

The Impact of Accounting for Derivatives on Measuring and Assessing Risk

Spencer Pierce*
Northwestern University
s-pierce@kellogg.northwestern.edu

February 11, 2013

Abstract

I examine whether the accounting for derivatives affects accounting-based measures of risk and investors' assessment of risk. Financial accounting standards require that derivatives be recognized on the balance sheet at fair value with changes in value being recognized in earnings immediately. However, if certain requirements are met, firms may elect to use hedge accounting to delay recognizing derivative gains and losses until the offsetting gains and losses from the hedged item are also recognized. I examine firms' choice to use hedge accounting and whether hedge accounting use decreases commonly used accounting- and market-based risk measures. I find that firms which elect to use hedge accounting achieve a significant decrease in the volatilities of reported earnings and operating cash flows. I also provide some evidence that investors partially unwind the impact of hedge accounting when assessing firm risk. Using disclosures required by the recently effective standard, FAS 161, this paper is the first to identify the extent to which firms use hedge accounting and whether the accounting treatment affects risk measurement.

* I thank my dissertation committee: Thomas Lys (co-chair), Linda Vincent (co-chair), Robert McDonald, Tjomme Rusticus and Beverly Walther for their guidance and support. I also thank the PhD students at Kellogg for many helpful comments and suggestions. I gratefully acknowledge funding from the Kellogg Graduate School of Management, Northwestern University.

1. Introduction

The use of derivatives has become prevalent in the modern economy. In 2010, the ISDA reported that the derivative market had a notional amount of \$466.8 trillion and had grown by a compounded annual growth rate of approximately 26% since 1996 (ISDA Survey, 2010). The increased use and potential economic effect of derivatives has led to an increased demand for information through improved accounting and disclosure. However, despite many attempts by standard setters and researchers at addressing this issue, there is no consensus on how to best recognize and disclose the use of derivatives.¹ I study firms' use of hedge accounting and how the unique accounting treatment it permits for derivatives affects accounting- and market-based risk measures. I further explore whether the association between hedge accounting use and market-based risk measures is due to the different accounting resulting from hedge accounting or the certification of hedge effectiveness required to use hedge accounting.²

FAS 133, *Accounting for Derivative Instruments and Hedging Activities*, which was issued in 1998, prescribes the accounting for derivatives.³ FAS 133 requires firms to recognize all derivatives on the balance sheet at fair value. During the development of FAS 133, its opponents argued that recognizing derivatives on the balance sheet at fair value would lead to increased earnings volatility that was unrepresentative of the economics of the firm. This accounting treatment would produce the undesirable result that firms using derivatives to hedge and *decrease* risk, would report more volatile earnings and appear to be *more* risky than if they had not used derivatives to hedge. This concern led to the creation of hedge accounting within FAS

¹ For example, the FASB has issued several standards in the last 20 years that changed the accounting or disclosure for derivatives including statements number 105, 107, 119, 126, 133, 137, 138, 149 and 161. Furthermore, the FASB has current projects related to hedging and accounting for financial instruments.

² Following prior literature such as Ahmed, Kilic and Lobo (2011) and Hodder, Hopkins and Whalen (2006), I consider a measure to be risk relevant if it is significantly correlated with a market-based measure of risk.

³ Under the new codification of accounting standards, FAS 133 is now included as part of ASC Topic 815. I use the pre-codification naming throughout to facilitate discussion of the changes in reporting requirement for derivatives over time.

133. If certain criteria are met, firms may apply hedge accounting to derivatives which results in derivatives being recognized on the balance sheet at fair value without the changes in value being immediately recognized in earnings.⁴ Instead, the earnings impact of the change in the derivative's value is postponed until the offsetting earnings impact of the hedged risk is recognized. Furthermore, the cash flows from derivatives designated as hedges are typically included as operating cash flows (CFO), whereas the cash flows from derivatives not designated as hedges are classified as investing or financing cash flows. Thus, hedge accounting can cause two identical derivatives to have very different effects on reported earnings and CFO.

Prior studies have struggled to examine the significance of derivatives and hedge accounting use due to a lack of disclosure. Although FAS 133 led to the comprehensive recognition of derivatives in the financial statements and the creation of hedge accounting, it also significantly decreased the disclosure for firms' derivative use. The amount of disclosure required for derivatives was minimal until the adoption of FAS 161, *Disclosures about Derivative Instruments and Hedging Activities*, which became effective in 2008. Prior to FAS 161, the main sources of information for derivative use were the amounts recognized in financial statements per FAS 133 and the quantitative and qualitative disclosures of market risks required by Financial Reporting Release No. 48. However, both of these provided almost no disclosure about firms' use of hedge accounting.⁵ While FAS 161 did not impact the accounting for derivatives, it did require, for the first time, that firms provide quantitative disclosures of the

⁴ This choice is contingent upon certain criteria being met, which I discuss in more detail later in the paper. In short, firms are required to designate a derivative as a hedge prior to entering into the contract and demonstrate that it is expected to be a "highly effective" hedge. This same documentation must be made every quarter.

⁵ FAS 133 requires the recognition of derivatives at their fair values on the balance sheet. However, these amounts are typically netted together into other assets/liabilities making it impossible to know what portion belongs to derivatives. Also, there was no requirement to provide any information as to whether a derivatives was designated as a hedge or not. FRR 48 requires firms to provide information about different risk exposures such as interest rate risk, foreign exchange risk, and commodity risk. However, firms were given flexibility as to how to disclose these risks and provided no disclosure regarding the use of hedge accounting.

balance sheet and income statement effects of derivatives based on hedge accounting designation.⁶ I use hand-collected data for 98 from the newly available FAS 161 disclosures to quantify derivative and hedge accounting use.

I first examine what factors determine whether or not firms choose to use hedge accounting. I classify potential determinants of hedge accounting use into two groups. The first group consists of variables associated with specific costs and benefits unique to hedge accounting. The second group consists of variables that prior literature has identified as predictors of derivative use⁷. I further classify these predictors of derivative use based on whether the motive for using derivatives is predominantly driven by the cash flow benefits of hedging or whether they are also motivated by the smoothing of accounting numbers. I find that the use of hedge accounting increases when firms are using derivatives for reasons motivated by smoothing earnings, when derivative contracts are longer and when documentation costs for hedge accounting are lower. I find that hedge accounting use decreases when firms are using derivatives for reasons driven by smoothing total cash flows rather than smoothing earnings.

To investigate the role that the accounting for derivatives plays in communicating information about risk, I examine how hedge accounting affects accounting-based measures of risk and, in turn, investors' assessments of risk. I use market-based measures of risk as a proxy for investors' assessment of risk. First, I focus on two commonly used accounting-based measures of risk, both of which are likely to be affected by hedge accounting: earnings volatility and CFO volatility. Hedge accounting leads to the change in fair value of the derivative and the offsetting change in fair value of the hedged risk to occur in the same reporting period. Without

⁶ See Exhibit 1 for an example of the disclosure required by FAS 161.

⁷ Because I limit this study to firms that use derivatives only for hedging purposes rather than speculative purposes, the use of derivatives is synonymous with hedging. I refer to derivative use throughout rather than hedging to avoid confusion between derivative use for hedging purposes and the accounting treatment, hedge accounting, which is applied to some derivatives.

hedge accounting, the change in value of the derivative could occur in a period other than when the offsetting amount from the hedged risk is recognized, resulting in more volatile earnings. Because the cash flows from derivatives designated as hedges are typically reported in the operating section they offset any cash flows from the hedged risk which are also recorded in the operating section. However, the cash flows for derivatives not designated as hedges are not recorded in the operating section. Thus, the variation in cash flows from risks that are hedged shows up in the operating section without any offsetting amount from the derivative used to hedge it. I find that firms that use hedge accounting decrease the volatility of their earnings and CFO. This decrease in volatility increases with the use of hedge accounting and derivatives.

Next, I examine the association between hedge accounting use and market-based measures of risk. I conjecture two channels through which investors may find that hedge accounting is risk relevant. The first, which I refer to as the “certification effect,” comes from the fact that firms must document that derivatives designated as hedges are anticipated to be “highly effective” hedges. No such requirement is required for derivatives not designated for hedge accounting. The second way that hedge accounting may affect market-based risk measures, which I refer to as the “measurement effect,” arises from the different accounting for derivatives designated as hedges. Investors may assess that a firm is more risky because of the incremental volatility of earnings and operating cash flows due to hedge accounting not being used. I find no evidence that investors react to the “certification effect.” Also, I find some evidence that investors are at least partially unwind the impact of hedge accounting on earnings and CFO volatility when assessing firm risk. These results call into question the ability of firms to achieve a decrease in investors’ assessment of risk by choosing to use hedge accounting.

This study provides several contributions to our understanding of the impact of derivatives and the accounting for derivatives on measuring and assessing risk. First, this paper is the first to examine the accounting choice of using hedge accounting for derivatives. Prior literature has extensively studied firms' use of financial instruments. I extend this literature by examining how firm characteristics determine an important aspect of using financial instruments: selecting their accounting treatment. Second, I provide the first evidence that hedge accounting achieves what it is intended to do, decrease earnings volatility. This is important to document and quantify because it provides at least a partial justification for the allegedly excessive costs that firms incur to use hedge accounting (Comiskey & Mulford, 2008).

As a third contribution, I add to the risk relevance literature by examining how different accounting methods affect accounting-based measures of risk and investors' assessments of risk. Understanding the risk relevance of the current financial reporting for derivatives is an initial step in answering the question recently posed by Kaplan (2011), who asks what scholarship can do to improve the reporting and disclosure of risk. Lastly, this research provides insight into what aspects of hedge accounting are important to investors. This research examines whether investors' assessment of risk is affected by the fact that a derivatives is verified as being a "highly effective hedge," or the decrease in earnings and CFO volatility. This finding may be of interest to the FASB which is currently considering lowering the requirement for hedge effectiveness from "highly effective" to "reasonably effective."

