What Drives Hedging Practices? An Examination of Managerial Inside Debt

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Abstract

Prior work advances several theories for the motivation behind risk management by firms using derivative instruments. Using a sample of firms across all industries, I examine the relationship between managerial inside debt and the likelihood of the firm using derivatives. I find that managers with higher inside debt to equity compensation ratio as a proportion of firm debt-equity ratio are more likely to use derivative instruments. Consistent with prior literature, results suggest that inside debt causes managers to be more risk averse and opt for more conservative policies.

1. Introduction

Many believe that the financial meltdown was the result of "colossal mismanagement of risk[1]". Bebchuk, Cohen and Spamann (2010) argue that the recent financial crisis itself was a result of the fact that managerial compensation was structured to promote excessive risk taking. In the context of risk management, theories abound that link managerial compensation to incentives (or lack thereof) to adopt risk management practices.

Existing literature advances several theories for the motivation behind hedging by firms. Smith and Stulz (1985) argue that that managerial compensation structure affects firms' hedging practices. For risk averse managers, a compensation package with more options increases the manager's risk taking abilities by making his utility a convex function of firm value. While the options provide unlimited upside and limited downside, the hedge by definition offers limited downside by limiting the upside. On the other hand, if a manager owns a significant portion of the firm, his utility increases as the variability of firm cash flows decreases. Tufano (1996) examines a sample of firms from the gold mining industry and finds evidence suggesting that managers who own more stocks manage more risk as compared to managers who own more options.

However, literature studying the debt-like component of CEOs' compensation is relatively new. Jensen and Meckling (1976) argue that "inside debt" can help mitigate agency costs. By contracting to hold a portion of the firm's debt, the manager has lesser incentives to transfer wealth from bondholders to shareholders. Edmans and Liu (2011) illustrate that since debt-like compensation is

[1] http://www.guardian.co.uk/business/2010/apr/18/goldman-sachs-regulators-civil-charges

sensitive to probability of default as well as the liquidation value, inside debt could be a more efficient solution to agency problems than salaries and bonuses. Sundaram and Yermack (2007) posit that managers with large pension holdings tend to manage conservatively so as to reduce the probability of debt default.

While the literature on inside debt is growing, little work has been done to examine the association between managerial inside debt and firm hedging practices. Since the debt-like component of CEOs' compensation makes them more sensitive to financial distress, and hedging is expected to reduce the cost of financial distress, I argue that CEO debt-like compensation is positively associated with the likelihood of firms using derivatives. Using data on derivatives use collected from annual 10-K filings, I find that CEO inside debt is indeed positively associated with the likelihood of a firm using derivatives. Colquitt, Hoyt and Lee (1999) find that a greater proportion of risk managers report to CFOs rather than CEOs. If the CFO of a firm is more directly involved in the risk management decisions of the firm, one would expect to find that CFOs with more inside-debt are more likely to act in risk averse ways. I study a subsample of CFO inside debt and find that firms whose CFOs have higher debt-like compensation are more likely to use derivatives.

Prior studies on drivers of risk management have been restricted in their sample size due to the costs involved in collecting data on derivatives usage. Many researchers have examined hedging practices within an industry to overcome such constraints. Using PERL, I examine derivatives usage for a larger sample of firms across all industries[2]. I find that CEOs and CFOs with greater proportion of inside debt are more likely to use derivative instruments to hedge firm risks. This is consistent with

[2] I exclude financial firms as these firms tend to use derivatives as part of business operations as well as to hedge their resultant positions.

prior literature that finds that managers' debt-like compensation increases their risk aversion and causes them to favor conservative policies.

In the subsequent section, I also find that consistent with the predictions of Wei and Yermack (2011), managers with relative D/E ratio of greater than one are associated with significant reductions in shareholders' wealth.

2. Hypotheses development

Theory suggests that hedging reduces the cost of bankruptcy by reducing the volatility of cash flows (Bessembinder (1991), Froot, Scharfstein and Stein (1993)). Consider a firm with equity as well as debt claims. At the time of maturity of debt, if the firm incurs bankruptcy, the debt-holders receive less than the face value of debt while the equity-holders receive nothing. Otherwise, debt-holders receive the entire face value of debt and equity-holders receive any residual claims (Smith and Stulz (1985)). Thus, the creditors tend to be more risk averse since they get paid as long as the firm does not declare bankruptcy. On the other hand, shareholders of the firm have incentives to invest in risky projects that could potentially generate returns significantly higher than the face value of debt. Thus, my hypothesis is that managers with more "inside debt" are more likely to manage their firm's risk. One way for firms to manage risks is through the use of derivative financial instruments. Large firms with business operations in different countries typically use currency forward contracts to lock in the exchange rate. Many manufacturing firms use commodity derivatives to lock in the prices of raw materials used. Loans and debt issuances can be converted from fixed to floating rates or vice versa using interest rate swaps to allow firms to hedge interest rate risks. Firms that file annual reports are required to disclose the sources of financial and operational risks. Froot, Scharfstein and Stein (1993) argue that hedging might not be optimal and required for every firm. They cite an example of a

company involved in drilling as well as distribution of oil to show that the risk of change in oil prices is cancelled across the two businesses. Guay and Kothari (2003) find that derivatives hedge a very small portion of companies' risk. They find that the median firm can hedge only 3% to 6% of its aggregate interest rate and currency risk exposures. However, one can argue that derivative use acts as a proxy for the overall risk management policy of firms. Firms that use derivatives to hedge interest rate and currency exposures are also more likely to actively follow other risk management practices. To the extent that the use of derivatives indicate the intent of the manager to actively manage risk, my first hypothesis is:

H1: Managers with more "inside debt" are more likely to use derivatives to hedge risks.

Literature on relationship between executive compensation structure and risk management has primarily focused on performance sensitive compensation i.e. stock and option compensation (Bizjack, Brickley and Coles (1993), Tufano (1996), Haushalter (2000) to name a few). The argument is that managers are undiversified in their exposure to firm risk, making them more risk averse than other shareholders. Performance based compensation with convex payoff structure i.e. options provide managers with risk taking incentives and helps align managerial interests with shareholder wealth maximization goals. Thus, stock and option based compensation helps mitigate the underinvestment problem.

There is sparse literature that examines the debt-like component of managerial compensation. Pension benefits and deferred compensation are accrued by employees, to be paid once they retire. These components align managers' interests with those of debt-holders in that they reduce managers' risk taking incentives and increase their incentive to reduce the probability of bankruptcy. Sundaram and Yermack (2007) point out that debt-like compensation constitutes a significant proportion of

CEO pay. They find that 84% of the CEOs in their sample hold "inside debt". Further they argue that CEOs with higher debt-like compensation tend to manage their firms more conservatively.

