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Does hedging with derivatives reduce the market's perception of credit risk?*

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Abstract

Risk management is the most widely-cited reason that non-financial corporations use derivatives. If hedging programs are effective, then firms using derivatives should have lower credit risk than those that do not. We exploit a unique, hand-collected dataset to study the impact of non-financial corporations' use of financial derivatives on credit default swap (CDS) spreads. All else equal, we find that CDS spreads are lower only for firms with derivatives that are designated accounting hedges. Surprisingly, we find that firms with derivatives positions without a hedge accounting designation (typically higher basis risk positions) have higher CDS spreads than firms that do not hedge with derivatives at all. We do not find evidence that these non-designated positions are associated with future credit realizations, as captured by changes in either credit ratings or CDS spreads. We examine alternative explanations for the results and find evidence that is most consistent with a market penalty for high basis risk positions when overall market conditions are poor.

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1. Introduction

How do credit markets interpret non-financial corporations' decisions to hedge with financial derivatives? Derivatives serve as a central component of the overall risk management strategies of many firms and help them to mitigate financial risks. However, because perfect hedges are not always possible, some contracts are more effective than others. Understanding how credit markets view the impact of derivatives with varying levels of basis risk is important, especially given the explosive growth of derivatives in recent years and the crisis-period controversy surrounding their use. This paper provides new evidence on the relationship between hedging and credit default swap (CDS) spreads using a large hand-collected dataset of firms' derivatives positions.

The main empirical challenge in estimating how hedge effectiveness impacts the market's assessment of credit risk is that firms do not generally disclose the extent to which the cash flows from the contract offset the cashflows of the underlying risky asset (basis risk). To identify variation in basis risk, we exploit variation in the accounting designation of financial derivatives. Only positions with very limited basis risk qualify for hedge accounting treatment. Firms are likely to use hedge accounting whenever they are eligible because doing so limits reported earnings fluctuations. Hedge accounting therefore allows us to take steps towards understanding how credit markets interpret the impact of derivatives contracts with different levels of basis risk. Our paper is the first, to our knowledge, to disaggregate derivatives positions according to basis risk to examine the impact of imperfect hedging on CDS spreads.

Theoretically, derivatives can both decrease and increase credit risk. They can be powerful risk management tools since they allow firms to transfer resources into states in which they will be most valuable. Thus, one might expect derivatives use to be viewed favorably by creditors and credit markets. Consistent with this idea, Campello et al. (2011) study corporate loans and provide evidence that firms with more active corporate hedging programs benefit from lower borrowing costs, on average. Chen and King (2014) report similar results

for corporate bond issues. However, the impact of derivatives could be negative as well. For example, derivatives can serve as a low-cost way for managers to take risk and speculate. In fact, Geczy, Minton and Schrand (2007) report that 40% of survey respondents indicate that they speculate with derivatives. If credit markets expect that managers behave in this way, then the expected relationship between credit risk and derivatives can reverse. Bolton and Oehmke (2014) suggest a second channel through which derivatives might increase risk to creditors. In the United States, derivatives have super-seniority in bankruptcy (i.e., derivatives counterparties are effectively paid before senior creditors). Bolton and Oehmke (2014) show that, even though derivative positions can mitigate cash flow fluctuations, when there is significant basis risk, the derivative position itself can cause financial distress and can increase risk to creditors. Informational frictions are a third potential channel through which derivatives can increased perceived credit risk. If the derivatives position and its impact on firm value are difficult to understand (in complicated firms or during changing economic conditions), it is possible that CDS spreads will be higher for firms that use derivatives.

If heterogeneity in basis risk or in the ways that firms use derivatives affects the market's assessment of credit quality, then analyses that pool all derivatives positions may not capture the full extent of the relationship derivatives use and CDS spreads. Most empirical studies of the financial implications of derivatives use have been limited by available data, in which firms have historically reported only their aggregate derivatives. Thus, they have only been able to report the dominant effect of derivatives (e.g., Aretz and Bartram, 2010 for a survey of the literature and empirical challenges). Since 2000, SFAS 133 has allowed certain derivatives positions to receive favorable accounting treatment. Only positions with limited basis risk are eligible for the favorable hedge designation. While some firms may elect not to designate these positions as accounting hedges, the majority will in order to avoid the volatility from marking the gains or losses associated with these positions to market. [1] We exploit variation in accounting classification in order to identify those positions that do and

[1]Reductions in earnings volatility are valuable to managers. Graham, Harvey, and Rajgopal (2005) report that 96.9% of CFOs surveyed prefer smooth earnings and 78% would sacrifice value to achieve this.

do not have substantial basis risk. We then examine the relationship between CDS spreads and derivatives use, allowing the results to vary by positions that are more and less likely to be perfect hedges.

Consistent with a risk management effect, we find that firms with designated hedge positions have lower CDS spreads than firms that do not use derivatives at all. In line with the idea that these hedges are likely to be more effective than derivatives without the hedge designation, we find that firms with positions that qualify for hedge accounting also have lower CDS spreads than firms with non-designated hedge positions. Surprisingly, we also find that firms with non-designated hedge positions have higher CDS spreads than firms that do not hedge with derivatives at all. That is, the market's assessment of credit risk increases when firms move from having no derivatives program to one in which they hedge with non-designated derivatives. The findings are not only statistically significant, they are also economically meaningful. The CDS spread for a firm with a designated hedge position is 6.8 basis points lower (5.2% relative to the mean of 130 basis points) than non-derivatives users. Firms with non-designated hedge positions have CDS spreads that are 10.0 basis points higher (7.7% higher relative to the mean) than non-derivatives users. If the derivatives only serve to reduce risk, we would expect high basis risk positions to reduce CDS spreads relative to no derivatives at all.

One potential explanation for the observed relationships between CDS spreads and derivatives is that, knowing that derivatives impact market perception of credit risk and possibly the cost of new debt, firms might choose their derivatives programs accordingly. For example, it is possible that firms and creditors negotiate debt contracts (and the associated credit risk) and derivatives use simultaneously. If this is the case, derivatives holdings are not exogenous. Although causality is difficult to establish without some ambiguity, we do not think it is the likely explanation for our findings. We report that firms that choose derivatives without hedge designations have higher CDS spreads than if they did not use derivatives at all. If firms were choosing their derivatives to minimize CDS spreads (and

their costs of debt capital), it is difficult to understand why any firms would take on these positions. Also, as we describe below, we examine potentially important interaction effects to aid in the interpretation. Still, the findings should be taken as suggestive in that we are unable to make strong causal statements.

If endogenity is unlikely to be the driver, what explains the observed positive relationship between non-designated hedge positions (which tend to have higher basis risk) and CDS spreads? There are several potential explanations. One possibility is that the derivatives positions that do not qualify for hedge accounting reflect an underlying risk exposure. Consistent with this idea, when we decompose the derivatives positions according to type (interest rate, foreign exchange, commodity and other), we do find that the effect is particularly strong for firms with non-designated foreign exchange derivatives positions. A second possibility is that the same factors that make it difficult for firms to find derivatives without a great deal of basis risk also increase credit risk. That is, non designated hedge positions reflect firm complexity. A third potential explanation is that non-designated hedge positions are capturing managerial speculation and credit markets are penalizing firms for this type of behavior. A fourth possibility is that the effects that we observe are driven by the high basis risk position itself. Bolton and Oehmke (2014) show how, for high basis risk positions, the super-seniority status of derivatives in bankruptcy can transfer credit risk to debtholders and potentially increase the cost of external debt capital. Finally, the increased CDS spreads might reflect a market penalty for difficult-to-understand positions during times of market turmoil. While both rely on an increase in spreads due to informational frictions, this market risk explanation is distinct from the firm-level complexity explanation mentioned earlier.

As in Rajan and Zingales (1998), we rely on interaction analysis to shed some economic light on the mechanisms driving our main result. We examine the five possibilities described above: foreign exchange exposure; firm complexity; managerial speculation; collateral channels; and macro-economic conditions. We use the ratios of foreign assets to total assets and foreign sales to total sales to capture foreign exchange exposure. We use the ratio of

R&D to total assets and the number of words in the firm's 10-K filing as proxies for firm complexity. We use vega, the sensitivity of CEO firm-based wealth to stock volatility, as a proxy for managerial speculation incentives. We use cash holdings and tangible assets to capture collateral risk.[2] The cash holdings variable is motivated by Bolton and Oehmke (2014), in which the authors suggest firms with higher cash holdings are more likely to be able to make derivatives counterparties whole in the event of distress. This occurs at the expense of the firm's creditors. We use the Baa-Aaa credit spread, term spread and VIX to capture changing macro-economic conditions. The results of our empirical tests suggest that the aggregate risk captured by these variables is, indeed, important to our findings. CDS spreads are higher for firms with non designated hedge positions only when credit spread, term spread and VIX are high. By contrast, there is little evidence that foreign exchange exposure, speculation incentives, firm complexity or collateral channels drive our results.

Do firms with non-designated hedge positions have worse future credit realizations than other firms? The CDS spreads that we observe for these firms suggest that they do. To examine this, we relate derivatives positions to future credit realizations, as captured by changes in credit ratings and changes in CDS spreads. We find no evidence that credit quality worsens for these firms or that CDS pricing changes in the future. We interpret this as evidence that CDS markets are pricing something other than default probabilities. It is possible that the payoffs associated with non-designated positions are difficult to understand when market fundamentals change, and the credit markets penalize firms for this uncertainty. If so, then firms looking to minimize the cost of credit should be aware of the main findings when choosing their derivatives programs.

This paper proceeds as follows. Section 2 provides a brief overview of the relevant derivatives accounting rules (SFAS 133) and literature. In Section 3, we describe the data and empirical methodology. Results are in Section 4. We conclude in Section 5.

[2]Rampini, Sufi and Viswanathan (2014) also examine the relationship between derivatives use and collateral; however, they focus on explaining cross-sectional patterns in derivatives use. In particular, they provide evidence on the extent to which financial constraints impact the ability of firms to hedge with derivatives.

2. Accounting for Derivatives (SFAS 133) and Related Literature

SFAS 133 is a Financial Accounting Standards Board (FASB) rule that governs derivatives accounting for US firms. SFAS 133 was issued in 1998 and requires firms to recognize all derivatives as assets or liabilities and to recognize changes in their fair values in their income statements. SFAS 133 also allows potential investors the opportunity to glean from firms' financial statements the main purpose of their derivatives use. Prior to 133, the regulation of derivatives disclosure was inconsistent and difficult for a user of financial statements to pinpoint exactly what was held, and for what purpose. The accounting regulations mandating enhanced disclosure aimed to improve this information problem.

Accounting for the fair value changes of a derivative position depends on the instrument's basis risk. If a derivatives position has low basis risk and qualifies for hedge accounting, fair value changes do not flow through accounting earnings in every reporting period. These positions receive preferential accounting treatment in that gains and losses can be deferred until maturity, thereby smoothing reported earnings. For all other derivative positions, gains or losses are recognized in the period of the value change. In general, in order for a derivatives position to qualify for hedge accounting, the hedge must be "highly effective." This means that the change in fair value or cash flow of the hedged item and the derivative must offset each other to a significant extent.[3]

Basis risk can occur when, for example, a firm tries to hedge cash flows, but is unable to locate a derivatives contract that allows them to perfectly do so. An often-cited example is that of a firm that wishes to hedge the price of selling tires and uses a rubber-based derivatives contract. Whether this contract qualifies for hedge accounting depends on whether the entire fair value of the rubber derivatives will offset a change in the value of tires.

[3]The rules provide some flexibility as to the method used to calculate hedge effectiveness; however, the "dollar offset method" is quite common. Users calculate the change in value of the hedged item, divided by the change in value of derivative. This value must be between 0.80 and 1.25.

