratio) show no sample selection

problem in my sample (including all interactions and various specifications of the models), and therefore, I use pooled OLS to test the rest of my hypotheses.

The results of my pooled regressions for testing Hypotheses 3-5 are presented in Table 9, Panels A-C. For comparative purposes, I run two sets of regressions, with and without interaction variables. In Panel A, I test for differences between firms that qualify for hedge accounting treatment and for those that do not qualify (hold speculative derivatives). In the year prior to the implementation of SFAS 133, I find no significant differences in the association between hedging and cash flow volatility and income smoothing. On the other hand, the association between hedging and earnings volatility is positively significant. If firms are concerned about earnings volatility, then one should observe no association between hedging and earnings volatility in the period before implementation. My results for the third hypothesis show no significant differences between firms that qualify and those that do not qualify for hedge accounting treatment before and after implementation of SFAS 133. However, the difference in hedging with respect to earnings volatility is significantly negative and lower in the period after implementation compared to the period before. The finding suggests the possibility that firms may be using other risk management tools to manage earnings volatility. A Chow test for joint significance of the dummy variables and interactions is significant across time but not across groups, which suggests that the slopes differ across time even though each term may be individually insignificant. The coefficients on the control variables yield similar findings as before. Bank debt is a significant determinant of derivative use and the extent of hedging use depends on the amount of bank debt. Managers with large option holdings are more likely to hedge their interest in the firm, a finding that supports

the managerial risk aversion theory. Unlike the probit model results, I find firm size is marginally and negatively related to hedging within groups of derivative users. Since Warner (1977) documents an inverse relation between firm size and bankruptcy costs, the benefits of hedging firm risk should be greater for low derivative users than larger derivative users (Smith and Stulz 1985). I also find the exchange rate exposure to be marginally and negatively related to hedging, implying that hedging will reduce exposure (decline in the size of the beta coefficient). The results of my fourth hypothesis are presented in Table 9, Panel B. I test whether derivative users that reported a transition adjustment to SFAS 133 are any different from those firms that did not report the adjustment in the use of derivatives before and after implementation of the standard. I find some evidence of the impact of the transition adjustment on derivative users. The difference in hedging with respect to smoothing is higher for firms that reported a transition adjustment in the period after implementation as compared to other derivative users firms in the period before. I find transition adjustment firms to be large derivative users, and subsequently, my evidence suggests that these firms may be smoothing earnings to reduce volatility induced by the transition to SFAS 133. Finally, I examine whether firms that terminated or discontinued the use of derivatives in response to SFAS 133 were any different from other derivative users. The results of Hypothesis 5 are presented in Table 9, Panel C. Again, the results show no significant differences between firms that terminated derivatives and those that did not terminate derivatives. Extending my analysis over a three-year period produces qualitatively similar results as shown in Table 9, Panels D-F.

Tests of Robustness of Results

In this section, I test the robustness of my results using alternative variables and specifications and discuss the findings.

Alternative Variables: Because the smoothing ratio may fail to distinguish between managed and non-managed accruals and therefore may fail to capture discretionary smoothing, I use an alternative measure, the standard deviation of earnings before discretionary accruals divided by standard deviation of quarterly earnings (Barton 2001; Pincus and Rajgopal 2002; Zarowin 2002)[9]. I rule out measurement error when I use this ratio because the correlation between notional values of derivatives and non-discretionary accruals is insignificant (Spearman correlation = 0.067). The results of my analysis are qualitatively similar and do not change the inferences drawn from my earlier findings. An alternative explanation for my results suggests a mechanical correlation between my measure of income smoothing and volatility. To test for this correlation, I specify a third measure for income smoothing that has been used in previous research (Myers and Skinner 1999; Zarowin 2002). More specifically, I measure income smoothing as the percentile ranking of the correlation between changes in accruals and changes in cash flows.[10] The results of using the ranking measure are qualitatively similar to my main findings. I rule out this mechanical correlation since I find income

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[9] The Spearman correlation between the two smoothing measures is 0.871.

[10] I rank each firm's correlation between changes in accruals and changes in cash flows by 2-digit industry and year and then convert these rankings into a percentile ranking of the correlation measure (rank-1)/(number of firms in industry-year-1). The percentile ranges from 0 (for lowest ranking firm) to 1 (for highest-ranking firm). Consequently, firms with a lower (higher) ranking engage in less (more) income smoothing. See (Zarowin 2002; Lundholm and Myers 2002). The Spearman correlation between percentile rankings and income smoothing ratio is positively significant (0.24) and the correlation between the percentile ranking and correlation of changes in accruals and cash flows is –0.91.

smoothing to be significantly and positively associated with cash flow volatility. I also deflate CEO stock options by the total value of CEO compensation and rerun the analysis, producing qualitatively similar results.[11] In addition, I specify bank debt as equal to one if a firm holds bank debt and zero otherwise. I find that bank debt is significant and negative only in the regressions in which earnings volatility and cash flow volatility are the dependent variables. Again, my results show that firms with outstanding bank debt have incentives to smooth earnings, to reduce earnings, and to reduce cash flow volatility. Finally, I use the market value of assets as an alternative deflator to the book value of assets as well as a proxy for firm size. Although my main results are qualitatively similar, I find that both firm size and the book-to-market ratio are highly significant in regressions where hedging is the dependent variable; however, the book-to-market ratio has the wrong sign contrary to expectations.

Alternative Specification: The use of pooled OLS will produce biased and inconsistent estimators if unobserved factors are correlated with the explanatory variables, resulting in omitted variable bias. To control for this possibility, I use a firm fixed-effects model as an alternative specification for my tests to control for unobserved factors affecting the use of derivatives. Unlike a pooled OLS regression, a fixed effects model explicitly considers how changes in the explanatory variables over time affect the change in the dependent variable over the same time period between and within firms, while controlling for any unobserved effects. In all my models, bank debt, derivative

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[11] The total value of CEO compensation is the sum of salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted, long-term incentive payout, and all other total. Figures are obtained from Compustat Execucomp database.

user, and the exposure coefficients are dropped from the equation because of a lack of variation when I examine year-year changes within firms. Therefore, I include an additional proxy, the ratio of foreign sales to total sales, to control for exchange rate exposure. In testing the robustness of my results, I specify three models: with and without the control variables over the 2000-2001 period and with control variables over the 1999-2001 period. The findings of my analyses for Hypotheses 2-5 are presented in Table 10, Panels A-F.

The results in Table 10, Panel A show cash flow volatility to be higher for derivative users compared to non-users in the period after implementation for Models 1 and 2. However, the coefficient, although positive, is insignificant in Model 3. If firms terminate derivatives or speculate, then cash flow volatility should increase from the increase in unhedged exposure. In Panels B and C, I find no significant differences in earnings volatility and income smoothing between derivative users and non-users. None of the interaction terms are highly significant despite weaker but qualitatively similar results to my earlier pooled OLS findings. Taken together, my results for Hypothesis 2 provide no conclusive evidence to support finding any significant differences in cash flow volatility, earnings volatility, and income smoothing between derivative users and non-users.

In my sub-sample analysis of derivative users in Table 10, Panel D, I find no conclusive evidence of any significant differences in the use of derivatives between firms that do not qualify (hold speculative derivatives) and those that do not hold such derivatives before and after the implementation of the standard. Therefore, my results do not support Hypothesis 3. On the other hand, I find weak evidence to support Hypothesis

4. In Model 3, the difference in derivatives with respect to smoothing is higher for firms that reported a transition adjustment in the period after implementation compared to other users in the period before. Finally, Table 10, Panel F shows significant differences in hedging between firms that terminated derivatives and non-terminating firms. Contrary to my expectations, the difference in derivatives with respect to earnings volatility is negative and statistically significant for firms that terminated derivatives in the period after implementation compared to non-terminating firms in the period before. The negative association between hedging and earnings volatility suggests that the termination of derivatives will reduce hedging activities and increase earnings volatility from the additional unhedged exposure. I find that many sample firms terminated derivatives- especially interest rate swaps primarily because these derivatives failed to meet the hedge accounting requirements of SFAS 133 (that is, these firms were probably speculating). I also find the coefficient on derivatives relative to smoothing is positive and statistically significant in Model 2 and marginally significant in Model 3, indicating that in the period after implementation of SFAS 133 the difference in hedging with respect to smoothing is higher for firms that terminated derivatives compared to non-terminating firms. If sample firms terminated derivatives in response to SFAS 133, then these firms are more likely to smooth earnings to reduce volatility.[12] These results provide some support for Hypothesis 5.

Thus far, I have assumed that all independent variables are exogenous. However, the choice to use derivatives is an endogenous decision. If the independent variable

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[12] Untabulated descriptive statistics show the terminating firms have higher mean smoothing, lower derivative use, higher cash flow volatility, and lower earnings volatility compared to non-terminating firms.

(hedging) is endogenous, it will be correlated with the unobservables in the model errors, potentially biasing my estimates and precluding findings of any significant differences. Furthermore, firms can manage the risk in alternative ways through operational and financial strategies for example, by changing or restructuring their assets to match their liabilities (so the firm is naturally hedged) or by using substitutes/complements for hedging. I find that sample firms such as Pepsico, McDonalds, Arrow Electronics, and First Data Corp. disclosed the use of natural hedges in their annual 10-K reports. If there are alternative ways that firms can hedge without using derivatives as part a of an overall risk management strategy, then an endogeneity bias could be driving my results (Beatty 1998). Therefore, I test for endogeneity bias by using a simultaneous equation model similar to Pincus and Rajgopal (2002) and Barton (2001). More specifically, I test whether smoothing and derivatives are jointly determined and are used as substitutes to manage volatility. I regress notional values and income smoothing on the control variables used in the study. In particular, I include additional control variables (excluded instruments) to overidentify the system of simultaneous equations.[13] I use Sargan's (1958) test of overidentifying restrictions to test the joint null hypothesis that the excluded instruments in each structural equation are valid instruments i.e., they are uncorrelated with the error terms and were correctly excluded from each equation. I also use the Hausman (1978) test to test the null hypothesis that the OLS estimates would yield consistent estimates and, consequently, not require the use of instrumental variables. My simultaneous equations take the following form:

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[13] These variables have been used in prior research by Pincus and Rajgopal 2002; Barton 2001; Graham and Rogers 2002; Allayannis and Ofek 2001.

$$\text{Deriv} = \text{Smooth} + \text{CFVol} + \text{EVol} + \text{BMRatio} + \text{Analyst} + \text{Tax} + \text{Options} + \text{After} + \text{Size} + \text{Divers} + \text{BDebt} + \text{Libor} + \text{FX} + \text{PPI} + \textit{FSales} + \textit{Yield} + \textit{Quick} + \text{Industry} \quad (7)$$

$$\text{Smooth} = \text{Deriv} + \text{CFVol} + \text{EVol} + \text{BMRatio} + \text{Analyst} + \text{Tax} + \text{Options} + \text{After} + \text{Size} + \text{Divers} + \text{Bdebt} + \text{Libor} + \text{FX} + \text{PPI} + \textit{Bonus} + \textit{Payout} + \textit{Shares} + \text{Industry} \quad (8)$$

A definition of the additional variables used in this study is provided in Appendix C. To identify the derivative equation, I use the ratio of foreign sales to total sales (FSales), dividend yield (Yield), and a substitute for hedging, the Quick ratio (Quick). On the other hand, the incentive to manage earnings in the smoothing equation is identified by CEO compensation (Bonus), shares owned by the CEO (Shares) and the dividend payout (Payout) ratio. I use two-stage least squares (2SLS) to estimate the structural equations. The results of my analysis are presented in Table 11, Panels A-B. In the smoothing equation in Table 11, Panel A, I find hedging to be positively and significantly related to smoothing. On the other hand, the coefficient on smoothing in the hedging equation is insignificant, implying that smoothing is not a determinant of hedging. Thus an increase in the use of derivatives will increase income smoothing, most likely, to reduce hedge ineffectiveness from the implementation of SFAS 133. The Hausman (1978) test provides no evidence to suggest that hedging is endogenous in the smoothing equation. When I extend my analysis over three years in Panel B, the Hausman (1978) test is also insignificant, and suggests that the OLS results will yield consistent estimates. Similarly, in the hedging equation, the null hypothesis of exogeneity cannot be rejected. Furthermore, the Sargan (1958) test of overidentifying

restrictions provides evidence of the validity of the excluded instruments in the structural equations.