2. Institutional background

2.1 Hedge accounting

FAS 133 outlines the required accounting guidelines for derivatives. The accounting changes were driven by the FASB's assertion that all derivatives were assets or liabilities and

should be recorded at their fair value on the balance sheet with changes in fair value flowing through the income statement. Critics of FAS 133 argued that this would significantly increase the volatility of earnings in a manner that poorly reflected the underlying economics of the hedging activity because the offsetting gain or loss from the hedged risk would not occur until a later period. Critics argued that this increase in earnings volatility would discourage firms from using derivatives to decrease risk. A commonly cited reason for using derivatives is to decrease earnings volatility. Thus, the earnings impact of FAS 133 would seemingly contradict one of the major reasons to hedge, by leading to more earnings volatility when derivatives were used to hedge risk and decrease earnings volatility.

Prior literature provides several reasons for why smooth performance may increase firm value. Firms with smoother earnings have a lower expected tax rate (Graham and Smith, 1999; and Smith and Stulz, 1985) and a greater ability to pay dividends (Beidleman, 1973). Firms with smoother earnings have a lower probability of bankruptcy and therefore have lower borrowing costs (Trueman and Titman, 1988; and Graham et al., 2005). Risk-averse managers will use derivatives to decrease uncertainty in their compensation (Smith and Stulz, 1985). As evidence that managers prefer smooth earnings, Graham et al. (2005) find that 78% of the executives they surveyed admit to sacrificing long-term value in order to smooth earnings.

To address the issue of increased earnings volatility caused by marking derivatives to market, the FASB created an optional accounting method called hedge accounting. The gains and losses on derivatives designated as hedges are recognized in the same period as the income effects of the underlying hedged item. Gains or losses from derivatives not designated for hedge accounting must be recorded in current earnings.

FAS 133 describes three types of permissible hedges: fair value hedges, cash flow hedges, and hedges of net investment. Cash flow hedges and fair value hedges are most common. A cash flow hedge is a “hedge of the exposure to variability in the cash flows of a recognized asset or liability, or of a forecasted transaction, that is attributable to a particular risk” (FAS 133, para. 4). For cash flow hedges, the effective portion is recognized in Other Comprehensive Income and then recorded on an after-tax basis in Accumulated Other Comprehensive Income (AOCI). This allows the change in the fair value of the derivative to show up on the balance sheet without affecting the income statement. The amount recognized in AOCI is reclassified into earnings when the offsetting gain or loss from the hedged item occurs. Hedges of net investment are accounted for similar to cash flow hedges, but are not as common.

A fair value hedge is “a hedge of the exposure to changes in the fair value of a recognized asset or liability, that is attributable to a particular risk” (FAS 133, para. 4). The change in fair value of a fair value hedges is recognized in earnings immediately. The carrying value of the hedged item is adjusted on the balance sheet to reflect the change in market value due to the risk being hedged, and this change is also recognized in earnings. Because both the change in value of the hedging instrument and the underlying asset or liability are recognized in earnings immediately their effects will offset each other. This leaves only the ineffective portion to be recognized immediately in earnings.

There are some frequently cited costs of using hedge accounting. The most explicit and frequently cited reason for firms to forego the use of hedge accounting is the cost of documentation and compliance (Comiskey and Mulford, 2008). To designate a derivative for hedge accounting, the firm must specify the hedged item, identify the hedging strategy and the derivative and document by statistical or other means the basis for expecting the hedge to be

“highly effective” in offsetting the designated risk exposure. Documenting that a hedge is expected to be highly effective is called prospective testing, and must be completed before entering into the hedge and on an ongoing basis to justify continuing hedge accounting. The firm must also perform retrospective testing each quarter going forward to determine how effective the hedging relationship was at achieving offsetting fair values or cash flows.

There is both a fixed and a variable component to the implementation cost. A firm must have the proper system and expertise in place to be able to use hedge accounting for even one derivative contract. Some firms simply do not have the resources necessary to comply with the complicated requirement of hedge accounting. Once a company has a system in place to apply hedge accounting, there are further costs incurred for designating additional derivative contracts for hedge accounting. A count of the number of actual derivative contracts entered into by the firm would provide a measure of how costly using hedge accounting is for a firm. Unfortunately, firms are not required to disclose such information. In an interview in 2006, the comptroller of General Electric (GE), Philip D. Ameen, stated that GE had the equivalent of 40 employees working full-time to ensure the accuracy of its hedge accounting for thousands of contracts outstanding at the end of any given year.

Two other deterrents of using hedge accounting are the risk of restatement and limited flexibility in derivative use. The complexity that firms face to implement hedge accounting is evidenced by the vast and ever-growing implementation guidance. Many firms have struggled with correctly implementing hedge accounting, as demonstrated by the hundreds of restatements required since the adoption of FAS 133 due to firms misapplying hedge accounting (Hughen, 2010). Such restatements can be costly. Another challenge to use hedge accounting is that qualifying hedges are not always available or documentation is untimely, inadequate, or

unavailable (Comiskey and Mulford, 2008). Thus, firms' flexibility in choosing derivative instruments in a timely manner appears to be limited if they wish to employ hedge accounting.⁸

2.2 Disclosure of derivative use

In this section, I describe the information related to derivative use that was available prior to FAS 161 and the new additional information that is provided by the FAS 161 disclosures. FAS 161 has no effect on the accounting for derivative instruments, but it does require firms to provide qualitative disclosures about objectives and strategies for using derivatives and quantitative disclosures about fair value amounts of, and gains and losses on, derivative instruments (FAS 161, para. 1). This study relies on the new information disclosed about the fair values and earnings impacts of derivatives segregated by risk type and, more importantly, accounting designation. FAS 161 is the first accounting standard to require firms to disclose information about derivatives separately depending on accounting designation.

Prior to FAS 161, the main sources of information about derivative use and market risks were the amounts recognized in financial statements per FAS 133 and the market risk disclosures required by Financial Reporting Release No. 48, *Disclosure of Accounting Policies for Derivative Financial Instruments and Derivative Commodity Instruments and Disclosure of Quantitative and Qualitative Information about Market Risk Inherent in Derivative Financial Instruments, Other Financial Instruments and Derivative Commodity Instruments*, (FRR 48).

FAS 133 specifies the accounting for derivatives and superseded many of the prior standards related to derivatives (FAS 105, FAS 119 and part of FAS 107). Under FAS 133, firms are allowed to net all derivative assets and liabilities into one value on the balance sheet. This net value of derivatives is commonly included as part of an account such as other assets or other

⁸ This concern was also voiced in a discussion the author had with a VP of Risk Management for a large firm. The VP mentioned that often by the time proper documentation for hedge accounting was in place, the position that was to be entered into was no longer desirable.

liabilities. Similarly, gains or losses from derivatives are typically included in other income or losses with other non-operating items. Thus, it is impossible to identify the portion of these accounts that is related to derivatives unless the firm discloses such information.

FRR 48 requires firms to provide information about different risk exposures such as interest rate risk, foreign exchange risk, and commodity risk. FRR 48 is flexible in the format that firms can use to disclose their exposure to these risks and permits firms to use one of three accepted methodologies: value-at-risk, sensitivity analysis or tabular. Tabular disclosures present a table of the fair value of financial instruments grouped by market risk category. The tabular format is the simplest format and requires the most disclosure of information that could be used for further analysis. However, most firms use value-at-risk or sensitivity analysis which is difficult for investors or researchers to use in a meaningful way Roulstone (1999).

FAS 161 is an attempt to improve disclosure quality by requiring firms to use a tabular format. FAS 161 requires disclosure of the fair value of derivative liabilities and assets as well as the earnings impact of derivatives by risk category and accounting designation with no netting of these positions. The amounts must be linked to accounts in the income statement and balance sheet. FAS 161 also requires firms to disclose an indication of derivative use volume and their objective in using derivative instruments. Firms are permitted to choose the method of disclosure for derivative usage volume that they find most appropriate. See Exhibit 1 for an example of an acceptable disclosure as provided by FAS 161.

3. Determinants of hedge accounting use

3.1 Hypothesis development and research design

I first examine firms' incentives to use hedge accounting. I identify firm characteristics that I expect to be determinants of hedge accounting use and classify them into two groups. The first

group consists of determinants driven by specific costs and benefits related to the implementation of hedge accounting. The second group consists of determinants that prior literature has identified as predictors of derivative use.

3.1.1 Costs and benefits specific to hedge accounting use

The benefit of using hedge accounting occurs when the derivative contract overlaps multiple reporting periods. If a derivative contract lasts shorter than one reporting period, there is no benefit to using hedge accounting because the gains and losses on the derivative would be recognized in the current period regardless of the accounting designation. I predict a positive relation between contract length and hedge accounting use. Because hedge accounting smooths earnings, firms with more volatile earnings may be more likely to use hedge accounting. I predict that firms with more volatile earnings are more likely to use hedge accounting.

FAS 133 allows for what is called the “shortcut method” for interest rate swaps. This allows firms to identify an interest rate swap as having no hedge ineffectiveness at the inception of the contract. When this is done, the swap receives hedge accounting treatment without having to verify and document hedge effectiveness every reporting period. Because the shortcut method decreases the costs of using hedge accounting for interest rate swaps, I expect a positive relation between the use of interest rate derivatives and hedge accounting use.

As mentioned previously, there is both a fixed and a variable component to the implementation cost. A firm must have the proper system and expertise in place to be able to use hedge accounting for even one derivative contract. Some firms simply do not have the resources necessary to comply with the complicated requirement of hedge accounting. Due to economies of scale, larger firms are more likely to implement a hedge accounting system. However, there

are possible explanations for why smaller firms may benefit more from the use of hedge accounting and, therefore, more likely to implement a hedge accounting system. For example, smaller firms may be more averse to earnings volatility and more prone to earnings volatility due to less diversification among business operations. Given that the sample includes predominantly larger firms, size may not be relevant for the decision to use hedge accounting for the sample used in this paper. I predict a positive relation between size and hedge accounting use. The economies of scale argument also applies to firms that use more derivatives. The cost to use hedge accounting per derivative contract decreases as a firm uses more derivatives due to the fixed cost of implementing a hedge accounting system. I predict a positive relation between derivative use and hedge accounting use.