Why would firms want to report economic hedges as accounting hedges? Hedge accounting is attractive to firms because they are not required to mark these positions to market for the purposes of periodic financial statements. In a Wall Street Journal Article on the topic, the Constellation Brands CFO Robert Ryder discusses managing currency risk. Hedge accounting "makes life easy because you don't have a lot of volatility on your income statement ... What we'll do is go out and, for example, we'll hedge high fructose corn syrup with corn ... if you are like us and you can't get hedge accounting, then you have to mark those hedges to market every month. That means every month you will have a gain or loss of years of commodity hedges hitting you in one month." (WSJ, 7/25/2014) Along similar lines, Fredric G. Reynolds, the former chief financial officer of CBS states that "No CFO wants to miss [an earnings estimate] because you happened to take a foreign-exchange hit." (WSJ 1/23/2012) An assumption underlying much of our analysis is that when eligible, firms choose hedge accounting for their positions.

Appendix A contains examples of the 10-K filings of two sample firms that disclose derivatives positions during fiscal year 2009. Air Products and Chemicals reports the use of interest rate, foreign exchange and commodity derivatives. While not required to do so, Air Products and Chemicals also provides information on the notional values of these positions. With the exception of some of its foreign exchange derivatives (which it says it uses to manage risks associated with working capital), most of Air Products and Chemicals' positions qualify for hedge accounting. The second example is Microsoft. In addition to interest rate, foreign exchange derivatives that qualify for hedge accounting, the Company has commodity, equity and credit derivatives that are not designated as accounting hedges. The Company states that the equity or credit derivatives are used to hedge some risk associated with its financial portfolio and that commodity positions are used to "enhance portfolio returns." In this paper, these positions are assumed to have higher basis risk than those positions that are designated as accounting hedges.

Researchers have long puzzled over the patterns in non-financial firms' use of derivatives

for risk management that we observe in the data (for surveys, see Stulz, 1996 and Avrez and Bartram, 2010). Much of the literature is focused on links between derivatives use and firm value. In a frictionless (Modigliani and Miller, 1958) world, risk management would not impact firm value; however, with frictions, value can be generated because of non-linearities in taxes, distress costs or agency problems (Smith and Stulz, 1985; Leland, 1998). When firms face financial constraints, hedging can also help firms plan investment (Froot, Scharfstein and Stein, 1993). To date, the empirical evidence regarding the motives and implications of derivatives use are mixed. There is some evidence of a positive association between derivatives use and firm value (Allayannis and Weston, 2001; Jin and Jorion, 2006; Bartram et al., 2011; Perez-Gonzalez and Yun, 2013), although the exact channels through which this occurs are not entirely understood.[4] There are, however, some interesting and consistent patterns in the data: (1) large firms are the heaviest users of derivatives; (2) derivatives use by all firms increased during the 1980s and 1990s; (3) most derivatives positions involve interest rate and foreign exchange rate risks; (4) survey evidence suggests that firms use derivatives to hedge and also to speculate; and (5) derivatives are only one part of firms' risk management strategies.

Most existing literature is based on data from the 1980s and 1990s, prior to SFAS 133. Many of these papers focus on single industries or firms (Tufano, 1996; Haushalter, 2000; Brown, 2001; Adam and Fernando, 2006; McCay and Moeller, 2007; Adam, Fernando and Salas, 2012; Rampini, Sufi and Viswanathan, 2014; Rampini, Viswanathan, and Vuillemey, 2016). By focusing our analysis on all non-financial firms in the S&P 500, we are able to provide more representative evidence on a specific financial implication of derivatives use. We are also able to mitigate potential selection concerns that would arise if small firms have limited access due to low net worth or face high costs in derivatives markets. Most importantly, we are able to decompose derivatives holdings into those that might increase

[4]Campello et al. (2011) and Chen and King (2014) are exceptions. As described earlier, these papers link the cost of loans and bonds (respectively) and derivatives use. Their papers are most related to ours; however, the disclosure rules in place during their sample periods do not allow for decomposition of these positions according to basis risk.

risk to creditors versus those that might decrease it. Aggregating these positions would limit us to identifying a dominant effect and could even cause the theoretically opposing effects to cancel out.

3. Data and Methodology

The initial sample consists of all non-financial firms in the S&P 500 index during 2003 through 2011. The sample begins in fiscal year 2003 to allow firms at least one year of experience reporting derivatives positions under the new rules. We allow this training period because SFAS 133 is widely considered to be one of the more complex sets of accounting standards. SFAS 133 had an original effective date of June 15, 1999; however, this was later deferred to all fiscal years beginning after June 15, 2000 (thus, ending after June 15, 2001). The first full calendar year in which all firms must report derivatives in compliance with SFAS 133 was 2002. We hand-collect information on derivatives holdings in each firm's annual 10K filing.[5] Our data differ from most prior work because we collect information on derivatives positions beyond just foreign exchange and interest rates (i.e., our data include commodity, equity and "other" contracts). Importantly, we are also able to distinguish between designated hedges versus other positions. We classify all firms as derivatives "users" and "non-users." Within the "user" category, we track whether firms' positions have the hedge accounting designation. We also collect data on the intensity of derivatives use based on the reported net notional amounts.

To construct the final sample, we merge the non-financial S&P 500 sample with CDS prices from Bloomberg and Markit. We use the five-year tenor CDS price on the firm's unsecured senior debt at each fiscal year end. We analyze CDS spreads rather than new loans or bond spreads because focusing on CDS spreads does not require us to condition the analysis on new issuance. Moreover, because CDS contracts are between two external

[5]Relevant sections from the text from the 10-Ks is identified via the following keyword searches: hedge, hedging, notional, derivative, option, gain, loss, investment, fair value, cash flow, commodity, financial instrument, swap, market risk, expos*, futures, forward contracts, forward exchange, and risk management.

counterparties (i.e., they do not involve the firm), we can be reasonably certain that the results are not being driven by other factors that may affect the at-issue cost of loans or bonds, such as related business between banks and firms. Finally, CDS prices are useful because they reflect the market's view of expected default and creditor recovery rates, which can vary over time. In robustness analysis (found in the Appendix), we also examine at-issue loan and bond spreads, to allow for clear comparisons of our work with the findings in Campello et al. (2011) and Chen and King (2014).

Summary statistics are in Table 1. There are three important observations from the table. First, the vast majority (92%) of non-financial firms in the S&P 500 report some derivatives holdings. Most firms designate at least some of their derivatives positions as accounting hedges: approximately 87% of all firm-year observations include some of these low basis risk positions.[6] Not only are they common, these positions are economically meaningful. In the subsample of firms that voluntarily report notional values, the mean (net) notional value of derivatives is 11.0% of total assets.[7] For those firms that decompose the notional values according to hedge designation, those positions that are designated as accounting hedges (DH) account for 6.8% of total assets. [8] Derivatives that are not designated as accounting hedges (NDH) are also common, with 67% of firms reporting some positions that are not accounting hedges. The mean (net) notional values of these positions for those firms that report notionals is substantially smaller than DH positions, at approximately 2.8% of total assets.

[6]Throughout the paper, we often characterize derivatives positions that are designated as accounting hedges (DH) as low basis risk positions and positions that do not have this designation (NDH) as high basis risk positions. The assumption is that, if a position is eligible for favorable accounting treatment, a firm will choose to designate it as an accounting hedge. As a check, we compute the r-square from a regression of historical operating income on interest rates and the trade-weighted dollar index. We interpret a low r-square as high basis risk (i.e., these firms have difficulty finding financial instruments that minimize basis risk). We find the correlation between the basis risk proxy and the use of accounting hedges to be consistent with our characterization. That is, firms with high r-squares hold more derivatives that qualify as accounting hedges.

[7]While firms are only required to report fair values under SFAS 133, we observe notional values in 67.3% of the observations where firm reports derivatives usage.

[8]In theory, "deltas " (the changes in value with respect to shocks to the uncertainty being hedged) would be most meaningful; however, there is some evidence in the literature that net notional values are informative. For example Graham and Rogers (2002) find that greater net notional values are associated with greater firm leverage.

A second observation from Table 1, which will be examined formally in the analysis that follows, is that the average CDS spreads are lower for firms reporting DH positions and higher for firms with NDH positions. Of course, these averages include several firms that report both types of positions. The aim of the regression analysis is to separately identify the effect of each.

Finally, the third important observation from Table 1 is that, while they do not exhibit substantially different cash flow or earnings volatility, firms with derivatives that do not qualify for hedge accounting tend to be larger, slightly less profitable, have lower market-to-book ratios and lower distance to default (z-scores) than other firms. It is therefore critical to control for these in the regression analysis.

Figure 1 shows the time series of derivatives use. The percentage of firms reporting any derivatives as well as designated hedge positions have seen slight decreases over the sample period. The percentage of firms reporting NDH positions has increased, particularly since 2007-2008. The patterns in the intensity of total derivatives has seen a small upward trend during the sample period, with the post-2007 increase driven entirely by NDH positions. Figure 2 reports derivatives usage, by type. From the figure, it is clear that most of the time series variation, specifically the post-2007 increase, in total derivatives use (Figure 1) comes from foreign exchange and commodities positions. In addition, it is useful to note that the majority of NDH positions (those that are not designated as accounting hedges) are foreign exchange and commodity positions. Most interest rate positions have low basis risk. This is likely due to the fact that firms often use interest rate derivatives to hedge risk associated with promised debt payments. In such a case, it is relatively easy to find an appropriate derivatives instrument with very little or no basis risk.

Table 2 shows correlations among the derivatives variables and CDS spreads. Consistent with the summary statistics and the findings in Campello et al.(2011) and Chen and King (2014), the table reveals that, unconditionally, firms with derivatives that qualify for hedge accounting have significantly lower CDS spreads. By contrast, derivatives positions

that do not have the hedge accounting designation are associated with higher loan spreads. If derivatives are simply reducing risk, the correlations between CDS spreads and all of the derivatives variables should be negative (but they should be more negative for hedge accounting positions since those have less basis risk).

The unconditional data suggest that, although derivatives can help firms manage cash flow and credit risk, the NDH positions result in a higher market assessment of credit risk than if managers did not hedge at all. To examine this further, we start with a regression specification similar to Campello et al. (2011):

ln(CDS spread) = f(derivatives variables, firm characteristics, macro economic variables, fixed effects).

The CDS spread is the natural logarithm of the 5-year CDS spread from Bloomberg and Markit data as of the fiscal year end. In all of the analysis, we construct two types of derivatives variables from the information in the 10-K filings. The first are three indicator variables, set equal to one if the firm has any derivatives, any derivatives that are designated as accounting hedges (DH) or any derivative positions that are not accounting hedges (NDH), respectively. It is mandatory for firms to report this information. The second type of derivatives variable is continuous and captures the notional values underlying the derivatives contracts. Notional values are reported voluntarily. The majority (but not all) of the firms reporting total notional positions also provide information regarding accounting classification that also allow us to track the size of the DH and NDH positions.[9] We conduct tests using both indicator variables and the notional values in all of the analysis.[10] This is because, while more than half of the firms in the sample report notional values, they are not required to do so. The firm characteristic control variables are: leverage, profitability, tangibility, distance-to-default (z-score), market-to-book, and implied volatility. Macroeconomic variables are

[9]All notional values are net (long minus short) positions. When these positions are given in units other than dollars, we take price of commodity as of fiscal year end date to calculate notional values.

[10]Firms are required to report fair values of all derivatives positions; however, these are often close to zero, especially for new swaps. Graham and Rogers (2002) argue that fair values provide information regarding the extent of price movements in the derivatives contracts rather than the amount of derivatives held by firms and can be particularly difficult to interpret at contract origination.

credit spread, term spread and VIX.[11] These control variables are defined in Table 1 and are based on data as of the fiscal year end date.

