The Informativeness of Disclosure Requirements under SFAS 133: The Petroleum Industry

Nancy Beneda
Professor of Economics and Finance
University of North Dakota
Grand Forks, North Dakota

Introduction

This study, using a sample of 704 firm year observations for 91 petroleum companies, finds that the disclosure requirements under SFAS 133 are informative about hedging effectiveness.[1] Firms are motivated to designate derivatives for hedging because these derivatives receive preferential accounting treatment under SFAS 133.[2] However, designated derivatives are required to have a high correlation between the derivative payoffs and the changes in prices of the underlying asset. Further hedging ineffectiveness must be disclosed for derivatives designated for hedging, under SFAS 133.[3] Because of the required disclosures, firms may be discouraged from using hedge accounting, especially if they are selectively speculating. The study expects that a petroleum firm, which designates their derivatives for hedging under SFAS 133, would more than likely have the intent to use derivatives for hedging and managing risk, as opposed to

---

[1] Statement of Financial Accounting Standard No. 133 (SFAS 133), *Accounting for Derivative Instruments and Hedging Activities* (implemented in 2001), requires that the gains and losses, and the fair values for all derivatives be reported in the financial statements. International Accounting Standard (IAS) 39, *Financial Instruments: Recognition and Measurement,* has similar reporting and disclosure requirements as SFAS 133.

[2] The unrealized gains and losses on the derivatives resulting from fair value reporting are permitted to be offset, on the income statement, by the losses and gains of the hedged asset, thereby reducing earnings volatility.

[3] An initial test for derivative hedging effectiveness and periodic effectiveness tests are required, under SFAS 133, to determine the continuing effectiveness of designated derivatives. A derivative is not permitted to be designated for hedging, or may be required to be reclassified, under SFAS 133, for example, when the derivative payoffs for certain types of derivatives, such as options, do not correlate well with the changes in prices of the underlying assets. Commodity designated derivatives must also be reclassified as ineffective, for example, when actual production falls short of the hedged amount causing the commodity designated derivatives to become ineffective, under SFAS 133.

selective speculation (Melumad et al. 1999).[4] The study also expects that firms which are successful in managing price risk (i.e., effectively hedging) should exhibit lower cash flow volatility (Froot et al. 1993).[5]

Derivatives which have not been designated for hedging and hedge accounting must be disclosed separately. The intent and effectiveness of non-designated derivative use may be less transparent than designated derivatives because SFAS 133 does not require the reason for non-use of hedge accounting to be disclosed.[6] The current study suggests that derivative users may be more likely not to designate derivatives for hedging and hedge accounting, and the associated increased disclosure, if their intent is to use hedging instruments selectively or take active positions (Melumad's et al. 1999; Glaum and Klocker 2011).[7] Thus, the impact of non-designation of derivatives and reduced cash flow volatility on firm value is expected to be less predictable. Non-designated derivatives include those which were not elected to be designated by the derivative user (but may otherwise qualify for designation), hedging instruments which did not pass the required effectiveness test under SFAS 133, and derivatives intended for selective speculation.

This study adds insight into the impact of derivative reporting rules on informativeness of disclosure requirements, decisions regarding the intent of derivative use, and contributes to the literature on hedging effectiveness. Study results suggest that cross-sectional differences in derivative designation, under SFAS 133, and differences in cash flow volatilities have

---

4 A theoretical model developed by Melumad et al. (1999) suggests that the use of derivatives designated for hedge accounting results in a higher degree of transparency, and thus promotes optimal hedging.

5 Froot et al. (1993) developed a theoretical model which shows that financial hedging should reduce the volatility of internal cash flows and thus increase a firm's ability to invest in available profitable projects.

6 Under SFAS 133, for derivatives not designated for hedge accounting, the only reporting requirement is that gains and losses must be included in ordinary income, and the fair values must be reported on the balance sheet. Although firms are required to disclose derivatives which are not designated for hedge accounting, there is no required test which proves the intent (i.e. hedge vs. speculative) of non-designated derivatives. Further, firms are not required to report effectiveness nor ineffectiveness for non-qualifying derivatives under SFAS 133. Effectiveness and ineffectiveness must be disclosed for designated derivatives.

7 Brown et al. (2006) and Adam and Fernando (2006) *suggest* that active hedging positions are not associated with higher profitability.

implications for the intent of derivative use, hedging effectiveness, firm value, and oil and gas price sensitivity. If derivative designation under SFAS 133 is informative about intent and hedging effectiveness, then one would expect that intent and hedging effectiveness would be associated with higher firm value and lower risk exposure. The study hypothesizes that the intent to hedge (derivatives designation, versus non-designation, for hedging under SFAS 133), combined with hedging effectiveness (lower than predicted cash flow volatility), is associated with higher firm value and lower stock price sensitivity for this sample of petroleum firms. The results of the study suggest that the disclosure requirements result in greater informativeness for designated derivatives than for non-designated derivatives.

Contribution to Literature

Hedging Designation under SFAS 133 and Intent of Derivative Use

Since the implementation of SFAS 133 in 2001, there have been no studies which empirically examine cross-sectional firm differences in derivative designation, and the implications of this, for intent of derivative use and hedging effectiveness. The findings of this study have implications for the informativeness of the disclosure requirements of SFAS 133. Consistent with Liu et al. (2011), Zhang (2009), Glaum and Klocker (2011), Lins et al. (2011), Demarzo and Duffie (1995), and Marshall and Weetman (2007), the current study suggests that the disclosure requirements for derivative use can impact decisions regarding how the derivatives will be used. In contrast with these studies, this study is the first to empirically differentiate between designated versus non-designated derivative use for each sample observation and examine the implications by cross-section for firm value and risk exposure. The study provides significant evidence that designated derivative use is an indicator of intent to hedge and reduced cash flow volatility is an indicator of hedging effectiveness.

Zhang (2009) examines changes in derivative use, risk exposure, and hedging effectiveness, after SFAS 133, using a broad sample of 225 non-financial firms.[8] He finds, *collectively,* that hedging firms engaged in more

---

[8] Zhang (2009) suggests that decisions regarding the amount and purpose of derivative use are affected by increased transparency, under SFAS 133. However Zhang (2009) does not examine the implications for transparency, intent and hedging effectiveness of designated versus non-designated derivative use.

conservative use of derivatives after the implementation of SFAS 133.[9] Zhang's (2009) sample includes firms which initiated a derivative program during the period 1996 to 1999 and then collectively examines differences in risk exposure for the initial time period and a four-year period, using averages, after the implementation of SFAS 133.[10] Liu et al. (2011) examine the gains and losses from hedging ineffectiveness for users of hedge accounting and find that the hedging ineffectiveness measure for users of hedge accounting, under SFAS 133, is useful in evaluating a firm's risk management activities. This study is different from Liu et al. (2011), because it examines the overall impact of derivative designation, whereas Liu et al. (2011) examine only the reported ineffectiveness measure.

In international surveys, Lins et al. (2011); and Glaum and Klocker (2011) conclude that a significant number of firms do not choose optimal hedging because of the required disclosures under SFAS 133. Demarzo and Duffie (1995) developed a model which supports the contention that managers choose a hedging policy based on required accounting disclosures versus effective hedging. Marshall and Weetman (2007) find that when given the choice, managers would choose not to disclose their risk strategies.

Hedging Effectiveness and Firm Value

In contrast with previous cross-sectional empirical studies on the association between hedging and firm value, the current study is the first to examine derivative designation under SFAS 133 and cash flow volatility as implications for intent of derivative use, hedging success, and firm value. Jin and Jorion (2006) use a hedging delta to measure hedging intent and do not find that commodity derivative use has any impact on firm value.[11] Jin and Jorion (2006), however, do not differentiate between designated versus non-designated derivatives and do not examine cash flow volatility as indicators of intent to hedge or hedging effectiveness.