3.1.2 Determinants of derivative use

Corporate risk-management theory has explained the extensive use of derivatives by examining market imperfections that can make volatility costly. Guay and Kothari (2003) classify these market imperfections into four types: (i) Financial distress costs; (ii) Costly external financing; (iii) Taxes, and (iv) Costs of managerial risk aversion. I identify financial distress costs, costly external financing, and taxes as determinants of derivative use that are predominantly driven by the cash flow benefits of derivative use rather than the smoothing of accounting numbers. I predict that firms that use derivatives for cash flow reasons will be less likely to use hedge accounting in order to avoid the costs associated with hedge accounting discussed in Section 2. Thus, I expect that measures of financial distress costs, costly external financing and taxes will be negatively related to hedge accounting use. Firms that use derivatives due to managerial risk aversion are interested in the smoothing effect that derivatives have on earnings because earnings play an integral role in determining executive compensation.

Therefore, I predict that firms using derivatives to minimize costs related to managerial risk aversion will be more willing to incur the costs of hedge accounting to take advantage of the smoothing effect of hedge accounting. Accordingly, I predict a positive association between measures of executive compensation and hedge accounting use.

Smith and Stulz (1985) argue that derivative use can increase the value of a levered firm by reducing the probability of incurring bankruptcy costs. I proxy for financial distress costs using leverage. I predict a negative association between leverage and hedge accounting use. Following prior literature, I proxy for investment growth opportunities where external financing may be costly using the interaction between leverage and the market-to-book ratio. Market-to-book proxies for a growth firms that are more likely to need financing for investment growth opportunities. A levered firm may find it more costly to obtain additional external financing. I predict a negative association between $MB \times \text{leverage}$ and hedge accounting use.

Derivative use can increase firm value by reducing expected taxes, if the firm's effective tax schedule is convex (Smith and Stulz, 1985). This follows from Jensen's Inequality and the reduction of earnings volatility through hedging. In practice, firms face a convex tax schedule because of statutory progressivity and tax preference items such as tax loss carry forwards, foreign tax credits and investment credits (Nance et al. 1993). Because the tax impact of derivatives does not vary by the accounting designation there is no tax benefit obtained by using hedge accounting. I proxy for the tax benefit of derivative use with the convexity of the marginal tax rate faced by the firm (tax_conv). I predict that tax convexity will be negatively associated with hedge accounting use.

Although derivative use is not effective for diversified and risk-neutral investors, it may be beneficial for under-diversified and risk-averse managers. Managers of this type require extra compensation to bear firm risk. Decreasing risk via derivative use can potentially decrease the risk premium that risk-averse managers require and, in turn, increase firm value (Smith and Stulz, 1985). Graham et al. (2005) report that executives express a strong desire to report smooth earnings, holding cash flow volatility constant. It is argued that this is the case because investors perceive a firm with more volatile earnings to be more risky, and, thus, require a higher cost of equity capital which impacts managerial stock holdings. Prior literature has provided empirical evidence that managerial stock holdings are associated with hedging decisions (Knopf et al., 2002; Barton, 2001;). I predict that managerial compensation incentives (*ceo_delta*) will be positively associated with hedge accounting use.

I model the decision to use hedge accounting as a function of several firm characteristics using an OLS regression. Volatility measures are measured as standard deviations over the entire sample period. All other variables are measured as averages over the quarters in the sample period. Each firm makes up only one observation in the analysis:

$$\begin{aligned}
 ha_use_i = & \beta_0 + \beta_1 contract_length_i + \beta_2 interest_der_i + \beta_3 lnassets_i + \beta_4 der_use_i \\
 & + \beta_5 leverage_i + \beta_6 MB_i + \beta_7 MB * leverage_i + \beta_8 taxconv_i + \beta_9 ceodelta_i \\
 & + \beta_{10} earn_vol_noder_i + \varepsilon_i
 \end{aligned}$$

I explain the measure of the extent to which a firm chooses to use hedge accounting (*ha_use*) in greater detail in section 3.2.2. I measure contract length (*contract_length*) as how long, in months, a firm's derivative contracts are outstanding, on average. I measure a firm's use of interest rate derivative (*int_der*) as the percentage of a firm's derivatives that are interest rate derivatives. I measure firm size using the natural log of total assets, *lnassets*. I explain how I

measure the extent to which firms use derivatives (*der_use*) in section 3.2.2. I measure leverage as total liabilities divided by total assets. *MB* is the firm's market-to-book ratio. I measure the convexity of a firm's tax function (*taxconv*) using the methodology and regression coefficients from Graham and Smith (1999). I measure managerial incentives as the sensitivity of the CEO's portfolio of stock and options to stock price (*ceo_delta*). I measure the volatility of a firm's earnings before derivatives, *earn_vol_noder*, as the standard deviation of earnings before derivative scaled by total assets.

3.2 Sample, proxies and results

3.2.1 Sample

The sample consists of 98 firms that were in the S&P500 between 2008 and 2012 and used derivatives only for hedging purposes during that time period. I examine S&P 500 firms because they make up a significant portion of the entire economy and are more likely to use derivatives because they are large firms (Guay and Kothari, 2003). I am able to identify which firms use derivatives for purposes other than hedging using the FAS 161 disclosure which requires that firms disclose their reason for using derivatives. Firms that use derivatives for hedging generally state that they do not use derivatives for speculation or trading. It is common for firms to state that they have adopted a policy to not use derivatives for speculation or trading. I remove firms from the sample that mention using derivatives for any reason other than hedging. Rather than describing their use of derivatives as speculation, these firms often describe their derivative use as for "value creation" or for "strategic purposes other than risk management."

I randomly select 146 S&P500 firms to arrive at the 98 firms in the sample that use derivatives only for hedging purposes and have sufficient disclosure and data. All variables are measured from the date of the first filing after adoption of FAS 161 (first quarter beginning after

November 15, 2008) until June 30, 2012. Volatility measures are measured over the entire time period of the sample. All other variables are measured as averages during the sample period. See Table 1 for a breakdown of the sample selection and summary statistics.

3.2.2 Measures of hedge accounting and derivative use

I hand collect data about hedge accounting and derivative use from the disclosures required by FAS 161. The disclosure provides information about the fair value of all derivative assets and liabilities segregated by risk type and accounting designation. It also provides information as to the amount recognized in AOCI and earnings from derivatives. Using this data I develop several proxies for the use of derivatives and hedge accounting.

I measure hedge accounting use as the percentage of all derivatives that are designated for hedge accounting. I create an overall hedge accounting use measure (*ha_use*) as the average of hedge accounting use based on the balance sheet (*ha_bs*) and the income statement (*ha_inc*). I measure *ha_bs* as the gross sum of all derivative assets and liabilities designated for hedge accounting divided by the gross sum of all derivative assets and liabilities. I measure *ha_inc* as the absolute value of all changes in value during the quarter from derivatives designated as hedges divided by the changes in value for all derivatives during the quarter. The change in value for designated derivatives is equal to amount recognized in earnings from fair value hedges and the amount recognized in AOCI during the quarter.

Looking at only the income statement or balance sheet aspect of hedge accounting use would provide an incomplete picture of hedge accounting use. For example, consider a firm that applies hedge accounting to only a small portion of the derivative contracts it enters. If the derivatives designated as hedges had long contract lengths and the non-designated derivatives had a short contract length as expected, the balance sheet measure would identify the firm as a larger user of

hedge accounting. This is because the non-designated derivatives would show up as minimal amounts on the balance sheet due to them being more likely to be closed out during the quarter and having experienced a shorter time period to change in value with market prices. Examining the income statement would show a different story as it would capture the impact of all of the non-designated derivatives on earnings regardless of whether or not they were still open at the end of the quarter.

I measure the extent to which firms use derivatives in different ways depending on the purpose of the measure. When examining the decision to use hedge accounting, I am interested in the quantity of derivatives used in aggregate rather than their impact on risk. Thus, I measure `der_use` as the sum of the gross amount of derivative assets and liabilities scaled by total assets. When examining the impact that derivatives have on risk I take into account the effect of having derivatives in offsetting positions (asset versus liability). Prior literature has measured derivative use in various ways. One of the most preferable measures is the notional amount of derivatives outstanding. However, without additional information even the notional amount is not a perfect measure of derivative use. FAS 161 does require firms to provide some measure of the extent to which they use derivatives but does not specify how firms are to do this. Some firms do disclose overall notional amounts, but it is very uncommon for them to do so by risk type and accounting designation.

I use an alternative measure of derivative use, `net_der`, that is possible with the data from FAS 161. I calculate `net_der` as the absolute value of the net fair value of derivatives divided by the absolute value of the gross fair value of derivatives. This measure is used by the Office of the Comptroller of the Currency uses to estimate the extent of non-offset derivative exposure to risk. The benefit of this measure is that it measures the impact of outstanding derivatives on risk and it

is used by professional agencies. I further break this measure down in to the exposure related to non-designated derivatives (`net_nd`) and derivatives designated as hedges (`net_d`).

3.3 Results

The use of hedge accounting is pervasive throughout the sample. There are only four firms in the sample that do not use hedge accounting at all throughout the entire sample period. There are twelve firms that designate all derivatives for hedge accounting. For the entire sample, the mean (median) use of hedge accounting is 0.61 (0.63). Table 2 presents the regression results for hedge accounting use.

All coefficients for variables related to specific costs and benefits of hedge accounting match the predicted sign. All are significant at the 5% or 1% level except for `lnassets`. It is not surprising that the coefficient for `lnassets` is not significant because the sample consists of large firms where the economies of scale may not be an issue. All else equal, an increase in contract length of one year (12 months) equates to an increase of hedge accounting use of 2.6%. Firms that use more interest rate derivatives use hedge accounting to a greater extent. For the median firm interest rate derivatives make up 14% of all derivatives. The impact of this median use of interest rate derivatives increases hedge accounting use by 3.8%. I find that derivative use and earnings volatility before derivatives use have positive and significant association with hedge accounting use.