Employees are paid pensions either as defined benefit plans or as defined contribution plans. Defined benefit plans are guaranteed up to a limit by the Pension Benefits Guarantee Corporation (PBGC). The maximum guaranteed amount is based on employee's age on the plan termination date (or the date the firm entered bankruptcy, if applicable) and under the provisions of ERISA. For 2012, the maximum guaranteed amount was $55,840.92 per year for employees who begin receiving pension from PBGC at the age of 65. Defined contribution plans, on the other hand, are not covered by the PBGC. Since the plans guaranteed by PBGC are subject to caps, the majority of top executives receive retirement benefits through Supplemental Executive Retirement Plans (SERPs), which are typically not guaranteed under PBGC. The average CEO in the sample is 55 years old and has accumulated around 456.87 million in pensions and deferred compensation. Thus, the difference in the value of top executives' post-retirement benefits is significantly large in the event the firm goes bankrupt.

Following SEC's increased disclosure requirements on executive compensation[3], Cassell, Huang, Sanchez and Stuart (2012) examine a sample of firms starting from 2006 and find that CEO debt-like compensation is negatively associated with volatility of firm's future stock returns as well as financial leverage. They also find a positive relation between managers' debt-like compensation and the extent of diversification, suggesting an increase in risk aversion in managers with greater debt-like compensation component.

[3] New SEC regulations in 2006 require firms to disclose executives' retirement plan and post-employment benefits in addition to disclosures on salary, stock and option compensation.

3. Sample construction and variable definitions

The dependent variable, *DERIVDUMMY*, is a binary variable that takes value of one if a firm uses derivatives, zero otherwise. Prior literature uses several variables to measure the extent of derivative usage by firms. Tufano (1996), Haushalter (2000) use notional values of commodity derivatives to examine the risk management practices in specific industries. Allayannis and Weston (2001) use the notional values and find that use of foreign currency derivatives significantly improves firm value. On the other hand, Graham and Rogers (2002) use net notional values, aggregate notional values as well as dummy variables and find no change to their overall results. SFAS 119 required firms to disclose whether they held derivative instruments for trading or hedging purposes; further it required firms to disclose the notional amount of such derivative contracts. In June 2000, FASB introduced the SFAS 133 which superseded FASB 119. According to the new regulations (SFAS 133, Paragraph 512) "Certain other requirements from Statements 105 and 119 have been deleted, including disclosure of the 'face or contract amount' for all derivative financial instruments held at the balance sheet date…". Thus, for the sample period, firms were not required to report the underlying notional values for derivative instruments. Further, many firms that enter into commodity derivatives specify the notional amounts in terms of quantity of the underlying commodity. Moreover, many firms report the notional values of currency derivatives in terms of multiple currencies. In light of this, notional values of derivative instruments would be a very noisy measure of firm's hedging practices. In this paper, I use a binary variable to measure whether a firm uses derivative financial instruments[4].

The dependent variable in this study, *DERIVDUMMY*, is a binary variable that takes value of one if a firm uses derivatives, zero otherwise. Data on derivative usage is collected from SEC's 10-K filings

[4] SFAS 161 was introduced effective November 15, 2008, which again requires firms to disclose notional values; however, this statement does not require companies to report these numbers in any standard format.

using PERL. First, I get the URLs for all available 10-K filings from SEC's website for the years 2006 to 2010. The choice of sample period is driven by the fact that data on pension and deferred compensation is available on Execucomp starting only from 2006. If pension and deferred compensation do indeed reduce managers' risk taking incentives, then this should be manifested as an increase in derivative usage in general. Thus, I consider interest rate, foreign currency as well as commodity derivatives in this study.

Next, I get the COMPUSTAT and EXECUCOMP variables for this sample of firms. Finally, I use PERL to read through the 10-K filings and search for occurrences of various words pertaining to derivatives usage. The list of phrases searched for include "interest rate derivative", "interest rate swap", "derivative financial instrument", "interest rate lock" , "foreign currency derivative", "cross-currency swap", "commodity price risk" etc. The complete list of the search phrases can be found in the appendix section of this paper. I then construct separate binary variables for interest rate derivatives, currency derivatives and commodity derivatives. Since the code searches for the given list of phrases, it will also yield positive results when it finds phrases like "no interest rate derivative". I control for the occurrences of such phrases by including a list of such "negative" phrases. For any firm-year, if at least one of the binary variables takes a value of one then the variable *DERIVDUMMY* takes a value of one. A majority of financial firms use derivative instruments (primarily interest rate derivatives) as part of their business operations rather than purely for hedging. I therefore exclude financial firms from my sample.

The final sample consists of 3072 observations with non-missing observations for all variables of interest, of which 79% use at least one type of derivative instrument. Table 2 provides descriptive statistics. A quick glance at the summary statistics shows that CEOs of hedging firms have higher

mean and median D/E ratio (relative to the firm) as well as higher current compensation (salary + bonus). Hedging firm managers are slightly older than managers of non-hedging firms. Firms using derivatives have lower cash holdings on average, pointing to a substitution effect. Hedging firms are also larger firms with higher leverage and R&D expenses. All differences in means between the two subsamples are statistically significant.

Measures of executive compensation and managers' age are obtained from the annual compensation files on EXECUCOMP. Consistent with prior studies, I define CEO's debt-like compensation as the sum of pension benefits and deferred compensation. Data on deferred compensation and pension is available only since 2006, which limits my sample period considerably even though data on interest rate hedging could be easily be collected starting 1994. Following Cassell et al. (2012), I construct two variables to measure managers' relative debt to equity ratio. The first variable is the log of one plus the ratio of debt-to-equity compensation of the manager to the ratio of debt-to-equity of the firm. The second variable is a binary variable that takes a value of 1 if the relative manager-to-firm D/E ratio is greater than or equal to one. The denominator of CEOs' debt-equity ratio is the value of stocks and options in the managers' compensation portfolio. I define CEO's portfolio of options as the sum of vested and unvested options that have not been not exercised, adjusted to 2010 dollar value. Stock ownership is defined as market value of shares held by the manager.

It must be noted here that the sample period coincides with the recent period of financial crisis. One potential cause for concern could be that results are possible driven by the fact that equity values were declining during this period, which would mechanically lead to an overstatement of the CEO's debt-to-equity ratio. The relative D/E ratio measure also addresses this issue. Since the manager's

debt-to-equity compensation is scaled by the firm D/E ratio, any underestimation of the CEO's equity holdings will be negated by an equivalent undervaluation of the firm's equity value.

Prior literature has found size to be an important control. Larger firms typically have more debt and therefore are expected to hedge more. Geczy, Minton and Schrand (1997) argue that economies of scale are an important determinant of (currency) derivatives among firms. Thus, I expect to find a positive relation between a firm's size and its likelihood of using interest rate derivatives. I define size as the log of total assets[5].