Other previous empirical studies (Nance et al. 1993; Allayannis and Ofek 2001, Allayannis and Weston 2001; Carter et al. 2006; and Choi et al. 2013) which have examined the impact of derivative use on firm value have,

---

[9] Zhang (2009) does not differentiate derivative designation versus non-designation but examines hedging firms collectively.

[10] Risk exposure is measured as the stock price sensitivity to changes in commodity prices, interest rates, and foreign exchange rates in Zhang (2009).

[11] The hedging delta used by Jin and Jorion (2006) is computed as the net short position of volume hedged divided by the total actual production of oil and gas.

primarily, used a dummy variable, where a value of "1" indicates hedging (i.e., derivative use).[12] The results of these studies are mixed. Allayannis and Ofek (2001) find results that suggest that firms with more growth opportunities use hedging more and may benefit more from derivative use. Nance et al. (1993) finds an association between hedging use and higher research and development. Choi et al. (2013) find that financial hedging is more likely to increase firm value for firms which exhibit both information asymmetries and growth opportunities. Neither Allayannis and Weston (2001) nor Carter et al. (2006) find any association between hedging and firm value.

Data, Hypotheses, and Research Design

All firm year observations for all oil and gas firms with an SIC code of 1311 (265 active firms) during the study period 2003 through 2011 were obtained from the Compustat database.[13] The study excludes 2002 observations, since it was the first year for the required reporting under SFAS 133. 2002 is considered a transitional year (see Table 1A). The purpose of the study is to examine the informativeness of disclosure requirements for designated derivatives, under SFAS 133. To achieve this goal, the study compares three sub-samples: (1) firms which use oil and gas price derivatives but do not use hedge accounting, (2) firms which use oil and gas price derivatives and apply hedge accounting, and (3) firms which do not use oil and gas price derivatives. To achieve a better focus on the impact of disclosure requirements, only commodity derivatives and the associated risk exposure are examined.[14] This is consistent with prior research. To make an accurate comparison of these three sub-samples, the sample construction strives to include all firms which are likely to use derivatives and hedge accounting.

---

[12] These previous studies do not examine derivative designation under SFAS 133 nor cash flow volatility differences.

[13] The data set used in this study was also used in Beneda (2016).

[14] Foreign firms are indicated by less than 50% U.S. ownership and are permitted to use their home country's accounting standards and file a 6-K, instead of a 10-K. According to the Securities and Exchange Commission, "Foreign private issuers may present financial statements pursuant to U.S. generally accepted accounting principles (GAAP), International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB) or home country accounting standards. See https://www.sec.gov/divisions/corpfin/internatl/foreign-private-issuers-overview,shtml#IIIB.

To determine the use of derivatives and/or hedge accounting, a key word search was performed on the 10-K financial statements for all firm year observations, which have related 10-K's filed, using the web site http://sec.gov. The key words used in each search to obtain information about derivative use include: derivative, designated, non-designated, qualifying, non-qualifying, fair value hedge, hedging, and risk management.

Consistent with Jin and Jorion (2006) and Choi et al. (2013), 25 foreign firms which filed 6-K's during the sample period were deleted. Foreign firms are excluded from the sample because the required disclosures of foreign firms (filing of 6-Ks) do not give enough detailed information to determine: (1) if firms are using derivatives and (2) using designated versus non-designated derivatives.[15] Also excluded from the current study's sample were: (1) firms not found on sec.gov, (2) firms which had not filed any reports on sec.gov, and (3) firms which had filed reports but not during the sample period (2003 through 2011). See Table 1A for sample construction.[16]

Five years of 10-K's, obtained from http://sec.govhttp://sec.gov are required to determine the consistent use of derivatives and hedge accounting. Also, firms which have fewer than five filings may be unlikely contenders for derivative use or hedge accounting. It was noted that many of these firms were very small, making them unlikely users of derivatives (Glaum and Klocker 2011 and Lins et al. 2011). The average total assets (*at*) from Compustat was $350.6 million for firms with fewer than five years of 10-K filings versus $11,236 million for the final study sample. Further, many of these firms started filing during the sample period, which also may make them unlikely contenders, since the use of hedge accounting would only complicate their new reporting requirements. Many of the deleted firms stopped reporting during the sample period which indicates their status was revoked, or they merged or were acquired.

[15] No firms in the current study sample filed S-1's because very few firms now qualify for small firm status per Securities and Exchange Commission reporting requirements. S-1 reporting requirements are insufficient to observe derivative use and Jin and Jorion (2006) deleted small firms which filed S-1's from their sample. See https//www.sec.gov/info/smallbus/secg/smrepcosysguid.pdf.

[16] Jin and Jorion (2006) deleted small firms which filed S-1's from their sample because the disclosure requirements for S-1 reports are insufficient to observe derivative use. SEC reporting requirements for S-1 reports are insufficient to observe derivative use. SE reporting requirements have become stricter for small firms. As a result no firms in the current study sample filed S-1's. See https://www.sec.gov/info/smallbus/secg/smrepcosysguid.pdf.

Derivative use of the deleted firms (firms having fewer than five users of 10-K's) was further analyzed to provide evidence that the firms were unlikely to use derivatives and were correctly excluded from the sample. These deleted firms (firms with fewer than five 10-K's) included 92 firms and 505 firm year observations (see Table 1A). It was noted that only 20.1% of the 92 deleted firms made use of derivatives and only 4.2% used hedge accounting. For the final study sample, 72.5% used derivatives consistently and 25.9% used hedge accounting. Thus the inclusion of firms with fewer than five years of filing could potentially bias the results because the sub-sample of non-derivative users would include mostly firms which may not likely use derivatives or hedge accounting.

The final study sample includes 704 firm year observations and 91 firms (see Table 1A). The small sample size is not expected to create survivorship bias for this study because all firms in the sample *should be* likely survivors to assure the potential of derivative use. The sample is constructed with the purpose of including only firms which have many years of reporting and are relatively large in size.

Variable Construction

Consistent with Jin and Jorion (2006), Zhang (2009), and Liu et al. (2011), the risk exposure is estimated as the beta in regression, Model A, for each firm year observation. Model A regresses monthly market returns and monthly computed returns for crude oil prices on monthly stock returns for each firm year observation. The risk exposure is compared across sub-samples of non-derivative users, non-designated derivative users, and designated derivative users. Consistent with Jin and Jorion (2006), Zhang (2009), and Liu et al. (2011), the risk exposure is computed only for the firm year observations included in the final study sample.

$$\textbf{Model A: } R_{it} = a_{0it} + a_1 R_{Mt} + a_2 Macro_t + e_{it}$$

R is the monthly stock return for firm i and for month t; R_M is the CRSP value-weighted market return for month t; *Macro* is the monthly percentage change in the New York Mercantile Exchange (NYMEX) historical prices for Crude Oil (Cushing).[17] Monthly prices for crude oil were obtained at

[17] Oil and gas firms may exhibit price sensitivity to changes in natural gas prices. However, the current study uses the sensitivity to changes in oil prices as the measure of risk exposure, for two reasons. First a high correlation was found between monthly oil and gas price changes for study period. Second, oil derivatives were found to have been predominantly used for the sample firm year observations.

http://www.eia.gov/dnav/pet/pet_pri_fut_s1_d.htm. The actual risk exposure in relation to changes in oil prices is represented by the absolute value of the estimated coefficient, a_2.