All coefficients for variables related to determinants of derivative use match the predicted sign. All are significant except for leverage. The coefficient for the interaction between `MB` and leverage is significant at 1%, providing evidence that firms that potentially face costly external financing are less likely to use hedge accounting. Firms with more convex tax function are less likely to use hedge accounting. These results are consistent with firms that are hedging for

reasons unrelated to accounting numbers using hedge accounting less. I do find that managers' compensation incentives as measured using ceodelta are positively associated with hedge accounting use. This provides evidence that, all else equal, managers that are more concerned with their equity portfolio are more willing to incur the costs of using hedge accounting to smooth earnings.

4. Impact of hedge accounting on financial reporting volatility

4.1 Hedge accounting and volatility of accounting numbers

The main benefit firms anticipate from using hedge accounting is lower earnings volatility than would be experienced otherwise. The fair value changes of derivatives that are not designated for hedge accounting are recognized in earnings immediately, which results in increased earnings volatility because the offsetting earnings impact from the hedged risk occurs at a later time. It is argued that this earnings volatility is not representative of the volatility of firms' underlying cash flows and can be misleading as to firms' true underlying economics. Alternatively, the changes in fair values of derivatives that firms designate for hedge accounting are not recognized in earnings until the earnings impact of the hedged risk is recognized. In theory, this matching of offsetting earnings effects should provide firms with less volatile earnings that better represent underlying economics.

Although it seems that earnings must be more volatile without the use of hedge accounting due to the mechanics of hedge accounting, prior literature has been unable to document this. This is likely due to the lack of data prior to FAS 161. In fact, prior literature has even been unable to document earnings volatility increased following the implementation of FAS 133. Zhang (2009) and Singh (2004) do not find a significant change in earnings volatility following the implementation of FAS 133. Zhang attributes this result to firms adjusting their derivative

portfolio in advance of FAS 133 to avoid the costs of volatile earnings. Singh concludes that FAS 133 may not have the impact on earnings volatility that it was expected to have.

It is likely that prior literature has been unable to document the predicted increase in earnings volatility around the implementation FAS 133 due to tests that relied only on pre and post analysis of firms that used derivatives. Prior literature was unable to identify whether firms were using hedge accounting, so possibly no increase in earnings volatility around FAS 133 adoption was identified because firms predominantly used hedge accounting. Using the FAS 161 disclosure, I am able to identify the income statement effects of using hedge accounting. For firms that use hedge accounting, I calculate what earnings and earnings volatility would have been for firms if they had not used hedge accounting.

There are a few reasons why I may not find that hedge accounting is associated with decreased earnings volatility. First, I may find, as prior literature has concluded, that the impact of FAS 133 on earnings volatility is not as large as was expected. With the new disclosure, I am able to identify if the inability to identify a change in earnings volatility due to FAS 133 is due to less derivative use than expected. Second, if managers have superior information, they may be able to use derivatives not designated as hedges as a way to smooth earnings in a manner that is just as effective as using hedge accounting. Barton (2001) provides evidence that, prior to FAS 133, firms used derivatives as a partial substitute for discretionary accruals to smooth earnings. Third, the volatility of earnings depends on the correlation between all of the assets and liabilities of the firm and not just the hedged item and the hedge. It could be the case that correlations between other unhedged firm assets and liabilities, the hedged item and the derivative used to hedge are such that earnings volatility would have been lower, if hedge accounting had not been used.

A less discussed, but possibly more risk relevant aspect of hedge accounting is how it affects the recognition of cash flows. Cash flows related to derivatives designated as hedges are typically classified as operating cash flows.⁹ In contrast, cash flows related to derivatives that are not designated as hedges are classified as investing cash flows. When using hedge accounting, the cash flows from the derivative and the cash flow from the offsetting hedged transaction are both recognized in the same time period as operating cash flows. Because this is not the case when derivatives are not designated for hedge accounting, I predict that operating cash flows will be less volatile when hedge accounting is used.

The volatility of operating cash flows is commonly used as a measure of risk that is unaffected by the smoothing effect of accrual accounting. Because operating cash flows are seen as unaffected by accrual accounting, their volatility is often considered a more true measure of the riskiness of the underlying economics of the firm. In fact, researchers often use the volatility of operating cash flows as a control to proxy for the volatility of the underlying economics of the firm when examining the volatility of earnings (Zhang, 2009; Rountree, 2008). The impact that hedge accounting has on the classification of cash flows, and, in turn, measures of risk has been completely ignored by prior literature. Using newly available data, I quantify the impact that hedge accounting has on the volatility of firms' earnings and operating cash flows.

4.2 Methodology and results

To measure the impact of hedge accounting use on earnings volatility, I compare the volatility of earnings as reported to the volatility of earnings removing the effect of hedge accounting. I use the disclosure from FAS 161 to estimate what earnings would have been if a

⁹ According to FAS 95, footnote 4, cash flows from a derivative instrument that are designated for hedge accounting may be classified into the operating section if the company chooses to do so. One exception to this is that, if the derivative includes an other-than-insignificant financing element all cash flows are considered cash flows from financing activities. Based on observation of footnote disclosures, it appears that firms that use hedge accounting do choose to classify all cash flows related to the derivative as operating cash flows.

firm had not used hedge accounting (earnings_noha). See Appendix B for details on the calculation of earnings_noha. After calculating earnings_noha for each firm quarter, I calculate what earnings volatility would have been if a firm had not used hedge accounting (earn_vol_noha). To test the significance of hedge accounting use on earnings volatility I perform a t-test comparing earnings volatility as reported (earn_vol) and earn_vol_noha. Results from this t-test are in Table 3, Panel A.

Removing hedge accounting treatment leads to an increase in earnings volatility that is statistically significant at the 1% level. The mean difference is equal to .00032 which is equivalent to a 2.81% increase in earn_vol when hedge accounting treatment is removed. The 25th percentile and median of earn_vol are equal to 0.0053 and 0.0080, respectively. Thus, the average difference in earnings volatility when removing hedge accounting treatment is sufficient to move a firm from the 25th percentile to above the median in earnings volatility.

Table 3, Panel A also reports the incremental difference in earnings volatility with and without hedge accounting separated by median of hedge accounting use and derivative use. The incremental earnings volatility (incr_earn_vol) is equal to the volatility of earnings removing hedge accounting treatment minus the volatility of earnings as reported. As expected, the incremental earnings volatility is highest for firms that are above the median in both derivative use and hedge accounting use. The incremental volatility is statistically different from zero for only this group of firms. The results are consistent with incremental volatility increasing in derivative and hedge accounting use. However, the difference across the groups is statistically significant only when focusing on firms with hedge accounting use above the median and varying the use of derivatives.

I perform a similar analysis for the volatility of CFO. I compare the volatility of CFO as reported (`cfo_vol`) to the volatility of CFO removing hedge accounting (`cfo_vol_noha`). To remove the effect of hedge accounting, I remove all cash flows from derivatives designated as hedges from CFO. See Appendix C for details on the calculation of cash from designated and non-designated derivatives (`d(nd)_realized`). There are reasons why this analysis may not be as clean as the analysis for earnings. First, the cash flows from derivatives based on accounting designation is estimated using the FAS 161 disclosure rather than stated explicitly in the disclosure like earnings are. Second, there is some discretion as to where the cash flows are classified. If firms use hedge accounting, they are given the option but not required to classify the cash flows in the operating section. Lastly, there is some evidence that firms are not complying with the rules to classify cash flows from non-designated derivatives in the investing or financing sections. Results from this analysis are in Table 3, Panel A.

Removing the impact of hedge accounting leads to an increase of 0.00057 in CFO volatility which is statistically significant at the 1% level. This change is equal to an increase in CFO volatility of 2.97%. Table 2, Panel B also reports the incremental difference in CFO volatility with and without hedge accounting separated by median of hedge accounting use and derivative use. As predicted, firms with both derivative use and hedge accounting use above the median have an incremental CFO volatility that is significantly different from zero. However, contrary to expectation, the incremental CFO volatility is also significant for firms with low derivative use and low hedge accounting use.

5. Impact of hedge accounting on investors' assessment of risk

5.1 Hypothesis development and research design

I conjecture two reasons why investors may perceive derivatives designated as hedges to be superior at decreasing risk relative to those that are not designated as hedges. The first, which I call the “certification effect”, is that derivatives that are designated as hedges have been certified to be “highly effective” hedges. This fact is documented by management quarterly, and the verification is audited externally annually. Although, in my sample, managers claim that all derivatives are used for hedging purposes and not speculation, this certification process is not required for derivatives not designated as hedges. Managers often refer to derivatives not designated for hedge accounting as economic hedges to emphasize their belief that the derivative positions do in fact decrease risk.

The second potential reason for a negative association between hedge accounting use and market-based risk measures, which I call the “measurement effect”, is related to the accounting treatment difference. Two derivatives that have exactly the same economic impact on firm risk would result in different earnings volatility and cash flow volatility, if hedge accounting were applied to only one of the derivatives. Thus, it is possible that the two fundamental accounting-based measures of risk used by investors (earnings volatility and operating cash flow volatility) that are lower due to hedge accounting will result in a negative relation between hedge designation and perceived risk.

When examining the relation between hedge designation and assessed risk I isolate the “certification effect” and the “measurement effect”. Understanding how the separate effects affect the market’s assessment of risk may be of interest to standard setters who seek to improve the information provided by the disclosure and recognition of derivatives. FAS 161 was created with the intent of improving the disclosure of firms’ derivative positions, which was found to be lacking after FAS 133. Currently, standard setters are debating whether to lower the requirement

for hedge effectiveness from “highly effective” to “reasonably effective” making it easier for firms to qualify to use hedge accounting and decreasing the documentation costs currently required. This test will examine whether the verification of a hedge being “highly effective” is important to investors’ assessments of risk beyond the impact that hedge accounting has on accounting-based risk measures.