My results differ from Barton (2001) who finds that hedging and smoothing are used as substitutes to reduce volatility. On the other hand, my results are similar to the findings of Pincus and Rajgopal (2002) that hedging is a determinant of smoothing and not vice versa. However, instead of a negative relation, I find a positive relation between derivatives and smoothing. If managers use derivatives to hedge or speculate, then they are likely to engage in a higher level of smoothing to reduce hedge ineffectiveness. In Panel A, I find the difference in smoothing to be statistically significant and higher in the period after implementation compared to the period before, consistent with my pooled OLS results. Turning to the other control variables, dividend payout is significantly related to smoothing, suggesting that smoothing increases with higher dividend payout rates. Similarly, the positive foreign sales ratio in the hedging equation is consistent with previous research. Other coefficients on bank debt, foreign exchange exposure, book-to-market ratio and firm size are also consistent with the pooled OLS results. Finally, when I test the sensitivity of my results over the three-year period; my findings in Table 11, Panel B are qualitatively similar and do not change the tenor of my findings.

As a further test of sensitivity, I break my sample into quintiles by their level of derivative use to assess whether volatility and smoothing varies with the extent of hedging. I then rerun the regressions for testing Hypotheses 3-5 to determine whether Statement 133 has any effect on extreme derivative users (top and bottom 20% of derivative users). The initial results (means) in Table 12 provide descriptive statistics on the volatility and smoothing variables relative to derivative non-users. The level of

smoothing appears to be inversely related to the level of derivative use; however, large derivative users (top 20%) appear to engage in the greatest amount of smoothing compared to other users and non-users. Cash flow volatility shows no systematic pattern with the level of hedging, but does show that non-users have the highest volatility while the top 20% has the lowest volatility. If the top 20% of users have the lowest cash flow volatility and engage in the most smoothing, then one would expect these firms to have the lowest earnings volatility as well. However, the results show these firms to have high earnings volatility that is exceeded only by the low derivative users. One possible explanation is that the standard induces the increase in earnings volatility as the firms increase the amount of derivatives they use, or these firms may be the ones most affected by the standard[14]. To provide further evidence on this issue, I rerun my regressions using only the top and bottom 20% of derivative users. The results of these regressions are presented in Table 13, Panels A-C. The results in Panel A show no significant differences (at 5% level) in hedging relative to volatility and smoothing between firms that qualify and those that do not qualify for hedge accounting in the bottom and top 20% of users. In Panel B, among large users, I find the difference in hedging relative to smoothing to be statistically significant and higher for users that report a transition adjustment compared to other users in the period after implementation. These results suggest that large derivative users reported higher transition amounts and were therefore more likely to have engaged in smoothing to reduce volatility. Finally, in Panel C,

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[14] I also compute the mean volatility and smoothing before and after by using deciles. I find the top 20% have the highest earnings volatility in the year prior and lowest earnings volatility in the year after. Similarly, mean smoothing is among the lowest in the year before and highest in the year after for this group.

although I find no significant differences among low derivative users, my results for large derivative users suggests otherwise. The difference in hedging relative to cash flow volatility (smoothing) is significantly lower (higher) for large users that terminated derivatives compared to other large non-terminating firms. If firms terminate derivatives, then cash flow volatility and earnings volatility will increase from the unhedged exposure. Since these firms are more likely to increase their derivative usage, they will also engage in a greater level of smoothing to reduce earnings volatility. These findings suggest that firms that are most concerned and affected by SFAS 133 may be the extreme derivative users that report high transition amounts and are more likely to terminate derivatives that do not meet the requirements of the standard.

Table 2 Panel A: Sample Selection

Firms	
500 firms	Fortune 500 list
(92) firms	Financial firms (SIC 6000-6999)
(61) firms	Regulated firms (SIC 4800-4999)
(11) firms	Non-publicly traded, subsidiaries, private, partnerships, cooperatives
(16) firms	Acquired firms and firms under Chapter 11 bankruptcy
(15) firms	Firms with missing financial data, no10K reports, insufficient data
= 305 firms	**Final sample of Fortune 500 firms**

Table 2 Panel B: Sample Composition

SIC Codes	**Description**	**Firms**	**%**
0-1999	Agricultural	16	5.25
2000-2399	Textile and apparel	28	9.18
2400-2799	Lumber, furniture, paper, publishing	19	6.28
2800-2999	Chemicals and Refining	32	10.49
3000-3499	Metals, machinery and construction	19	6.23
3500-3599	Industrial, commercial, and computer equipment	25	8.20
3600-3699	Electrical and electronic equipment	12	3.93
3700-3999	Transport equipment and instruments	30	9.84
4000-4999	Transportations and transport services	18	5.90
5000-5299	Wholesale Goods	24	7.87
5300-5499	General merchandise and food stores	21	6.89
5500-5699	Automotive dealers	11	3.61
5700-5999	Retail	19	6.23
7000-9999	Services	31	10.16
	Totals	**305**	**100%**

Table 3: Panel A Descriptive Statistics on 261 Derivative Users

Derivative Use:	**Frequency**	**Percent**
Non-users	44	14.4
Users	261	85.6
Adoption of SFAS 133 for Derivative Users:		
Early Adoption	8	3.1
Adoption after official date	253	96.9
Type of Risk Hedged:		
Interest Rate	228	87.7
Foreign Currency	193	73.9
Commodity	99	37.9
Other	37	14.2
Number of Hedged Risks:		
One risk	67	23.5
Two risks	113	43.4
Three risks	75	28.9
All four risks	11	4.2
Type of Instrument:		
Forward	201	77.0
Future	46	17.6
Option	136	52.1
Swap	233	89.2
Number of Instruments Used:		
1 instrument used	56	21.4
2 instruments	85	32.6
3 instruments	90	34.5
All 4 instruments	30	11.5
Termination of Derivative:		
Terminated Derivatives	55	21.1
No Termination	206	78.9
Derivative Use After Adoption of SFAS 133:		
Stopped derivative use	9	3.5
Continued derivative use	251	96.5
Hedge Accounting Treatment:		
Did not qualify	6	2.3
Qualify for hedge accounting	133	50.9
Partially qualify	122	46.7
Trading Derivatives:		
Hold Trading Derivatives	14	5.4
No Trading Derivatives	247	94.6
Transition Adjustment:		
Reported Transition Adjustment	147	56.3
No Transition Adjustment	114	43.7

Table 3: Panel B: Descriptive Statistics on 261 Derivative Users (2000-2001)

Impact of SFAS 133 Transition Adjustment on Earnings (261 users)						
Gain/Loss	**N**	**Q1**	**Median**	**Mean**	**Q3**	**SD**
Gain	29	1.0	3.0	8.8	8	12.8
Loss	46	-12.0	-3.3	-25.6	-2.0	72.6
Overall	75	-5.0	-1.4	-12.3	2.0	59.6
Impact of SFAS 133 Transition Adjustment on Equity (AOCI) (261 users)						
Gain	60	3.0	11.0	26.7	44.3	37.7
Loss	72	-16.4	-7.4	-42.3	-3.8	126.9
Overall	132	-9.0	-1	-10.9	7.5	102.7
Notional Values*						
Year	**N**	**Q1**	**Median**	**Mean**	**Q3**	**SD**
2000	189	125	412	1,153	1,147	2,304
2001	188	150.0	575	1,269	1,504	1,921
Overall	377	150	477	1,211	1,353	2,120

***** Excludes 30 derivative users without consecutive year observations on FV or NV

Table 3 Panel C: Descriptive Statistics of 305 Sample Firms (2000-2001)

Variable	**N**	**Q1**	**Median**	**Mean**	**Q3**	**Std. Dev**
Net Sales	610	4,097	6,893	13,942	14,437	23,941
Income before Ext Items	610	70	226	640	646	1,902
Dependent Variables:						
User	610	1	1	0.86	1	0.35
Earnings Volatility (2000)	284	.49	0.56	0.97	0.65	3.69
Earnings Volatility (2001)	288	.47	0.56	1.60	0.74	6.70
Cash Flow Volatility (2000)	304	.46	0.80	2.17	1.58	6.79
Cash Flow Volatility (2001)	305	.42	0.79	2.32	1.49	7.92
Smoothing Ratio (2000)	284	.59	1.08	1.64	2.04	1.70
Smoothing Ratio (2001)	288	.64	1.33	2.07	2.66	2.22
Independent Variables:						
B/M Ratio	610	.85	.362	.469	.612	.546
After	610	0	.5	.5	1	.5
Firm Size ($mil) – Assets	610	3167	6945	14,420	14,298	36,612
Tax	610	0	0	0.27	1	0.44
Bank Debt	610	0	1	0.70	1	0.46
Options (000)	598	613	1,208	2,592	2,463	5,992
Analyst (Number)	610	13	19	20	26	10.4
Diversification	610	0	0.530	0.557	0.959	0.523
Libor	298	-.0049	.0048	.0049	.0209	.0606
FX	298	-.0404	.0001	.0227	.0646	.1825
PPI	297	-.1366	-.0155	.0127	.0726	.4262

Table 4: Tests of Differences between Derivative Users and Non-Users (2000-2001)

	Mean		Medians			test of differences		Wilcoxon rank-sum test	
Variable	**User**	**Non-User**	**User**	**Non-User**	**Predict**	**t stat**	**p-value**	**z-stat**	**p-value**
Evol	0.96	0.97	0.56	0.59	U>NU	0.01	0.497	2.44	**0.007**
CFVol	1.96	2.30	0.78	0.91	NU>U	0.46	0.322	0.86	0.194
Smooth	1.90	1.64	1.17	1.09	U>NU	-1.09	0.138	0.30	0.381
Bdebt	0.72	0.52	1	1	U>NU	-3.46	**0.000**	-3.71	**0.000**
BMRatio	0.46	0.57	0.37	0.35	NU>U	1.72	**0.044**	0.79	0.215
Analyst	2.88	2.72	2.94	2.94	U>NU	-2.11	**0.019**	-1.61	0.054
Tax	0.29	0.11	0	0	U>NU	-4.50	**0.000**	-3.49	**0.000**
Options	7.18	6.86	7.11	7.10	U-N=0	-2.43	**0.015**	-1.40	0.162
Size	8.94	8.24	8.90	8.45	U>NU	-5.75	**0.000**	-5.06	**0.000**
Divers	.585	.388	.572	.162	U>NU	-3.294	**0.000**	-3.356	**0.000**

Notes: All variables except indicator variables, options, analyst and firm size have been winsorized at the 1% and 99% levels. P-values in bold reflect significance at the .01 and .05 levels respectively depending on two-tailed or one-tailed prediction. Definition of variables is provided in Appendix C. Test of differences not computed on exposure coefficients

Table 5: Correlations between Dependent Variables and Independent Variables (2000-2001)