One of the primary challenges in attempting to ascertain hedging effectiveness from empirical studies is the issue of endogeneity. Firms which choose not to hedge, versus those which choose to hedge may, inherently, possess certain characteristics such as higher firm value, higher cash flow volatility, or higher risk exposure. Thus it may not be correct to reach a conclusion about causality among these variables. Also, firms which are all equity tend to have higher firm values (Strebulaev and Yang 2013). To alleviate endogeneity issues in the current study, the differences between actual and predicted values were estimated for (1) firm value (using Tobin's *Q*), (2) stock price sensitivity to changes in crude oil prices (risk exposure) and (3) cash flow volatility. Also observed is whether the actual firm value, actual risk exposure, and actual cash flow volatility are higher or lower than the predicted values for each firm year. The differences between actual and expected values for Tobin's *Q* and risk exposure are the variables of interest in this study. The difference between the actual and expected values for cash flow volatility is used to determine hedging effectiveness.

First, using firm year observations in which *no* derivative use is present, the following regressions (Model B, C and D) are used to estimate the coefficients for the purpose of computing predicted values for Tobin's *Q*, risk exposure, and cash flow volatility (see Appendix 1 for regression results).

Model B: $Tobin_{it} = b_0 + b_1 Lnsize_{it} + b_2 Bklev_{it} + b_3 Intan_{it} + b_4 Quik_{it} + b_5 Cfbve_{it} + year\ dummies$

Model C: $AbsCOexp_{it} = c_0 + c_1 Lnsize_{it} + c_2 Bklev_{it} + c_3 Quik_{it} + c_5 Intan_{it} + c_6 Ocfvol_{it} + year\ dummies$

Model D: $Ocfvol_{it} = d_0 + d_1 Lnsize_{it} + d_2 Bklev_{it} + b_3 Intan_{it} + b_4 Quik_{it} + b_5 Cfbve_{it} + year\ dummies$

Tobin is the dependent variable in Model B and is the measure for firm value. It is computed as the sum of long-term debt (*dltt*) plus debt in current liabilities (*dlc*) plus market value of common equity (*prrc_f* csho*) divided by the sum of long-term debt (*dltt*) plus debt in current liabilities (*dlc*) plus book value of common equity (*bve*). This measure of Tobin's *Q* is similar to that used in Jin and Jorion (2006) and Choi et al. (2013) and is derived from the definition of firm value from Strebulaev and Yang (2013).[18]

Lnsize is the natural log of the firm's total assets (*at*) for each firm year observation. *Bklev* is the book value of debt (*dltt* plus *dlc*) divided by total assets (*at*) for each firm year observation. *Intan* is intangible assets (*intan*) divided by total assets (*at*) for each firm year observation. *Quik* is the quick ratio (*qr*) for each firm year observation. *Cfbve* is the annual operating cash flow (*oanc*) divided by the book value of equity (*bve*) for each firm year observation. The variable construction is modeled after previous studies including Jin and Jorion (2006), Choi et al. (2013), and Allayannis and Weston (2001). Compustat variable names are shown italicized and in parentheses (see Table 1B for variable descriptions).

AbsCOexp is the dependent variable in Model C and is a measure for risk exposure. It is the estimated coefficient, a_2, from Model A (see above). *Ocfvol* is the dependent variable in Model D and an independent variable in Model C. It is computed as the standard deviation of quarterly reported amounts for operating cash flow (*oancq*) divided by total assets (*at*) for each firm year observation. Using the estimated coefficients from Models B, C, and D, the predicted firm value (*PTobin*), the predicted risk exposure (*Pcorisk*), and the predicted cash flow volatility (*Pocfvol*) for each firm year observation are calculated.

Models E, F, and G are then used to compute the differences (*Tobininc, COexpred*, and *Ocfvolred*) between predicted and actual values for each firm year observation.

Model E: $Tobininc_{it} = Tobin_{it} - PTobin_{it}$

Model F: $COexpred_{it} = Pcorisk_{it} - AbsCOexp_{it}$

Model G: $Ocfvolred_{it} = Pocfvol_{it} - Ocfvol_{it}$

[18] Jin and Jorion (2006) and Choi et al. (2013) compute Tobin's *Q* as the sum of book value of total assets (at) minus book value of common equity (*bve*) plus the market value of common equity (*prrc_f* * csho*) divided by the sum of book value of total assets (*at*). Other previous studies which have used Tobin's *Q* as a measure of firm value and hedging effectiveness include Mackay and Moeller (2007), Carter et al. (2006), Allayannis and Weston (2001), and Tufano (1996). Perez-Gonzalez and Yun (2013) use market-to-book ratio as a measure of "hedging effectiveness" for weather derivatives.

Hypotheses and Hypotheses Testing

Hypothesis 1: The intent to hedge (derivative designation versus non-designation for hedging, under SFAS 133), combined with hedging effectiveness (lower than predicted cash flow volatility) is associated with higher than predicted firm value.

Hypothesis 2: The intent to hedge (derivatives designation versus non-designation for hedging, under SFAS 133), combined with hedging effectiveness (lower than predicted cash flow volatility) is associated with lower than predicted stock price sensitivity.

To test the hypotheses, three dummy variables (see variable descriptions, Table 1B) are used as the primary independent variables in regressions on *Tobininc* and *COexpred:*

DesigDerD	independent variable used to represent the use of hedge accounting under SFAS 133. This variable takes a value of "1" for firm year observations for firms which have a strong and consistent use of designated derivatives, (firms must exhibit no more than one year in which designated derivatives are not used), and zero otherwise.
EffcfvDerD	independent variable used to represent lower than predicted cash flow volatility. This variable takes a value of "1" for firm year observations which exhibit a positive value for *Ocfvolred,* and zero otherwise
DesigDerD_EffcfvDerD	independent variable which represents designated derivative use *combined with* lower than predicted cash flow volatility and is computed as *DesigDerD* times *EffcfvDerD.*

To test Hypothesis 1, these dummy variables are applied in the regressions on firm value (Models 1A, 1B, and 1C) for the sample overall and the sub-sample of all derivative users.[19]

[19] The sub-sample of derivative users contains the all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than 1 year in which derivatives are not used.

Model 1A: $Tobininc_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 1B: $Tobininc_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 1C: $Tobininc_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

To test Hypothesis 2, the dummy variables in the regressions on risk exposure (Models 2A, 2B, and 2C) are applied for the sample overall and the sub-sample of all derivative users.

Model 2A: $COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 2B: $COexpred_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 2C: $COexpred_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

The coefficient on *DesigDerD_EffcfvDerD* is expected to be positive and significant, in Models 1C and 2C, for the sample overall and the sub-sample of derivative users. These results would support the hypotheses and indicate that, on average, the combination of designated derivative use (intent to hedge) and lower than predicted cash flow volatility (hedging effectiveness) would result in higher than predicted firm value (Hypothesis 1) and lower than predicted risk exposure (Hypothesis 2).

Results

Descriptive Statistics, Mean Difference Testing, and Data Distribution

Table 2A presents descriptive characteristics for the study sample and by sub-samples. *Tobin* is inherently lower for derivative users and designated derivative users. Derivative users, designated derivative users, and firms with lower than predicted cash flow volatility have lower risk exposure

(*AbsCOexp*) and higher risk reduction (*COexpred*).[20] As expected, *Bklev* is slightly higher and *Quik* is slightly lower for derivative users. Effective hedging reduces risk allowing a firm to increase their debt and lower their cash reserves (Froot et al. 1993).