The most important coefficients in the regressions are those on the derivatives variables, particularly those that are disaggregated according to accounting treatment. If derivatives are used for risk management purposes, then most models would predict a negative relationship between the cost of debt financing and all derivatives, but the magnitude of the relationship should be larger for positions with lower basis risk. A positive relationship between derivatives and credit spreads could suggest speculation (i.e., that the financial products are not being used for risk management purposes), firm complexity, that the derivatives positions themselves introduce new frictions that are relevant to creditors (e.g., the potential impact of the super-seniority of derivatives in bankruptcy, as suggested in Bolton and Oehmke, 2014) or market uncertainty.

4. Results

4.1. Baseline Results

The main findings are reported in Table 3. The regressions in Panel A use indicator variables for derivatives reporting. In our sample of S&P 500 firms, we find no evidence that overall derivatives use is related to the market's perception of credit risk. That is, the results in Columns 1 and 2 show negative but insignificant coefficients on the Derivatives indicator variable. However, once we allow the coefficients to vary according to hedge designation (in Column 3), a striking pattern emerges. The negative and significant coefficient of -0.068 on the DH indicator variable implies that CDS spreads are 6.8 basis points lower (5.2% relative to the mean of 130 basis points) for these firms than non-derivatives users. By contrast, the positive and significant coefficient of 0.10 on the NDH indicator variable implies that firms with non-designated hedge positions have CDS spreads that are 10.0 basis points higher

[11] The results are not sensitive to an alternative specification that includes time fixed effects instead of the macroeconomic variables.

(7.7% higher relative to the mean) than non-derivatives users. This latter result appears inconsistent with the idea that the derivatives are only being used to reduce risk.[12] To control for the possible multi-collinearity effects induced by the fact that firms with NDH positions are likely to have DH positions, in Columns 4 and 5, we repeat the regressions but focus only on the subsample of firms that report derivatives. The estimated coefficients confirm that the results reported in Column 3 are not due to a statistical problem.

We provide some further robustness to the evidence by analyzing intensity of derivatives use. Results are reported in Panel B of Table 3. To estimate the regressions, we need to condition the analysis on those firms that report notional positions (as reporting is optional). From Columns 1 and 2, we do not observe a significant impact of total notional position on CDS spreads; however, when we decompose the positions according to hedge designation (and basis risk) in Column 3, we see the same patterns shown in Panel A. From Column 3, the estimated coefficient of -0.491 on the DH notional variable implies that a one standard deviation increase in the notional value of designated hedges results in a 4.5 basis points reduction of CDS spreads (or 3.4% relative to the mean of 130 basis points). The estimated coefficient of 0.915 on the NDH notional variable implies that a one standard deviation increase in the notional value of designated hedges results in a 7.1 basis points increase in CDS spreads (or 5.5% relative to the mean).

Note that there are several control variables that are also significant in all of the regressions: CDS spreads are positively related to leverage, distance to default, term spreads and VIX; they are negatively related to market-to-book ratios. All of these relationships are consistent with what one would expect.

[12]Note that, in Columns 1 and 2, we do not find the statistically significant negative coefficient on derivatives use reported in Campello et al (2011). There are several possible reasons for this. First, our sample period begins when theirs ends, and there may be time series variation in the way that derivatives are perceived by creditors. Second, to mitigate potentially important selection concerns about derivatives users, we focus only on the S&P 500 firms. There is little variation in access to derivatives, given the size of these firms. While the sample in Campello et al. (2011) is more representative of the overall Compustat population than ours, the average size of derivatives users is more than three times that of non-users in their sample. Finally, our derivatives variables include not only interest rate and foreign exchange positions, but also commodity and equity-linked derivatives, which may carry more basis risk.

As Figure 2 reveals, the patterns in derivatives usage vary substantially by type of contract. Interest rate, foreign exchange (FX) and commodity derivatives are the most important economically, and foreign exchange and commodity contract usage have the most volatility. To investigate how our results compare across contract category, we repeat the analysis reported in Table 3, but we further decompose the derivatives according to type. The specifications are identical to Table 3, but the derivatives variables are modified to indicate the specific derivatives contract type. We also add control variables to capture derivatives usage outside of a given type: for example, when the main dependent variables are indicators equal to one if the firm reports interest rate derivatives, we also include indicators equal to one if the firm report any other form of derivatives that is not related to interest rates. The inclusion or exclusion of these variables does not affect the sign of the main variables of interest.

Results of analyses using the decomposed derivatives indicator variables are in Table 4 Panel A. In Columns 1 and 2, we focus on interest rate derivatives. For this contract, we observe a significant negative relationship between derivatives usage and CDS spreads, this is true for total derivatives use (Panel A, Column 1), and is particularly strong for DH positions (Panel A, Column 2). In the case of foreign exchange (Panel A, Columns 3 and 4), we find patterns that are similar to what we observe in the aggregated sample (Table 3). DH foreign exchange positions are associated with lower spreads, while NDH foreign exchange positions are associated with higher spreads. We do not find significant patterns in the regressions that focus only on commodity and other positions (Columns 5 through 8). It may be that there are too few observations of these contracts capture significant effects. The results using notional values in are in Table 4 Panel B and are similar to the findings in Panel A except that the coefficients on the commodity contracts (Panel B, Columns 5 and 6) become statistically significant and are qualitatively similar to the foreign exchange results. That is, DH positions are associated with lower CDS spreads while NDH positions are associated with higher ones.

In all, the most robust finding from Table 4 is that FX positions are a primary driver of the main findings in Table 3. We will return to this observation later, when we examine whether our findings can be explained by economic exposure to foreign exchange risk.

4.2. Robustness: Loan Spreads

As mentioned earlier, there are several advantages to analyzing CDS prices rather than at-issue loan spreads. One notable advantage is that at-issue spreads may be affected by factors unrelated to credit risk (such as related business with lenders). However, because it is useful to interpret our results in terms of debt costs for firms, we conduct robustness analyses in which we replace CDS spreads with at-issue loan spreads. The analysis of at-issue spreads also allow us to compare our findings using the decomposed derivatives variables with the earlier findings in in Campello et al. (2011) and Chen and King (2014). To construct the loan sample, we merge the non-financial S&P 500 sample with the syndicated loan data in Dealscan. There 2,159 unique Dealscan loans over our sample period. The loan spread specification is almost identical to the CDS spread specification except that we add loan level control variables from Campello et al. (2011) which, in turn, is based on Graham and Rogers (2002).

Results from the loan spread analysis are shown in Appendix B. Consistent with the CDS analysis, we find that the loan spreads are significantly higher when firms have derivatives that do not qualify for hedge accounting (relative to no derivatives at all).

While CDS prices do not reflect the direct cost of debt to firms, they are useful benchmarks because they are likely to be very close to what the market would charge if the firm were to issue debt. The loan spread findings in Appendix B confirm that CDS market penalty for NDH positions shown in the Table 3 analysis does, in fact, reflect a real cost to firms that decide to issue debt.

4.3. Mechanisms

Why are the high basis risk positions without hedge designation associated with higher CDS spreads? This question is not easy to answer because it is possible that firms with

risks that are difficult to hedge in financial markets are also considered risky to creditors. It is also possible that the derivatives are not being used for risk management at all, and that high basis risk positions capture managerial speculation. It might also be that credit markets are imposing penalties to derivatives users during times of significant macroeconomic uncertainty. The correlations between the CDS spreads and NDH positions are clear in the data; however, the mechanisms driving the positive relationship are less so. Causality is very difficult to establish in this framework; however, as in Rajan and Zingales (1998), one can use interaction analysis to help shed light on the economic channels driving the average result. We examine five possibilities: underlying economic exposure, managerial speculation incentives, firm complexity, collateral channels and macroeconomic risk.

4.3.1. Foreign Exchange Exposure

As shown in Table 4, the main findings appear to be driven primarily by foreign exchange derivatives. It is possible that the relationship between NDH and CDS spreads for FX derivatives users reflects foreign exchange risk exposure, and not an increase in market perception of credit risk due to the derivatives position itself. To examine this explanation, we introduce two new explanatory variables to the main specification (from Table 3): (1) foreign sales, defined as non-US sales reported in the Compustat segment files, divided by total sales; and (2) foreign assets, defined as non-US assets, divided by total assets. Higher values of each of these variables indicate more fundamental FX exposure and allow us to test the hypothesis that the results are simply driven by foreign exchange risk. We also interact these variables with the derivatives variables to examine whether the main results vary with the extent of FX exposure.

Results are in Table 5. There is no evidence from the table that the findings are driven by FX exposure.

4.3.2. Managerial Speculation and Risk Taking Incentives

The positive and significant coefficients on the NDH derivatives variables are also consistent with the idea that these instruments are being used for speculation as opposed to risk

management.[13] To examine this possibility, we consider the interaction between CEO and CFO risk-taking incentives and the impact of high basis risk derivatives positions. In particular, following Chava and Purnanandam (2010), we use Execucomp data on CEOs' equity and options holdings to calculate the sensitivity of CEO firm-based wealth to firm volatility (vega). Coles, Daniel and Naveen (2006) find that CEOs with high vega implement riskier firm policies. We include vega as an additional explanatory variable in the regressions and we also interact it with the derivatives variables. If the positive relationship between high basis risk derivatives and spreads are driven by lenders' beliefs that the derivatives are being used for speculation rather than risk management, the effect should be more pronounced for firms where risk-taking incentives are strongest.

Results are shown in Table 6. We find no evidence that CEO risk taking incentives are associated with CDS spreads. In the case of CFO risk-taking, we do find a positive and significant relationship between CFO vega and CDS spreads (i.e., the direct effect); however, we do not find an important interaction effect. Moreover, the main coefficients on the derivatives variables remain very similar to those in Table 3.

4.3.3. Firm Complexity

Another possible explanation for the NDH results is that firms that are unable to qualify for hedge accounting treatment are simply more complex than firms that do not qualify for such treatment. To capture firm complexity, we add R&D expense divided by total assets as an additional explanatory variable and interact it with the derivatives variables. In an alternative specification, we use the (log)number of words in the firm's 10-K filing as a proxy for complexity. The idea is that firms with more verbose financial statements are more difficult to understand. If NDH is simply a proxy for firm complexity, we would expect to observe positive and significant coefficients on these new variables. We also interact the complexity proxies with the derivatives variables. If the effect of higher basis risk derivatives

[13]The majority of firms in our sample state explicitly in their financial statements that derivatives do not represent speculative positions; however, survey evidence suggests that managers routinely use derivatives to take views or time the market (Gczy Minton and Schrand, 2007; Servaes, Tamayo, Tufano, 2009).

positions on CDS spreads is driven by firm complexity, we would expect to observe a positive and significant coefficient on the interaction terms.

The results of the complexity analysis are shown in Table 7. We find no evidence that firm complexity is driving the results.

4.3.4. Collateral Channels

The collateral channel described in Bolton and Oehmke (2014) is also consistent with our results. Derivative positions are exempt from the automatic stay in bankruptcy and are therefore super-senior, which can be harmful to creditors. Derivative counterparties may have incentives to make inefficient collateral calls when firms approach distress. Bolton and Oehmke (2014) argue that unassigned cash is particularly difficult to protect from collateral calls by derivatives counterparties. Although this problem is particularly acute for financial institutions, non-financial institutions could face similar challenges. If so, then the costs borne by creditors due to the super-seniority status of derivatives are likely to be more relevant when firms have high cash holdings and/or lower tangible assets. To examine this collateral-based channel, we interact the derivatives variables with cash (equal to cash holdings divided by assets). In an alternative specification, we use asset tangibility (property, plant and equipment, divided by total assets) as a proxy for pledgeability. Bolton and Oehmke (2014) argue that securing debt with pledgeable assets such as property, plant and equipment (PP&E) can help shield creditors from these derivative collateral calls. [14]

The results are shown in Table 8. We do not find evidence that our main results are driven by collateral. The coefficients on the derivatives variables remain consistent with those on Table 3, and the interaction effects are insignificant.