	After	BMRatio	User	NV	Evol	Cfvol	Smooth	BDebt	Size	Tax	Options	Divers	Analyst
After	1	.000	.000	.087	.045	-.004	.082*	.000	.031	-.015	.067	.010	-.045
BMRatio	-.047	1	-.032	-.187**	.130**	.214**	.379**	.048	-.111**	-.019	-.289**	.020	-.409**
User	.000	-.090*	1	.	-.102*	-.035	.013	.150**	.205**	.141**	.058	.136**	.066
NV	.028	-.106*	.	1	-.062	-.010	-.009	.188**	-.026	-.030	.042	.032	-.072
Evol	.082	.101*	-.000	.026	1	.213**	.115**	-.005	-.031	-.088*	-.028	-.077	-.106*
Cfvol	-.001	.144**	-.023	-.009	.019	1	.693**	-.016	-.226**	-.024	-.118**	-.064	-.262**
Smooth	.107*	.311**	.046	.056	.089*	.289**	1	-.002	-.207**	.037	-.186**	-.055	-.294**
BDebt	.000	.028	.150**	.129**	-.079	-.001	.015	1	.056	.056	.017	-.021	.005
Size	.037	-.097*	.227**	-.073	.008	-.064	-.133**	.073	1	-.042	.402**	.245**	.533**
Tax	-.015	-.057	.141**	-.096	-.092*	.008	.036	.056	-.045	1	-.108**	-.024	-.012
Options	.056	-.217**	.099*	.109*	.022	.044	-.098*	.027	.409**	-.089*	1	.009	.404**
Divers	.011	-.065	.132**	-.014	-.039	-.057	-.047	-.019	.277**	-.025	.029	1	
Analyst	-.036	-.374**	.094*	-.023	-.036	-.081*	-.241**	-.028	.520**	-.004	.420**	-.003	1

Notes: All variables except indicator variables, options, analyst and firm size have been winsorized at the 1% and 99% levels. Values below the diagonal reflect Pearson's correlation and values above the diagonal reflect Spearman rank correlation. **, * denote 1% and 5% significant levels respectively based on two-tailed tests. Correlations of exposure coefficients omitted

Table 6
Determinants of Incentives for Derivatives between Users and Non-Users, 1999-2001

Independent Variables	Sign	Model 1 (00-01): Coeff. (z-stat)	Model 2 (99-01): Coeff. (z-stat)
Intercept	+/-	-4.709 (-5.17)***	-4.579 (-6.19)***
Evol	+	0.014 (0.32)	0.021 (0.56)
CFVol	+	0.007 (0.54)	0.008 (0.71)
Smooth	-	0.194 (2.64)***	0.202 (3.46)***
After	+	-0.179 (-1.01)	-0.213 (-1.41)*
BDebt	+	0.665 (3.52)***	0.660 (4.36)***
B/M Ratio	-	-0.658 (-3.38)***	-0.557 (-3.20)***
Analyst	+/-	-0.339 (-2.05)**	-0.246 (-1.72)*
Tax	+/-	0.678 (2.81)***	0.707 (3.59)***
Options	+/-	0.227 (3.06)***	0.204 (3.27)***
Size	+/-	0.486 (4.17)***	0.451 (4.67)***
Divers	+/-	-0.072 (-0.34)	-0.027 (-0.16)
Libor	+/-	3.730 (1.75)*	3.697 (2.13)**
FX	+/-	0.699 (1.28)	0.729 (1.62)
PPI	+/-	1.096 (3.34)***	1.017 (3.72)***
Observations		409	610
LR Chi-sq		125	175
P-value		0.0000	0.0000
Pseudo R-Square		0.336	0.329
% Correctly Predicted		83.6%	84.6%

Notes: All variables except dummy variables and firm size are winsorized at the 1% 99% levels. ***, **, * denote the 1%, 5% and 10% significance levels respectively based on one-tailed tests, two-tailed otherwise. Coefficients on industry dummies are not reported. T-statistics are based on White heteroskedasticity robust standard-errors

Table 7: Panel A
Estimation of Effects of SFAS 133 on Cash Flow Volatility (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.121 (0.05)	0.596 (0.21)
Evol	+/-	-0.051 (-0.55)	0.117 (0.61)
Smooth	-	0.708 (2.84)***	0.869 (2.29)**
After	+/-	-0.463 (-1.03)	-2.241 (-1.58)
User	+/-	-0.321 (-0.40)	-1.406 (-1.06)
Bdebt	+/-	-0.337 (-0.59)	-0.318 (-0.55)
B/M Ratio	+/-	1.226 (0.91)	1.029 (0.77)
Analyst	+/-	-0.469 (-0.68)	-0.466 (-0.66)
Tax	+/-	0.030 (0.06)	0.053 (0.11)
Options	+/-	0.505 (1.97)**	0.506 (1.96)*
Size	+/-	-0.055 (-0.18)	-0.058 (-0.19)
Divers	+/-	-0.182 (-0.37)	-0.196 (-0.40)
Libor	+/-	-6.615 (-1.12)	-5.868 (-0.98)
FX	+/-	4.006 (1.45)	4.089 (1.48)
PPI	+/-	0.497 (0.39)	0.614 (0.47)
After*User	+		2.828 (1.64)*
Evol*User*After	+		-0.269 (-1.29)
Smooth*User*After	+		-0.281 (-0.61)
Observations		541	541
Adjusted R^2		0.099	0.103

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, options, size and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 7: Panel B
Estimation of Effects of SFAS 133 on Earnings Volatility (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.345 (0.31)	0.308 (0.32)
CFVol	+/-	-0.008 (-0.56)	0.005 (0.28)
Smooth	-	0.050 (0.99)	0.077 (1.17)
After	+	0.321 (1.93)**	0.557 (1.37)*
User	+	0.172 (0.53)	0.325 (1.16)
Bdebt	+/-	-0.562 (-1.95)*	-0.564 (-1.96)**
B/M Ratio	+/-	0.549 (1.26)	0.514 (1.16)
Analyst	+/-	-0.073 (-0.38)	-0.093 (-0.47)
Tax	+/-	-0.426 (-2.76)***	-0.435 (-2.74)***
Options	+/-	0.033 (0.43)	0.029 (0.38)
Size	+/-	0.120 (1.20)	0.119 (1.18)
Divers	+/-	-0.352 (-1.48)	-0.370 (-1.52)
Libor	+/-	1.472 (0.63)	1.454 (0.62)
FX	+/-	-0.227 (-0.30)	-0.217 (-0.29)
PPI	+/-	0.027 (0.06)	0.005 (0.01)
After*User	+		-0.095 (-0.22)
CFVol*User*After	+		-0.070 (-1.43)*
Smooth*User*After	+		-0.037 (-0.40)
Observations		541	541
Adjusted R^2		0.013	0.011

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, options, size and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 7: Panel C
Estimation of Effects of SFAS 133 on Income Smoothing (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	1.633 (2.12)**	1.447 (1.81)*
Evol	+	0.036 (1.05)	0.030 (0.50)
CFVol	-	0.082 (3.25)***	0.058 (1.81)**
After	+	0.466 (3.05)***	0.493 (1.43)*
User	+	0.941 (3.91)***	0.926 (3.45)***
Bdebt	+/-	-0.069 (-0.40)	-0.059 (-0.35)
B/M Ratio	+/-	1.171 (3.98)***	1.207 (4.12)***
Analyst	+/-	-0.223 (-1.13)	-0.196 (-1.00)
Tax	+/-	0.176 (0.97)	0.196 (1.08)
Options	+/-	-0.010 (-0.17)	-0.007 (-0.10)
Size	+/-	-0.108 (-1.12)	-0.106 (-1.10)
Divers	+/-	0.096 (0.60)	0.125 (0.79)
Libor	+/-	0.021 (0.01)	0.109 (0.06)
FX	+/-	-0.769 (-1.87)*	-0.791 (-1.89)*
PPI	+/-	-0.004 (-0.02)	0.036 (0.14)
After*User	+		-0.261 (-0.65)
EVol*User*After	+		0.017 (0.23)
CFVol*User*After	+		0.130 (1.42)*
Observations		541	541
Adjusted R^2		0.212	0.216

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, size, options and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 7 Panel D
Estimation of Effects of SFAS 133 on Cash Flow Volatility (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	1.117 (0.53)	1.249 (0.58)
Evol	+/-	-0.041 (-0.66)	0.025 (0.28)
Smooth	-	0.671 (3.66)***	0.741 (3.29)***
After	+/-	-0.398 (-1.03)	-1.306 (-1.50)
User	+/-	-0.066 (-0.11)	-0.463 (-0.59)
Bdebt	+/-	0.047 (0.12)	0.051 (0.13)
B/M Ratio	+/-	0.562 (0.53)	0.483 (0.46)
Analyst	+/-	-0.376 (-0.70)	-0.369 (-0.68)
Tax	+/-	0.422 (0.95)	0.424 (0.96)
Options	+/-	0.406 (1.82)*	0.403 (1.82)*
Size	+/-	-0.090 (-0.43)	-0.094 (-0.45)
Divers	+/-	-0.409 (-0.97)	-0.402 (-0.95)
Libor	+/-	-6.238 (-1.45)	-5.986 (-1.37)
FX	+/-	2.473 (1.27)	2.504 (1.27)
PPI	+/-	0.391 (0.43)	0.434 (0.47)
After*User	+		1.549 (1.39)*
Evol*User*After	+		-0.151 (-1.28)
Smooth*User*After	+		-0.172 (-0.48)
Observations		806	806
Adjusted R^2		0.087	0.086

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, size, options and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 7 Panel E
Estimation of Effects of SFAS 133 on Earnings Volatility (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.991 (1.11)	0.945 (1.19)
CFVol	+/-	-0.006 (-0.68)	0.002 (0.19)
Smooth	-	0.044 (1.03)	0.049 (0.96)
After	+	0.233 (1.44)*	0.510 (1.24)
User	+	0.226 (0.97)	0.344 (1.72)**
Bdebt	+/-	-0.423 (-1.98)**	-0.428 (-1.98)**
B/M Ratio	+/-	0.395 (1.18)	0.381 (1.13)
Analyst	+/-	-0.118 (-0.55)	-0.131 (-0.61)
Tax	+/-	-0.268 (-1.88)*	-0.277 (-1.91)*
Options	+/-	-0.019 (-0.24)	-0.020 (-0.26)
Size	+/-	0.140 (1.79)*	0.141 (1.78)*
Divers	+/-	-0.437 (-2.17)**	-0.444 (-2.18)**
Libor	+/-	2.520 (1.33)	2.479 (1.30)
FX	+/-	-0.350 (-0.58)	-0.332 (-0.55)
PPI	+/-	0.013 (0.04)	-0.003 (-0.01)
After*User	+		-0.210 (-0.45)
CFVol*User*After	+		-0.064 (-1.60)*
Smooth*User*After	+		-0.004 (-0.05)
Observations		806	806
Adjusted R^2		0.017	0.016

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, size, options and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 7 Panel F
Estimation of Effects of SFAS 133 on Income Smoothing (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	1.332 (2.17)**	1.225 (1.95)*
Evol	+	0.032 (1.05)	0.030 (0.68)
CFVol	-	0.076 (3.85)***	0.060 (2.79)***
After	+	0.362 (2.63)***	0.383 (1.23)
User	+	0.864 (4.66)***	0.857 (4.42)***
Bdebt	+/-	-0.121 (-0.90)	-0.109 (-0.82)
B/M Ratio	+/-	1.327 (5.21)***	1.342 (5.28)***
Analyst	+/-	-0.220 (-1.30)	-0.199 (-1.19)
Tax	+/-	0.050 (0.36)	0.069 (0.49)
Options	+/-	0.042 (0.72)	0.044 (0.76)
Size	+/-	-0.073 (-0.94)	-0.072 (-0.93)
Divers	+/-	0.009 (0.07)	0.023 (0.17)
Libor	+/-	-0.014 (-0.01)	0.051 (0.04)
FX	+/-	-0.500 (-1.54)	-0.535 (-1.62)
PPI	+/-	0.085 (0.41)	0.112 (0.53)
After*User	+		-0.238 (-0.65)
EVol*User*After	+		0.010 (0.18)
CFVol*User*After	+		0.123 (1.48)*
Observations		806	806
Adjusted R^2		0.212	0.216

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, size, options and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. T-statistics are based on White heteroskedasticity robust standard errors. See Appendix C for variable definitions.