From Table 2B, mean difference testing indicates that non-users of derivatives have significantly higher firm value and higher than predicted firm value, on average. Designated derivative users have significantly lower than predicted risk exposure. However, there is no significant difference in risk exposure between effective and ineffective hedgers. This finding could have implications for Hypothesis 2 because the results of the mean testing suggest that all designated derivative users exhibit effective hedging and have lower cash flow volatility and lower risk exposure. Accordingly, there should be no differences in hedging effectiveness across designated derivative users.

From Table 2C, Kolmogorov-Smirnov statistics and the Shapiro-Wilk statistics are all very significant for the variables *Tobininc*, *COexpred*, and *Ocfcolred*. The statistical significance of the variables refutes the null hypothesis that the data for each of these variables has a normal distribution. Because non-linearity is indicated, dichotomous variables are constructed and binary logistic regressions are estimated, in addition to the ordinary least squares (OLS) analysis.

Testing of Firm Value

From Table 3A and 3B, the OLS regressions (Models 1A, 1B and 1C) are applied to the sample overall (Table 3A) and the sub-sample of derivative users (Table 3B). As expected the coefficient on *DesigDerD_EffcfvDerD* is positive and significant for the sample overall (Table 3A) and for the sub-sample of derivative users (Table 3B). The coefficients on *DesigDerD* (Model 1A) and *EffcfvDerD* (Model 1B) are not significant for the sample overall (Table 1A) nor the sub-sample of derivative users (Table 3B). These results support Hypothesis 1—the intent to hedge combined with hedging effectiveness has a positive impact on firm value.

[20] The sub-sample of designated derivative users contains all firm year observations for firms which have a strong and consistent use of designated derivatives. The firm must exhibit no more than 1 year in which designated derivatives are not used; The sub-sample of firm year observations with lower than predicted cash flow volatility contain all firms which have a positive value for *Ocfvolred* from Model G above.

Testing of Risk Exposure

From Tables 4A and 4B, the regressions (Models 2A, 2B, and 2C) are applied to the sample overall (Table 4A) and the sub-sample (Table 4B). As expected the coefficient on *DesigDerD_EffcfvDerD* is positive and significant for the sample overall (Table 4A) and the sub-sample (Table 4B). These results support Hypothesis 2,—that intent to hedge combined with hedging effectiveness has a positive impact on risk reduction. The coefficient on *EffcfvDerD* (Model 2B) is not significant for the sample overall (Table 4A) nor the sub-sample Table 4B). However, the coefficient on *DesigDerD* (Model 2A) is significant for the sample overall (Table 4A) and for the sub-sample (Table 4B). This result is consistent with the mean difference testing (see Table 2B) and suggests that only intent to hedge (designated derivative use), alone, may be required to reduce risk exposure and there is little difference in hedging effectiveness across designated derivative users. To isolate the impact of hedging effectiveness and further test Hypothesis 2, the following regression (Model 2D) is applied to the sample overall (Table 4A) and the sub-sample (Table 4B).

Model 2D:

$$COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 DesigDerD\_EffcfvDerD_{it} + e_3 Lnsize_{it} + e_4 Bklev_{it} + e_5 Intan_{it} + e_6 Quik_{it} + e_7 Cfbve_{it} + year\ dummies$$

The expected outcome for Model 2D is that the coefficient for *DesigDerD_EffcfvDerD* should be positive and significant, while the coefficient for *DesigDerD* should lose its significance in Model 2D. This finding would support Hypothesis 2, that both intent to hedge and hedging effectiveness are needed to reduce risk exposure. The results of Model 2D applied to the sub-sample of derivative users, in Table 4B, support Hypothesis 2 because the coefficient for *DesigDerD_EffcfvDerD* is positive and significant, while the coefficient for *DesigDerD* is not significant. However, the results of Model 2D applied to the sample overall, in Table 4A, do not support Hypothesis 2 because neither of the coefficients for *DesigDerD_EffcfvDerD* nor *DesigDerD* are significant. These findings indicate mixed results and suggest that designated derivative use may be sufficient in reducing risk exposure. The results should be further tested using logit modelling, because the data distributions for *COexpred* and *Ocfvolred* indicate non-linearity (see Table 2C).

Binary Logistic Regression Analysis

Because the data distributions for *Tobininc, COexpred,* and *Ocfvolred* exhibit nonlinear characteristics (see Table 2C), logit modelling is also used to test the hypotheses. To test Hypothesis 1, a binary logistic regression model is used to estimate the likelihood that firm value will be higher than predicted when firm observations exhibit both the intent to hedge and hedging effectiveness.[21] The binary logistic regressions (Models 3A, 3B, and 3C) are applied to the sample overall and the sub-sample of derivative users. The significance of the coefficient for *DesigDerD_EffcfvDerD* in Model 3C is then examined.

Model 3A: $TobinincD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + \text{year dummies}$

Model 3B: $TobinincD_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + \text{year dummies}$

Model 3C: $TobinincD_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + \text{year dummies}$

For Models 3A, 3B, 3C, the dichotomous dependent variable, *TobinincD,* has a value of "1" if actual firm value is greater than the predicted amount (*Tobininc* is positive in Model E), and zero otherwise. For Models 4A, 4B, 4C, the dichotomous dependent variable, *COexpredD,* has a value of "1" if actual crude oil risk exposure is less than the predicted amount (*COexpred* is positive in Model E), and zero otherwise. The expected outcome for these models is that the coefficient for *DesigDerD_EffcfvDerD* will be positive and significant. There is also an expected likelihood that resulting statistics having higher than predicted firm value and lower than predicted risk exposure will be greater than "1" for firm observations which exhibit designated derivative use and hedging effectiveness, and less than "1" for other firm observations.

From Table 5, the results of these regressions support Hypothesis 1. The coefficient for *DesigDerD_EffcfvDerD* is positive and significant when Model 3C is applied to the sample overall and the sub-sample. This indicates that firms which use hedge accounting (designated derivative use under SFAS 133) and exhibit effective hedging (lower than predicted cash flow volatility) are 2.090 times more likely to have higher than predicted firm value for the

[21] In a binary logistic regression the dependent variable is dichotomous and the cumulative distribution of the error term is logistic.

sample overall and 3.629 times more likely to have higher than predicted firm value for the sub-sample of derivative users.

Also from Table 5, the coefficient, for *EffcfvDerD* in Model 3B, is not significant for the sample overall or the sub-sample. The coefficient for *DesigDerD* is also not significant in Model 3A for the sample overall. However, the coefficient for *DesigDerD* in Model 3A, applied to the sub-sample, is significant, and the reported likelihood of all firms with designated derivative use, including firms with less than effective hedging, to have higher than predicted firm value was 2.039. This finding is consistent with the mean testing (Table 2B) and the results of Model 2D applied to the sample overall (Table 4A). This suggests that hedging effectiveness would not have implications for firm value across designated derivative users, possibly because firms which use hedge accounting are all considered effective hedgers. To isolate the impact of $DesigDerD\_EffcfvDerD_{it}$ and further test Hypothesis 1, Model 3D is applied to the sub-sample of derivative users.

Model 3D: $TobinincD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 DesigDerD\_EffcfvDerD_{it} + e_3 Lnsize_{it} + e_4 Bklev_{it} + e_5 Intan_{it} + e_6 Quik_{it} + e_7 Cfbve_{it}$ + *year dummies*

It is expected that the coefficient for *DesigDerD_EffcfvDerD* should be positive and significant in Model 3D and the coefficient for *DesigDerD* will lose its significance. As expected the results of applying Model 3D to the sub-sample indicate that the coefficient for *DesigDerD_EffcfvDerD* is positive and significant and the coefficient for *DesigDerD* is not significant. Further, firm observations which exhibit hedge accounting use (designated derivative use under SFAS 133) and exhibit effective hedging (lower than predicted cash flow volatility) are 4.199 times more likely to have higher than predicted firm value than other firm observations. The likelihood of a firm observation which exhibits designated derivative use, including those firms which exhibit hedging ineffectiveness is only 0.845. The results of the binary logistic regressions (Models 3A, 3B, 3C, and 3D) provide significant support for hypothesis 1.