[14]In interpreting the collateral channel analysis, it is useful to note that many derivatives positions of non-financial firms are not collateralized (see ISDA, 2010). However, the derivatives contracts can contain collateral provisions that are triggered in the event of credit downgrades. For example, Kellogg Company's 2011 10-K reports that "certain of the Company's derivative instruments contain provisions requiring the Company to post collateral on those derivative instruments that are in a liability position if the Company's credit rating falls below BB+ (S&P) or Baa1 (Moody's)." Thus, the risk associated with collateral calls is relevant not only for distressed firms, but also for investment grade firms that have not yet posted collateral.

4.3.5. Macroeconomic Risk

Given that the main findings do not appear to be driven by firm-level risk measures, we examine the hypothesis that macroeconomic conditions are driving the results. It is clear from all of the specifications thus far that macroeconomic risk impacts CDS spreads directly. In Tables 3 through 8, we find that the coefficients on the term spread and VIX are all positive and highly statistically significant. The same is true for the credit spread coefficients, though they are less statistically significant. The main regressions constrain the relationship between CDS spreads and NDH to be constant across economic environments; however, it is possible that market perception of the credit risk of derivatives users varies with macroeconomic uncertainty. To examine this possibility, we interact the macroeconomic uncertainty measures with the derivatives variables. Results are shown in Table 9.

The patterns in Table 9 are striking. There are four key observations. First, once we allow the coefficients on the derivatives variables to vary with macroeconomic conditions, we find that the direct effect of NDH on CDS spreads becomes insignificant (if anything, the coefficients are negative). Second, the positive and significant coefficients on the NDH interactions with the macroeconomic variables reveal that all of the NDH results are driven by periods of high macroeconomic uncertainty. Third, the direct effect of DH on CDS spreads remains negative and is economically larger than in the baseline specification in Table 3. Finally, the beneficial effect of DH positions are muted during crises. The coefficient on the interaction variables are all positive and statistically significant.

In Panel B of Table 9, we repeat the analysis reported in Table 4 in which we analyze the four categories of derivatives separately. While the results in Panel B are somewhat noisier and less significant statistically than in Panel A, the findings are qualitatively similar: The main results are driven by times of high economic uncertainty.

4.3.6. Credit Market Realizations

To summarize, when we test whether firm-specific variation in foreign exchange exposure, managerial risk-taking incentives, firm complexity, and pledgeability of collateral are more

likely to experience higher CDS spreads when they have NDH positions, we fail to find any evidence of any of these channels. When we examine the role of macroeconomic conditions, we find that periods of high economic uncertainty drive the overall finding that NDH positions are associated with higher CDS spreads than firms that do not hedge at all.

It is possible that changing macroeconomic conditions cause the derivatives positions to generate losses, resulting in increased credit risk. If so, we would expect firms with NDH positions to have worse credit realizations than firms with DH and firms that do not report any derivatives. To examine this hypothesis, we relate derivatives positions to future changes in credit ratings and to changes in CDS spreads.

Results are in Table 10. We find no evidence that credit quality worsens for NDH firms relative to firms that do not hedge at all. We do find some evidence that future CDS spreads are lower when firms have DH positions (Column 4). This is not surprising, given that DH positions have very little basis risk and are likely to be highly effective risk management tools.

Overall, we interpret the main findings, along with the Table 10 results, as evidence that CDS markets are pricing something other than issuer credit risk when they assign higher spreads to firms with NDH positions. It may be that the payoffs associated with non-designated positions are difficult to understand when market fundamentals change, and the credit markets penalize firms for this uncertainty. If so, then firms looking to minimize the cost of credit should be aware of the market penalty when choosing their derivatives programs.

5. Conclusions

We examine the relationship between non-financial corporations' use of financial derivatives and the market's assessment of credit risk. Using derivatives that receive hedge accounting treatment as a proxy for low basis risk positions and derivatives that are ineligible as a proxy

for positions with higher basis risk, we find that firms with high basis risk positions have higher CDS spreads. The CDS spreads for these firms are higher than firms with designated hedges as well as those firms that do not hedge with derivatives at all. If derivatives simply served as risk management tools, we would not expect to observe the latter finding.

We perform interaction analysis to examine alternative mechanisms that might be driving our findings. We find evidence that the increase in CDS spreads associated NDH positions is driven by periods of high macroeconomic uncertainty. We do not find evidence that the relationship is driven by firm-level variables from the literature (such as managerial speculation, collateral and firm complexity).

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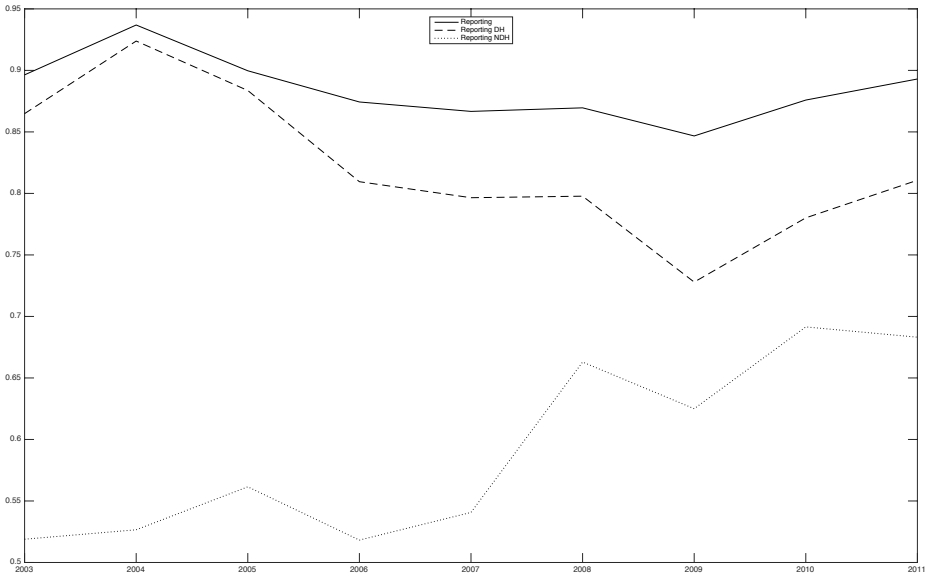
Figure 1
Time series of total derivatives usage

This figure shows the time series of derivatives positions over the 2003 to 2011 sample period. Panel A shows the percentage of firms reporting derivatives positions. Reporting is the fraction of firms reporting any derivatives. Reporting DH refers to the fraction of firms reporting derivatives positions that are designated as accounting hedges. Reporting NDH refers to the fraction of firms reporting derivatives positions that do not have the hedge accounting designation. Panel B shows the annual average notional values of reported derivatives positions, divided by total assets. Total notional refers to the notional values reported by firms reporting any derivatives. Notional DH refers to the total notional values of positions that are designated as accounting hedges. Notional NDH refers to the notional values of positions that do not have the hedge accounting designation.

Panel A: Percentage of firms reporting derivatives



Panel B: Notional values

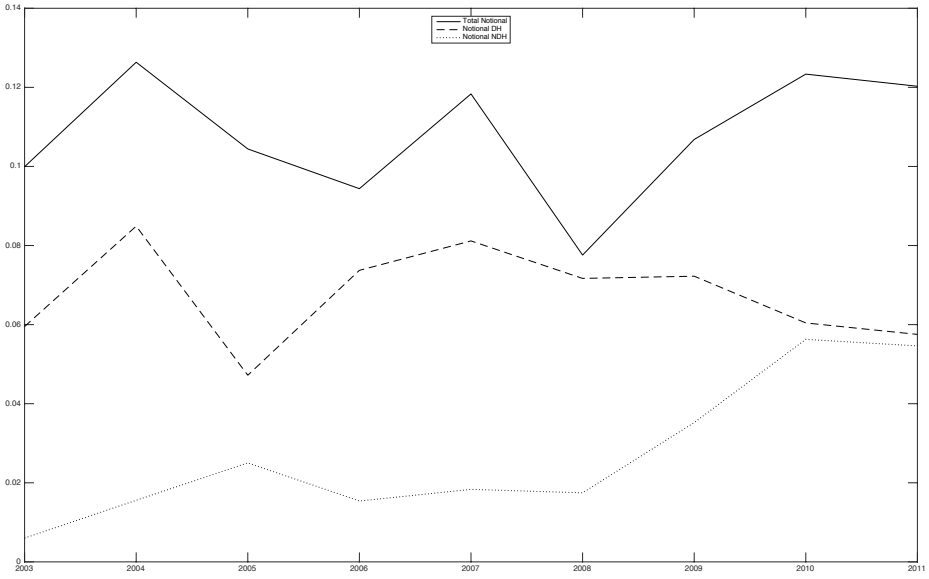
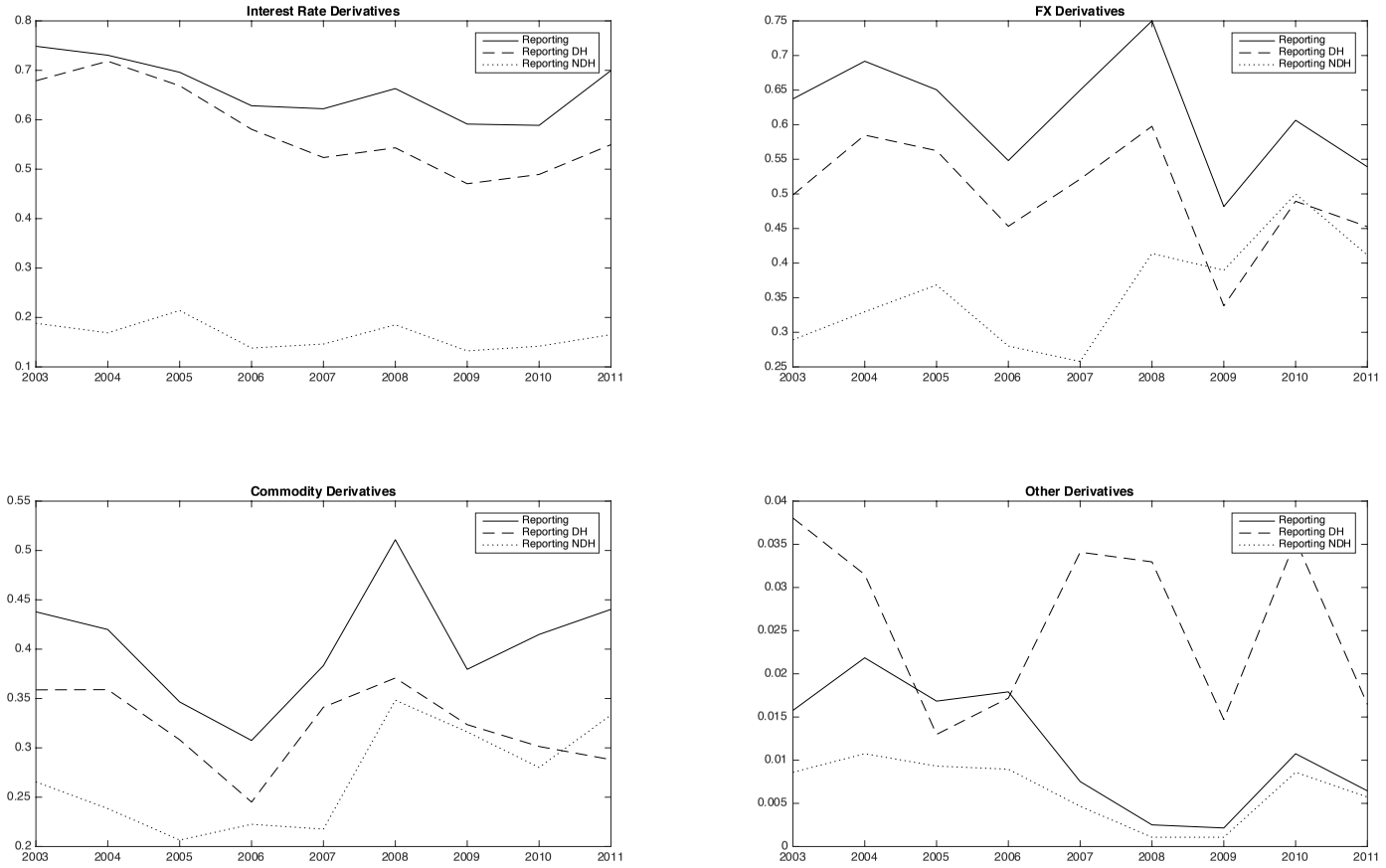