Table 8
Estimation of Effects of SFAS 133 on Derivatives (2000-2001)

Independent Variables	Predicted Sign	User (Probit) Coeff. (z-stat)	NV (Heckman) Coeff. (z-stat)
Intercept	+/-	-0.561 (-0.88)	0.033 (0.26)
EVol	+	0.023 (0.85)	0.002 (0.40)
CFVol	+/-	-0.001 (-0.12)	0.001 (0.54)
Smooth	+	0.117 (3.28)***	0.012 (1.82)**
After	+/-	-0.165 (-1.21)	-0.039 (-1.64)*
DNQ	+/-	0.465 (2.58)***	0.077 (2.39)**
BDebt	+/-	0.534 (3.94)***	0.079 (2.50)**
B/M Ratio	+/-	-0.203 (-1.19)	-0.022 (-0.73)
Analyst	+/-	-0.094 (-0.73)	-0.031 (-1.49)
Tax	+/-	0.454 (3.29)***	
Options	+/-	0.163 (2.66)***	0.039 (3.52)***
Size	+/-	-0.069 (-0.89)	-0.030 (-2.27)**
Divers	+/-	0.004 (0.03)	-0.013 (-0.67)
Libor	+/-	-8.708 (-3.61)***	-0.189 (-0.48)
FX	+/-	-0.099 (-0.27)	-0.110 (-2.08)**
PPI	+/-	-1.010 (-3.48)***	-0.073 (-1.50)
Mills	+/-		0.101 (1.34)
Observations		541	541
Pseudo R^2		0.134	

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise. All variables except dummy variables, size, options and analyst are winsorized at 1% and 99% to reduce the undue influence of extreme outliers. Dependent variable for probit model equals 1 for derivative user; 0 otherwise. See Appendix A for variable definitions.

Table 9 Panel A
Effects of Hedge Accounting Treatment on Derivatives (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.104 (1.09)	0.084 (0.86)
EVol	+	0.002 (0.37)	0.011 (3.32)***
CFVol	+	0.000 (0.07)	-0.000 (-0.10)
Smooth	-	0.009 (1.90)*	0.008 (0.82)
After	+/-	-0.025 (-1.27)	-0.010 (-0.39)
DNQ	+/-	0.057 (2.31)**	0.044 (1.54)
BDebt	+	0.053 (2.55)**	0.053 (2.50)**
B/M Ratio	+/-	-0.021 (-0.83)	-0.029 (-1.22)
Analyst	+/-	-0.016 (-1.03)	-0.015 (-0.96)
Tax	+/-	-0.015 (-0.96)	-0.014 (-0.92)
Options	+/-	0.029 (2.79)***	0.030 (2.79)***
Size	+/-	-0.026 (-1.79)*	-0.025 (-1.68)*
Divers	+/-	-0.010 (-0.57)	-0.009 (-0.48)
Libor	+/-	0.106 (0.36)	0.130 (0.45)
FX	+/-	-0.106 (-1.85)*	-0.100 (-1.68)*
PPI	+/-	-0.028 (-1.02)	-0.024 (-0.90)
CFVol*After	+/-		-0.003 (-0.53)
CFVol*DNQ*After	+		0.007 (0.82)
EVol*After	+/-		-0.018 (-3.65)***
EVol*DNQ*After	+		0.004 (0.70)
Smooth*After	+/-		0.004 (0.34)
Smooth*DNQ*After	+		-0.001 (-0.07)
Observations		339	339
Adjusted R^2		0.124	0.119

Table 9: Panel B
Effects of Transition Adjustment on Derivatives (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.090 (1.00)	0.060 (0.65)
EVol	+	0.003 (0.64)	0.012 (3.50)***
CFVol	+	0.000 (0.12)	0.001 (0.49)
Smooth	-	0.010 (2.11)**	0.008 (0.84)
After	+/-	-0.022 (-1.04)	0.007 (0.24)
TA	+/-	0.043 (1.78)*	-0.022 (-0.65)
BDebt	+	0.049 (2.35)**	0.046 (2.22)**
B/M Ratio	+/-	-0.022 (-0.89)	-0.024 (-1.05)
Analyst	+/-	-0.014 (-0.91)	-0.005 (-0.34)
Tax	+/-	-0.015 (-1.00)	-0.017 (-1.07)
Options	+/-	0.030 (2.82)***	0.032 (2.98)***
Size	+/-	-0.024 (-1.75)*	-0.025 (-1.81)*
Divers	+/-	-0.007 (-0.41)	-0.002 (-0.09)
Libor	+/-	0.133 (0.47)	0.196 (0.71)
FX	+/-	-0.106 (-1.84)*	-0.095 (-1.75)*
PPI	+/-	-0.027 (-0.97)	-0.020 (-0.74)
CFVol*After	+/-		-0.003 (-0.46)
CFVol*TA*After	+		-0.001 (-0.12)
EVol*After	+/-		-0.011 (-3.54)***
EVol*TA*After	+		0.008 (0.50)
Smooth*After	+/-		-0.001 (-0.09)
Smooth*TA*After	+		0.030 (1.92)**
Observations		339	339
Adjusted R^2		0.118	0.127

Table 9: Panel C
Effects of Hedge Termination on Derivatives (2000-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.071 (0.79)	0.042 (0.44)
EVol	+	0.002 (0.50)	0.011 (3.43)***
CFVol	+	0.000 (0.13)	0.000 (0.20)
Smooth	-	0.010 (1.93)*	0.008 (0.90)
After	+/-	0.001 (0.07)	0.007 (0.27)
Term	+/-	-0.000 (-0.00)	0.029 (0.61)
Bdebt	+	0.052 (2.50)**	0.051 (2.43)***
B/M Ratio	+/-	-0.022 (-0.88)	-0.031 (-1.31)
Analyst	+/-	-0.018 (-1.14)	-0.018 (-1.12)
Tax	+/-	-0.014 (-0.88)	-0.011 (-0.74)
Options	+/-	0.031 (2.83)***	0.032 (2.89)***
Size	+/-	-0.021 (-1.52)	-0.021 (-1.44)
Divers	+/-	-0.008 (-0.44)	-0.006 (-0.29)
Libor	+/-	0.153 (0.54)	0.172 (0.62)
FX	+/-	-0.110 (-1.90)*	-0.111 (-1.88)*
PPI	+/-	-0.023 (-0.85)	-0.026 (-0.99)
CFVol*After	+/-		0.003 (0.54)
CFVol*Term*After	+		-0.011 (-1.13)
EVol*After	+/-		-0.016 (-3.09)***
EVol*Term*After	+		-0.007 (-0.10)
Smooth*After	+/-		0.003 (0.28)
Smooth*Term*After	+		-0.004 (-0.23)
Observations		339	339
Adjusted R^2		0.109	0.107

Table 9 Panel D
Effects of Hedge Accounting Treatment on Derivatives (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.056 (0.72)	0.040 (0.51)
EVol	+	0.002 (0.79)	0.006 (2.06)**
CFVol	+	-0.000 (-0.38)	-0.000 (-0.59)
Smooth	-	0.009 (2.59)***	0.008 (1.54)*
After	+/-	-0.015 (-0.89)	-0.008 (-0.34)
DNQ	+/-	0.053 (2.25)**	0.042 (1.48)
BDebt	+	0.049 (2.84)***	0.048 (2.79)***
B/M Ratio	+/-	-0.020 (-1.07)	-0.022 (-1.20)
Analyst	+/-	-0.010 (-0.79)	-0.010 (-0.75)
Tax	+/-	-0.008 (-0.67)	-0.008 (-0.68)
Options	+/-	0.019 (1.79)*	0.019 (1.84)*
Size	+/-	-0.015 (-1.25)	-0.014 (-1.18)
Divers	+/-	-0.005 (-0.29)	-0.004 (-0.26)
Libor	+/-	0.045 (0.21)	0.052 (0.24)
FX	+/-	-0.087 (-2.08)**	-0.085 (-1.97)**
PPI	+/-	-0.027 (-1.33)	-0.026 (-1.26)
CFVol*After	+/-		-0.002 (-0.40)
CFVol*DNQ*After	+		0.005 (0.74)
EVol*After	+/-		-0.012 (-2.75)***
EVol*DNQ*After	+		0.003 (0.56)
Smooth*After	+/-		0.003 (0.47)
Smooth*DNQ*After	+		0.000 (0.04)
Observations		503	503
Adjusted R^2		0.113	0.108

Table 9: Panel E
Effects of Transition Adjustment on Derivatives (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.047 (0.63)	0.023 (0.30)
EVol	+	0.003 (1.03)	0.006 (2.08)**
CFVol	+	-0.000 (-0.29)	-0.000 (-0.11)
Smooth	-	0.010 (2.76)***	0.008 (1.60)*
After	+/-	-0.011 (-0.62)	0.009 (0.37)
TA	+/-	0.039 (1.70)*	-0.024 (-0.71)
BDebt	+	0.046 (2.68)***	0.043 (2.52)**
B/M Ratio	+/-	-0.021 (-1.12)	-0.018 (-1.05)
Analyst	+/-	-0.009 (-0.69)	-0.004 (-0.27)
Tax	+/-	-0.009 (-0.72)	-0.010 (-0.83)
Options	+/-	0.019 (1.80)*	0.020 (1.93)*
Size	+/-	-0.014 (-1.20)	-0.014 (-1.22)
Divers	+/-	-0.003 (-0.16)	0.000 (0.02)
Libor	+/-	0.062 (0.29)	0.096 (0.45)
FX	+/-	-0.087 (-2.07)**	-0.082 (-2.02)**
PPI	+/-	-0.027 (-1.30)	-0.022 (-1.09)
CFVol*After	+/-		-0.001 (-0.12)
CFVol*TA*After	+		-0.001 (-0.11)
EVol*After	+/-		-0.011 (-2.64)***
EVol*TA*After	+		0.007 (0.50)
Smooth*After	+/-		-0.001 (-0.18)
Smooth*TA*After	+		0.029 (1.87)**
Observations		503	503
Adjusted R^2		0.109	0.113

Table 9: Panel F
Effects of Hedge Termination on Derivatives (1999-2001)

Independent Variables	Predicted Sign	Model 1: Coeff. (t-stat)	Model 2: Coeff. (t-stat)
Intercept	+/-	0.035 (0.47)	0.014 (0.18)
EVol	+	0.002 (0.84)	0.006 (2.06)**
CFVol	+	-0.000 (-0.30)	-0.000 (-0.39)
Smooth	-	0.009 (2.60)***	0.008 (1.61)*
After	+/-	0.011 (0.79)	0.010 (0.49)
Term	+/-	-0.008 (-0.30)	0.012 (0.30)
Bdebt	+	0.048 (2.80)***	0.047 (2.73)***
B/M Ratio	+/-	-0.020 (-1.07)	-0.022 (-1.22)
Analyst	+/-	-0.011 (-0.85)	-0.010 (-0.80)
Tax	+/-	-0.008 (-0.64)	-0.007 (-0.61)
Options	+/-	0.019 (1.80)*	0.020 (1.89)*
Size	+/-	-0.012 (-1.02)	-0.011 (-0.97)
Divers	+/-	-0.003 (-0.21)	-0.002 (-0.15)
Libor	+/-	0.074 (0.34)	0.077 (0.36)
FX	+/-	-0.089 (-2.09)**	-0.090 (-2.09)**
PPI	+/-	-0.024 (-0.21)	-0.026 (-1.27)
CFVol*After	+/-		0.004 (0.80)
CFVol*Term*After	+		-0.008 (-0.92)
EVol*After	+/-		-0.010 (-2.32)**
EVol*Term*After	+		-0.007 (-0.12)
Smooth*After	+/-		0.003 (0.49)
Smooth*Term*After	+		-0.004 (-0.23)
Observations		503	503
Adjusted R^2		0.104	0.099