To test Hypothesis 2, a binary regression model is used to estimate the likelihood that crude oil risk exposure will be lower than predicted when firm observations exhibit both the intent to hedge and hedging effectiveness. To also test Hypothesis 2, the binary logistic regressions (Models 4A, 4B, and 4C) are applied to the overall sample and the sub-sample of derivative users. The significance of the coefficient for *DesigDerD_EffcfvDerD* in Model 4C is then examined.

Model 4A: $COexpredD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 4B: $COexpredD_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 4C: $COexpredD_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

The results of the binary regressions (Models 4A, 4B, and 4C) provide significant evidence in support of Hypothesis 2. From Table 6, as expected, the coefficient for *DesigDerD_EffcfvDerD* is positive and significant in Model 4C for both the sample overall and the sub-sample. The results of these binary regressions indicate that firms which use hedge accounting (designated derivative use under SFAS 133) and exhibit effective hedging (lower than predicted cash flow volatility) were 1.536 (and 1.594) times more likely to have lower than predicted risk exposure for the sample overall (and for the sub-sample of derivative users). Further, as expected, the coefficients for *DesigDerD* in Model 4A and for *EffcfvDerD* in Model 4B were not significant for both the sample overall and the sub-sample.

Conclusion

The study indicates that the disclosure requirements for designated derivative use under SFAS 133 are informative about intent of derivative use and hedging effectiveness. It also documents that designated derivative use (under SFAS 133), in combination with hedging effectiveness (i.e. lower than predicted cash flow volatility), is associated with higher than predicted firm value and lower than predicted risk exposure. This study fills an important void in the literature by differentiating firms which designate their derivatives for hedge accounting versus derivative users which don't use hedge accounting. It also differentiates effective hedging by examining differences between actual and expected cash flow volatility. Further, it provides support for the increased disclosure requirements for designated derivative use, under SFAS 133, impact decisions about derivative use.

Table 1A. Sample Construction

Variables	Total	9 10-K	8 10-K	7 10-K	6 10-K	5 10-K	4 10-K	3 10-K	2 10-K	1 10-K
Compustat firms	1,673 (265)[1]	1,071 (119)	96 (12)	112 (16)	120 (20)	80 (16)	56 (14)	57 (19)	64 (32)	17 (17)
Foreign firms (filed 6-K	-174 (-25)	-135 (-15)	-8 (-1)	-7 (-1)	-6 (-1)	0 (0)	-12 (-3)	0 (0)	-4 (-2)	-2 (-2)
Firms not on sec.gov	-49 (-8)	-36 (-4)	0 (0)	0 (0)	0 (0)	5 (-1)	-4 (-1)	0 (0)	4 (-2)	0 (0)
Firms with no filings	-71 (-15)	-36 (-4)	0 (0)	7 (-1)	-6 (-1)	0 (0)	-4 (-1)	-9 (-3)	-8 (-4)	-1 (-1)
Out of study period range	-49 (-20)	-9 (-1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-21 (-7)	-14 (-7)	-5(-5)
Fewer than 5 years 10-K	-505 (-92)	-324 (-36)	-8 (-1)	-21 (-3)	-36 (-6)	-10 (-2)	-36 (-9)	-27 (-9)	-34 (-17)	-9 (-9)
Assets < $20 million[2]	-72 (-8)	-72 (-8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Missing data Compustat[3]	-49 (-6)	-36 (-4)	0 (0)	7 (-1)	-6 (-1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Final Sample[4]	704 (91)	423 (47)	80 (10)	70 (10)	66 (11)	65 (13)	0 (0)	0 (0)	0 (0)	0 (0)

[1]Number of firm observations reported with number of firms in parentheses.

[2]The further deletion of firms and firm observations for assets less than $20 (Compustat variable *at*) is consistent with Jin and Jorion (2006), Nance et al. (1993), Allaynis and Ofek (2001), and Choi et al. (2013). The inclusion of these firms could bias the results since the outcome (impact of derivative use on firm value and risk exposure) would less predictable for these small firms (Glaum and Klocker 2011 and Lins et al. 2011).

[3]The further deletion of firms and firms and firm observations with missing data which resulted in extreme values for Tobin's *Q* is consistent with Jin and Jorion (2006), Nance et al. (1993), Allayannis and Ofek (2001), and Choi et al. (2013).

[4]All data for all variables included in the final sample was tested for outliers (observations more than three standard deviations from the mean), and no winsorizing was required.

Table 1B. Variables

Variable Name	Variable Description
Tobin (Tobin's *Q*)	computed as the sum of long-term debt (*dltt*)[1] plus debt in current liabilities (*dlc*) plus market value of common equity (*prrc_f* * *csho*) divided by the sum of long-term debt (*dltt*) plus debt in current liabilities (*dlc*) plus book value of common equity (*bve*).
Tobininc	*Tobin* minus the predicted natural log of Tobin's *Q* (Model B)
TobinincD	dichotomous variable takes a value of "1" if actual firm value is greater than the predicted amount, *Tobininc* is positive in Model E, and zero otherwise.
AbsCOexp	crude oil risk exposure, the estimated coefficient, a_2, from *Model A* (Model A: $R_{it} = a_{0it} + a_1 R_{Mt} + a_2 Macro_t + e_{it}$). It is the stock price sensitivity to changes in crude oil prices.
COexpred	estimated crude oil risk exposure obtained from regression, Model D, minus *AbsCOexp*
COexpredD	dichotomous dependent variable, *COexpredD,* has a value of "1" if actual crude oil risk exposure is less than the predicted amount, COexpred is positive in Model E, and zero otherwise
DesigDerD	independent variable used to represent the use of hedge accounting under SFAS 133. This variable takes a value of "1" for firm year observations which have a strong and consistent use of designated derivatives, (firms must exhibit no more than one year in which designated derivatives are not used), and zero otherwise.
EffcfvDerD	independent variable used to represent lower than predicted cash flow volatility. This variable takes a value of one for firm year observations in which exhibit a positive value for *Ocfvolred*, and zero otherwise
DesigDerD_EffcfvDerD	independent variable which represents designated derivative use *combined with* lower than predicted cash flow volatility and is computed as *DesigDerD* times *EffcfvDerD*.
Ocfvol	the standard deviation of quarterly reported amounts for operating cash flow (*oancq*) divided by total assets (*at*) for each firm year observation.

TABLE 1B (cont'd.)

Variable Name	Variable Description
Ocfvolred	Estimated operating cash flow volatility from regression, Model C, minus *Ocfvol*
Firm Size ($billion)	total firm assets (*at*) in $billion
Bklev	book value of debt (*dltt* plus *dlc*) divided by total assets (*at*) for each firm year observation.
Intan	intangible assets (*intan*) divided by total assets (*at*) for each firm year observation.
Quik	the quick ratio (*qr*) for each firm year observation.
Cfbve	the annual operating cash flow (*oanc*) divided by the book value of equity (*bve*) for each firm year observation.