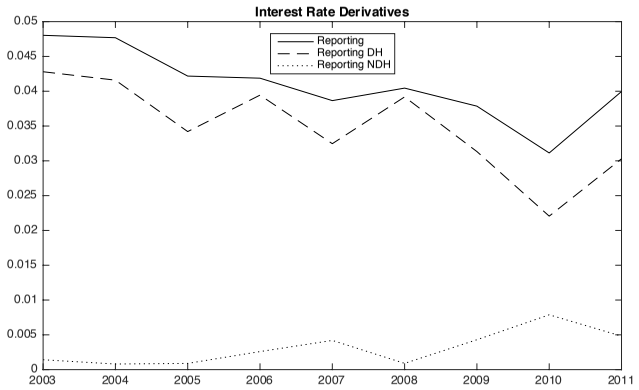
Figure 2
Time series of derivatives usage by type

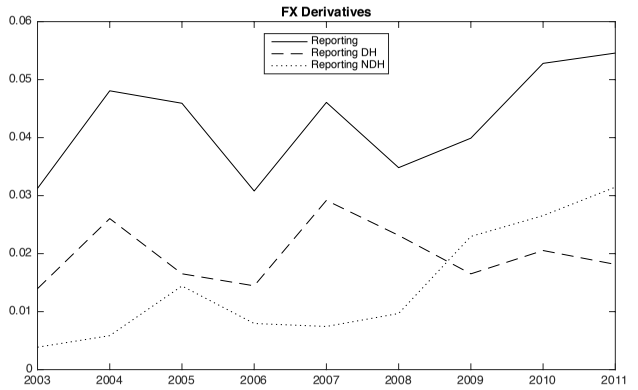
This figure shows the time series of derivatives positions over the 2003 to 2011 sample period, by type of derivative. Panel A shows the percentage of firms reporting derivatives. DH refers to derivatives positions that are designated as accounting hedges. NDH refers positions that do not have the hedge accounting designation. Panel B shows the annual average of the notional values of reported derivatives positions, divided by total assets.

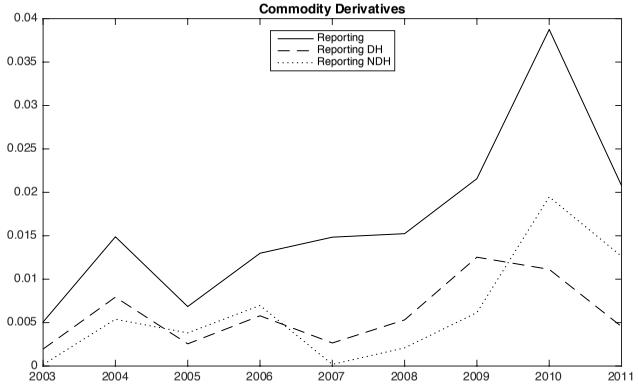
Panel A: Percentage of firms reporting derivatives



Panel B: Notional values







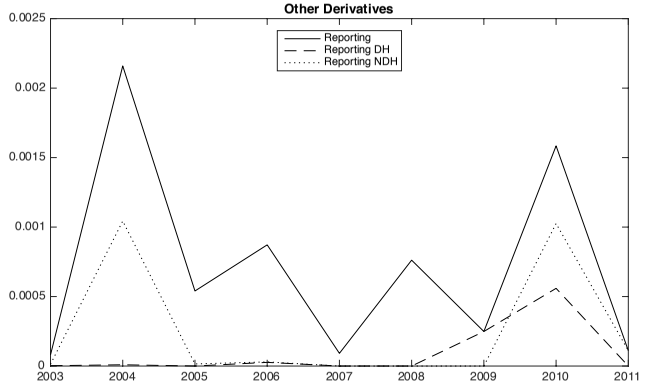


Table 1
Summary statistics

This table shows descriptive statistics for the sample of non-financial firms in the S&P 500 during the years 2003-2011. 5-Year CDS Spread is the price of a 5-year credit default swap on the issuer as of the fiscal year end. Reporting is a dummy variable equal to 1 if the firm reports any derivatives position in the year t 10-K filing. DH refers to derivatives positions that are designated as accounting hedges. NDH refers to derivatives positions that do not have the hedge accounting designation. Reporting DH is a dummy variable equal to 1 if the firm reports any derivatives that qualify for hedge accounting. Reporting NDH is a dummy variable equal to 1 if the firm reports any derivatives that are not designated as accounting hedges. Total notional is the total notional value of derivatives positions. DH Notional (NDH Notional) is the total notional value of derivatives positions that are designated (are not designated) as accounting hedges. Size is the natural log of total assets. Leverage is book leverage, defined as the book value of total debt divided by total assets. Profitability is earnings before interest and depreciation, divided by total assets. Tangibility is the book value of property, plant, and equipment, divided by total assets. Market to book is defined as the market value of equity plus total assets minus the book value of equity, divided by total assets. Z-score is the modified z-score, defined as: 1.2 times working capital plus 1.4 times retained earnings plus 3.3 times earnings before interest and taxes plus .999 times sales, divided by total assets. Cash flow volatility is defined as the standard deviation of operating income before depreciation, divided by total assets, calculated over the past 20 quarters. IV is the 1 year at the money equity option implied volatility. Rating is the S&P credit rating of the firm, where the value 1 corresponds to an S&P rating of AAA+; 2 corresponds to AAA; 3 corresponds to AAA-, and so on.

	All Firms				Reporting Designated Hedges				Reporting Non-Designated Hedges			
	Mean	Median	Std	Obs	Mean	Median	Std	Obs	Mean	Median	Std	Obs
5-Year CDS Spread	1.304	0.618	2.440	2598	1.255	0.598	2.528	2170	1.373	0.634	2.654	1544
Reporting	0.922	1.000	0.268	2598	1.000	1.000	0.000	2170	1.000	1.000	0.000	1544
Reporting DH	0.867	1.000	0.339	2502	1.000	1.000	0.000	2170	0.916	1.000	0.278	1529
Reporting NDH	0.674	1.000	0.469	2292	0.720	1.000	0.449	1944	1.000	1.000	0.000	1544
Total notional	0.110	0.068	0.131	1612	0.134	0.094	0.133	1258	0.151	0.114	0.148	804
DH total notional	0.068	0.034	0.091	1256	0.092	0.065	0.096	925	0.070	0.037	0.085	601
NDH total notional	0.028	0.000	0.079	1326	0.030	0.000	0.078	1025	0.070	0.033	0.112	543
Size	9.585	9.561	1.035	2597	9.638	9.602	1.039	2170	9.793	9.729	1.058	1544
Leverage	0.274	0.259	0.140	2597	0.281	0.266	0.137	2170	0.282	0.270	0.140	1544
Profitability	0.146	0.139	0.076	2596	0.146	0.138	0.076	2169	0.139	0.129	0.074	1544
Tangibility	0.325	0.259	0.228	2596	0.330	0.261	0.229	2169	0.328	0.266	0.224	1544
Market to Book	1.784	1.538	0.832	2596	1.784	1.543	0.817	2169	1.742	1.467	0.828	1544
Quick Ratio	1.159	1.014	0.727	2480	1.140	0.991	0.699	2073	1.205	1.040	0.779	1459
Z-Score	1.832	1.769	1.084	2476	1.802	1.740	1.055	2069	1.643	1.568	1.032	1455
Cash Flow Volatility	0.012	0.008	0.012	2571	0.011	0.008	0.010	2148	0.012	0.008	0.013	1531
ROA Volatility	0.016	0.010	0.019	2571	0.015	0.010	0.018	2148	0.017	0.010	0.020	1531
IV	0.326	0.288	0.157	2597	0.319	0.281	0.154	2169	0.326	0.290	0.159	1544
Rating	8.391	8.000	3.501	2596	8.141	8.000	3.162	2168	8.345	8.000	3.446	1543

Table 2
Correlations

This table shows correlations between CDS spreads and the derivatives variables. Reporting is a dummy variable equal to 1 if the firm reports any derivatives position in its most recent 10-K filing. Reporting DH refers to derivatives positions that are designated as accounting hedges. Reporting NDH refers to derivatives positions that do not have the hedge accounting designation. Total notional is the total notional value of derivatives positions. DH Notional (NDH Notional) is the total notional value of derivatives positions that are designated (are not designated) as accounting hedges. *** denotes statistical significance at the 1% level. ** denotes statistical significance at the 5% level. * denotes statistical significance at the 10% level.

	CDS Spread	Reporting	Reporting DH	Reporting NDH	Notional	DH Notional
Reporting	-0.060***					
Reporting - DH	-0.116***	0.808***				
Reporting - NDH	0.049**	0.498***	0.308***			
Total Notional	-0.058**	0.366***	0.375***	0.361***		
Notional - DH	-0.104***	0.370***	0.475***	0.088***	0.780***	
Notional - NDH	0.075***	0.176***	0.062***	0.443***	0.667***	0.058***

Table 3
CDS spreads and derivatives

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. In Panel A, derivatives positions are indicated by dummy variables. In Panel B, derivatives positions are notional values divided by total assets. CDS spreads, derivatives and firm-level control variables are defined in Table 1. Credit spread is the difference between Moody's Baa and Aaa bond yields. Term spread is the difference between 10 year and 1 year treasury yields. VIX is the CBOE volatility index. Credit ratings and 2-digit SIC industry fixed effects are also included in the regressions. All variables are measured at the end of fiscal year t. Columns 1 through 3 show results for all non-financial firms in the S&P 500 during the years 2003-2011. In Columns 4 and 5, the analysis is conditioned on firms that report any derivatives. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

Panel A: Indicators

				Conditional on Reporting	
	(1)	(2)	(3)	(4)	(5)
Derivatives	-0.057	-0.022			
	(-0.91)	(-0.45)			
DH			-0.068		
			(-1.85)		
NDH			0.100	0.186	0.115
			(3.26)	(4.34)	(3.64)
Size		-0.034	-0.047		-0.047
		(-1.55)	(-2.07)		(-1.92)
Leverage		0.826	0.863		0.924
		(4.81)	(4.91)		(4.89)
Profitability		-0.229	-0.169		-0.328
		(-0.63)	(-0.47)		(-0.85)
Tangibility		-0.029	-0.012		-0.001
		(-0.30)	(-0.13)		(-0.01)
Z-Score		0.014	0.014		0.023
		(0.96)	(0.94)		(1.32)
MB		-0.219	-0.225		-0.232
		(-6.00)	(-6.22)		(-6.01)
IV		1.174	1.151		1.099
		(3.18)	(3.20)		(2.87)
Credit Spread		0.081	0.091		0.087
		(1.60)	(1.85)		(1.67)
Term Spread		0.123	0.120		0.123
		(13.07)	(12.74)		(12.23)
VIX		2.814	2.718		2.950
		(7.71)	(7.67)		(7.81)
Adj-R^2	0.509	0.787	0.789	0.507	0.792
Observations	2055	2055	2055	1870	1870
Rating FE	X	X	X	X	X
Industry FE	X	X	X	X	X