Tufano (1996) argues that manager's age could proxy for risk aversion in that older managers closer to retirement are likely more risk averse. Thus, older managers could be expected to manage firm risks to a greater extent. On the other hand, one could argue that younger CEOs are more likely to adopt derivatives than their older counterparts. Thus, one cannot unambiguously predict the sign of the coefficient on this variable. However, the average CEO age is not expected to be same across all industries. More importantly, since pension benefits grow with age, manager's age is expected to be strongly correlated with the debt compensation variable (Sundaram and Yermack (2007)). Therefore, I use the deviation of CEO's age from the industry mean to account for this multi-collinearity with the debt compensation variable.

Smith and Stulz (1985) argue that option like features in the compensation package could reduce manager's incentive to hedge. Since options offer unlimited upside (with limited downside) while hedging limits both upside as well as downside, CEO's with more option compensation are less likely to hedge. Examining a sample of gold mining firms, Tufano (1996) finds a negative relationship between hedging of gold price risk and managers' option compensation. On the other hand,

[5] I also define size as log of market value of equity and log of sales; Results are consistent to alternate definitions of size.

managers with more stocks in their portfolio are exposed to both positive as well as negative shocks to the firm value. One would expect such managers to have greater incentives to reduce variability of cash flows.

One of the primary lines of argument in explaining a firm's decision to use derivatives is that hedging increases debt capacity and reduces the risk of bankruptcy. If external financing is costly, then firms tend to hedge against the possibility that it might be difficult or impossible to raise enough capital to take advantage of investment opportunities. Thus, one should observe that firms with higher leverage are more likely to use derivatives. However, this relationship need not necessarily be linear. Purnanandam (2007) argues that the relationship between leverage and hedging practices is non-linear. He contends that at low levels of leverage, financial distress cost is negligible and therefore the firm has little incentive to hedge. On the other hand, when these costs are very high, there is no distinction between financial distress and bankruptcy. Such firms have ex-post no incentive to hedge. I measure leverage as the book value of debt scaled by total assets. I also include the square of leverage in the regressions to test for the nonlinearity.

If hedging does indeed alleviate financial distress costs, then the increase in debt capacity (as a result of hedging) should be more valuable to firms with higher growth opportunities. Geczy et al. (1997) examine the use of currency derivatives and find evidence consistent with this theory. I use a firm's R&D expense to proxy for its growth opportunities. Thus, I expect to find a positive relationship between R&D expense and the probability of hedging.

Finally, Opler, Pinkowitz, Stulz and Williamson (1999) posit that cash and derivative use are complements rather than substitutes. They find no evidence to suggest that the two are substitutes, albeit an insignificant one. Bates, Kahle and Stulz (2009) argue that firms face many risks that they

cannot effectively hedge using derivatives i.e. derivatives and cash holdings are complements. On the other hand, Haushalter, Klasa and Maxwell (2007) find that in product market context, cash holdings and derivatives use can be viewed as substitutes. I define cash holdings as the ratio of cash and marketable securities to total assets. Results are robust to an alternative definition of cash and marketable securities scaled by net sales.

4. CEO Compensation and Probability of Hedging

Table 3 presents results from the Probit model for CEOs' relative D/E ratios. In the first column, I find that the CEO relative debt-equity ratio is positive and significant in explaining the likelihood of a firm using derivatives to hedge. Since the sample period coincides with the recent financial meltdown, one potential concern could be that the results are driven by unobserved common factors. To control for these, the second column presents results from the model with industry and year fixed effects. I find that a one standard deviation increase in the CEO's D/E ratio relative to the firm increases the likelihood of the firm using derivatives by about 2.4%. In the third column I find that this likelihood further increases to 4.9% if the CEO's relative D/E ratio is greater than one. The results in Table 3 are consistent with the first hypothesis. To the extent that derivative use is a proxy for firm risk management practices, I find that risk averse managers are more likely to use derivatives to hedge firm risks. To the extent that inside debt does indeed make managers more risk averse, these results can also be interpreted as evidence that firms use derivatives to hedge financial and operational risk rather than to speculate. If pension and deferred compensation aligns managers' incentives more in favor of bondholders, then it is difficult to argue that such managers are using derivatives to speculate or to time the market.

Similar to Haushalter (2000), I find that firms with higher leverage are more likely to hedge. Consistent with Purnanandam (2007), results suggest a non-linear relationship between the probability of hedging and leverage. Firms with higher cash holdings are 13% to 19% less likely to use derivatives. This is consistent with prior literature that finds that cash holdings and derivatives are substitutes. Finally, results indicate that diversified firms are less likely to hedge using derivative instruments. This is consistent with Hankins (2011) and Petersen and Thiagarajan (2000) who argue that firms substitute operational hedging for financial hedging.

5. CFO Compensation and Probability of Hedging

In many firms, the decision to hedge risks is made by the CFOs. Firms typically appoint a "Risk Manager" to oversee the risk management policies in the company. Colquitt, Hoyt and Lee (1999) conduct a survey on the role of risk managers and find that 23.7% of the respondents report to the CFO, vis-à-vis 4.2% respondents who report to the CEO. To the extent that the CFO oversees the risk management and hedging practices in a firm, the CFO's compensation is more likely to influence whether or not a firm undertakes hedging activities. I use a Probit model to examine if the compensation structure of CFOs is significantly associated with a firm's likelihood of hedging. The model is similar to that in Table 3, but with CFO characteristics. Note that there is no variable in EXECUCOMP to indicate the date an executive became CFO, and therefore, no way to estimate the tenure of the CFO. Thus, Table 4 does not include *TENURE* on the right hand side. In Table 4, I find that CFOs' relative D/E ratio is positively related to a firm's probability of hedging. A percentage increase in the CFO's relative D/E ratio is associated with 1.8% increase in the firm's probability of hedging. However, these results are not statistically significant. Columns 3 and 4 of the table indicate that the probability of a firm hedging is even greater when the relative D/E ratio is greater than one.

Further, this likelihood is higher when the CFO's relative D/E ratio is greater than 1 than when the CEO's relative D/E is greater than one.

6. Derivatives Instruments for Hedging vs. Speculation

In this section, I test for whether firms do indeed use derivatives for hedging. Faulkender (2005) and Géczy, Minton and Schrand (2007) find evidence that managers could be using derivative instruments to time the market or to "take a view" to gain perceived cost advantages. One could argue that the binary variable for derivative use could be measuring the extent of managerial speculation rather than risk management. However, in such a scenario one would expect to find no significant association between managerial inside debt and the likelihood of using derivatives. Since results in Tables 3 and 4 provide evidence that such a relationship does in fact exist, it must be that managers are using derivative instruments for risk management purposes. Further, given the evidence from prior literature that inside debt makes managers more risk averse, it is difficult to argue that such a positive association could be due to managers with higher inside debt are more likely to undertake speculative activities.