[1]Compustat variables shown in italics and parentheses

Table 2A. Descriptive Statistics

Variables	Overall	Derivative Users[1]	Designated Derivative Users[2]	Lower Than Predicted Cash Flow Volatility[3]
N	704	543	182	308
Tobin (Tobin's Q)	2.046[4]	1.811	1.773	1.593
	(1.426)	(1.072)	(0.849)	(0.705)
Tobininc	-0.264	-0.342	-0.351	-0.330
	(0.501)	(0.453)	(0.450)	(0.446)
TobinincD	0.259	0.192	0.231	0.256
	(0.438)	(0.394)	(0.423)	(0.437)
AbsCOexp	0.518	0.476	0.409	0.449
	(0.473)	(0.421)	(0.333)	(0.407)
COexpred	0.047	0.060	0.119	0.044
	(0.442)	(0.415)	(0.342)	(0.417)
COexpredD	0.615	0.628	0.654	0.616
	(0.487)	(0.484)	(0.477)	(0.487)
Ocfvol	0.054	0.056	0.0056	0.037
	(0.030)	(0.030)	(0.028)	(0.017)
Ocfvolred	0.001	0.001	0.001	0.020
	(0.029)	(0.030)	(0.027)	(0.015)
Firm Size ($billion)[5]	$11.236	$10.107	$12.743	$13,434
	(35.6)	(26.9)	(32.9)	(26.1)
Bklev	0.272	0.314	0.286	0.343
	(0.209)	(0.202)	(0.173)	(0.189)

Table 2A (cont'd.)

Variables	Overall	Derivative Users[1]	Designated Derivative Users[2]	Lower Than Predicted Cash Flow Volatility[3]
Intan	0.031	0.036	0.035	0.045
	(0.066)	(0.069)	(0.065)	(0.071)
Quik	0.008	-0.024	-0.032	-0.020
	(0.151)	(0.104)	(0.076)	(0.110)
Cfbve	0.026	0.028	0.020	0.050
	(0.398)	(0.333)	(0.116)	(0.393)

[1]The sub-sample of derivative users contains all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than one year in which derivatives are not used.

[2]The sub-sample of designated derivative users contains all firm year observations for firms which have a strong and consistent use of designated derivatives. The firm must exhibit no more than one year in which designated derivatives are not used.

[3]The sub-sample of firm year observations with lower than predicted cash flow volatility contain all firms which have a positive value for *Ocfvolred* from Model G above.

[4]Means are reported with standard deviations reported in parentheses.

[5]Firm size is total assets reported in $billion. Firms with negative debt and negative total assets were dropped from the original sample. Values for Tobin's Q which exceeded three standard deviations from the mean were deleted from the sample.

Table 2B. Mean Difference Testing Results

Variables	*Tobininc*	*TobinincD*	*COexpred*	*COexpredD*
Firm observations[1]				
Derivative users (N=543)	-0.342	0.192	0.05976	0.62801
No derivative use (N=161)	0.001	0.484	0.00515	0.57143
Mean difference	-0.344***	-0.293***	0.05461	0.0566
Mean difference t-value	(-7.137)	(-6.817)	(1.221)	(1.277)
Designated derivative users (N=182)	-0.351	0.231	0.11912	0.65385
No designated derivative use (N=361)	-0.339	0.172	0.02983	0.61496
Mean difference	0.012	0.059	0.08929***	0.03889
Mean difference t-value	(0.283)	(1.591)	(2.586)	(0.884)
Effective hedgers (N=308)	-0.330	0.201	0.044	0.630
Ineffective hedgers (N=235)	-0.360	0.170	0.081	0.630
Mean difference	0.030	0.031	-0.037	0.000
Mean difference t-value	(0.772)	(0.661)	(-1.033)	(0.103)
Effective hedgers/designated derivative use (N=105)	-0.234	0.304	0.125	0.688
Ineffective hedgers/designated derivative use (N=77)	-0.510	0.130	0.112	0.610
Mean difference	0.276***	0.174***	0.013	0.078
Mean difference t-value	(4.279)	(2.948)	(0.249)	(-1.044)
[1]Means and t-values reported for sample and sub-samples of firm observations				
***$p<.01$				

Table 2C. Non-Linearity Testing For Primary Variables

	Kolmogorov-Smirnov Test of Normality[1]	**Shapiro-Wilk Test of Normality[1]**
Tobininc (N=704)	0.068***	0.970***
	(0.0)	(0.000)
COexpred (N=704)	0.089***	0.902***
	(0.0)	(0.000)
Ocfvolred (N=704)	0.066***	0.981***
	(0.000)	(0.000)
[1]Statistic reported with (significance)		
***p<.01		

Table 3A. Regressions of *DesigDerd_EffcfvDerD* on *Tobininc*; Models 1A, 1B, 1C; Sample Overall

	Sample Overall		
Model	**1A**	**1B**	**1C**
Variables	**N=704**	**N=704**	**N=704**
Intercept	0.000*[1]	0.000***	0.000**
	(1.96)	(1.80)	(2.00)
DesigDerD	-0.059		
	(-1.61)		
EffcfvDerD		0.038	
		(1.01)	
DesigDerD_EffcfvDerD			0.067*
			(1.82)
Lnsize	-0.311***	-0.326***	-0.332***
	(-7.94)	(-8.32)	(-8.46)
Bklev	0.056	0.050	0.051
	(1.50)	(1.31)	(1.35)
Intan	0.159***	0.157***	0.154***
	(4.25)	(4.19)	(4.11)
Quik	-0.025	-0.022	-0.012
	(-0.65)	(-0.58)	(-0.32)
Cfbve	0.075**	0.073**	0.075**
	(2.08)	(2.03)	(2.10)

Table 3A, (cont'd.)			
	Sample Overall		
F-value	7.178***	7.050***	7.235***
R^1	0.110	0.108	0.110
[1]Coefficients and (t-values presented); Year dummies not shown;			
*p<.10			
**p<.05			
***p<.01			
Model 1A: $Tobininc_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$			
Model 1B: $Tobininc_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$			
Model 1C: $Tobininc_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$			

Table 3B. Regressions of *EffcfvDerD_DesigDerD* on *Tobininc*; Models 1A, 1B, 1C; Derivative Users

	Derivative Users[1]		
Model	**1A**	**1B**	**1C**
Variables	**N=543**	**N=543**	**N=543**
Intercept	0.000[2]	0.000	0.000
	(-0.50)	(-0.15)	(0.16)
DesigDerD	0.019		
	(0.49)		
EffcfvDerD		0.033	
		(0.82)	
DesigDerD_EffcfvDerD			0.131***
			(3.38)
Lnsize	-0.291***	-0.297***	-0.312***
	(-7.03)	(-7.03)	(-7.53)
Bklev	0.175***	0.166***	0.168***
	(3.46)	(3.82)	(3.55)
Intan	0.229***	0.226***	0.218***
	(5.80)	(5.70)	(5.55)
Quik	-0.173***	-0.177***	-0.164**
	(-4.29)	(-4.39)	(-4.09)
Cfbve	0.156***	0.154***	0.157**
	(3.94)	(3.89)	(4.02)

Table 3B (cont'd.)

	Derivative Users		
F-value	11.877***	11.918***	12.926***
R^2	0.219	0.220	0.236

[1]The sub-sample of derivative users contains the all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than 1 year in which derivatives are not used.