Table 10 Panel A: Fixed Effects Model of SFAS 133 on Cash Flow Volatility (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	0.587 (1.04)	-24.926 (-1.22)	0.819 (0.07)
EVol	+	-0.006 (-0.02)	-0.045 (-0.18)	-0.044 (-0.27)
Smooth	-	0.941 (3.43)***	0.951 (3.19)***	0.533 (2.86)***
After	+/-	-2.326 (-2.01)**	-2.485 (-1.97)**	-1.405 (-1.38)
User	+/-	Dropped	Dropped	-0.637 (-0.10)
BDebt			Dropped	Dropped
BMRatio	+/-		2.256 (1.19)	1.627 (1.37)
Analyst	+/-		2.519 (1.53)	0.111 (0.11)
Tax	+/-		1.620 (1.10)	0.556 (0.58)
Options	+/-		0.325 (0.46)	0.556 (1.30)
Size	+/-		2.212 (0.96)	0.037 (0.03)
Fsales	+/-		-22.119 (-1.93)*	-19.149 (-4.06)***
Divers	+/-		0.381 (0.09)	-0.271 (-0.13)
After*User	+	2.796 (2.00)**	2.814 (1.89)**	1.410 (1.17)
EVol*After*User	+	-0.076 (-0.24)	0.035 (0.11)	-0.047 (-0.20)
Smooth*After*User	+	-0.273 (-0.98)	-0.265 (-0.89)	0.013 (0.06)
Observations		572	546	812
Overall R^2		0.083	0.031	0.022

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 10 Panel B: Fixed Effects Model of SFAS 133 on Earnings Volatility (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	0.770 (3.87)***	11.691 (1.61)	7.206 (1.79)*
CFVol	+	0.009 (0.33)	0.018 (0.66)	-0.005 (-0.28)
Smooth	-	0.021 (0.20)	-0.031 (-0.28)	0.029 (0.45)
After	+	0.533 (1.25)	0.860 (1.91)**	0.682 (1.91)**
User	+	Dropped	Dropped	0.218 (0.10)
Bdebt			Dropped	Dropped
BMRatio	+/-		1.597 (2.39)**	0.749 (1.80)*
Analyst	+/-		0.943 (1.57)	0.050 (0.13)
Tax	+/-		-1.462 (-2.84)***	-0.640 (-1.93)*
Options	+/-		-0.326 (-1.28)	-0.245 (-1.64)
Size	+/-		-1.486 (-1.82)*	-0.662 (-1.57)
Fsales	+/-		2.049 (0.50)	1.651 (0.98)
Divers	+/-		1.701 (1.11)	0.526 (0.74)
After*User	+	-0.207 (-0.41)	-0.415 (-0.80)	-0.445 (-1.08)
CFVol*After*User	+	-0.081 (-1.01)	-0.116 (-1.34)*	-0.021 (-0.34)
Smooth*After*User	+	0.018 (0.16)	0.085 (0.74)	0.018 (0.22)
Observations		572	546	812
Overall R^2		0.010	0.003	0.003

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 10 Panel C: Fixed Effects Model of SFAS 133 on Income Smoothing (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	1.491 (13.45)***	9.355 (1.68)*	5.274 (1.65)*
EVol	+	0.049 (0.70)	0.035 (0.50)	0.034 (0.76)
CFVol	+	0.050 (2.54)***	0.047 (2.35)***	0.034 (2.46)***
After	+	0.292 (0.88)	0.494 (1.43)*	0.411 (1.45)*
User	+	Dropped	Dropped	0.131 (0.08)
Bdebt			Dropped	Dropped
BMRatio	+/-		1.024 (1.99)**	1.169 (3.59)***
Analyst	+/-		-0.219 (-0.48)	-0.355 (-1.19)
Tax	+/-		0.245 (0.61)	0.169 (0.63)
Options	+/-		0.153 (0.79)	0.129 (1.08)
Size	+/-		-1.041 (-1.66)*	-0.539 (-1.61)
FSales	+/-		0.131 (0.04)	1.988 (1.49)
Divers	+/-		0.463 (0.39)	0.068 (0.12)
After*User	+	0.112 (0.30)	-0.039 (-0.10)	-0.085 (-0.27)
EVol*After*User	+	-0.050 (-0.56)	-0.037 (-0.41)	-0.023 (-0.35)
CFVol*After*User	+	0.059 (1.03)	0.059 (0.99)	0.058 (1.25)
Observations		572	546	812
Overall R^2		0.104	0.114	0.111

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 10 Panel D : Fixed Effects Model of SFAS 133 on Hedge Acct. Treatment (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	0.132 (13.69)***	0.753 (2.47)**	0.301 (1.60)
EVol	+	-0.009 (-2.47)***	-0.008 (-1.99)**	-0.006 (-2.23)**
CFVol	+	-0.000 (-0.22)	0.000 (0.02)	0.000 (0.23)
Smooth	-	0.000 (0.08)	0.001 (0.23)	-0.006 (-1.67)**
After	+/-	-0.010 (-0.68)	-0.007 (-0.40)	0.001 (0.05)
Qualify	+/-	0.015 (0.69)	0.028 (1.22)	0.001 (0.04)
BDebt	+/-		Dropped	Dropped
BMRatio	+/-		-0.021 (-0.72)	-0.021 (-1.02)
Analyst	+/-		0.022 (0.83)	-0.001 (-0.07)
Tax	+/-		0.004 (0.19)	-0.010 (-0.59)
Options	+/-		0.000 (0.03)	-0.014 (-1.57)
Size	+/-		-0.087 (-2.66)***	-0.009 (-0.41)
FSales	+/-		0.209 (1.04)	0.132 (1.41)
Divers	+/-		0.062 (0.88)	-0.008 (-0.20)
EVol*After	+/-	0.010 (1.07)	0.010 (1.03)	0.003 (0.35)
EVol*DNQ*After	+	-0.001 (-0.14)	-0.004 (-0.41)	0.003 (0.30)
CFVol*After	+/-	-0.002 (-0.51)	-0.004 (-0.70)	-0.005 (-1.22)
CFVol*DNQ*After	+	0.002 (0.40)	0.004 (0.83)	0.005 (1.02)
Smooth*After	+/-	0.006 (1.04)	0.005 (0.86)	0.010 (2.17)**
Smooth*DNQ*After	+	-0.008 (-1.12)	-0.011 (-1.53)*	-0.003 (-0.50)
Observations		357	339	502
Overall R^2		0.002	0.023	0.019

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 10 Panel E: Fixed Effects Model of SFAS 133 on Transition Adj. (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	0.128 (13.13)***	0.769 (2.54)**	0.286 (1.52)
EVol	+	-0.008 (-2.12)**	-0.007 (-1.74)**	-0.006 (-2.20)**
CFVol	+	-0.000 (-0.46)	-0.000 (-0.32)	0.000 (0.39)
Smooth	-	0.002 (0.49)	0.003 (0.51)	-0.005 (-1.54)*
After	+/-	0.019 (1.20)	0.028 (1.57)	0.022 (1.35)
TA	+/-	-0.045 (-1.99)**	-0.045 (-1.85)*	-0.044 (-1.96)*
Bdebt	+/-		Dropped	Dropped
BMRatio	+/-		-0.003 (-0.12)	-0.014 (-0.72)
Analyst	+/-		0.012 (0.48)	-0.001 (-0.09)
Tax	+/-		0.009 (0.39)	-0.011 (-0.63)
Options	+/-		-0.000 (-0.04)	-0.015 (-1.75)*
Size	+/-		-0.087 (-2.68)***	-0.007 (-0.32)
FSales	+/-		0.216 (1.09)	0.133 (1.44)
Divers	+/-		0.080 (1.16)	-0.002 (-0.04)
EVol*After	+/-	0.008 (1.36)	0.005 (0.89)	0.005 (1.07)
EVol*TA*After	+	0.001 (0.09)	0.006 (0.50)	-0.006 (-0.53)
CFVol*After	+/-	-0.000 (-0.12)	0.000 (0.11)	-0.005 (-0.99)
CFVol*TA*After	+	0.000 (0.03)	-0.002 (-0.33)	0.004 (0.65)
Smooth*After	+/-	-0.002 (-0.39)	-0.004 (-0.69)	0.006 (1.18)
Smooth*TA*After	+	0.011 (1.39)*	0.011 (1.27)	0.015 (1.87)**
Observations		357	339	502
Overall R^2		0.000	0.020	0.019

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 10 Panel F: Fixed Effects Model of SFAS 133 on Termination (1999-2001)

Independent Variables	Predicted Sign	Model 1 (2000-2001): Coeff. (t-stat)	Model 2 (2000-2001): Coeff. (t-stat)	Model 3 (1999-2001): Coeff. (t-stat)
Intercept	+/-	0.139 (14.72)***	1.033 (3.55)***	0.428 (2.39)**
EVol	+	-0.008 (-2.19)**	-0.006 (-1.66)**	-0.005 (-2.05)**
CFVol	+	-0.000 (-0.43)	0.000 (0.06)	0.000 (0.35)
Smooth	-	-0.004 (-0.97)	-0.005 (-1.02)	-0.008 (-2.33)**
After	+/-	0.005 (0.47)	0.019 (1.59)	0.019 (1.54)
Term	+/-	0.015 (0.57)	0.025 (0.91)	0.033 (1.37)
BDebt	+/-		Dropped	Dropped
BMRatio	+/-		-0.021 (-0.78)	-0.017 (-0.85)
Analyst	+/-		0.009 (0.37)	-0.007 (-0.39)
Tax	+/-		0.009 (0.42)	-0.008 (-0.48)
Options	+/-		-0.009 (-0.62)	0.014 (-1.66)*
Size	+/-		-0.105 (-3.40)***	-0.022 (-1.03)
FSales	+/-		0.171 (0.92)	0.129 (1.46)
Divers	+/-		0.066 (1.03)	-0.012 (0.34)
EVol*After	+/-	0.008 (1.56)	0.005 (1.05)	0.005 (1.15)
EVol*Term*After	+	-0.131 (-3.36)***	-0.157 (-3.73)***	-0.183 (-5.07)***
CFVol*After	+/-	-0.001 (-0.15)	0.000 (0.10)	-0.001 (-0.32)
CFVol*Term*After	+	-0.002 (-0.31)	-0.007 (-1.11)	-0.005 (-0.97)
Smooth*After	+/-	0.004 (0.98)	0.002 (0.45)	0.008 (1.99)**
Smooth*Term*After	+	0.010 (1.24)	0.016 (1.85)**	0.012 (1.49)*
Observations		357	339	509
Overall R^2		0.000	0.013	0.012

***,**,* represents significance at 1%, 5%, and 10% based on one-tailed predictions, two-tailed otherwise.

Table 11: Panel A
2SLS Estimation of Hedging and Smoothing (2000-2001)

Independent Variables	Predicted Sign	Smooth (t-stat)	Predicted Sign	Deriv (t-stat)
Intercept	+/-	2.395 (1.39)	+/-	-0.038 (-0.25)
Deriv	-	5.927 (1.43)*		
Smooth	-		-	-0.011 (-0.39)
EVol	+	-0.019 (-0.19)	+	0.010 (1.37)*
CFVol	+	0.076 (2.55)***	+	0.002 (0.49)
After	+	0.464 (1.76)**	+	0.028 (1.02)
Bdebt	+/-	-0.049 (-0.12)	+	0.048 (1.71)*
B/M Ratio	+/-	1.188 (2.98)***	+/-	0.010 (0.22)
Analyst	+/-	-0.118 (-0.42)	+/-	0.006 (0.24)
Tax	+/-	0.213 (0.70)	+/-	-0.005 (-0.20)
Options	+/-	-0.161 (-0.67)	+/-	0.050 (3.56)***
Size	+/-	0.010 (0.04)	+/-	-0.047 (-2.56)**
Divers	+/-	-0.231 (-0.80)	+/-	-0.005 (-0.20)
Libor	+/-	0.345 (0.08)	+/-	0.467 (1.25)
FX	+/-	0.022 (0.02)	+/-	-0.137 (-2.06)**
PPI	+/-	0.807 (1.43)	+/-	0.005 (0.07)
Bonus	+/-	-1.166 (-1.35)		
Payout	+/-	0.423 (2.61)***		
Shares	+/-	2.012 (1.39)		

Table 11: Panel A (Continued)
2SLS Estimation of Hedging and Smoothing (2000-2001)

FSales			+/-	0.185 (2.19)**
Yield			+/-	1.553 (1.54)
Quick			+/-	-0.004 (-0.14)
Observations		259		259
Adjusted R^2		0.136		0.074
Hausman Test	p-value	0.204		0.487
Sargan Test	p-value	0.077		0.893

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise.