Another concern could be that managers could be using derivatives to take a view on the markets with the purpose of reducing risk. One could then argue that the idea that higher inside debt is associated with a higher likelihood of taking such views could be driving these results. I argue that this is still consistent with the arguments in this paper that inside debt makes managers more risk averse. To the extent that such view are undertaken with the idea of reducing risk, the results in Tables 3 and 4 indicate that higher managerial inside debt is associated with higher likelihood of (perceived) risk management.

Table 5 presents results for test of whether firms in my sample are indeed using derivatives for risk management purposes. Using firm R&D expenditure (scaled by net sales) as a proxy for firm risk, I find that in the presence of high inside debt, firms with higher R&D expenses are more likely to use derivatives than firms with lower R&D expenses. In Table 5, the interaction between R&D expenses and *LOG_REL_DE* is positive and significant for the CEO as well as CFO subsamples, suggesting that managers with high inside debt are indeed using derivatives to hedge firm risk rather than to speculate. Specifically, in the presence of high R&D expense, a percentage increase in the CFO's (CEO's) relative debt-to-equity ratio increases the likelihood of using derivatives by 2.2% (1.1%) more as compared to the low R&D firms. Similarly, in the presence of high R&D expense, CFOs (CEOs) with relative debt-to-equity ratio greater than 1 are 4.6% (3.2%) more likely to use derivatives compared to CFOs of low R&D firms.

7. Instrumental Variables

An important concern in these tests is that the decision to hedge and the CEO's (CFO's) inside debt are endogenously determined by some unobserved factors. To check for the robustness of the above results, I use an instrumental variables approach. I use the individual tax rates in the state where the firm is headquartered as an instrumental variable. Anantharaman, Fang and Gong (2011) argue that pensions and deferred compensation offer tax advantages to executives. Since deferred compensation is taxable only when received, managers have incentives to defer part of their compensation to a later period when they may be taxed at a lower rate. These tax rates are obtained from http://www.nber.org/~taxsim/state-rates/ (See Feenberg and Coutts (1993) for details on TAXSIM). I also use the industry-year median relative D/E ratio as an instrument. Tables 6 and 7 present results for the CEO and CFO subsamples respectively. I find that the results are robust to using these

instruments. However, I find that the relationship between managerial inside debt and the likelihood of using derivatives is not statistically significant when using industry-year median relative D/E ratio as the instrument, though the sign on the coefficient in this case are as predicted. Further, the second column in Tables 6 and 7 suggests an even higher economic significance of managers' inside debt in explaining the likelihood of derivatives usage.

8. Future Work: Inside Debt and Shareholders' Wealth

The evidence from above papers suggests that risk averse managers will tend to underinvest in risky projects. CEOs with high inside debt are expected to have incentives more aligned towards the debtholders of the firm and are therefore expected to favor conservative policies that might reduce shareholders' wealth. It is therefore possible that hedging by such risk averse managers is perceived by equityholders as acting in favor of the bondholders. It follows then that hedging using derivative instruments when the manager's relative debt-to-equity ratio is greater than one should result in greater reduction in shareholders' wealth.

H2: Derivatives use in the presence of higher managerial inside debt is negatively associated with shareholders' wealth.

Guay (1999) argues that firms with strong incentives to hedge are likely to provide managers with weaker risk-taking incentives. Consequently if inside debt does indeed increase managers' risk aversion, they have incentives to avoid value enhancing risky investments. Further, if these managers are in fact acting in favor of debt holders by avoiding risk, this could result in decrease in shareholders' wealth. I propose to examine the impact of hedging in the presence of high inside debt on the excess stock returns of the firm. Wei and Yermack (2011) find that disclosure about inside

debt decreases shareholder value and is associated with higher bond prices. However, little is known about the efficiency of the inside debt compensation itself in aligning managerial incentives.

Following Faulkender and Wang (2006) I propose to measure shareholder value as the excess stock return over return of similar firm by size and book-to-market ratio. I expect to find that the use of derivative instruments in the presence of high managerial inside debt is associated with lower excess returns.

9. Conclusion

Prior literature advances several motivations for firms to undertake risk management practices. This paper contributes to the growing literature on managers' inside debt as well as to the literature on risk management practices in firms by examining the likelihood of a firm using derivatives in the presence of managers with higher inside debt. Using large sample of firms from across industries, I collect data on derivatives usage using PERL. I find that managers with greater debt-to-equity ratio relative to the firm debt-equity ratio are more likely to use derivative instruments. To the extent that derivatives proxy for overall risk management practices, these results support managerial risk aversion hypothesis. Results are robust to using instrumental variables. In many cases the decision to use derivatives rests with the CFO rather than CEO; I show that the results above are applicable to subsample of CFO relative D/E ratios. These results are consistent with prior literature that argues that presence of inside debt makes managers more risk averse and provides incentives to undertake conservative firm policies.

Table 1: Variable Definitions

Variable name	Definition
Firm Characteristics	
DERIVDUMMY	Dependent variable: Defined as a binary variable that takes value of 1 if firm uses derivative instruments in fiscal year t, 0 otherwise. Derivative instruments here are defined as interest rate, foreign currency and commodity derivatives.
CASH	Natural logarithm of (1 + cash and marketable securities scaled by total assets). An alternative measure is constructed as the natural logarithm of 1 + cash and marketable securities scaled by net sales.
FIRM D/E	The debt-to-equity ratio of the firm in fiscal year t. Defined as book value of leverage divided by market value of equity.
LEVERAGE	Defined as long term debt (DLTT + DLC from Compustat) scaled by total assets in fiscal year t.
LEVSQ	This variable is defined as the square of LEVERAGE in fiscal year t.
SIZE	Defined as the natural logarithm of 1 + total assets in fiscal year t. Alternative definitions used are natural logarithm of 1 + net sales and natural logarithm of 1 + market value of equity.
DIVERSIFICATION	Herfindahl-Hirschman Index (HHI) from segments file in Compustat. HHI is calculated as the sum of square of the ratio of segment sales of firm to total firm sales in fiscal year t. Total firm sales is calculated as the sum of all segment sales of the firm in fiscal year t. Alternatively, this measure is defined as
FIRM AGE	Age of the firm measured as the number of years since the firm first appeared in Compustat.
ROA	Earnings before interest and taxes scaled by total assets for fiscal year t
R&D	Natural logarithm of 1 + Research and development expenditures scaled by total assets in fiscal year t. This variable is set to 0 if R&D expenditure in missing in Compustat.
PPE	Plant , Property and Equipment scaled by total assets for fiscal year t.
ABRET	Annualized returns for the firm in fiscal year t in excess of the six Fama-French size and book-to-market benchmark portfolios. Each year firms are classified into one of the six benchmark portfolios matched by market value of equity and book-to-market ratio. Returns for the firm as well as the benchmark portfolios are calculated each month and annualized to get an estimate of returns at the end of fiscal year t. Abnormal returns for the firm at the end of fiscal year t is then constructed as the difference between firm annualized return and benchmark annualized return.