Panel B: Notionals

	(1)	(2)	(3)	Conditional on Reporting (4)	(5)
Derivatives	0.101	0.099			
	(0.47)	(0.48)			
DH			-0.491		
			(-2.44)		
NDH			0.915	1.104	0.977
			(4.13)	(3.85)	(4.27)
Size		0.014	0.001		0.007
		(0.41)	(0.02)		(0.18)
Leverage		0.807	0.936		1.063
		(3.32)	(3.89)		(4.42)
Profitability		-0.010	0.082		-0.166
		(-0.02)	(0.17)		(-0.38)
Tangibility		0.029	-0.024		0.016
		(0.23)	(-0.21)		(0.14)
Z-Score		0.035	0.040		0.064
		(1.53)	(1.69)		(2.40)
MB		-0.239	-0.253		-0.285
		(-4.18)	(-4.42)		(-4.62)
IV		1.170	1.144		1.125
		(3.56)	(3.53)		(3.01)
Credit Spread		0.056	0.061		0.057
		(0.93)	(1.06)		(0.84)
Term Spread		0.096	0.093		0.094
		(7.26)	(7.17)		(6.28)
VIX		2.700	2.664		2.959
		(4.67)	(4.81)		(4.29)
Adj-R^2	0.518	0.761	0.768	0.506	0.768
Observations	970	970	970	791	791
Rating FE	X	X	X	X	X
Industry FE	X	X	X	X	X

Table 4
CDS spreads and derivatives, by category

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification is the same as in Table 3, except that derivatives positions are disaggregated by type. Types are: Interest rate (Columns 1 and 2); FX (Columns 3 and 4); Commodity (Columns 5 and 6); Other (Columns 7 and 8). The Other Than Type variables reflect the difference between the sum of all reported categories of positions and the positions of a given type. In Panel A, derivatives positions are indicated by dummy variables. In Panel B, derivatives positions are notional values divided by total assets. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

Panel A: Indicators

	Interest		FX		Commodity		Other	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Derivatives	-0.080		0.015		-0.006		-0.082	
	(-2.71)		(0.38)		(-0.17)		(-1.38)	
DH		-0.074		-0.062		0.006		0.035
		(-2.61)		(-1.92)		(0.18)		(0.41)
NDH		-0.043		0.115		0.031		-0.005
		(-1.08)		(3.46)		(0.68)		(-0.06)
Size	-0.040	-0.052	-0.023	-0.035	-0.041	-0.058	-0.023	-0.041
	(-1.71)	(-2.21)	(-1.04)	(-1.50)	(-1.77)	(-2.46)	(-1.04)	(-1.83)
Leverage	0.975	1.027	0.851	0.847	0.914	0.935	0.800	0.846
	(5.37)	(5.63)	(4.98)	(4.92)	(5.27)	(5.18)	(4.60)	(4.71)
Profitability	-0.466	-0.449	-0.144	-0.081	-0.512	-0.459	-0.334	-0.313
	(-1.38)	(-1.32)	(-0.41)	(-0.22)	(-1.43)	(-1.25)	(-0.91)	(-0.85)
Tangibility	-0.008	-0.002	0.025	0.043	-0.039	-0.018	-0.044	-0.032
	(-0.08)	(-0.02)	(0.24)	(0.42)	(-0.36)	(-0.18)	(-0.46)	(-0.34)
Z-Score	0.022	0.024	0.016	0.015	0.012	0.012	0.018	0.019
	(1.61)	(1.75)	(1.13)	(1.01)	(0.83)	(0.81)	(1.04)	(1.04)
MB	-0.224	-0.231	-0.224	-0.223	-0.201	-0.204	-0.211	-0.217
	(-5.98)	(-6.19)	(-6.02)	(-6.01)	(-5.31)	(-5.41)	(-5.55)	(-5.60)
IV	1.181	1.161	1.122	1.106	1.173	1.139	1.152	1.138
	(3.07)	(3.09)	(3.07)	(3.23)	(3.27)	(3.24)	(3.24)	(3.28)
Credit Spread	0.088	0.095	0.088	0.093	0.061	0.069	0.091	0.099
	(1.70)	(1.88)	(1.70)	(1.87)	(1.19)	(1.37)	(1.82)	(2.03)
Term Spread	0.118	0.114	0.122	0.118	0.117	0.113	0.118	0.114
	(12.08)	(11.52)	(12.34)	(12.16)	(11.88)	(11.39)	(12.47)	(12.01)
VIX	2.764	2.705	2.694	2.679	2.913	2.866	2.735	2.653
	(7.66)	(7.79)	(7.20)	(7.36)	(7.88)	(7.95)	(7.40)	(7.44)
Derivatives Other Than Type	0.080		-0.085		-0.041		-0.014	
	(1.74)		(-2.45)		(-1.00)		(-0.29)	
Derivatives Other Than Type — DH		-0.008		-0.028		-0.059		-0.050
		(-0.26)		(-0.92)		(-1.80)		(-1.44)
Derivatives Other Than Type — NDH		0.126		-0.005		0.095		0.115
		(4.28)		(-0.14)		(3.16)		(3.63)
Adj-R^2	0.784	0.786	0.791	0.792	0.784	0.786	0.784	0.786
Observations	2003	2003	1949	1949	2031	2031	2046	2046
Rating FE	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X

Panel B: Notionals

	Interest		FX		Commodity		Other	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Derivatives	-0.346		0.081		0.429		-0.502	
	(-1.54)		(0.28)		(1.31)		(-0.08)	
DH		-0.289		-0.563		-0.605		8.869
		(-1.18)		(-1.68)		(-3.73)		(1.40)
NDH		-0.218		1.219		0.903		-5.632
		(-0.31)		(3.08)		(4.33)		(-0.70)
Size	-0.021	-0.023	-0.005	-0.014	-0.024	-0.035	-0.056	-0.059
	(-0.86)	(-0.98)	(-0.17)	(-0.52)	(-0.96)	(-1.40)	(-1.91)	(-2.01)
Leverage	1.147	1.138	0.834	0.878	0.883	0.940	0.817	0.892
	(6.04)	(6.01)	(4.09)	(4.17)	(4.92)	(5.27)	(3.67)	(3.96)
Profitability	-0.440	-0.332	-0.334	-0.187	-0.479	-0.377	-0.792	-0.703
	(-1.42)	(-1.06)	(-0.97)	(-0.54)	(-1.24)	(-1.02)	(-1.79)	(-1.59)
Tangibility	-0.061	-0.099	-0.008	-0.021	-0.048	-0.070	0.181	0.163
	(-0.61)	(-1.01)	(-0.07)	(-0.19)	(-0.42)	(-0.66)	(1.24)	(1.08)
Z-Score	0.023	0.022	0.029	0.030	0.004	0.004	0.006	0.011
	(1.57)	(1.48)	(1.66)	(1.71)	(0.27)	(0.29)	(0.22)	(0.37)
MB	-0.202	-0.201	-0.218	-0.223	-0.180	-0.179	-0.150	-0.154
	(-5.17)	(-5.26)	(-4.62)	(-4.74)	(-4.54)	(-4.60)	(-2.08)	(-2.14)
IV	1.075	1.058	0.886	0.837	1.038	1.003	1.035	1.011
	(2.95)	(2.91)	(2.27)	(2.19)	(2.63)	(2.59)	(2.46)	(2.43)
Credit Spread	0.095	0.106	0.084	0.088	0.055	0.073	-0.138	-0.142
	(1.73)	(1.96)	(1.26)	(1.36)	(0.94)	(1.27)	(-1.78)	(-1.86)
Term Spread	0.106	0.100	0.112	0.109	0.092	0.083	-0.281	-0.279
	(10.21)	(9.62)	(9.04)	(8.82)	(7.97)	(7.34)	(-12.01)	(-11.79)
VIX	2.732	2.644	3.057	3.067	2.881	2.704	0.316	0.350
	(7.09)	(7.06)	(6.29)	(6.52)	(6.95)	(6.74)	(0.46)	(0.52)
Derivatives Other Than Type	0.318		0.255		0.219		-0.034	
	(1.95)		(1.39)		(1.36)		(-0.20)	
Derivatives Other Than Type — DH		-0.378		-0.204		-0.226		-0.407
		(-1.70)		(-0.97)		(-1.13)		(-2.13)
Derivatives Other Than Type — NDH		1.361		0.721		2.111		0.331
		(5.06)		(2.91)		(6.09)		(1.50)
Adj-R^2	0.777	0.781	0.772	0.775	0.780	0.786	0.781	0.784
Observations	1684	1684	1368	1368	1568	1568	690	690
Rating FE	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X

Table 5
Are the results driven by foreign exchange exposure?

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification is identical to Table 3, except that two new explanatory variables are introduced. Foreign Assets is the ratio of non-US assets to total assets. Foreign Sales is the ratio of non-US sales to total sales. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

	(1)	(2)	(3)	(4)
Derivatives	0.017		0.047	
	(0.42)		(0.96)	
DH		-0.062		-0.051
		(-1.84)		(-1.05)
NDH		0.112		0.097
		(3.24)		(1.76)
Size	-0.030	-0.037	-0.029	-0.037
	(-1.31)	(-1.57)	(-1.27)	(-1.56)
Leverage	0.804	0.816	0.793	0.800
	(4.71)	(4.74)	(4.56)	(4.55)
Profitability	-0.154	-0.102	-0.173	-0.112
	(-0.43)	(-0.28)	(-0.48)	(-0.31)
Tangibility	-0.028	0.034	-0.024	0.029
	(-0.27)	(0.34)	(-0.23)	(0.29)
Z-Score	0.016	0.013	0.018	0.015
	(1.07)	(0.89)	(1.20)	(1.00)
MB	-0.223	-0.217	-0.225	-0.220
	(-5.69)	(-5.65)	(-5.82)	(-5.78)
IV	1.120	1.106	1.126	1.124
	(3.06)	(3.23)	(3.13)	(3.34)
Credit Spread	0.087	0.094	0.087	0.093
	(1.66)	(1.88)	(1.68)	(1.87)
Term Spread	0.122	0.119	0.123	0.119
	(12.27)	(12.19)	(12.29)	(12.13)
VIX	2.742	2.701	2.736	2.697
	(7.33)	(7.39)	(7.23)	(7.35)
Foreign Assets	0.184	-0.106		
	(0.86)	(-0.66)		
Foreign Sales			0.118	-0.078
			(0.80)	(-0.56)
Foreign Assets × Derivatives	-0.309			
	(-1.36)			
Foreign Assets × DH		-0.111		
		(-0.73)		
Foreign Assets × NDH		0.097		
		(0.66)		
Foreign Sales × Derivatives			-0.195	
			(-1.34)	
Foreign Sales × DH				-0.021
				(-0.17)
Foreign Sales × NDH				0.061
				(0.51)
Adj-R^2	0.790	0.792	0.790	0.792
Observations	1936	1936	1936	1936
Rating FE	X	X	X	X
Industry FE	X	X	X	X

Table 6
Are the results driven by managerial risk taking incentives?