[2]Coefficients and (t-values presented); Year dummies not shown; p<.01*** p<.05** p<.10*

**p<.05

***p<.01

Model 1A: $Tobininc_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} +$ *year dummies*

Model 1B: $Tobininc_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} +$ *year dummies*

Model 1C: $Tobininc_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} +$ *year dummies*

Table 4A. Regressions of *DesigDerD_EffcfvDerD* on *Coexpred*; Models 2A, 2B, 2C; Sample Overall

	Sample Overall			
Model	**2A**	**2B**	**2C**	**2D**
Variables	**N=704**	**N=704**	**N=704**	**704**
Intercept	0.000*[1]	0.000***	0.000**	0.000**
	(1.93)	(1.91)	(2.06)	(1.99)
DesigDerD	0.100***			0.066
	(2.68)			(1.25)
EffcfvDerD		0.011		
		(0.27)		
DesigDerD_EffcfvDerD			0.097**	0.050
			(2.54)	(0.94)
Lnsize	-0.054	-0.040	-0.055	-0.057
	(-1.35)	(-0.98)	(-1.36)	(-1.42)
Bklev	-0.138***	-0.139***	-0.144***	-0.142***
	(-3.59)	(-3.55)	(-3.73)	(-3.66)
Intan	0.007	0.005	-0.003	0.002
	(0.17)	(0.12)	(-0.07)	(0.05)
Quik	--0.035	0.048	-0.039	-0.035
	(-0.89)	(-1.21)	(-0.98)	(-0.89)
Cfbve	-0.074**	-0.075**	-0.073**	-0.074**
	(-1.99)	(-2.00)	(-1.98)	(-1.99)

Table 4A (cont'd.)

	Sample Overall			
F-value	4.186***	3.643***	4.133***	3.965***
R^2	0.060	0.050	0.059	0.060

[1]Coefficients and (t-values presented); Year dummies not shown; p<.01*** p<.05** p<.10*

*p<.10

**p<.05

***p<.01

Model 2A: $COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*

Model 2B: $COexpred_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*

Model 2C: $COexpred_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*

Model 2D: $COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 DesigDerD\_EffcfvDerD_{it} + e_3 Lnsize_{it} + e_4 Bklev_{it} + e_5 Intan_{it} + e_6 Quik_{it} + e_7 Cfbve_{it}$ + *year dummies*

Table 4B. Regressions of *DesigDerD_EffcfvDerD* on *Coexpred*; Models 2A, 2B, 2C and 2D; Derivative Users

	Derivative Users[1]			
Model	**2A**	**2B**	**2C**	**2D**
Variables	**N=543**	**N=543**	**N=543**	**N=543**
Intercept	0.000***[2]	0.000***	0.000***	0.000***
	(2.74)	(4.04)	(3.88)	(3.73)
DesigDerD	0.085**			0.015
	(2.10)			(0.27)
EffcfvDerD		0.047		
		(1.10)		
DesigDerD_EffcfvDerD			0.112***	0.101*
			(2.73)	(1.75)
Lnsize	-0.133***	-0.138***	-0.147***	-0.146***
	(-3.05)	(-3.09)	(-3.33)	(-3.30)
Bklev	-0.218***	-0.237***	-0.231***	-0.229***
	(-5.10)	(-5.40)	(-5.43)	(-5.31
Intan	0.010	0.004	-0.001	0.000
	(0.24)	(0.11)	(-0.03)	(0.00)
Quik	0.012	0.002	0.015	0.015
	(0.28)	(0.06)	(0.36)	(0.36)
Cfbve	-0.110***	-0.113***	-0.109**	-0.109***
	(-2.65)	(-2.71)	(-2.63)	(-2.63)

Table 4B (cont'd.)

	Derivative Users			
F-value	6.922***	6.651***	7.174***	6.688***
R^2	0.133	0.127	0.138	0.136

[1]The sub-sample of derivative users contains the all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than 1 year in which derivatives are not used.

[2]Coefficients and (t-values presented); Year dummies not shown; p<.01*** p<.05** p<.10*

*p<.10

**p<.05

***p<.01

Model 2A: $COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 2B: $COexpred_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 2C: $COexpred_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 2D: $COexpred_{it} = e_0 + e_1 DesigDerD_{it} + e_2 DesigDerD\_EffcfvDerD_{it} + e_3 Lnsize_{it} + e_4 Bklev_{it} + e_5 Intan_{it} + e_6 Quik_{it} + e_7 Cfbve_{it} + year\ dummies$

Table 5. Binary Logistic Regressions of *DesigDerD_EffcfvDerD* on *TobinincD*; Models 3A, 3B, and 3C; sample overall and sub-sample derivative users

	Sample Overall				Derivative Users			
Model	**3A**	**3B**	**3C**		**3A**	**3B**	**3C**	**3D**
Variables	**N=704**	**N=704**	**N=704**		**N=543**	**N=543**	**N=543**	**N=543**
DesigDerD	-0.169[2]				0.712***			-0.169
	(0.59)[3]/*0.84*[4]				(7.53)/*2.039*			(0.17)/*0.845*
EffcfvDerD		0.070				0.206		
		(0.13)/*1.072*				(0.62)/*1.229*		
DesigDerD_EffcfvDerD			0.737***				1.289***	1.435***
			(7.78)/*2.090*				(17.78)/*3.629*	(9.27)/*4.199*
Lnsize	-0.378***	-0.372***	-0.395***		-0.591***	-0.572***	-0.641***	-0.642***
	(55.47)	(55.80)	(60.08)		(45.90)	(44.99)	(50.20)	(50.42)
Bklev	0.684	0.660	0.631		2.100***	1.791***	1.892***	1.855***
	(2.50)	(2.30)	(2.08)		(12.85)	(9.63)	(10.70)	(10.08)
Intan	3.695***	3.668***	3.228***		5.362***	5.356***	4.458***	4.387***
	(7.00)	(6.85)	(5.25)		(11.53)	(11.22)	(7.76)	(7.44)
Quik	0.533	0.448	0.632		-1.579	-1.932*	-1.514	-1.544
	(0.82)	(0.59)	(1.15)		(1.86)	(2.87)	(1.67)	(1.73)
Cfbve	0.309	0.304	0.321		0.725**	0.708*	0.774**	0.779**
	(2.13)	(2.04)	(2.24)		(4.17)	(3.75)	(4.55)	(4.55)
Chi-square	83.336***	82.886***	90.248***		103.066***	96.168***	113.088***	113.260***
Cox and Snell R^2	0.112	0.111	0.120		0.173	0.162	0.188	0.188

Table 5 (cont'd.)
[1]The sub-sample of derivative users contains the all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than 1 year in which derivatives are not used.
[2]Coefficients are presented for all variables.
[3](Wald-values) are presented for all variables.
[4]*likelihood statistics* are reported only for predictor variables.
*p<.10
**p<.05
***p<.01
Year dummies not shown; p<.01*** p<.05** p<.10*
Model 3A: $TobinincD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*
Model 3B: $TobinincD_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*
Model 3C: $TobinincD_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it}$ + *year dummies*
Model 3D: $TobinincD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 DesigDerD\_EffcfvDerD_{it} + e_3 Lnsize_{it} + e_4 Bklev_{it} + e_5 Intan_{it} + e_6 Quik_{it} + e_7 Cfbve_{it}$ + *year dummies*

Table 6. Binary Logistic Regressions of *DesigDerD_EffcfvDerD* on *CoexpredD*; Models 4A, 4B, and 4C; Sample Overall and Sub-Sample Derivative Users

	Sample Overall				Derivative Users[1]		
Model	**2A**	**2B**	**2C**				
Variables	**N=704**	**N=704**	**N=704**		**N=543**	**N=543**	**N=543**
DesigDerD	0.205[2]				0.134		
	(1.18)[3]/*1.228*[4]				(0.45)/*1.143*		
EffcfvDerD		0.154				0.316	
		(0.83)/*1.167*				(2.41)/*1.372*	
DesigDerD_EffcfvDerD			0.429*				0.466*
			(3.18)/*1.536*				(3.52)/*1.594*
Lnsize	-0.030	-0.029	-0.035		-0.110*	-0.128**	-0.124**
	(0.58)	(0.55)	(0.78)		(3.70)	(4.69)	(4.59)
Bklev	-0.707*	-0.761*	-0.754*		-1.514***	-1.733***	-1.588***
	(2.99)	(3.37)	(3.38)		(8.76)	(10.70)	(9.57)
Intan	1.327	1.218	1.129		1.355	1.119	1.130
	(1.00)	(1.33)	(0.72)		(0.84)	(0.58)	(0.58)
Quik	-0.813	-0.940	-0.802		-0.257	-0.406	-0.162
	(1.96)	(2.59)	(1.91)		(0.07)	(0.18)	(0.03)
Cfbve	-0.511**	-0.518**	-0.508**		-0.689**	-0.712**	-0.684**
	(5.06)	(5.28)	(5.02)		(4.31)	(4.66)	(4.21)

Table 6 (cont'd.)