I estimate the following model to examine the impact of hedge accounting on market-based risk measures:

Market – Based Risk_i

$$= \beta_0 + \beta_1 \text{incr_earn_vol}_i + \beta_2 \text{incr_cfo_vol}_i + \beta_3 \text{net_d}_i + \beta_4 \text{net_nd}_i + \text{controls}$$

I use two different market-based risk measures. The first is idiosyncratic risk (irisk) which I measure as the standard deviation of the residual on a market model that is estimated over the entire sample period. The second is a measure of total risk (sdret) which I measure as the standard deviation of the stock return over the entire sample period. To test whether hedge accounting affects the market assessment of risk via the accounting effect, I test whether $\beta_1 = \beta_2 = 0$. The volatility of earnings and CFO as reported are included as controls. Thus, if these coefficients are greater than zero, it provides evidence that investors at least partially unwind the impact of hedge accounting on decreasing earnings and CFO volatility. I examine the certification effect by comparing the coefficients on net_d and net_nd. Specifically, I test whether $\beta_3 = \beta_4$. If derivatives with different accounting designation are viewed by investors to have different impacts on risk, the coefficients will be different. If designated derivatives are seen as decreasing risk more effectively than non-designated derivatives, β_3 will be less than β_4 . Because I already control for the accounting effect by including the incremental volatilities any difference in these coefficients provides evidence for the certification effect.

I first run the model with only the incremental volatilities, excluding the net derivative positions. Next, I run the model excluding the incremental volatilities. Last, I run the full model as described above. I do this in an attempt to identify if there is any relation between hedge accounting use and market-based risk measures. It is a challenge to isolate the accounting effect and the certification effect because the use of hedge accounting will affect both. Thus, I examine my proxies for both effects individually and then jointly.

5.2 Results

Table 4 reports the results for the relation between hedge accounting use and market-based risk measures. The results consistently show positive coefficients on the incremental earnings and CFO volatilities. However, these coefficients are not quite significant at the 10% level in any of the models. The coefficients are jointly significant at the 10% level when *irisk* is the dependent variable. I conclude from these models that there is some evidence of a positive association between the market's assessment of risk and incremental earnings and CFO volatilities that is statistically weak. The weakness of the results is potentially caused by the small sample size. I interpret this evidence of a positive association as indicating that investors are able to see through the accounting treatment. It seems that investors at least partially back out the accounting treatment for hedge accounting. Investors price the riskiness due to the earnings volatility as reported and then price in some additional risk for the incremental amount of earnings volatility that would exist if hedge accounting did not exist. These results provide evidence that investors prefer to use earnings volatility without the use of hedge accounting as a signal of firm risk rather than earnings as reported.

I find no evidence in support of the certification effect. There is no difference in the coefficients for *net_d* and *net_nd*. In fact, their coefficients are not significantly different from

zero. In summary, I am unable to find any support for the accounting or the certification effect. Furthermore, it seems that investors at least partially unwind the hedge accounting treatment when pricing the risk of the firm. Thus, I am unable to find any stock market benefits to using hedge accounting.

6. Conclusions and Future Research

6.1 Conclusions

Using data collected from a newly required disclosure about firms' derivative use, I examine the risk relevance of the accounting for derivatives. I first examine which firm characteristics determine whether firms choose to use hedge accounting. I document that benefits and costs specific to hedge accounting requirements as well as general motivations to use derivatives drive firms' decision to use hedge accounting. I provide evidence that the accounting for derivatives has a significant impact on financial reporting. Specifically, firms that elect to use hedge accounting achieve a significant decrease in reported earnings and CFO volatility. However, I am unable to identify firms obtaining any stock market benefits from using hedge accounting. In fact, I provide some evidence that investors' at least partially unwind the impact of hedge accounting when assessing firm risk. Also, I find no evidence that investors view derivatives designated as hedges as being more effective at decreasing risk than derivatives that are not designated for hedge accounting.

6.2 Future Research

The data obtained from the FAS 161 disclosures can be used to answer many questions related to firms' use of derivatives and hedge accounting. This paper focuses on the choice that firms make between the different accounting treatments for derivatives and how the use of hedge accounting affects commonly used accounting-based and market-based measures of risk. Further

analysis can examine which firms obtain the greatest decrease in earnings volatility from using hedge accounting. This paper was unable to find a stock market benefit to using hedge accounting. Further analysis will be able to identify if there are other potential ways that firms benefit from using hedge accounting. Questions previously addressed about derivative use in general can now be answered more strongly. For example, using disclosures of notional amounts and simulations of market prices, Guay and Kothari (2003) find evidence that suggests that derivatives use by non-financial firms is modest. The FAS 161 disclosure makes it possible to measure more precisely the extent to which derivatives impact, and initial analysis suggests that contrary to the findings in Guay and Kothari (2003), the earnings impact of derivatives may be significant.

References

- Adam, Tim R, and Chitru S Fernando. 2006. "Hedging, speculation, and shareholder value." *Journal of Financial Economics* 81 (2) (August): 283-309.
- Baber, William R, Sok-Hyon Kang, and Krishna R Kumar. 1998. "Accounting earnings and executive compensation: The role of earnings persistence." *Journal of Accounting and Economics* 25 (2) (May 27): 169-193.
- Barton, Jan. 2001. "Does the Use of Financial Derivatives Affect Earnings Management Decisions?" *The Accounting Review* 76 (1): 1-26.
- Beatty, Anne L, Reining Chen, and Haiwen Zhang. 2011. Hedge Commitments and Agency Costs of Debt: Evidence from Interest Rate Protection Covenants and Accounting Conservatism. *SSRN eLibrary*. SSRN. <http://ssrn.com/paper=1463001>.
- Beidleman, Carl R. 1973. "Income Smoothing: The Role of Management." *The Accounting Review* 48 (4) (October 1): 653-667.
- Comiskey, E.E., and C.W. Mulford. 2008. "The non-designation of derivatives as hedges for accounting purposes." *Journal of Applied Research in Accounting and Finance (JARAF)* 3 (2): 3.
- Easley, David, and Maureen O'hara. 2004. "Information and the Cost of Capital." *The Journal of Finance* 59 (4): 1553-1583.
- Fields, Thomas D, Thomas Z Lys, and Linda Vincent. 2001. "Empirical research on accounting choice." *Journal of Accounting and Economics* 31 (1-3) (September): 255-307.
- Financial Accounting Standards Board. Statement of Financial Accounting Standards No. 133: Accounting for Derivative Instruments and Fair Value of Financial Instruments. Stamford, Connecticut.: FASB, 1994
- Financial Accounting Standards Board. Statement of Financial Accounting Standards No. 161: Disclosures about Derivative Instruments and Hedging Activities. Stamford, Connecticut.: FASB, 2008
- Francis, Jennifer, Ryan LaFond, Per M Olsson, and Katherine Schipper. 2004. "Costs of Equity and Earnings Attributes." *The Accounting Review* 79 (4) (October 1): 967-1010.
- Gay, Gerald D, and Jouahn Nam. 1998. "The Underinvestment Problem and Corporate Derivatives Use." *Financial Management* 27 (4) (December 1): 53-69.
- Géczy, Christopher, Bernadette A Minton, and Catherine Schrand. 1997. "Why Firms Use Currency Derivatives." *The Journal of Finance* 52 (4) (September 1): 1323-1354.
- Géczy, Christopher C, Bernadette A Minton, and Catherine Schrand. 2007. "Taking a View: Corporate Speculation, Governance, and Compensation." *The Journal of Finance* 62 (5): 2405-2443.
- Géczy, Christopher C, Bernadette A Minton, and Catherine Schrand. 2006. "The use of multiple risk management strategies: evidence from the natural gas industry." *The Journal of Risk* 8 (3): 1-54.
- Glaum, Martin, and André Klöcker. 2011. When the Tail Wags the Dog: Hedge Accounting and its Influence on Financial Hedging. *Accounting and Business Research, Forthcoming*.

- Graham, John R, Campbell R Harvey, and Shiva Rajgopal. 2005. "The economic implications of corporate financial reporting." *Journal of Accounting and Economics* 40 (1-3) (December): 3-73.
- Graham, John R, and Daniel A Rogers. 2002. "Do Firms Hedge in Response to Tax Incentives?" *The Journal of Finance* 57 (2) (April 1): 815-839.
- Graham, John R, and Clifford W Smith. 1999. "Tax Incentives to Hedge." *The Journal of Finance* 54 (6): 2241-2262.
- Guay, Wayne R. 1999. "The impact of derivatives on firm risk: An empirical examination of new derivative users." *Journal of Accounting and Economics* 26 (1-3) (January): 319-351.
- Guay, Wayne, and S P Kothari. 2003. "How much do firms hedge with derivatives?" *Journal of Financial Economics* 70 (3) (December): 423-461.
- Hughen, Linda. 2010. "When Do Accounting Earnings Matter More than Economic Earnings? Evidence from Hedge Accounting Restatements." *Journal of Business Finance & Accounting* 37 (9-10): 1027-1056.
- Johnson, N. S. 1999. Current SEC developments—"Managed earnings" and "The year of the accountant." Remarks delivered at the Utah State Bar Mid-Year Conventions, St. George, UT. March 6. Securities and Exchange Commission.
- Knopf, John D, Jouahn Nam, and John H Thornton Jr. 2002. "The Volatility and Price Sensitivities of Managerial Stock Option Portfolios and Corporate Hedging." *The Journal of Finance* 57 (2): 801-813.
- Leland, Hayne E. 1998. "Agency Costs, Risk Management, and Capital Structure." *The Journal of Finance* 53 (4): 1213-1243.
- McInnis, John. 2010. "Earnings Smoothness, Average Returns, and Implied Cost of Equity Capital." *Accounting Review* 85 (1) (January): 315-341.
- Modigliani, Franco, and Merton H Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *The American Economic Review* 48 (3) (June 1): 261-297.
- Myers, Stewart C, and Nicholas S Majluf. 1984. "Corporate financing and investment decisions when firms have information that investors do not have." *Journal of Financial Economics* 13 (2) (June): 187-221.
- Nance, Deana R, Clifford W Smith Jr., and Charles W Smithson. 1993. "On the Determinants of Corporate Hedging." *The Journal of Finance* 48 (1) (March 1): 267-284.
- Previts, Gary John, Robert J Bricker, Thomas R Robinson, and Stephen J Young. 1994. "A Content Analysis of Sell-Side Financial Analyst Company Reports." *Accounting Horizons* 8 (2) (June): 55-70.
- Richie, Nivine, Charmaine Glegg, and Kimberly C Gleason. 2006. "The effects of SFAS 133 on foreign currency exposure of US-based multinational corporations." *Journal of Multinational Financial Management* 16 (4) (October): 424-439.
- Roulston, D. 1999. Effects of SEC Financial Reporting Release No. 48 on derivative and market risk disclosures. *Accounting Horizons* 13 (December): 343-363.
- Rountree, Brian, James P Weston, and George Allayannis. 2008. "Do investors value smooth performance?" *Journal of Financial Economics* 90 (3) (December): 237-251.