CEO, CFO Characteristics: Variables are defined for CEO as well as CFO	
DEBTCOMP	The sum of the total value of CEO pensions and aggregate balance in deferred compensation in fiscal year t, scaled by 1000. Pension and deferred compensation values are set to zero if reported missing in Execucomp. For the CFO subsample, this variable is defined as the sum of total value of the CFO's pension and deferred compensation in fiscal year t.
OPT_OWN	The sum of estimated value of unexercised vested and unvested options in the CEO's compensation portfolio at fiscal year t, scaled by 1000. This variable is set to zero if reported missing in Execucomp. OPT_OWN is also defined similarly for the CFO in fiscal year t.
STK_OWN	Market value of shares owned by CEO in fiscal year t excluding options, scaled by 1000. This variable is also defined as the market value of shares owned (excluding options) by the CFO in fiscal year t, scaled by 1000.
CURR_COMP	Defined as the natural logarithm of 1 + current compensation (salary + bonus) of the CEO in fiscal year t. For the CFO subsample, this variable is defined as the natural logarithm of 1 + CFO's current compensation in fiscal year t.
LOG_REL_DE	This is a measure of the relative debt-equity ratio of the CEO in fiscal year t. This variable is constructed as the natural logarithm of (1 + (CEO debt-to-equity ratio scaled by firm debt-equity ratio)). In the CFO subsample, this variable is defined as the natural logarithm of (1 + (CFO debt-equity ratio scaled by firm debt-equity ratio))
DEDUMMY	Binary variable that takes a value of 1 if the CEO or CFO's relative debt-equity ratio measured by LOG_REL_DE in fiscal year t is greater than 1, 0 otherwise.
AGE	Age of the CEO at fiscal year t less the industry mean CEO age in fiscal year t. Industry is defined at the 2 digit SIC code. In the subsample examining CFO inside debt and probability of derivative use (CFO subsample), AGE variable is defined as theCFO's age in fiscal year t less the industry average CFO age in fiscal year t. Again, industry is defined at the 2 digit SIC code.
TENURE	This variable measures the tenure of the CEO. Defined for each fiscal year t as the number of years since the executive became CEO. If the CEO is reported to have left office before fiscal year t, this variable is measured as the number of years since the date the executive became CEO to the date the CEO left office. The date when an executive became CFO of the firm is not available in Execucomp and hence this variable is not constructed for the CFO subsample.
SERP	Following Sundaram and Yermack (2007), SERP is constructed as a binary variable that takes value of 1 if the number of years of credited service for CEO pension in fiscal year t is positive, 0 otherwise. For the CFO subsample, SERP takes a value of 1 if the number of years of credited service for CFO's pension is positive in fiscal year t.

Table 2 : Descriptive Statistics

The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CEO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CEO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of sale. LEVERAGE is the ratio of book value of debt to total assets. LEVSQ is the square of LEVERAGE. CASH is defined as cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CEO's age expressed as deviation from industry-year mean. CURRCOMP is the log of 1 + CEO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive. TENURE is the number of years the executive has been CEO of the firm; FIRM AGE is the number of years the firm has accounting data on Compustat. DIVERSIFICATION is the degree of segment diversification, calculated as the segment HHI.

	HEDGERS (Firm-years where DERIVDUMMY = 1)			*NON-HEDGERS (Firm-years where DERIVDUMMY = 0)*		
	N	Mean	Std Dev	N	Mean	Std Dev
LOG_REL_DE	2422	0.708	0.918	650	0.453	0.892
DEDUMMY	2422	0.360	0.480	650	0.217	0.412
DEBT-LIKE COMPENSATION	2422	569.296	982.809	650	239.507	758.899
CURR_COMP	2422	6.772	0.559	650	6.526	0.539
SIZE	2422	7.971	1.473	650	6.754	1.384
LEVERAGE	2422	0.277	0.170	650	0.218	0.193
LEVSQ	2422	0.105	0.120	650	0.085	0.129
CASH	2422	0.098	0.105	650	0.157	0.153
R&D	2422	2.010	2.427	650	1.305	1.883
AGE	2422	55.251	6.581	650	54.586	7.598
TENURE	2422	7.016	6.537	650	7.596	7.210
SERP	2422	0.533	0.499	650	0.229	0.421
DIVERSIFICATION	2422	0.693	0.277	650	0.796	0.252
FIRM AGE	2422	30.605	18.465	650	21.385	14.496

Table 3: PROBIT Model for CEO relative D/E ratios

PROBIT estimations are for the CEO subsample. The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CEO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CEO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of total assets. LEVERAGE is the ratio of book value of debt to total assets. LEVSQ is the square of LEVERAGE. CASH is defined as the log of cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CEO's age expressed as deviation from industry mean; TENURE is the number of years the executive has been CEO of the firm. CURRCOMP is the log of 1+ CEO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive; DIVERSIFICATION is the segment sales HHI calculated by 2 digit SIC codes. Standard errors are clustered at firm level.

Dependent Variable	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*
LOG_REL_DE	0.027**	0.021*		
	(2.20)	(1.76)		
DEDUMMY			0.054**	0.039*
			(2.34)	(1.75)
CURR_COMP	-0.007	-0.009	-0.007	-0.013
	(-0.33)	(-0.45)	(-0.36)	(-0.69)
SIZE	0.062***	0.066***	0.070***	0.080***
	(6.67)	(7.42)	(7.79)	(9.15)
LEVERAGE	0.522***	0.482***	0.581***	0.583***
	(3.20)	(3.11)	(3.93)	(4.10)
LEVSQ	-0.585***	-0.478**	-0.659***	-0.603***
	(-2.71)	(-2.25)	(-3.18)	(-2.96)
CASH	-0.157*	-0.302***	-0.121	-0.295***
	(-1.76)	(-3.50)	(-1.44)	(-3.50)
MTB	-0.025	-0.014	-0.043	-0.010
	(-0.75)	(-0.44)	(-1.25)	(-0.34)
AGE	-0.000	-0.001	-0.001	-0.001
	(-0.30)	(-0.36)	(-0.74)	(-0.79)
TENURE	-0.001	-0.001	-0.001	-0.000
	(-0.73)	(-0.34)	(-0.63)	(-0.34)
FIRM AGE	0.001	0.001	0.001	0.001
	(1.16)	(1.43)	(0.88)	(1.30)
DIVERSIFICATION	-0.065	-0.008	-0.097**	-0.026
	(-1.55)	(-0.19)	(-2.30)	(-0.62)
Constant	-0.899*	-1.859***	-0.900*	-1.962***
	(-1.75)	(-3.42)	(-1.95)	(-3.97)
Industry Fixed Effects	No	Yes	No	Yes
Year Fixed Effects	No	Yes	No	Yes
N	3072	3067	3670	3565

t stats in parenthesis

****=p<0.01, **=p<0.05, *=p<0.10*

Table 4: PROBIT Model for CFO relative D/E ratios

PROBIT estimations are for the CFO subsample. The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CFO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CFO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of total assets. LEVERAGE is the ratio of book value of debt to total assets. LEVSQ is the square of LEVERAGE. CASH is defined as the log of cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CFO's age expressed as deviation from industry mean. CURRCOMP is the log of 1+ CFO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive; DIVERSIFICATION is the segment sales HHI calculated by 2 digit SIC codes. Standard errors are clustered at firm level.