	Sample overall				Derivative users[1]		
Chi-square	45.826***	45.475***	47.907***		54.870***	56.843***	58.039***
Cox and Snell R^2	0.063	0.063	0.066		0.096	0.099	0.101

[1]The sub-sample of derivative users contains the all firm year observations for firms which have a strong and consistent use of derivatives. The firm must exhibit no more than 1 year in which derivatives are not used.

[2]Coefficients are presented for all variables; [3](Wald-values) are presented for all variables; [4]*likelihood statistics* are reported only for predictor variables.

Year dummies not shown; $p<.01$*** $p<.05$** $p<.10$*

Model 4A: $COexpredD_{it} = e_0 + e_1 DesigDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 4B: $COexpredD_{it} = e_0 + e_1 EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Model 4C: $COexpredD_{it} = e_0 + e_1 DesigDerD\_EffcfvDerD_{it} + e_2 Lnsize_{it} + e_3 Bklev_{it} + e_4 Intan_{it} + e_5 Quik_{it} + e_6 Cfbve_{it} + year\ dummies$

Appendix 1. Regressions Used to Compute Predicted Values for *Tobin*, *Abs_Coexp*, and *Ocfvol*

Dependent variable	*Tobin*	*Abs_COexp*	*Ocfvol*
Intercept	0.542***	1.186***	0.041***
	(2.98)	(6.51)	(5.47)
Lnsize	0.063***	-0.085***	0.003***
	(3.09)	(-4.59)	(3.13)
Bklev	-0.145	-0.042	0.001
	(-0.45)	(-0.146)	(0.04)
Quik	1.098***	-0.224	0.004
	(4.62)	(-1.07)	(0.36)
Intan	1.974*	0.404	-0.082*
	(-1.87)	(0.43)	(-1.90)
Ocfbve	-0.017		0.012***
	(-0.18)		(3.04)
Ocfvol		-0.416	
		(0.24)	
F-value	2.847***	3.175***	3.556***
R^2	0.131	0.151	0.173
Model B: $Tobin_{it} = b_0 + b_1 Lnsize_{it} + b_2 Bklev_{it} + b_4 Intan_{it} + b_3 Quik_{it} + b_5 Cfbve_{it}$ + *year dummies*			
Model C: $Abs\_COexp_{it} = c_0 + c_1 Lnsize_{it} + c_2 Bklev_{it} + c_3 Intan_{it} + c_4 Quik_{it} + c_5 Ocfvol_{it}$ + *year dummies*			
Model D: $Ocfvol_{it} = d_0 + d_1 Lnsize_{it} + d_2 Bklev_{it} + d_3 Intan_{it} + d_4 Quik_{it} + d_5 Cfbve_{it}$ + *year dummies*			

Appendix 1 (cont'd.)
Unstandardized coefficients presented
Sample consists of firm observations for non-hedging firms, N=161
Year dummy variables not shown

References

Adam, T. and C. Fernando, 2006. Hedging, speculation, and shareholder value. *Journal of Financial Economics* 81, 283-309.

Allayannis, G. and E. Ofek, 2001. Exchange rate exposure, hedging, and the use of foreign currency derivatives. *Journal of International Money and Finance* 20, 273–296.

Allayannis, G. and J. Weston, 2001. The Use of Foreign Currency Derivatives and Firm Market Value. *The Review of Financial Studies* 14, 243-76.

Beneda, N., 2016. Does hedge accounting under SFAS 133 increase the information content of earnings: Evidence from the US oil and gas industry? *Journal of Corporate Accounting & Finance*, forthcoming.

Brown, G., P. Crabb, and D. Haushalter, 2006. Are firms successful at selective hedging? *Journal of Business* 79, 2925-2949.

Carter, D.A., D. Rogers and B. J. Simkins, 2006. Does Hedging Affect Firm Value? Evidence from the U.S. Airline Industry. *Financial Management*, Vol. 35, pp. 53-86.

Choi, J. C., C. X. Mao, and A. D. Upadhyay, 2013. Corporate risk management under information asymmetry. *Journal of Business Finance and Accounting* 40, 239-271.

DeMarzo, P. and D. Duffie,1995. Corporate Incentives for Hedging and Hedge Accounting, *Review of Financial Studies* 8, 743-71.

FASB Statement No. 133, *Accounting for Derivative Instruments and Hedging Activities, 1998.* Financial Accounting Standards Board (FASB), Statement No. 133 (Stamford, CT; FASB, 1998)

Froot, K., D. Scharfstein, and J. Stein, 1993. Risk-management: coordinating corporate investment and financing policies, *Journal of Finance* 48, 1629-1648.

Glaum, M. and A. Klocker, 2011. Hedge accounting and its influence on financial hedging: when the tail wags the dog, Accounting and Business Research, 459-489.

Jin, Y. and P. Jorion, 2006. Firm value and hedging: evidence from U.S. oil and gas producers', *Journal of Finance* 61, 893-919.

Liu, Z. G. Seow, and H. Xie, 2011. Does the accounting hedge ineffectiveness measure under SFAS 133 capture the economic ineffectiveness of a firm's hedging activities, working paper, University of Connecticut and University of Kentucky?

Lins, K. V., Servaes, H., and Tamayo, A., 2011. Does fair value reporting affect risk management? International survey evidence, *Financial Management* 40, 525-551.

Mackay, P. and S.B. Moeller, 2007. The Value of Corporate Risk Management, *Journal of Finance* 62, 1379-419.

Marshall, A. and P. Weetman, 2007. Modelling transparency in disclosure: the case of foreign exchange risk management, *Journal of Business Finance & Accounting* 34, 705-39.

Melumad, N. D., G. Weyns, and A. Ziv, 1999. Comparing alternative hedge accounting standards; shareholders perspective, *Review of Accounting Studies* 5, 265-292.

Nance, D.R., C.W. Smith Jr. and C.W. Smithson, 1993. On the Determinants of Corporate Hedging, *Journal of Finance* 48, 267-84.

Perez-Gonzalez, F. and Yun, H., 2013. Risk management and firm value: evidence from weather derivatives. *Journal of Finance* 68 (5), 2143-2176.

Strebulaev, I. A. and B. Yang, 2013. The mystery of zero-leverage firms, *Journal of Financial Economics* 109, 1-23.

Tufano, P., 1996. Who manages risk? An empirical examination of risk-management practices in the gold mining industry, *Journal of Finance* 51, 1097-1137.

Zhang, H., 2009. Effect of derivative accounting rules on corporate risk-management behavior. Journal of accounting and economics 47, 244-264.