Smith, Clifford W, and Rene M Stulz. 1985. "The Determinants of Firms' Hedging Policies." *The Journal of Financial and Quantitative Analysis* 20 (4) (December 1): 391-405.

Trueman, Brett, and Sheridan Titman. 1988. "An Explanation for Accounting Income Smoothing." *Journal of Accounting Research* 26 (January 1): 127-139.

Warner, Jerold B. 1977. "Bankruptcy Costs: Some Evidence." *The Journal of Finance* 32 (2) (May 1): 337-347.

Watts, Ross L, and Jerold L Zimmerman. 1990. "Positive Accounting Theory: A Ten Year Perspective." *The Accounting Review* 65 (1) (January 1): 131-156.

Zhang, Haiwen. 2009. "Effect of derivative accounting rules on corporate risk-management behavior." *Journal of Accounting and Economics* 47 (3) (June): 244-264.

Exhibit 1: Example Disclosures from FAS 161—Impact of Derivatives on the Balance Sheet and Income Statement

Fair Values of Derivative Instruments

In millions of dollars

As of December 31

	Asset Derivatives				Liability Derivatives			
	2010		2009		2010		2009	
	Balance Sheet Location	Fair Value						
Derivatives designated as hedging instruments under Statement 133								
Interest rate contracts	Other assets	\$XX,XXX	Other assets	\$XX,XXX	Other liabilities	\$XX,XXX	Other liabilities	\$XX,XXX
Foreign exchange contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Equity contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Commodity contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Credit contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Other contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Total derivatives designated as hedging instruments under Statement 133		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>
Derivatives not designated as hedging instruments under Statement 133 (a)								
Interest rate contracts	Other assets	\$XX,XXX	Other assets	\$XX,XXX	Other liabilities	\$XX,XXX	Other liabilities	\$XX,XXX
Foreign exchange contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Equity contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Commodity contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Credit contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Other contracts	Other assets	XX,XXX	Other assets	XX,XXX	Other liabilities	XX,XXX	Other liabilities	XX,XXX
Total derivatives not designated as hedging instruments under Statement 133		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>
Total derivatives		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>		<u>\$XX,XXX</u>

(a) See footnote XX for additional information on the ABC Company's purpose for entering into derivatives **not** designated as hedging instruments and its overall risk management strategies.

Exhibit 1 (continued)

The Effect of Derivative Instruments on the Statement of Financial Performance for the Years Ended December 31, 2010, and 2009

Derivatives in Statement 133 Fair Value Hedging Relationships	Location of Gain or (Loss) Recognized in Income on Derivative ^(a)	Amount of Gain or (Loss) Recognized in Income on Derivative	
		2010	2009
		Interest rate contracts	Interest income/(expense)
Foreign exchange contracts	Foreign currency gain/(loss)	XX,XXX	XX,XXX
Equity contracts	Other income/(expense)	XX,XXX	XX,XXX
Commodity contracts	Other income/(expense)	XX,XXX	XX,XXX
Credit derivatives	Other income/(expense)	XX,XXX	XX,XXX
Other contracts	Other income/(expense)	XX,XXX	XX,XXX
Total		<u>\$XX,XXX</u>	<u>\$XX,XXX</u>

Derivatives in Statement 133 Cash Flow Hedging Relationships	Amount of Gain or (Loss) Recognized in OCI on Derivative (Effective Portion)		Location of Gain or (Loss) Reclassified from Accumulated OCI into Income (Effective Portion) ^(a)	Amount of Gain or (Loss) Reclassified from Accumulated OCI into Income (Effective Portion)		Location of Gain or (Loss) Recognized in Income on Derivative (Ineffective Portion and Amount Excluded from Effectiveness Testing) ^(a)	Amount of Gain or (Loss) Recognized in Income on Derivative (Ineffective Portion and Amount Excluded from Effectiveness Testing) ^(d)	
	2010	2009		2010	2009		2010	2009
	Interest rate contracts	\$XX,XXX		\$XX,XXX	Interest income/(expense)		\$XX,XXX	\$XX,XXX
Foreign exchange contracts	XX,XXX	XX,XXX	Sales/Revenue	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX
Equity contracts	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX
Commodity contracts	XX,XXX	XX,XXX	Cost of sales	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX
Credit derivatives	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX
Other contracts	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX	Other income/(expense)	XX,XXX	XX,XXX
Total	<u>\$XX,XXX</u>	<u>\$XX,XXX</u>		<u>\$XX,XXX</u>	<u>\$XX,XXX</u>		<u>\$XX,XXX</u>	<u>\$XX,XXX</u>

Exhibit 1 (continued)

Derivatives in Statement 133 Net Investment Hedging Relationships	Amount of Gain or (Loss) Recognized in OCI on Derivative (Effective Portion)		Location of Gain or (Loss) Reclassified from Accumulated OCI into Income (Effective Portion) ^(a)	Amount of Gain or (Loss) Reclassified from Accumulated OCI into Income (Effective Portion)		Location of Gain or (Loss) Recognized in Income on Derivative (Ineffective Portion and Amount Excluded from Effectiveness Testing) ^(a)	Amount of Gain or (Loss) Recognized in Income on Derivative (Ineffective Portion and Amount Excluded from Effectiveness Testing) ^(d)	
	2010	2009		2010	2009		2010	2009
	Foreign exchange contracts	\$XX,XXX	\$XX,XXX	Gain or (loss) on sale of subsidiary	\$XX,XXX	\$XX,XXX	Other income/(expense)	\$XX,XXX

Derivatives Not Designated as Hedging Instruments under Statement 133 ^{(b),(c)}	Location of Gain or (Loss) Recognized in Income on Derivative ^(a)	Amount of Gain or (Loss) Recognized in Income on Derivative	
		2010	2009
		Interest rate contracts	Other income/(expense)
Foreign exchange contracts	Other income/(expense)	XX,XXX	XX,XXX
Equity contracts	Other income/(expense)	XX,XXX	XX,XXX
Commodity contracts	Other income/(expense)	XX,XXX	XX,XXX
Credit derivatives	Other income/(expense)	XX,XXX	XX,XXX
Other contracts	Other income/(expense)	XX,XXX	XX,XXX
Total		<u>\$XX,XXX</u>	<u>\$XX,XXX</u>

(a) If gains and losses associated with a type of contract (for example, interest rate contracts) are displayed in multiple line items in the income statement, the entity is required to disclose the amount included in each line item.

(b) See footnote XX for additional information on the ABC Company's purpose for entering into derivatives not designated as hedging instruments and its overall risk management strategies.

(c) For alternative disclosures about "trading derivatives," see separate table for trading activities in footnotes to the financial statements.

(d) The amount of gain or (loss) recognized in income represents \$XXX related to the ineffective portion of the hedging relationships and \$XXX related to the amount excluded from the assessment of hedge effectiveness.

Appendix A: Variable Definitions

d_asset(liab)	Fair value of designated derivative assets (liabilities).
nd_asset(liab)	Fair value of non-designated derivative assets (liabilities).
grossbs_d(nd)	Sum of designated (non-designated) assets and liabilities.
netbs_d(nd)	Designated (non-designated) assets minus designated (non-designated) liabilities.
der_use	Proxy for extent to which firms use derivatives. Computed as $(grossbs_d + grossbs_nd)/assets$.
net_der	Derivative assets minus liabilities divided by the sum of derivative assets and liabilities.
net_d(nd)	Designated (Non-designated) derivative assets minus liabilities divided by the sum of designated (non-designated) derivative assets and liabilities.
d(nd)_ni	Amount recognized in net income from designated (non-designated) derivatives.
d(nd)_realized	Estimate of realized gains and losses from designated (non-designated) derivatives.
ha_inc	Proxy for the extent to which firms use hedge accounting. Computed as $d_ni/(d_ni+nd_ni)$.
ha_bs	Proxy for the extent to which firms use hedge accounting. Computed as $grossbs_d/(grossbs_d + grossbs_nd)$.
ha_use	Average of ha_inc and ha_bs.
contract_length_d(nd)	Estimate for average length of time, in months, a firm's designated (non-designated) derivative contracts are open. Computed as $1.5*(netbs_d(nd)+lagged(netbs_d(nd)))/d(nd)_realized$.
contract_length	Estimate for average length of time, in months, a firm's derivative contracts are open. Computed as $ha_use*contract_lengthd + (1-ha_use)*contract_lengthnd$.
irisk	Standard deviation of the residual from market model regression.
sdret	Standard deviation of stock return over the sample period.
earnings	Earnings scaled by total assets.
earnings_noder	Earnings before derivatives scaled by total assets.
earnings_noha	Earnings removing the effect of hedge accounting scaled by total assets. This measures what earnings would have been if the treatment for hedge accounting did not exist.
earn_vol	Standard deviation of earnings as reported, scaled by total assets.
earn_vol_noder	Standard deviation of earnings before derivatives, scaled by total assets.
earn_vol_noha	Earnings volatility removing the effect of hedge accounting scaled by total assets.
incr_earn_vol	The incremental earnings volatility that would arise if hedge accounting were removed. Computed as $earn_vol_noha - earn_vol$.