Table 11: Panel B
2SLS Estimation of Hedging and Smoothing (1999-2001)

Independent Variables	Predicted Sign	Smooth (t-stat)	Predicted Sign	Deriv (t-stat)
Intercept	+/-	2.525 (1.90)*	+/-	-0.050 (-0.43)
Deriv	-	4.251 (1.31)*		
Smooth	-		-	-0.001 (-0.04)
EVol	+	-0.019 (-0.36)	+	0.007 (1.63)*
CFVol	+	0.054 (2.66)***	+	0.000 (0.11)
After	+	0.354 (1.58)*	+	0.031 (1.46)*
Bdebt	+/-	-0.119 (-0.39)	+	0.044 (2.11)**
B/M Ratio	+/-	1.131 (3.75)***	+/-	0.015 (0.41)
Analyst	+/-	-0.392 (-1.84)*	+/-	0.012 (0.58)
Tax	+/-	0.018 (0.08)	+/-	0.004 (0.22)
Options	+/-	-0.076 (-0.45)	+/-	0.042 (4.03)***
Size	+/-	0.069 (0.38)	+/-	-0.041 (-3.00)***
Divers	+/-	-0.408 (-1.87)*	+/-	0.007 (0.37)
Libor	+/-	1.347 (0.40)	+/-	0.156 (0.54)
FX	+/-	-0.204 (-0.33)	+/-	-0.109 (-2.25)**
PPI	+/-	0.707 (1.68)*	+/-	-0.022 (-0.57)
Bonus	+/-	-0.990 (-1.55)		
Payout	+/-	0.449 (3.54)***		
Shares	+/-	-0.364 (-0.17)		

Table 11: Panel B (Continued)
2SLS Estimation of Hedging and Smoothing (1999-2001)

FSales			+/-	0.167 (2.78)***
Yield			+/-	0.744 (1.04)
Quick			+/-	-0.030 (-1.44)
Observations		380		380
Adjusted R^2		0.204		0.1112
Hausman Test	p-value	0.313		0.668
Sargan Test	p-value	0.236		0.820

Notes: Industry indicator variable for each industry group is identified in Panel B of Table 1. Coefficients on industry dummies are not reported. ***, **, * represents significance at 1%, 5% and 10% levels respectively based on one-tailed tests predictions, two-tailed otherwise.

Table 12
Mean Volatility and Smoothing by Extent of Hedging (2000-2001)

Quintile	Earnings Vol.	Cash Flow Vol.	Smoothing
Non-User	1.089	2.819	1.659
1	2.175	2.339	2.209
2	1.133	2.266	2.097
3	0.899	2.633	1.783
4	0.883	2.707	1.883
5	1.910	1.727	2.343

Notes: Quintile 1 refers to the bottom 20% and quintile 5 refers to the top 20% in extent of derivative use measured using notional values. Includes all outliers.

Table 13: Panel A
Effects of Hedge Accounting Treatment on Derivatives by Quintiles (2000-2001)

Independent Variables	Predicted Sign	Bottom 20% Coeff. (t-stat)	Top 20% Coeff. (t-stat)
Intercept	+/-	0.034 (1.89)	1.279 (2.46)**
EVol	+	0.000 (0.37)	-0.001 (-0.14)
CFVol	+	0.001 (2.05)**	-0.032 (-1.47)*
Smooth	-	-0.000 (-0.38)	0.061 (1.67)*
After	+/-	0.004 (0.84)	0.081 (0.46)
DNQ	+/-	-0.001 (-0.16)	-0.224 (-1.20)
Bdebt	+	0.004 (1.07)	-0.117 (-1.95)*
B/M Ratio	+/-	-0.007 (-1.76)*	-0.078 (-0.92)
Analyst	+/-	-0.004 (-1.21)	0.047 (0.61)
Tax	+/-	-0.008 (-3.18)***	-0.137 (-1.80)*
Options	+/-	-0.002 (-1.44)	0.034 (1.06)
Size	+/-	0.001 (0.62)	-0.130 (-2.56)**
Divers	+/-	0.002 (0.68)	0.007 (0.11)
Libor	+/-	0.002 (0.11)	1.534 (1.70)*
FX	+/-	-0.010 (-1.01)	-0.047 (-0.53)
PPI	+/-	0.002 (0.52)	0.044 (0.46)
CFVol*After	+/-	-0.001 (-1.25)	0.071 (0.93)
CFVol*Term*After	+	0.001 (0.37)	-0.036 (-0.47)
EVol*After	+/-	0.000 (0.07)	-0.158 (-0.84)
EVol*Term*After	+	-0.002 (-0.39)	0.269 (1.37)*
Smooth*After	+/-	-0.000 (-0.06)	-0.047 (-1.16)
Smooth*Term*After	+	0.001 (0.57)	-0.023 (-0.60)
Observations		60	65
Adjusted R^2		0.065	0.063

Table 13: Panel B
Effects of Transition Adjustment on Derivatives by Quintiles (2000-2001)

Independent Variables	Predicted Sign	Bottom 20% Coeff. (t-stat)	Top 20% Coeff. (t-stat)
Intercept	+/-	0.043 (2.58)**	1.171 (2.17)**
EVol	+	0.000 (0.50)	0.001 (0.12)
CFVol	+	0.001 (2.47)***	-0.029 (-1.17)
Smooth	-	-0.001 (-0.67)	0.059 (1.44)*
After	+/-	0.001 (0.13)	-0.002 (-0.01)
TA	+/-	0.010 (1.12)	-0.213 (-1.17)
Bdebt	+	0.003 (0.96)	-0.079 (-1.26)
B/M Ratio	+/-	-0.007 (-1.77)*	-0.091 (-0.94)
Analyst	+/-	-0.006 (-1.64)	0.087 (1.10)
Tax	+/-	-0.007 (-2.67)***	-0.085 (-1.32)
Options	+/-	-0.003 (-2.06)**	0.020 (0.57)
Size	+/-	0.001 (0.72)	-0.125 (-2.72)***
Divers	+/-	0.001 (0.64)	0.017 (0.24)
Libor	+/-	-0.017 (-0.63)	1.744 (1.90)*
FX	+/-	-0.006 (-0.68)	-0.053 (-0.70)
PPI	+/-	-0.002 (-0.42)	0.027 (0.38)
CFVol*After	+/-	-0.001 (-1.93)*	0.079 (0.43)
CFVol*Term*After	+	0.010 (1.81)**	-0.059 (-0.31)
EVol*After	+/-	0.000 (0.32)	-0.005 (-0.02)
EVol*Term*After	+	-0.012 (-1.14)	0.075 (0.22)
Smooth*After	+/-	0.000 (0.48)	-0.084 (-1.60)*
Smooth*Term*After	+	-0.004 (-1.20)	0.103 (2.10)**
Observations		60	65
Adjusted R^2		0.156	0.118

Table 13: Panel C
Effects of Hedge Termination on Derivatives by Quintiles (2000-2001)

Independent Variables	Predicted Sign	Bottom 20% Coeff. (t-stat)	Top 20% Coeff. (t-stat)
Intercept	+/-	0.037 (2.37)**	1.356 (2.89)***
EVol	+	0.000 (0.04)	-0.004 (-0.99)
CFVol	+	0.001 (1.91)**	-0.025 (-1.15)
Smooth	-	-0.000 (-0.36)	0.049 (1.30)*
After	+/-	0.002 (0.48)	-0.116 (-1.17)
Term	+/-	-0.004 (-0.85)	-0.087 (0.75)
Bdebt	+	0.004 (1.13)	-0.117 (-1.82)*
B/M Ratio	+/-	-0.007 (-1.86)*	-0.039 (-0.47)
Analyst	+/-	-0.006 (-1.31)	0.009 (0.15)
Tax	+/-	-0.008 (-2.93)***	-0.114 (-1.95)*
Options	+/-	-0.003 (-1.50)	0.023 (0.74)
Size	+/-	0.002 (0.87)	-0.114 (-2.45)**
Divers	+/-	0.001 (0.60)	-0.027 (-0.47)
Libor	+/-	0.008 (0.33)	1.402 (1.69)*
FX	+/-	-0.010 (-0.96)	-0.016 (-0.15)
PPI	+/-	0.003 (0.64)	-0.004 (-0.05)
CFVol*After	+/-	-0.001 (-1.12)	0.026 (0.97)
CFVol*Term*After	+	-0.001 (-0.46)	-0.214 (-4.65)***
EVol*After	+/-	0.000 (0.24)	0.068 (1.06)
EVol*Term*After	+	0022 (1.26)	-0.044 (-0.57)
Smooth*After	+/-	-0.000 (-0.01)	-0.058 (-1.36)
Smooth*Term*After	+	-0.001 (-0.37)	0.329 (8.11)***
Observations		60	65
Adjusted R^2		0.086	0.189

Chapter 5

Summary and Conclusions

The purpose of this study was to investigate the effects of SFAS 133 on the use of derivatives, cash flow volatility, earnings volatility, and income smoothing one year before and after the implementation of the standard. I use data from the 2000-2001 period for a sample of 305 nonfinancial, nonregulated Fortune 500 firms and run a series of probit and pooled cross-sectional regressions with dummy variables to determine if the implementation of SFAS 133 had any significant effect on firm hedging activities, volatility of earnings and cash flows, and income smoothing. I define and measure three dependent variables, particularly the notional values of derivatives, as a proxy for hedging, for the coefficient of variation as a measure of volatility, and for an income smoothing ratio as a measure of earnings management. I regress these dependent variables on a set of explanatory variables that proxy for the incentives to hedge, including financial distress, underinvestment, managerial risk aversion, information asymmetry, and taxes. I include dummy variables to proxy for SFAS 133 and interact these variables with the volatility and smoothing variables. I then compare the difference in the coefficients on the interaction terms after SFAS 133, relative to the coefficients before SFAS 133 for derivative users and a control group of non-users and within groups of derivative users. I also test the sensitivity of my results by extending the analysis over a longer interval, two-years prior to and one-year after implementation of SFAS 133. In addition, I specify a fixed-effects model and a simultaneous equation model as alternative specifications to test the robustness of my results. Finally, I test the sensitivity of my

results by assessing the variation in volatility and smoothing by the level of hedging among low (bottom 20%) and high (top 20%) derivative users.