Dependent Variable	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*
LOG_REL_DE	0.018	0.012		
	(1.56)	(1.03)		
DEDUMMY			0.062**	0.047**
			(2.40)	(1.98)
CURR_COMP	-0.044	-0.022	-0.049*	-0.036
	(-1.58)	(-0.80)	(-1.94)	(-1.59)
SIZE	0.072***	0.071***	0.079***	0.083***
	(7.31)	(7.12)	(8.32)	(8.53)
LEVERAGE	0.528***	0.478***	0.575***	0.524***
	(3.21)	(3.00)	(3.74)	(3.62)
LEVSQ	-0.553**	-0.424**	-0.581***	-0.463**
	(-2.54)	(-1.99)	(-2.69)	(-2.27)
CASH	-0.083	-0.273***	-0.053	-0.244***
	(-0.90)	(-2.99)	(-0.61)	(-2.83)
MTB	-0.034	-0.013	-0.051	-0.011
	(-0.96)	(-0.39)	(-1.45)	(-0.34)
AGE	0.003*	0.003*	0.003*	0.003*
	(1.80)	(1.81)	(1.83)	(1.90)
FIRM AGE	0.001	0.001*	0.001	0.001
	(1.47)	(1.85)	(1.19)	(1.63)
DIVERSIFICATION	-0.074*	-0.006	-0.089**	-0.013
	(-1.71)	(-0.14)	(-2.04)	(-0.31)
Constant	-0.357	2.289***	-0.320	2.556***
	(-0.58)	(3.17)	(-0.61)	(4.79)
Industry Fixed Effects	No	Yes	No	Yes
Year Fixed Effects	No	Yes	No	Yes
N	2567	2563	3164	3159

t stats in parenthesis

****=p<0.01, **=p<0.05, *=p<0.10*

Table 5: PROBIT Model for interaction of Relative D/E ratios with R&D expense

The first two columns report PROBIT estimations for the CEO subsample, and the last two columns for the CFO subsample. The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CEO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CEO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of total assets. LEVERAGE is the ratio of book value of debt to total assets expressed as deviation from industry mean. LEVSQ is the square of LEVERAGE. CASH is defined as the log of cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CEO's age expressed as deviation from industry-year mean; TENURE is the number of years the executive has been CEO of the firm. CURRCOMP is the log of 1+ CEO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive.

Dependent Variable	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*
LOG_REL_DE	0.004		-0.014	
	(0.25)		(-0.98)	
DEDUMMY		-0.012		-0.014
		(-0.41)		(-0.47)
R&D	0.006	0.009	0.003	0.009
	(0.72)	(1.14)	(0.39)	(1.17)
*R&D * LOG_REL_DE*	0.011*		0.022***	
	(1.65)		(3.52)	
R&D DEDUMMY*		0.032***		0.046***
		(2.71)		(3.65)
CURR_COMP	-0.008	-0.011	-0.022	-0.037
	(-0.41)	(-0.60)	(-0.81)	(-1.63)
SIZE	0.063***	0.073***	0.067***	0.077***
	(6.56)	(7.94)	(6.44)	(7.63)
LEVERAGE	0.489***	0.561***	0.432***	0.490***
	(3.09)	(4.03)	(2.76)	(3.47)
LEVSQ	-0.477**	-0.569***	-0.363*	-0.410**
	(-2.20)	(-2.86)	(-1.74)	(-2.08)
CASH	-0.350***	-0.336***	-0.296***	-0.279***
	(-3.91)	(-4.01)	(-3.29)	(-3.26)
AGE	-0.000	-0.001	0.002*	0.003*
	(-0.23)	(-0.65)	(1.66)	(1.86)
TENURE	-0.001	-0.001		
	(-0.37)	(-0.39)		
FIRM AGE	0.001	0.001	0.001	0.001
	(1.41)	(1.41)	(1.62)	(1.54)
DIVERSIFICATION	-0.007	-0.021	-0.004	-0.009
	(-0.18)	(-0.50)	(-0.10)	(-0.21)
Constant	-1.743***	-1.829***	2.478***	2.945***
	(-3.16)	(-3.68)	(3.44)	(3.69)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	2959	3565	2563	3159

t stats in parenthesis

****=p<0.01, **=p<0.05, *=p<0.10*

Table 6: PROBIT Analysis with Instrumental Variables for CEO Subsample

PROBIT estimations are for the CEO subsample. The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CEO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CEO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of total assets. LEVERAGE is the ratio of book value of debt to total assets. LEVSQ is the square of LEVERAGE. CASH is defined as the log of cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CEO's age expressed as deviation from industry-year mean; TENURE is the number of years the executive has been CEO of the firm. CURRCOMP is the log of 1+ CEO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive. DIVERSIFICATION is the segment sales HHI calculated by 2 digit SIC codes. Standard errors are clustered at firm level.

	State Individual Tax Rate		Industry Median Relative D/E ratio	
Dependent Variable	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*
	First Stage	Second stage	First Stage	Second stage
INSTRUMENT	0.011		0.574***	
	(1.52)		(7.88)	
LOG_REL_DE		1.205***		0.317
		(18.47)		(1.34)
CURR_COMP	0.089**	-0.110*	0.093**	-0.043
	(2.00)	(-1.92)	(2.22)	(-0.52)
SIZE	0.077***	-0.017	0.077***	0.227***
	(3.37)	(-0.29)	(3.47)	(4.78)
LEVERAGE	-3.675***	4.922***	-3.775***	2.838***
	(-7.03)	(8.56)	(-7.44)	(2.78)
LEVSQ	3.280***	-4.519***	3.517***	-3.008***
	(5.28)	(-6.21)	(5.85)	(-2.75)
CASH	-0.279	0.105	-0.218	-0.565
	(-1.27)	(0.36)	(-1.04)	(-1.62)
R&D	0.223**	-0.299**	0.209**	-0.145
	(2.20)	(-2.41)	(2.06)	(-1.05)
AGE	0.013***	-0.016***	0.015***	-0.005
	(3.58)	(-3.65)	(4.23)	(-0.65)
TENURE	-0.013***	0.013**	-0.012***	-0.002
	(-3.34)	(2.40)	(-3.13)	(-0.30)
FIRM AGE	0.012***	-0.013***	0.008***	0.001
	(6.79)	(-5.06)	(4.79)	(0.23)
DIVERSIFICATION	-0.255***	0.216	-0.190**	-0.202
	(-2.73)	(1.50)	(-2.11)	(-1.15)
Constant	-0.189	-0.108	-0.312	-0.872*
	(-0.61)	(-0.26)	(-1.05)	(-1.71)
N	3028	3028	3072	3072