Appendix A (continued)	
cfo_vol	Standard deviation of CFO as reported, scaled by total assets.
cfo_vol_nh	Standard deviation of CFO after removing d_realized from CFO as reported.
incr_cfo_vol	The incremental volatility of CFO that would arise if hedge accounting were removed. Computed as cfo_col_nh - cfo_vol.
int_der	Percentage of derivatives that are used for interest rate risk rather than foreign exchange, commodity or other.
lnassets	Natural logarithm of total assets.
leverage	Leverage calculated as total liabilities divided by total assets.
MB	Market-to-book ratio.
taxconv	A measure of the convexity of a firm's tax function following the methodology and regression coefficients from Graham and Smith (1999)
ceodelta	The delta of the CEO's portfolio of stock and option following Core and Guay (1999).

*Measures of volatility are measured over the entire sample period. All other measures are averages of the quarterly observations.

Appendix B: Calculation of earnings_noha

In this Appendix, I describe the calculation for what earnings would have been if derivatives had not been designated for hedge accounting (earnings_noha):

There are two main types of hedges for accounting purposes: cash flow hedges and fair value hedges.¹⁰ A cash flow hedge is a “hedge of the exposure to variability in the cash flows of a recognized asset or liability, or of a forecasted transaction, that is attributable to a particular risk” (FAS 133, para. 4). For cash flow hedges, the effective portion is recognized in Other Comprehensive Income and then recorded on an after-tax basis in Accumulated Other Comprehensive Income (AOCI). This allows the change in the fair value of the derivative to show up on the balance sheet without affecting the income statement. The amount recognized in AOCI is reclassified into earnings when the hedged item (i.e. the forecasted transaction) occurs.

A fair value hedge is “a hedge of the exposure to changes in the fair value of a recognized asset or liability that is attributable to a particular risk” (FAS 133, para. 4). Both the effective and ineffective portions of the change in fair value of fair value hedges are recognized in earnings immediately. The carrying value of the hedged item is also adjusted on the balance sheet to reflect the change in market value, and this change is also recognized in earnings. Because both the change in value of the hedging instrument and the underlying asset or liability are recognized in earnings immediately their effects will offset each other. This leaves only the ineffective portion to be recognized immediately in earnings.

To arrive at earnings without hedge accounting (earnings_noha) I begin with reported earnings and remove the effect of special accounting given to cash flow and fair value hedges.

¹⁰ Another, infrequently used, hedge type allowed by FAS 133 is a hedge of net investment. The accounting treatment for a hedge of net investment is similar to that for cash flow hedges.

To remove the hedge accounting for cash flow hedges, I subtract the amount transferred from AOCI into earnings and add the amount recognized in AOCI. The amount being recognized in AOCI would be recognized in current earnings were it not for hedge accounting. The amount transferred from AOCI into earnings is being recognized in the current quarter under hedge accounting, but I want to remove this effect because without hedge accounting it would have affected earnings in a previous quarter.

Removing the impact of hedge accounting for fair value hedges is not as precise. FAS 161 requires disclosure of gains and losses related to fair value hedges and items hedged by fair value hedges. The net of these two amounts is recognized in earnings. Without hedge accounting, derivatives gains and losses would be recognized in earnings immediately. However, it is not certain that the gains and losses on the item being hedged would not be recognized. Some types of assets and liabilities are marked to market even if hedge accounting is not applied. I assume that hedged item would not be marked to market, if hedge accounting were not used. I make this assumption because it is unlikely that a firm would use hedge accounting for assets and liabilities that were already marked to market. Using hedge accounting in this situation would be value destroying because the accounting treatment is the same and there are costs to using hedge accounting. Therefore, I remove the impact of hedge accounting by removing the amount currently recognized in earnings from fair value hedges and add the gains and losses on the derivatives designated as fair value hedges.

To summarize, my measure of earnings removing the impact of hedge accounting:

$$\text{earnings_noha} = \text{Earnings as Reported} - \text{Transfers from AOCI to Earnings} + \text{Recognized in AOCI} - \text{Earnings impact of FV hedges} + \text{Gains on derivatives designated as FV hedges}$$

Appendix C: Estimating cash flows from derivatives designated as hedges

This appendix describes how to calculate the fair value of derivative contracts that have been closed during the quarter, which provides a measure of the amount of cash received from these derivatives. Estimating the fair value of the derivatives closed during the quarter provides me a way to estimate the average contract length.

In this framework, derivatives can be placed in three different groups determined by their lifecycle relative to the quarter of interest. I define a derivative as held if it is on the books at the beginning of the quarter and also at the end of the quarter. I define a derivative as entered if it is not on the books at the beginning of the quarter and is entered into during the quarter. I define a derivative as closed if it is closed out during the quarter.

Non-designated derivatives:

For non-designated derivatives, the earnings impact and the changes in balance sheet assets and liabilities are observable. It is possible to obtain an estimate of the fair value of the derivative contracts that were closed during the quarter by looking at the changes in the fair values of the derivatives and how these changes differ from the amount recognized in earnings. For example, if the values on the balance sheet decreased by \$2, but the impact on earnings was \$0, then we can infer that \$2 worth of derivatives were closed out during the quarter.

Simple algebra shows how the fair value of contracts closed during the quarter can be estimated. I refer to the beginning of the quarter as t and the end of the quarter as $t+1$. $NDFV$ refers to the fair value of the non-designated derivative contracts, or the value of the assets minus the liabilities. This analysis can be applied to non-designated derivatives as a whole or by risk type. $NDFV_{\text{at time } t \text{ of closed}}$ refers to the fair value of non-designated derivative contracts that were closed during the quarter at their balance sheet values at the beginning of the quarter.

NDEarnings refers to the amount recognized in earnings related to non-designated derivatives. $\Delta NDFV_i$ refers to the change in fair value that derivatives of type i experienced during the quarter.

Balance sheet impact of non-designated derivatives:

$$(1) \quad NDFV_{t+1} = NDFV_t + \Delta NDFV_{held} + \Delta NDFV_{entered} - NDFV_{at\ time\ t\ of\ closed}$$

Earnings impact of non-designated derivatives:

$$(2) \quad NDEarnings = \Delta NDFV_{held} + \Delta NDFV_{entered} + \Delta NDFV_{closed}$$

Solving for $\Delta NDFV_{entered} + \Delta NDFV_{closed}$ and substituting into the first equation gives:

$$(3) \quad NDFV_t = NDFV_{t-1} + NDEarnings - \Delta NDFV_{closed} - NDFV_{at\ time\ t\ of\ closed}$$

Manipulation gives us the fair value of contracts closed out during the quarter at the fair value at the time they were closed in terms of variables that are all known:

$$(4) \quad \text{Cash flow from ND} = NDFV_{closed} = \Delta NDFV_{closed} + NDFV_{at\ time\ t\ of\ closed} = \\ NDFV_{t-1} - NDFV_t + NDEarnings$$

Designated Derivatives:

The FAS 161 disclosure provides the beginning and ending balance of designated derivative assets and liabilities which includes cash flow and fair value hedges combined together. The FAS 161 disclosure requires the amount of fair value hedges reported in earnings, the amount of cash flow hedges recognized in AOCI (*RECinAOCI*) and the amount of cash flow hedges transferred from AOCI into earnings. D, FVH and CFH refer to designated derivative, fair value hedge and cash flow hedge respectively.

Balance sheet impact of designated derivatives:

$$(5) \quad DFV_t = DFV_{t-1} + \Delta FVHFV_{held} + \Delta FVHFV_{entered} - FVHFV_{at\ time\ t\ of\ closed} + \\ \Delta CFHFV_{held} + \Delta CFHFV_{entered} - CFHFV_{at\ time\ t\ of\ closed}$$

Earnings impact of fair value hedges:

$$(6) \text{ FVHEarnings} = \Delta\text{FVHFV}_{\text{held}} + \Delta\text{FVHFV}_{\text{entered}} + \Delta\text{FVHFV}_{\text{closed}}$$

$$(7) \text{ FVHEarnings} - \Delta\text{FVHFV}_{\text{closed}} = \Delta\text{FVHFV}_{\text{held}} + \Delta\text{FVHFV}_{\text{entered}}$$

Earnings impact of cash flow hedges:

$$(8) \text{ RECinAOCI} = \Delta\text{CFHFV}_{\text{held}} + \Delta\text{CFHFV}_{\text{entered}}$$

Substituting (7) and (8) into (5) produces:

$$(9) \text{ DFV}_t = \text{DFV}_{t-1} + \text{FVHEarnings} - \Delta\text{FVHFV}_{\text{closed}} - \text{FVHFV}_{\text{at time } t \text{ of closed}} + \text{RECinAOCI} - \text{CFHFV}_{\text{at time } t \text{ of closed}}$$

Manipulation to get values of contracts closed during the quarter in terms of known values:

$$(10) \quad \text{DVF}_{\text{closed}} = \Delta\text{FVHFV}_{\text{closed}} + \text{FVHFV}_{\text{at time } t \text{ of closed}} + \text{CFHFV}_{\text{at time } t \text{ of closed}} = \text{DFV}_{t-1} - \text{DFV}_t + \text{FVHEarnings} + \text{RECin AOCI}$$

Table 1: Sample**Panel A: Sample Selection**

Total Firms Examined from S&P500:	146
Firms not using derivatives:	(5)
Firms using derivatives for reasons besides hedging:	(11)
Firms without sufficient disclosure:	(30)
Firms without data for all controls:	(2)
Total Sample Size:	98

Panel B: Summary Statistics

Variable	Mean	Std. Dev.	Q1	Median	Q3
ha_use	0.61	0.264	0.42	0.63	0.78
der_use	0.012	0.018	0.003	0.007	0.014
contract_length_d	30.414	43.36	4.61	12.07	34.78
contract_length_nd	12.162	20.58	1.35	3.97	11.52
contract_length	26.35	38.99	3.93	10.51	30.48
irisk	0.014	0.007	0.010	0.012	0.016
sdret	0.019	0.008	0.013	0.017	0.022
earn_vol	0.011	0.009	0.005	0.008	0.015
incr_earn_vol	0.0003	0.001	-0.0002	0	0.0003
cfo_vol	0.019	0.015	0.011	0.015	0.021
incr_cfo_vol	0.0006	0.002	-0.0005	0.0002	0.0012
int_der	0.258	0.291	0.005	0.139	0.427
assets	32,050	78,489	6,640	13,577	31,383
leverage	0.638	0.197	0.4925	0.636	0.7743
MB	3.204	26.92	1.78	2.82	3.88

Descriptive statistics of main variables. All variables are defined in Appendix A.