The implementation of SFAS 133 had raised concerns about the potential impact the standard could have on firm hedging activities. Chief among these concerns has been an increase in earnings volatility and a reduction in the use of derivatives. On the other hand, efficient market theory implies that there should be no direct economic implications because the increase in earnings volatility which is induced by the standard is simply a change in the method of accounting for derivatives and is therefore not a change in the derivative's inherent economic risk. Consequently, cash flow volatility should be unaffected. Overall, the results of this study show no significant differences in earnings volatility, cash flow volatility, and income smoothing between derivative users and non-users before and after the implementation of SFAS 133. I also find no evidence of any significant decline in the use of derivatives after the implementation of SFAS 133. Even though a number of sample firms terminated or discontinued the use of derivatives, overall derivative use, as measured by notional value, has increased after the implementation of the standard. Thus, the empirical evidence does not support the claims of critics nor managers who were concerned that SFAS 133 would prevent firms in their decision to use derivatives or reduce the amount of derivatives used.

In assessing the impact of SFAS 133 within groups of derivative users, I find no evidence of any significant differences in the association between earnings volatility, cash flow volatility, and income smoothing between firms that qualify for hedge accounting treatment and firms that hold speculative derivatives before and after the implementation of the standard. On the other hand, I find some evidence of the effect of

the transition adjustment on derivative users. Firms that report a transition adjustment appear to have smoothed earnings to manage volatility. I also find significant differences in the association between hedging and smoothing between firms that terminated derivatives and other derivative users. The lower association between hedging and earnings volatility and higher association between hedging and smoothing suggests that firms that terminated derivatives also engaged in a higher level of income smoothing to mitigate the volatility induced by the termination. This result from the fixed effects model leads me to the conclusion that SFAS 133 may be driving the earnings management decisions of managers, particularly among the largest derivative users. I find there is a lower association between hedging and cash flow volatility and a higher association between hedging and smoothing among the largest derivative users. These extreme derivative users have the lowest earnings volatility and the highest level of smoothing in the period after implementation compared to other users and to the year before.

If earnings volatility is costly to firms, then my results provide some support for the critics' assertions that managers may end up focusing more on minimizing earnings volatility through earnings management or other tools and employing less effective hedging strategies. The relative increase in the association between hedging and smoothing in the period after implementation provides evidence that managers will engage in a higher level of smoothing to manage volatility. Furthermore, my results also suggest that firms with the largest derivative users may be the ones most concerned and affected by the standard.

There is also evidence consistent with prior research (Pincus and Rajgopal 2002) that the extent of hedging is a marginally significant determinant of the extent of smoothing, while the extent of smoothing is an insignificant determinant of the extent of hedging. This is in contrast to Barton's (2001) finding of a simultaneous relation between hedging and smoothing. My results differ from prior research because it documents a positive relation between hedging and smoothing, implying that derivatives and smoothing are used in a complementary manner. If managers use derivatives to hedge or speculate, then they are likely to engage in a higher level of smoothing to reduce hedge ineffectiveness.

I find that the control variables that proxy for the incentives to hedge also support the risk management theories in the decision to hedge. Consistent with prior research, the factors that affect the decision to hedge are different from the factors that determine the extent of hedging. However, with the exception of bank debt, these incentive control variables, in general, do not provide consistent and conclusive evidence on the extent of hedging. Bank debt is also negatively related to earnings volatility and cash flow volatility, consistent with firms having incentives to smooth earnings to avoid covenant violations.

Although I examine a large sample of Fortune 500 firms that are more likely to use derivatives and be affected by the implementation of SFAS 133, my study is not without its limitations. I do not rule out an endogeneity bias even though my results show no endogeneity bias. Many sample firms had incomplete information, which reduced the number of observations available for testing each empirical model. Consequently, low power in my tests may preclude me from finding any significant

differences. Furthermore, my sample is limited to a small number of non-derivative users, and prevents me from matching non-users with derivative users on the basis of asset size and industry. My study is also biased toward large Fortune 500 firms, and additionally, I cannot rule out measurement errors in my measures of exposure, notional values, and the smoothing ratios.

The long-term effect of the standard is still an interesting issue and therefore, should continue to be addressed in future research. This study may be improved by increasing the sample size and observations by including more non-derivative users. This study can also be extended by testing the effects of SFAS on volatility and smoothing over a longer period after the implementation of the standard. Although there is still much inconsistency in the disclosures of notional values and fair values by sample firms, nevertheless, the use of notional values has been validated by prior research. Researchers should consider testing these variables and selecting firms that provide full disclosures on both notional and fair values. My weak findings or failure to document an empirical relationship in many cases could also be attributed to my use of aggregated notional values. Future research in this area should consider disaggregating notional values by the risk hedged and the type of instrument used to further determine the impact of Statement 133, if any, on volatility and income smoothing. Furthermore, this line of research should also focus on specific industries such as service industries, where evidence on hedging is lacking. Despite its limitations, my study is the first to provide empirical evidence on the effects of SFAS 133 on the use of derivatives, volatility and smoothing. It lays the groundwork for further research into one of the most controversial accounting standards implemented by regulators.

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Appendix A

Summary of SFAS 133 Requirements

Designation and Recognition of Derivatives that Qualify for Hedge Accounting Treatment

1. **Fair value hedge**. A hedge of a recognized asset or liability or an unrecognized firm commitment.
    a. Gains and losses on the instrument and the offsetting losses and gains on the hedged item are recognized in earnings in the same period

2. **Cash flow hedge**. A hedge of a recognized asset or liability or a forecasted transaction
    b. The effective portion of the gains and losses are recorded as a component of Other Comprehensive Income (outside earnings) in Stockholder's Equity and reclassified into earnings in the period when the transaction affects earnings
    c. The ineffective portion of the gain or loss on the instrument is recognized in earnings.

3. **Foreign currency hedge**. A hedge of:
    a. An unrecognized firm commitment or a recognized asset or liability (fair value hedge)
    b. An available-for-sale security (fair value hedge)
    c. A forecasted transaction, an unrecognized firm commitment, or the forecasted functional currency cash flows of a recognized asset or liability (cash flow hedge)
    d. A net investment in a foreign operation
        1. For a fair value hedge, the gains and losses are recognized in earnings in the same period.
        2. For a cash flow hedge, the effective portion is recognized in Other Comprehensive Income (outside earnings) in Stockholder's Equity and reclassified into earnings in the period when the transaction affects earnings.
        3. For a net investment in a foreign operation, the gain or loss will be recorded as part of the Cumulative Translation Adjustment (CTA) in Stockholder's Equity.

Derivatives that do not qualify for Hedge Accounting Treatment

1. Trading and Speculative Derivatives

2. Hedges where the hedged item, instrument, financial risk do not qualify, or the hedge is not highly effective:

SFAS 133 General and Specific Disclosure Requirements

General Disclosures

The general disclosure requirements are qualitative in nature and require firms to disclose:

1. The general risk management policy of the company,
2. The objectives for holding or issuing the derivatives,
3. The strategies for achieving those objectives,
4. Contextual information necessary for understanding the strategies and objectives, and
5. Descriptions of items or transactions that are being hedged.

Disclosures for Fair Value Hedges

For fair value hedges, firms are required to disclose:

1. The net gain or loss on derivatives excluded from the assessment of hedge effectiveness (if any)
2. The amount of hedge ineffectiveness,
3. The income statement location of excluded or ineffective gain or loss recognized in earnings, and
4. The amount of gain or loss recognized in earnings when a hedged firm commitment no longer qualifies for fair value hedging.

Disclosures for Cash Flow Hedges

For cash flow hedges, firms are required to disclose:

1. The net gain or loss on derivatives excluded from the assessment of hedge effectiveness (if any),
2. The amount of hedge ineffectiveness,
3. The income statement location of excluded or ineffective gain or loss recognized in earnings,
4. A description of transactions or other events that will cause amounts recorded as accumulated other comprehensive income to be recognized in earnings,
5. The amount of accumulated other comprehensive income to be recognized in earnings in the next 12 months,
6. The maximum length of time over which the cash flows of forecasted transactions are being hedged, and
7. The amount of gain or loss recognized in earnings when a hedged forecasted transaction no longer qualifies for cash flow hedging.

Disclosures for a Net Investment in a Foreign Operation

1. The net amount of hedging gains and losses included in the cumulative translation adjustment account of the period.

Source: Financial Accounting Standards Board

Appendix B

Maytag Corporation Annual 10-K Report, 2002: Selected Derivative Disclosures

Market Risks

Maytag is exposed to foreign currency exchange risk related to its transactions, assets and liabilities denominated in foreign currencies. Foreign currency forward and option contracts are entered into to manage certain foreign exchange exposures. Maytag also is exposed to commodity price risk related to its purchase of selected commodities used in the manufacturing of its products. Commodity swap agreements are entered into reducing the effect of changing raw material prices for selected commodities.

Maytag also is exposed to interest rate risk in the portfolio of its debt. Maytag uses interest rate swap contracts to adjust the proportion of total debt that is subject to variable and fixed interest rates. The swaps involve the exchange of fixed and variable rate payments without exchanging the notional principal amount.

Non-Exchange Traded Contracts Accounted for at Fair Value

The Company has a trading program of interest rate swaps that it marks to market each period. The swap transactions involve the exchange of Canadian variable interest and fixed interest rate instruments. As of December 31, the Company had five swap transactions outstanding that mature on June 10, 2003 with a total notional amount of $53.8 million and $61 million as of December 31, 2002 and December 31, 2001, respectively. The fair value of the swap positions of $4.7 million at December 31, 2002 and $14.9 million at December 31, 2001 is reflected in Other noncurrent liabilities in the Consolidated Balance Sheets.

Notes to Consolidated Financial Statements

Summary of Significant Accounting Policies

Financial Instruments: The Company uses foreign exchange forward contracts to manage the currency exchange risk related to sales denominated in foreign currencies.

The Company uses commodity swap agreements to manage the risk related to changes in the underlying material prices of component parts used in the manufacture of home and commercial appliances.

The Company has a trading program of interest rate swap contracts outstanding that are marked to market each period.

The Company uses interest rate swap contracts to adjust the proportion of total debt that is subject to variable and fixed interest rates. The interest rate swap contracts are designated as fair value hedges.

Financial Instruments

The Company uses foreign currency exchange forward contracts to manage the currency exchange risk related to sales denominated in foreign currencies. The counterparties to the contracts are high credit quality international financial institutions. Forward contracts used by the Company include contracts for the exchange of Canadian and Australian dollars to U.S. dollars to hedge the sale of appliances manufactured in the United States and sold to customers in Canada and Australia. The fair values of the contracts as of December 31, 2002 and 2001, which were reflected in Other current assets of the Consolidated Balance Sheets, were $0.1 million and $0.8 million, respectively. For 2002, 2001 and 2000, the gains and losses from these contracts were not significant. As of December 31, 2002 and 2001, the Company had open

foreign currency forward contracts, all with maturities of less than twelve months, in the amount of U.S. $32.9 million and U.S. $50.4 million, respectively.

The Company uses commodity swap agreements to manage the risk related to changes in the underlying material prices of component parts used in the manufacture of home and commercial appliances. The fair value of the contracts as of December 31, 2002, and 2001, which were reflected in Other current assets of the Consolidated Balance Sheets, were $0.5 million and $0.6 million, respectively. For 2002, 2001 and 2000, $0.5 million of gains, $0.9 million of losses, and $5.7 million of gains were recognized from these contracts, respectively. As of December 31, 2002 and 2001, the Company had open commodity swap contracts in the amount of U.S. $6 million and U.S. $10.5 million, respectively. Open contracts as of December 31, 2002 have maturities ranging from one month to two years.