t stats in parenthesis

****=p<0.01, **=p<0.05, *=p<0.10*

Table 7: PROBIT Analysis with Instrumental Variables for CFO Subsample

PROBIT estimations are for the CFO subsample. The dependent variable DERIVDUMMY takes a value of 1 if the firm has interest rate, foreign currency or commodity derivatives outstanding in a given year. LOG_REL_DE is the log of ratio of CEO's D/E ratio to firm D/E ratio. DEDUMMY takes a value of 1 if the CFO relative D/E ratio is > 1, 0 otherwise. SIZE is the log of total assets. LEVERAGE is the ratio of book value of debt to total assets. LEVSQ is the square of LEVERAGE. CASH is defined as the log of cash holdings scaled by total assets; R&D is log of 1+ firm R&D expense scaled by total assets. AGE is the CEO's age expressed as deviation from industry mean. CURRCOMP is the log of 1+ CEO salary + bonus; SERP takes a value of 1 if the number of years used for computing pension is positive. Standard errors are clustered at firm level.

	State Individual Tax Rate		Industry Median Relative D/E ratio	
Dependent Variable	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*	*DERIVDUMMY*
	First Stage	Second stage	First Stage	Second stage
INSTRUMENT	0.008		0.571***	
	(0.98)		(6.41)	
LOG_REL_DE		1.097***		0.186
		(23.89)		(0.69)
CURR_COMP	-0.081	0.048	-0.063	-0.169
	(-1.08)	(0.56)	(-0.86)	(-1.44)
SIZE	0.132***	-0.087	0.125***	0.276***
	(4.54)	(-1.33)	(4.39)	(4.58)
LEVERAGE	-4.558***	5.314***	-4.544***	2.636*
	(-7.38)	(8.91)	(-7.51)	(1.95)
LEVSQ	4.305***	-5.039***	4.413***	-2.708*
	(5.88)	(-6.82)	(6.16)	(-1.93)
CASH	-0.389	0.329	-0.258	-0.290
	(-1.52)	(1.07)	(-1.03)	(-0.76)
MTB	0.145	-0.188	0.142	-0.151
	(1.36)	(-1.56)	(1.36)	(-1.06)
AGE	0.023***	-0.022***	0.024***	0.009
	(4.70)	(-3.91)	(5.01)	(1.00)
FIRM AGE	0.012***	-0.012***	0.009***	0.003
	(6.25)	(-5.07)	(4.70)	(0.73)
DIVERSIFICATION	-0.140	0.092	-0.114	-0.282
	(-1.34)	(0.72)	(-1.13)	(-1.58)
Constant	0.547	-0.670	0.410	-0.421
	(1.36)	(-1.54)	(1.06)	(-0.66)
N	2525	2525	2567	2567

t stats in parenthesis

****=p<0.01, **=p<0.05, *=p<0.10*

Bibliography

Allayannis, G., & Weston, J. P. (2001). The Use of Foreign Currency Derivatives and Firm Market Value. *The Review of Financial Studies*, 243-276.

Anantharaman, D., Fang, V. W., & Gong, G. (2011). Inside debt and the Design of Corporate Debt Contracts. *Working paper*.

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do US firms hold so much more cash than they used to? *The Journal of Finance*, 1985-2021.

Beatty, A., Chen, R., & Zhang, H. (2010). Commitment to hedge and agency costs of debt: Evidence from interest rate protection covenant.

Bebchuk, L. A., Cohen, A., & Spamann, H. (2010). *The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000-2008.*

Bessembinder, H. (1991). Forward Contracts and Firm Value: Investment Incentive and Contracting Effects. *Journal of Financial and Quantitative Analysis*, 519-532.

Bizjak, J. M., Brickley, J. A., & Coles, J. L. (1993). Stock based incentive compensation and investment behavior. *Journal of Accounting and Economics*, 349-372.

Cassell, C. A., Huang, S. X., Sanchez, J. M., & Stuart, M. D. (2012). Seeking Safety: The relation between CEO inside debt holdings and the riskiness of firm investment and financial policies. *Journal of Financial Economics*, 588-610.

Colquitt, L. L., Hoyt, R. E., & Lee, R. B. (1999). Integrated risk management and the role of the risk manager. *Risk Management and Insurance Review*, 43-61.

Edmans, A., & Liu, Q. (2011). Inside Debt. *Review of Finance*, 75-102.

Faulkender, M. (2005). Hedging or Market Timing? Selecting the Interest Rate Exposure of Corporate Debt. *The Journal of Finance*, 931-962.

Feenberg, D. R., & Coutts, E. (1993). An introduction to the TAXSIM model . *Journal of Policy Analysis and Management*, 189-194.

Froot, K. A., Scharfstein, D. S., & Stein, J. C. (1993). Risk Management: Coordinating Corporate Investment and Financing Policies. *The Journal of Finance*, 1629-1658.

Geczy, C. C., Minton, B. A., & Schrand, C. M. (2007). Taking a View: Corporate Speculation, Governance, and Compensation. *The Journal of Finance*, 2405-2443.

Geczy, C., Minton, B. A., & Schrand, C. (1997). Why Firms Use Currency Derivatives. *The Journal of Finance*, 1323-1354.

Graham, J. R., & Rogers, D. A. (2002). Do Firms Hedge in Response to Tax Incentives? *The Journal of Finance*, 815-839.

Guay, W., & Kothari, S. (2003). How much do firms hedge with derivatives? *Journal of Financial Economics*, 423-461.

Hankins, K. W. (2011). How do financial firms manage risk? Unraveling the interaction of financial and operational hedging. *Management Science*, 2197-2212.

Haushalter, D. G. (2000). Financing policy, basis risk and corporate hedging: Evidence from oil and gas industry. *The Journal of Finance*, 107-152.

Haushalter, D., Klasa, S., & Maxwell, W. F. (2007). The influence of product market dynamics on a firm's cash holdings and hedging behavior. *Journal of Financial Economics*, 797-825.

Jensen, M. C., & Meckling, W. H. (1976). Theory of firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 305-360.

Jin, Y., & Jorion, P. (2006). Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers. *The Journal of Finance*, 893-919.