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification is identical to Table 3, except that two new explanatory variables are introduced. CEO vega is the sensitivity of the CEOs firm-based wealth (based on the value of equity and options positions) to firm volatility. CFO vega is identical to CEO vega, but is based on the holdings of the chief financial officer. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

	(1)	(2)	(3)	(4)
DH	-0.050	-0.100	-0.050	-0.078
	(-1.37)	(-1.28)	(-1.24)	(-1.53)
NDH	0.102	0.068	0.126	0.137
	(3.07)	(1.23)	(3.51)	(3.11)
Size	-0.025	-0.025	-0.063	-0.062
	(-1.14)	(-1.12)	(-2.41)	(-2.39)
Leverage	0.882	0.877	0.655	0.651
	(4.58)	(4.53)	(3.46)	(3.44)
Profitability	-0.121	-0.111	0.336	0.324
	(-0.34)	(-0.32)	(1.07)	(1.03)
Tangibility	-0.077	-0.074	0.034	0.028
	(-0.78)	(-0.75)	(0.34)	(0.28)
Z-Score	0.016	0.016	-0.008	-0.007
	(0.99)	(0.99)	(-0.49)	(-0.43)
MB	-0.212	-0.211	-0.244	-0.247
	(-5.87)	(-5.80)	(-5.68)	(-5.73)
IV	1.214	1.210	0.809	0.811
	(3.34)	(3.33)	(2.37)	(2.37)
Credit Spread	0.101	0.101	0.119	0.117
	(2.00)	(2.02)	(2.32)	(2.28)
Term Spread	0.123	0.123	0.139	0.139
	(12.32)	(12.33)	(12.09)	(12.11)
VIX	2.584	2.580	2.518	2.517
	(7.14)	(7.10)	(6.48)	(6.50)
CEO Vega	0.001	-0.002		
	(0.56)	(-0.75)		
CFO Vega			0.004	0.002
			(3.32)	(0.44)
CEO Vega × DH		0.002		
		(0.83)		
CEO Vega × NDH		0.001		
		(0.78)		
CFO Vega × DH				0.004
				(1.41)
CFO Vega × NDH				-0.002
				(-0.76)
Adj-R^2	0.793	0.793	0.784	0.784
Observations	1808	1808	1417	1417
Rating FE	X	X	X	X
Industry FE	X	X	X	X

Table 7
Are the results driven by firm complexity?

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification is identical to Table 3, except that two new explanatory variables are introduced. R&D is the research and development expense divided by total assets. 10K Number of Unique Words is the natural log of the number of words in the most recent 10K filing. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. t-statistics are presented in parentheses.

	(1)	(2)	(3)	(4)
Derivatives - DH	-0.070	-0.070	-0.079	0.014
	(-1.91)	(-1.79)	(-2.14)	(0.17)
Derivatives - NDH	0.102	0.115	0.100	0.149
	(3.33)	(3.26)	(3.23)	(1.98)
Size	-0.046	-0.045	-0.051	-0.052
	(-2.02)	(-2.02)	(-2.13)	(-2.16)
Leverage	0.865	0.874	0.850	0.854
	(4.91)	(4.94)	(4.75)	(4.78)
Profitability	-0.212	-0.203	-0.158	-0.147
	(-0.57)	(-0.54)	(-0.42)	(-0.40)
Tangibility	-0.020	-0.025	0.001	0.001
	(-0.21)	(-0.26)	(0.01)	(0.01)
Z-Score	0.016	0.018	0.013	0.013
	(1.04)	(1.12)	(0.81)	(0.82)
MB	-0.221	-0.223	-0.224	-0.224
	(-6.00)	(-5.90)	(-6.14)	(-6.16)
IV	1.151	1.149	1.140	1.137
	(3.19)	(3.19)	(3.13)	(3.11)
Credit Spread	0.093	0.094	0.090	0.088
	(1.89)	(1.91)	(1.82)	(1.78)
Term Spread	0.121	0.121	0.122	0.121
	(12.73)	(12.72)	(12.84)	(12.72)
VIX	2.717	2.702	2.722	2.743
	(7.68)	(7.59)	(7.56)	(7.59)
R&D	-0.420	-0.024		
	(-1.00)	(-0.02)		
R&D × Derivatives - DH		0.008		
		(0.01)		
R&D × Derivatives - NDH		-0.553		
		(-0.71)		
10K Number of Unique Words			0.087	-0.094
			(1.36)	(-0.69)
10K Number of Unique Words × Derivatives - DH				0.161
				(1.20)
10K Number of Unique Words × Derivatives - NDH				0.083
				(0.70)
Adj-R^2	0.789	0.789	0.792	0.792
Observations	2055	2055	2009	2009
Rating FE	X	X	X	X
Industry FE	X	X	X	X

Table 8
Are the results driven by collateral channels?

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification is identical to Table 3, except that we add interactions of the derivatives variables with Tangibility and Cash. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

	(1)	(2)
DH	-0.009	-0.083
	(-0.13)	(-1.49)
NDH	0.095	0.111
	(1.80)	(2.46)
Size	-0.050	-0.049
	(-2.25)	(-2.17)
Leverage	0.871	0.888
	(4.95)	(5.00)
Profitability	-0.145	-0.170
	(-0.39)	(-0.46)
Tangibility	0.204	0.030
	(1.11)	(0.31)
Z-Score	0.007	0.009
	(0.47)	(0.53)
MB	-0.234	-0.233
	(-6.43)	(-6.45)
IV	1.127	1.122
	(3.13)	(3.09)
Credit Spread	0.093	0.093
	(1.89)	(1.88)
Term Spread	0.118	0.117
	(12.42)	(12.31)
VIX	2.724	2.740
	(7.71)	(7.75)
Cash	0.381	0.399
	(1.95)	(0.92)
Tangibility × DH	-0.194	
	(-1.35)	
Tangibility × NDH	-0.006	
	(-0.04)	
Cash × DH		0.097
		(0.21)
Cash × NDH		-0.154
		(-0.45)
Adj-R^2	0.790	0.790
Observations	2055	2055
Rating FE	X	X
Industry FE	X	X

Table 9
Are the results driven by aggregate risk?

This table presents results from regressions of CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The specification in Panel A is identical to Table 3, except that we add interactions of the derivatives variables with Credit Spread, Term Spread and VIX. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Panel A shows results for all derivatives positions. Panel B shows separate results for interest rate, foreign exchange, commodity and other positions. The specification for the Panel B regressions is described in Table 4. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

Panel A: Indicators

	(1)	(2)	(3)
DH	-0.243	-0.158	-0.500
	(-3.90)	(-2.93)	(-3.90)
NDH	0.001	-0.044	-0.156
	(0.02)	(-1.02)	(-1.52)
Size	-0.044	-0.046	-0.044
	(-1.97)	(-2.05)	(-1.97)
Leverage	0.884	0.858	0.883
	(5.05)	(4.95)	(5.03)
Profitability	-0.152	-0.151	-0.175
	(-0.43)	(-0.43)	(-0.50)
Tangibility	-0.004	-0.009	0.005
	(-0.04)	(-0.10)	(0.05)
Z-Score	0.015	0.013	0.015
	(0.98)	(0.83)	(0.96)
MB	-0.228	-0.223	-0.228
	(-6.31)	(-6.29)	(-6.28)
IV	1.177	1.187	1.174
	(3.20)	(3.31)	(3.14)
Credit Spread	-0.065	0.095	0.086
	(-1.00)	(1.93)	(1.68)
Term Spread	0.120	0.027	0.119
	(12.70)	(1.29)	(12.57)
VIX	2.697	2.658	1.154
	(7.66)	(7.59)	(2.29)
DH × Credit Spread	0.133		
	(3.08)		
NDH × Credit Spread	0.080		
	(2.39)		
DH × Term Spread		0.050	
		(2.30)	
NDH × Term Spread		0.086	
		(5.05)	
DH × VIX			1.350
			(3.35)
NDH × VIX			0.834
			(2.63)
Adj-R^2	0.791	0.793	0.792
Observations	2055	2055	2055
Rating FE	X	X	X
Industry FE	X	X	X

Panel B: Indicators by categories

	Interest			FX			Commodity			Other		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DH	-0.119	-0.118	-0.269	-0.086	-0.087	-0.085	-0.140	-0.049	-0.379	-0.064	0.056	-0.173
	(-2.29)	(-2.52)	(-2.71)	(-1.64)	(-1.84)	(-0.80)	(-2.40)	(-0.94)	(-3.21)	(-0.48)	(0.56)	(-0.82)
NDH	-0.168	-0.077	-0.315	0.102	0.029	0.034	-0.021	-0.104	-0.160	-0.058	-0.123	0.221
	(-2.44)	(-1.10)	(-2.32)	(1.82)	(0.61)	(0.32)	(-0.31)	(-1.55)	(-1.20)	(-0.22)	(-0.68)	(0.40)
DH × Credit Spread	0.034			0.021			0.116			0.083		
	(1.01)			(0.58)			(2.89)			(1.10)		
NDH × Credit Spread	0.104			0.010			0.041			0.040		
	(2.58)			(0.26)			(0.95)			(0.21)		
DH × Term Spread		0.025			0.014			0.036			-0.015	
		(1.39)			(0.72)			(1.69)			(-0.29)	
NDH × Term Spread		0.023			0.047			0.072			0.057	
		(0.86)			(2.61)			(3.11)			(0.87)	
DH × VIX			0.614			0.080			1.242			0.670
			(2.01)			(0.23)			(3.33)			(1.17)
NDH × VIX			0.891			0.257			0.608			-0.696
			(2.13)			(0.76)			(1.45)			(-0.40)
Derivatives Other Than Type - DH	-0.128	-0.078	-0.261	-0.100	-0.073	-0.300	-0.141	-0.109	-0.264	-0.182	-0.167	-0.376
	(-2.31)	(-1.71)	(-2.30)	(-1.71)	(-1.36)	(-2.85)	(-2.58)	(-2.23)	(-2.42)	(-3.00)	(-3.15)	(-3.08)
Derivatives Other Than Type - NDH	0.089	-0.019	-0.036	-0.157	-0.134	-0.378	0.054	-0.006	-0.024	0.050	-0.018	-0.129
	(1.76)	(-0.46)	(-0.34)	(-2.71)	(-2.48)	(-3.53)	(1.10)	(-0.14)	(-0.24)	(0.98)	(-0.40)	(-1.30)
Derivatives Other Than Type - DH × Credit Spread	0.098			0.053			0.063			0.100		
	(2.57)			(1.45)			(1.69)			(2.44)		
Derivatives Other Than Type - NDH × Credit Spread	0.029			0.120			0.034			0.052		
	(0.83)			(3.71)			(1.03)			(1.56)		
Derivatives Other Than Type - DH × Term Spread		0.041			0.026			0.033			0.070	
		(2.22)			(1.24)			(1.69)			(3.15)	
Derivatives Other Than Type - NDH × Term Spread		0.085			0.072			0.058			0.079	
		(4.86)			(3.63)			(3.38)			(4.55)	
Derivatives Other Than Type - DH × VIX			0.821			0.852			0.651			1.025
			(2.29)			(2.65)			(1.89)			(2.70)
Derivatives Other Than Type - NDH × VIX			0.520			1.199			0.393			0.786
			(1.56)			(3.67)			(1.26)			(2.55)
Adj-R^2	0.789	0.791	0.790	0.795	0.795	0.796	0.789	0.791	0.791	0.787	0.790	0.789
Observations	2003	2003	2003	1949	1949	1949	2031	2031	2031	2046	2046	2046
Controls	X	X	X	X	X	X	X	X	X	X	X	X
Rating FE	X	X	X	X	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X	X	X	X	X

Table 10
Are derivatives positions related to future risk realizations?