The Company has a trading program of interest rate swaps that it marks to market each period. The swap transactions involve the exchange of Canadian variable interest and fixed interest rate instruments. As of December 31, 2002, the Company had five swap transactions outstanding that mature on June 10, 2003 with a total notional amount of $53.8 million and $61 million as of December 31, 2002 and December 31, 2001, respectively. The fair value of the swap positions of $4.7 million at December 31, 2002 and $14.9 million at December 31, 2001 is reflected in Other noncurrent liabilities in the Consolidated Balance Sheets.

The Company uses interest rate swap contracts to adjust the proportion of total debt that is subject to variable and fixed interest rates. To manage associated cost of this debt, the Company enters into interest rate swaps, in which the Company agrees to exchange, at specified intervals, the difference between interest amounts calculated by reference to an agreed upon notional principal amount. These swap contracts are used to hedge the fair value of certain medium term notes. The contracts are a perfect hedge as their terms, interest rates and payment dates exactly match the underlying debt. At December 31, 2002 and 2001, the Company had outstanding interest rate swap agreements with notional amounts totaling $250 million. Under these agreements, the Company receives weighted average fixed interest rates of 7.32 percent and pays floating interest rates based on LIBOR rates plus an agreed upon spread, or a weighted average interest rate of 5.63 percent, as of December 31, 2002. Maytag had interest rate swaps designated as fair value hedges of underlying fixed rate debt obligations with a fair market value as of December 31, 2002 and December 31, 2001 of $9.3 million and $10.9 million, respectively.

The fair values of interest rate swaps, foreign currency contracts, commodity swaps, forward stock purchase contracts and put option contracts were estimated based on amounts the Company would pay to terminate the contracts at the reporting date.

The carrying amounts and fair values of the Company's financial instruments, consisted of the following:

(in thousands)	**Dec 31, 2002**		**Dec 31, 2001**	
	Carrying Value	**Fair Value**	**Carrying Value**	**Fair Value**
Interest rate swaps - trading	(4,703)	(4,703)	(14,876)	(14,876)
Interest rate swaps – non-trading	9,257	9,257	10,949	10,949
Foreign currency contracts	90	90	831	831
Commodity swap contracts	531			

Source: Maytag Annual 10-K Report

Appendix C

Definition of Variables*

Construct	Proxy	Variable
Total Notional Value of Derivatives	Aggregate total notional value of derivatives outstanding for each firm at year-end/Book value of assets at end of year. Annual 10-K report	Deriv
Earnings Volatility	Coefficient of Variation measured as firm i's standard deviation of quarterly earnings firm before extraordinary items/Absolute value of mean quarterly earnings before extraordinary items. (σ #76/|μ #76|)	EVol
Cash Flow Volatility	Coefficient of Variation measured as firm i's standard deviation of quarterly operating cash flows/Absolute value of mean quarterly cash flows. (σ #108/|μ #108|)	CFVol
Smoothing Ratio	Ratio measured as the standard deviation of firm i's quarterly cash flows/standard deviation of firm i's quarterly income before extraordinary items and scaled by total assets at end of previous quarter. (#108/#8)/#44	Smooth
Smoothing Ratio	Ratio measured as the standard deviation of firm i's quarterly income before discretionary accruals and extraordinary items in quarter t/standard deviation of firm i's quarterly income before extraordinary items and scaled by total assets at end of previous quarter. Income before Discretionary Accruals = Cash Flow from Operations + Non-Discretionary Accruals. ((#108 + Non-Discretionary Accruals)/(#76))/#44	Smooth[1]
Bank Debt	Equals 1 if has outstanding bank debt in yeat t; 0 otherwise	BDebt
Growth Opportunities	Book value of equity/Market value of equity of firm i at fiscal t year-end. (#60)/(#199 * #25)	B/M Ratio
Info. Asymmetry	Number of analysts following firm i in year t. I/B/E/S Database	Analyst
Income Taxes	Dummy variable that equals 1 if firm i is profitable (Income before Extraordinary items>0) in year t and have NOL carry-forward at fiscal t year-end; otherwise 0. Compustat #18 and #52	Tax
Managerial Ownership	Logarithm of the total number of CEO stock options outstanding at end of fiscal year, Compustat Execucomp	Options
Firm Size	Log of book value of assets of firm i in year t (#6)	Size
Inverse Mills Ratio	Ratio between the standard normal PDF and the standard normal CDF. Computed for each firm using the binomial Probit model	Mills
Industry Effect	Dummy variable that equals 1 indicating membership in each 2-digit SIC group; otherwise 0	Industry
SFAS 133	1= After implementation of SFAS 133; 0 otherwise	After
Derivative User	1= Derivative user; 0 otherwise	User
Hedge Accounting Treatment	1= Firms do not qualify for hedge accounting; 0 otherwise	DNQ
Transition Adjustment	1= Firm disclosing transition adjustment; 0 otherwise	TA
Derivative Termination	1= Firm terminating derivatives in year t; 0 otherwise	Term

Appendix C

Definition of Variables Continued)

Construct	Proxy	Variable
Diversification	Measured using the entropy index by (Palepu 1985). Computed as $\Sigma P_i \ln(1/P_i)$ where P_i is the total net sales of product i scaled by the total net sales of the firm for each firm-year. Compustat Product Segments File	Divers
Foreign Sales	The ratio of total sales to total sales for each firm-year. Compustat Geographic Segments File.	FSales
Interest Exposure	Exposure coefficient (beta) of sensitivity of quarterly changes in cash flows to changes in 6-month Libor rate. Global Insight/DRI, Compustat	Libor
Exchange Rate Exposure	Exposure coefficient (beta) of sensitivity of quarterly changes in cash flows to changes in Federal Reserve Nominal Dollar Index. Global Insight/DRI, Compustat	FX
Commodity Exposure	Exposure coefficient (beta) of sensitivity of quarterly changes in cash flows to changes in the Producer Price Index for All Commodities. Index obtained from Global Insight/DRI, Compustat	PPI
Dividend Payout	Total common dividends/Income before extraordinary items. Compustat #21/#20.	Payout
Dividend Yield	Dividends per share/fiscal close share price. Compustat #26/#199	Yield
Incentive Compensation	The ratio of CEO bonus scaled by Total Cash Compensation (TCC) where TCC is the sum of salary, bonus and other annual compensation. Compustat Execucomp	Bonus
ManagerialRisk Aversion	The ratio of shared owned by the CEO scaled by total common shares outstanding at end of firm fiscal year. Compustat Exececomp	Shares
Liquidity	The ratio of quick assets to total liabilities. Compustat (#1 + #2)/#5	Quick

***** # refers to Compustat numbers. Smooth[1] is an alternative ratio used in the sensitivity analysis to test the robustness of the results.

Appendix D

Notional & Fair Value Disclosures of 30 Excluded Firms

X – indicates that firm has no disclosure of notional or fair value in period before/after adoption of SFAS 133 in June 2000.

NV = Notional Value; FV = Fair Value

TIC	CoName	NV before SFAS 133	NV after SFAS 133	FV before SFAS 133	FV after SFAS 133
A	Agilent Tech. Inc	X	X	X	X
ADM	Archer-Daniels	X	X	X	X
AVT	Avnet Inc.	X	X	X	X
NOC	Northrop Grumman	X	X	X	X
PH	Parker-Hannifin	X	X	X	X
NWAC	Northwest Airlines	X	X	X	X
SBUX	Starbucks	X	X	X	X
SGR	Shaw Group	X	X	X	X
BA	Boeing Co.		X	X	X
JNJ	Johnson & Johnson		X	X	X
MSFT	Microsoft Corp.		X	X	X
EMN	Eastman Chemical	X	X		X
SSOC	Smurfit-Stone	X	X	X	
HD	Home Depot	X		X	X
ASH	Ashland Inc.	X		X	
AZO	Autozone Inc.	X		X	
DRI	Darden Restaurants	X		X	
HCA	HCA Inc.	X		X	
IB	Interstate Bakeries	X		X	
IPG	Interpublic Group	X		X	
LMT	Lockheed Martin	X		X	
MHK	Mohawk Industries	X		X	
PAS	PepsiAmericas	X		X	
AMAT	Applied Materials		X		X
F	Ford Motor Co.		X		X
UCL	Unocal Corp.		X		X
UIS	Unisys Corp.		X		X
MMM	3M Co.		X	X	
XOM	Exxon Mobil		X	X	
VFC	VF Corp.	X		X	
	Totals	**21**	**19**	**25**	**17**

Source: SEC 10-K filings

Appendix E

Selective Disclosures of Non-Qualifying Derivatives of Fortune 500 Firms

" In some situations, the corporation has chosen not to designate certain immaterial derivatives used for hedging economic exposure as hedges for accounting purposes due to the excessive administrative effort that would be required to account for these items as hedging transactions" (Exxon-Mobil 2001 Form 10-K: Notes to Consolidated Financial Statements, p. 38)

"Valero uses derivative commodity instruments (swaps, futures, and options) to manage its exposure to: price volatility on a portion of its refined product inventories and on certain forecasted feedstock and refined product purchases that are not designated as either fair values or cash flow hedges. In addition, Valero uses derivative commodity instruments for trading purposes based on its fundamental and technical analysis of market conditions." (Valero Energy Corporation 2002 Form 10-K: Notes to Consolidated Financial Statements, No. 17, p. 88)

"Our foreign currency risk management objective is to protect our earnings and cash flows from the adverse impact of exchange rate changes. Foreign exchange risk is managed by using foreign currency forwards, options, and swap contracts, to hedge inter-company loans, trade receivables and payables. We have elected not to designate our foreign currency contracts as hedging instruments, and they are therefore marked to market with changes in their value recorded in the income statement in each period." (Tech Data Corporation 2002 Form 10-K: Item 7a, p.24)

"As a policy, the company does not engage in speculative or leveraged transactions, nor does the company hold or issue financial instruments for trading purposes. The company enters into certain derivative contracts in accordance with its risk management strategy that do not meet the criteria for hedge accounting. Although these derivatives do not qualify as hedges, they have the economic impact of largely mitigating foreign currency, commodity price or interest rate exposures. These derivative instruments are accounted for on a full mark to market basis through current earnings even though they were not acquired for trading purposes." (Heinz H. J. Co Inc. 2002 10-K: Notes to Consolidated Financial Statements, p. 37,54)

"The company uses forward contracts and cross-currency swap agreements to hedge earnings from the effects of fluctuations in currency exchange rates relating to certain of the company's inter-company and third-party receivables and payables denominated in a foreign currency. These derivative instruments are not formally designated as hedges, and the change in the fair value of these instruments, which substantially offsets the changes in the book value of the hedged items, is recorded directly to earnings. (paragraph omitted). In conjunction with the company's rebalancing of its debt portfolio and in anticipation of the adoption of SFAS 133, certain of such contracts (cross currency swaps and equity puts and calls)were terminated in 2000 and a gain was recognized in other income." (Baxter International 2000 & 2001 10-K: Notes to Consolidated Financial Statements, p. 41, 51)

"Due to the complex nature of risks we attempt to hedge, our commodity financial instruments have generally not qualified as effective hedges under SFAS 133. Even though these financial instruments may not qualify for hedge accounting treatment under SFAS 133, we view such contracts as hedges since this was the intent when we entered into such positions. Upon entering into such positions, our expectation is that the economic performance of these instruments will mitigate (or offset) commodity risk being addressed." (Enterprise products Partner 2002 Form 10-K: Item 7a, p. 56)

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