Panel C: Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ha_inc											
(2) ha_bs	0.89										
(3) ha_use	0	0.92									
(4) der_use	0.1	-0.04	0.06								
(5) net_der	0.34	0.71	0.56	-0.15							
(6) irisk	0.04	0.15	0.08	0.13	0.1						
(7) sdret	0.67	0.13	0.42	0.13	0.12	0.94					
(8) incr_earn_vol	-0.16	-0.16	-0.12	-0.12	0.24	0	-0.01				
(9) int_der	0.13	0.11	0.22	0.24	0.12	0.89	0.91	-0.16			
(10) contract_length	0.15	0.15	0.22	0.16	0.24	0	0	0.11	0.08		
(11) assets	0.16	0.13	0.13	0.26	-0.04	0.01	-0.01	0.04	0.4	0.12	
	0.1	0.21	0.2	0.01	0.68	0.89	0.91	0.04	0.4	0.12	
	0.27	0.29	0.28	-0.11	0.22	0	0	-0.16			
	0.01	0	0	0.27	0.03	0.98	0.98	0.11			
	0.3	0.29	0.26	0.07	0.11	-0.08	-0.03	0.04	0.08		
	0	0	0.01	0.46	0.29	0.45	0.77	0.71	0.4		
	0.09	0.02	0.03	0.11	-0.19	-0.08	-0.05	0.07	0.08	0.12	
	0.37	0.81	0.76	0.27	0.06	0.41	0.63	0.5	0.45	0.24	

This table presents pair-wise Pearson correlations of variables of interest. The level of significance is included under the coefficient. All variables are defined in Appendix A.

Table 2: Determinants of Hedge Accounting Use

	Prediction	(1) ha_use
contract_length	+	0.00214*** (0.0004)
int_der	+	0.272*** (0.08)
lnassets	+	0.0176 (0.0198)
der_use	+	2.750*** (0.85)
earn_vol_noder	+	5.697** (2.66)
MB	+	0.136*** (0.04)
leverage	-	-0.155 (0.13)
MB*leverage	-	-0.142*** (0.04)
taxconv	-	-.0128** (.00541)
ceodelta	+	.0238* (.0122)
Constant		0.147 (0.25)
Observations		99
R-squared		0.373

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

This table proves an OLS regression that examines the determinants of hedge accounting use. The sample consists of S&P500 firms between 2009 and June 30, 2012 that used derivatives only for hedging purposes. ha_use measures the extent to which firms use hedge accounting as the percentage of all derivatives that are designated as hedges. contract_length is the length of time, in months, that a firm's average derivative contract is outstanding. int_der is the percentage of derivatives that are interest rate derivatives. Lnassets is the natural log of assets. Der_use measures the gross amount of derivatives that firm has outstanding scaled by assets. Earn_vol_noder is the quarterly earnings volatility over the sample period removing the effects of derivatives. MB is the market-to-book ratio. Leverage is total liabilities divided by total assets. Taxconv is the convexity of a firms' tax function following Graham and Smith (1999). Ceodelta is the delta of the CEO's portfolio of stock and options. Besides earn_vol_noder, all other variables are calculated as the average of quarterly observations over the sample period.

Table 3: Accounting Impact of Hedge Accounting

Panel A: Earnings Volatility

Standard deviation of earnings scaled by total assets:

earn_vol	earn_vol_noha	Difference (incr_earn_vol)
.01136	.01168	.00032 (3.14)***

Incremental Earnings Volatility Removing Hedge Accounting (incr_earn_vol):

		Derivative Use (der_use)		Difference
		Below Median	Above Median	
Hedge Accounting Use (ha_use)	Below Median	-.0000095 (-0.17)	.0002241 (1.43)	.00023 (1.62)
	Above Median	.0000646 (0.66)	.0005016 (2.94)***	.00032 (1.98)*
	Difference	.00007 (0.71)	.00028 (1.14)	

*** p<0.01, ** p<0.05, * p<0.1

This panel examines the effect that hedge accounting has on earnings volatility. Earn_vol is the volatility of quarterly earnings as reported scaled by assets. earn_vol_noha is the volatility of quarterly earnings removing the effect of hedge accounting scaled by total assets. incr_earn_vol is the incremental volatility in earnings that would occur if the effects of hedge accounting were removed. Hedge accounting use (ha_use) and derivative use (der_use) are described in detail in section in Section 3.2.2. The individual quadrants test whether incr_earn_vol is different from zero depending on ha_use and der_use being below and or above the median. Differences between quadrants are tested against each other.

Table 3 (continued):

Panel B: CFO Volatility

Standard deviation of CFO scaled by total assets:

cfo_vol	cfo_vol_nha	Difference (incr_cfo_vol)
.0191679	.0197379	.00057 (3.50)***

		Incremental CFO Volatility Removing Hedge Accounting		Difference
		Below Median	Above Median	
Hedge Accounting Use (ha_use)	Derivative Use (der_use)			
	Below Median	Above Median		
	Below Median	.00078 (2.80)***	.00058 (1.25)	-.0002 (-0.40)
Above Median	.00044 (1.52)	.00077 (2.94)***	.0003 (0.82)	
Difference	-.0003 (-0.80)	.0002 (0.39)		

*** p<0.01, ** p<0.05, * p<0.1

This panel examines the effect that hedge accounting has on CFO volatility. cfo_vol is the volatility of quarterly CFO as reported scaled by assets. cfo_vol_noha is the volatility of quarterly CFO removing the effect of hedge accounting scaled by total assets. incr_cfo_vol is the incremental volatility in earnings that would occur if the effects of hedge accounting were removed. Hedge accounting use (ha_use) and derivative use (der_use) are described in detail in section in Section 3.2.2. The individual quadrants test whether incr_cfo_vol is different from zero depending on ha_use and der_use being below and or above the median. Differences between quadrants are tested against each other.

Table 4: Hedge Accounting Use and Market Risk Measures

	(1)	(2)	(3)	(4)	(5)	(7)
	irisk	sdret	irisk	Sdret	irisk	sdret
incr_earn_vol	0.498 (0.370)	0.313 (0.417)			0.627 (0.423)	0.490 (0.476)
incr_cfo_vol	0.728 (0.486)	0.717 (0.452)			0.731 (0.482)	0.721 (0.451)
net_d			0.00077 (0.00226)	0.00093 (0.00296)	0.00002 (0.0023)	0.00019 (0.0029)
net_nd			-0.00001 (0.00213)	0.00113 (0.00258)	0.00047 (0.002)	0.00169 (0.0025)
net_der	0.0021 (0.003)	0.0032 (0.003)				
earn_vol	0.231*** (0.076)	0.238*** (0.086)	0.282*** (0.082)	0.294*** (0.093)	0.300*** (0.084)	0.309*** (0.097)
leverage	0.0020 (0.0038)	-0.0013 (0.0037)	0.0019 (0.0037)	-0.0001 (0.0036)	0.0036 (0.0042)	0.0015 (0.0040)
lnassets	-0.00068 (0.0004)	-0.00048 (0.0005)	-0.00066 (0.0005)	-0.00039 (0.0006)	-0.00078* (0.0004)	-0.00052 (0.0005)
MB	-0.0002 (0.0007)	-0.00002 (0.0007)	0.0001 (-0.0007)	0.00033 (0.0008)	-0.00003 (0.0007)	0.0002 (0.0008)
earnings_noder	-0.195*** (0.073)	-0.304*** (0.068)	-0.212** (0.084)	-0.323*** (0.077)	-0.199** (0.080)	-0.312*** (0.073)
cfo_vol	0.064 (0.078)	0.085 (0.073)	0.052 (0.078)	0.070 (0.074)	0.042 (0.076)	0.061 (0.072)
Constant	0.0165*** (0.0044)	0.0228*** (0.0060)	0.0178*** (0.0056)	0.0225*** (0.0073)	0.0172*** (0.0051)	0.0220*** (0.0068)
Observations	98	98	98	98	98	98
R-squared	0.469	0.524	0.506	0.576	0.533	0.595
$F(\beta_1 = \beta_2 = 0)$	2.636	1.575			2.744	1.729
Prob($\beta_1 = \beta_2 = 0$)	0.0773*	0.213			0.0711*	0.185
$F(\beta_3 = \beta_4)$			0.106	0.00385	0.03	0.22
Prob($\beta_3 = \beta_4$)			0.746	0.951	0.858	0.638

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

This table proves an OLS regression that examines the impact of hedge accounting on market-based risk measures of idiosyncratic and total risk. Idiosyncratic risk (irisk) is measured as the standard deviation of the residual from a market model. Total risk (sdret) is measured as the standard deviation of stock returns over the sample period. incr_earn_vol is the incremental volatility in quarterly earnings that would have occurred if hedge accounting had not been used. incr_cfo_vol is the incremental volatility in quarterly CFO that would have occurred if hedge accounting had not been used. net_d (net_nd) measure the exposure that a firm has to outstanding designated (non-designated) derivatives. It is measured as the absolute value of the net value of designated (non-designated) derivatives divided by the gross value of designated (non-designated) derivatives outstanding. net_der is measured the same as net_d, but includes all derivatives regardless of accounting designation. earn_vol is the volatility of earnings as reported. leverage is total liabilities over total assets. Lnassets is the natural log of assets. MB is the market-to-book ratio. earnings_noder is earnings before gains and losses from derivatives scaled by total assets. cfo_vol is the volatility of CFO as reported. Volatility measures are measured as the volatility over the entire sample period. All other variables are calculated as the average of quarterly observations over the sample period.