Modigliani, F., & Miller, M. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 261-297.

Myers, S. C. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*, 147-175.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 3-46.

Petersen, M. A., & Thiagarajan, S. R. (2000). Risk Measurement and Hedging: With and without derivatives. *Financial Management*, 5-29.

Purnanandam, A. (2008). Financial distress and corporate risk management: Theory and evidence. *Journal of Financial Economics*, 706-739.

Sundaram, R. K., & Yermack, D. L. (2007). Pay me later: Inside debt and its role in managerial compensation. *The Journal of Finance*, 1551-1588.

Tufano, P. (1996). Who Manages Risk? An empirical examination of risk management practices in the gold mining industry. *The Journal of Finance*, 1097-1137.

Wei, C., & Yermack, D. (2011). Investor reactions to CEOs' Inside Debt Incentives. *Working Paper*.

Appendix A

Data collection on interest rate derivatives use

SEC's provides the URLs to all the filings by firms. I first get the URLs for 10-K filings from here. I use a subsample of URLs with the requisite COMPUSTAT and EXECUCOMP variables available. Next, I use PERL to go through each 10-K filing to find mention of interest rate, currency and commodity derivatives. Since data on pension and deferred compensation is available only from 2006, I extract data on derivative use for the years 2006 to 2010. For example, I count the number of occurrences of the following phrases for interest rate derivatives:

interest rate derivative

interest rate hedging

interest rate hedge

interest rate swap

interest rate contract

interest rate cap

interest rate collar

interest rate protection

interest rate lock

interest rate forward

hedge interest rate risk using derivative

mitigate our interest rate risk

mitigates its interest rate risk

mitigate interest rate risk

manage our interest rate risk

manages its interest rate risk

manage interest rate risk

hedge interest rate risk

hedge our interest rate risk

hedges its interest rate risk

If I find at least one instance of any of the above phrases, IRSDUMMY takes a value of 1, subject to NOT finding the following phrases:

does not use interest rate derivative

does not utilize interest rate derivative

did not have any interest rate swap

no interest rate derivative

no interest rate swap

did not have any interest rate derivative

did not have any interest rate contract

does not hedge its interest rate risk

does not utilize interest rate contract

does not use any derivative contracts to hedge its interest rate risk

no material interest rate risk

does not use derivative financial instruments, such as interest rate swap

no open interest rate derivatives

manages its interest rate risk exposure by maintaining a mix of

manages interest rate risk exposure by maintaining a mix of

interest rate hedging master agreement

means any interest rate swap, cap

means any interest rate swap

do not use interest rate derivative

the company (may|may also) enter into (certain foreign currency and interest rate derivative|interest rate derivative|interest rate swap)

no outstanding currency swap, interest rate derivative

liabilities under interest rate swap

changes in fair value of interest rate swap

no interest rate contract

termination (of|of related|of an) interest rate swap

interest rate agreement means any interest rate (swap|cap|collar)

interest rate protection means any interest rate (swap|cap|collar)

no open interest rate derivative

It is not the Company|'s policy to enter into derivative financial instruments

FXDUMMY takes a value of 1 if any one of the following phrases are found, 0 otherwise:

currency forward

currency option

foreign exchange forward

exchange rate contract

foreign exchange derivative

foreign exchange contract

foreign exchange rate contract

forward foreign exchange

exchange rate derivative

forward currency exchange contract

currency swap

cross-currency swap

foreign currency hedge contract

manages its currency risk

manage currency risk

manage our currency risk

manages its exchange rate risk

manage our exchange rate risk

manage exchange rate risk

hedges its exchange rate risk

hedge our exchange rate risk

hedge exchange rate risk

We are exposed to market risk from changes in foreign currency exchange rates and utilize derivative financial instruments to manage our exposure to such fluctuation

forward contract

Subject to NOT finding the following phrases:

no currency forward

no currency option

no foreign exchange forward

no exchange rate contract

no foreign exchange derivative

no foreign exchange contract

no foreign exchange rate contract

no forward foreign exchange

no exchange rate derivative

no foreign currency exchange rate

no currency swap

no cross-currency swap

no foreign currency hedge contract

does not have any exchange rate derivative

does not have any currency forward

manage our currency risk

does not have any currency derivative

does not have any outstanding foreign exchange derivative

does not have any outstanding (exchange rate/foreign currency forward) contract

no derivative agreement

does not use any derivative

no material derivative instrument

does not utilize currency derivative

does not use currency derivative

does not utilize foreign currency derivative

does not utilize currency forward

no material exchange rate risk

not enter into derivative

but continues to monitor the effects of foreign currency exchange rate

currency swap and interest rate hedging master agreement

market risk exposure is not material

obligation of such person arising under interest rate or currency swap

obligation of such person arising under currency swap

losses and gains on (foreign currency hedge|interest rate and foreign currency hedge|foreign currency and interest rate hedge)

no outstanding commodity derivatives, currency swap

no outstanding interest rate derivatives, (currency swap|foreign exchange contract)

(not directly|not) subject to foreign currency exchange rate fluctuations

do not engage in forward foreign exchange

no foreign currency forward contract

no outstanding forward

does not currently have any significant foreign currency exposure

It is not the Company\|'s policy to enter into derivative financial instruments

COMMDUMMY takes a value of 1 if any one of the following phrases are found, 0 otherwise:

commodity futures

commodities future

commodity option

derivative commodity instrument

manage commodity price risk

hedge commodity price

manage fuel price risk

hedge fuel price risk

natural gas option

natural gas swap

crude oil hedge

oil futures

commodity forward

manage exposure to (fluctuation/fluctuations/changes/change) in commodity prices

manage electricity cost

aluminum forward

natural gas forward

utilizes commodity futures and options

diesel fuel hedge contract

fuel hedge

Subject to NOT finding the following phrases:

no commodity futures

no commodities future

no commodity option

no derivative commodity instrument

does not hedge its commodity price risk

do not use any commodity derivative

does not have any commodity derivative outstanding

does not have material commodity price risk

no commodities future contract

no derivative instrument

no derivative contract

no interest rate or foreign exchange contract

does not have derivative agreement outstanding

does not use any derivative

no material derivative instrument

not enter into any derivative

commodity futures modernization act

has not used derivative commodity instruments

manages commodity price (risk|risks) through (negotiated supply contract|supply contract)

no outstanding commodity derivative

does not use financial instruments to hedge commodity prices

we do not hold or issue derivatives, derivative commodity instruments

does not use financial instruments to hedge commodity prices

company has not entered into any transactions using derivative financial instruments or derivative commodity instruments

does not use derivative commodity instrument

we do not use any derivative or other financial instruments or derivative commodity instruments to hedge

not utilize (derivative financial instruments, derivative commodity instrument|derivative commodity instrument)

It is not the Company\'s policy to enter into derivative financial instruments