This table presents results from regressions of year-ahead credit rating downgrades and changes in CDS spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. The dependent variable in Columns 1 and 2 is a dummy equal to 1 if the firm experiences a credit rating downgrade in year t+1. The dependent variable in Columns 3 and 4 is the first-difference of CDS spreads as of fiscal year end t+1. Derivatives positions are indicated by dummy variables. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

	Downgrades		CDS Changes	
	(1)	(2)	(3)	(4)
Derivatives	0.008		-0.049	
	(0.18)		(-0.97)	
DH		-0.011		-0.106
		(-0.32)		(-2.76)
NDH		-0.009		0.014
		(-0.32)		(0.46)
Size	-0.071	-0.069	0.037	0.038
	(-4.78)	(-4.46)	(2.49)	(2.37)
Leverage	0.534	0.536	0.039	0.060
	(3.83)	(3.86)	(0.33)	(0.50)
Profitability	-0.479	-0.471	0.642	0.687
	(-1.86)	(-1.83)	(2.26)	(2.43)
Tangibility	0.168	0.170	0.045	0.058
	(1.84)	(1.85)	(0.47)	(0.59)
Z-Score	0.011	0.011	-0.010	-0.011
	(0.90)	(0.88)	(-0.97)	(-1.15)
MB	-0.145	-0.144	0.000	-0.001
	(-4.54)	(-4.50)	(0.01)	(-0.03)
IV	0.291	0.296	-0.118	-0.105
	(1.43)	(1.45)	(-0.73)	(-0.66)
Credit Spread	0.047	0.047	-1.040	-1.038
	(1.32)	(1.31)	(-12.22)	(-12.22)
Term Spread	-0.029	-0.029	-0.149	-0.151
	(-3.15)	(-3.12)	(-13.57)	(-13.76)
VIX	-0.523	-0.532	6.236	6.176
	(-1.64)	(-1.67)	(7.52)	(7.46)
Adj-R^2	0.104	0.104	0.301	0.303
Observations	1997	1997	1792	1792
Rating FE	X	X	X	X
Industry FE	X	X	X	X

Appendix A

Examples of Derivatives Disclosures from sample firms' 10-K's

1. Air Products and Chemicals Corporation, Fiscal Year 2009

Currency Price Risk Management

The Company's earnings, cash flows, and financial position are exposed to foreign currency risk from foreign currency denominated transactions and net investments in foreign operations. It is the policy of the Company to minimize its cash flow volatility to changes in currency exchange rates. This is accomplished by identifying and evaluating the risk that the Company's cash flows will change in value due to changes in exchange rates and by determining the appropriate strategies necessary to manage such exposures. The Company's objective is to maintain economically balanced currency risk management strategies that provide adequate downside protection.

Forward Exchange Contracts

The Company enters into forward exchange contracts to reduce the cash flow exposure to foreign currency fluctuations associated with highly anticipated cash flows and certain firm commitments such as the purchase of plant and equipment. Forward exchange contracts are also used to hedge the value of investments in certain foreign subsidiaries and affiliates by creating a liability in a currency in which the Company has a net equity position.

In addition to the foreign exchange contracts that are designated as hedges, the Company also hedges foreign currency exposures utilizing forward exchange contracts that are not designated as hedges. These contracts are used to hedge foreign currency-denominated monetary assets and liabilities, primarily working capital. The primary objective of these forward contracts is to protect the value of foreign currency-denominated monetary assets and liabilities from the effects of volatility in foreign exchange rates that might occur prior to their receipt or settlement.

Option Contracts

In certain limited situations, the Company enters into option contracts to manage cash flow exposures to foreign currency fluctuations. Similar to forward contracts, these instruments are evaluated for hedge accounting treatment and are recognized on the balance sheet at fair value.

The table below summarizes the Company's outstanding currency price risk management instruments:

	2009		2008	
30 September	**US$ Notional**	**Years Average Maturity**	US$ Notional	Years Average Maturity
Forward exchange contracts:				
Cash flow hedges	**$ 1,799.3**	**.8**	$ 1,839.9	.5
Net investment hedges	**873.6**	**3.5**	749.5	4.0
Fair value hedges	**2.7**	**.4**	10.3	.3
Hedges not designated	**330.3**	**.6**	267.4	.1
Total Forward Exchange Contracts	**$ 3,005.9**	**1.6**	$ 2,867.1	1.3

Options:					
Cash flow hedges	$ —	—	$	26.0	.3
Total Options	**$ —**	**—**	$	26.0	.3

In addition to the above, the Company uses foreign currency denominated debt and qualifying intercompany loans to hedge the foreign currency exposures of the Company's net investment in certain foreign affiliates. The designated foreign currency denominated debt includes €1,013.0 at 30 September 2009 and €1,450.0 at 30 September 2008. The designated intercompany loans include €437.0 at 30 September 2009. There were no designated intercompany loans as of 30 September 2008.

Debt Portfolio Management

It is the policy of the Company to identify on a continuing basis the need for debt capital and evaluate the financial risks inherent in funding the Company with debt capital. Reflecting the result of this ongoing review, the debt portfolio and hedging program of the Company are managed with the objectives and intent to (1) reduce funding risk with respect to borrowings made by the Company to preserve the Company's access to debt capital and provide debt capital as required for funding and liquidity purposes, and (2) manage the aggregate interest rate risk and the debt portfolio in accordance with certain debt management parameters.

Interest Rate Swap Contracts

The Company enters into interest rate swap contracts to change the fixed/variable interest rate mix of its debt portfolio in order to maintain the percentage of fixed- and variable-rate debt within the parameters set by management. In accordance with these parameters, the agreements are used to optimize interest rate risks and costs inherent in the Company's debt portfolio. In addition, the Company also uses interest rate swap agreements to hedge the interest rate on anticipated fixed-rate debt issuance. The notional amount of the interest rate swap agreements are equal to or less than the designated debt instrument being hedged. When variable-rate debt is hedged, the variable-rate indices of the swap instruments and the debt to which they are designated are the same. It is the Company's policy not to enter into any interest rate swap contracts which lever a move in interest rates on a greater than one-to-one basis.

Cross Currency Interest Rate Swap Contracts

The Company also enters into cross currency interest rate swap contracts. These contracts may entail both the exchange of fixed- and floating-rate interest payments periodically over the life of the agreement and the exchange of one currency for another currency at inception and at a specified future date. These contracts effectively convert the currency denomination of a debt instrument into another currency in which the Company has a net equity position while changing the interest rate characteristics of the instrument. The contracts are used to hedge intercompany and third-party borrowing transactions and certain net investments in foreign operations.

The following table summarizes the Company's outstanding interest rate swaps and cross currency interest rate swaps:

	2009			2008		
30 September	**US$ Notional**	**Pay %**	**Average Receive %**	US$ Notional	Pay %	Average Receive %
Interest rate swaps (fair value hedge)	**$ 327.2**	**6 month LIBOR**	**4.47%**	$ 321.9	6 month LIBOR	4.49%
Cross currency interest rate swaps (net investment hedge)	**$ 32.2**	**5.54%**	**5.48%**	$ 40.3	5.55%	3.89%

Commodity Price Risk Management

The Company has entered into a limited number of commodity swap contracts in order to reduce the cash flow exposure to changes in the price of natural gas relative to certain oil-based feedstocks. The Company has also entered into forward contracts, hedging the cash flow exposure of

changes in the market price of certain metals which are raw materials used in the fabrication of certain industrial gas equipment, with the overall intent of locking in or minimizing its price exposure to these base metals. As of 30 September 2009, there were no outstanding contracts hedging the changes in the market price of metals.

The table below summarizes the Company's outstanding commodity contracts:

	2009		2008	
30 September	**US$ Notional**	**Years Average Maturity**	US$ Notional	Years Average Maturity
Energy	**$ 18.5**	**.2**	$ 72.6	.8
Metals	**—**	**—**	4.2	.2
Total Commodity Contracts	**$ 18.5**	**.2**	$ 76.8	.8

The table below summarizes the fair value and balance sheet location of the Company's outstanding derivatives:

		2009	2008		2009	2008
30 September	Balance Sheet Location	**Fair Value**	Fair Value	Balance Sheet Location	**Fair Value**	Fair Value
Derivatives Designated as Hedging Instruments:						
Foreign exchange contracts	Other receivables	**$ 48.8**	$ 34.1	Accrued liabilities	**$ 55.1**	$ 78.5
Interest rate swap contracts	Other receivables	**—**	1.2	Accrued liabilities	**.4**	—
Commodity swap contracts	Other receivables	**4.3**	5.9	Accrued liabilities	**2.4**	2.5
Foreign exchange contracts	Other noncurrent assets	**10.0**	19.6	Other noncurrent liabilities	**45.4**	29.8
Interest rate swap contracts	Other noncurrent assets	**15.1**	4.4	Other noncurrent liabilities	**3.0**	3.5
Commodity swap contracts	Other noncurrent assets	**—**	1.8	Other noncurrent liabilities	**—**	.4
Total Derivatives Designated as Hedging Instruments		**$ 78.2**	$ 67.0		**$ 106.3**	$ 114.7
Derivatives Not Designated as Hedging Instruments:						
Foreign exchange contracts	Other receivables	**$ 1.0**	$ 1.2	Accrued liabilities	**$ 3.4**	$ .9
Total Derivatives		**$ 79.2**	$ 68.2		**$ 109.7**	$ 115.6

Refer to Note 13, Fair Value Measurements, which defines fair value, describes the method for measuring fair value, provides additional disclosures regarding fair value measurements, and discusses the Company's counterparty risk.

The table below summarizes the gain or loss related to the Company's cash flow, net investment, and non-designated hedges. The amounts of gain or loss associated with the outstanding fair value hedges are not material.

	Year Ended 30 September							
	Forward Exchange Contract		Foreign Currency Debt		Other [A]		Total	
	2009	2008	**2009**	2008	**2009**	2008	**2009**	2008
Cash Flow Hedges:								
Net (gain) loss recognized in OCI (effective portion)	**$ 7.2**	$ 74.0	**$ —**	$ —	**$(2.7)**	$ .4	**$ 4.5**	$ 74.4
Net gain (loss) reclassified from OCI to sales/cost of sales (effective portion)	**(4.1)**	4.6	**—**	—	**5.3**	(1.1)	**1.2**	3.5
Net gain (loss) reclassified from OCI to other (income) expense (effective portion)	**(1.0)**	(53.5)	**—**	—	**—**	—	**(1.0)**	(53.5)
Net gain (loss) reclassified from OCI to other (income) expense (ineffective portion)	**.5**	(.7)	**—**	—	**—**	—	**.5**	(.7)

Net Investment Hedges:								
Net (gain) loss recognized in OCI	**$27.1**	$(15.4)	**$31.3**	$(5.1)	**$(2.4)**	$(3.5)	**$56.0**	$(24.0)
Derivatives Not Designated as Hedging Instruments:								
Net loss recognized in other (income) expense [B]	**$14.5**	$ 19.0	**$ —**	$ —	**$ —**	$ —	**$14.5**	$ 19.0

[A] Other includes the impact on Other Comprehensive Income (OCI) and earnings related to commodity swap contracts, interest rate swaps, and currency option contracts.

[B] The impact of the non-designated hedges noted above was largely offset by gains and losses, respectively, resulting from the impact of changes in exchange rates on recognized assets and liabilities denominated in nonfunctional currencies.

Credit Risk-Related Contingent Features

Certain derivative instruments are executed under agreements that require the Company to maintain a credit rating of at least A- from Standard & Poor's and A3 from Moody's. If the Company's credit rating falls below these levels, the counterparty to the derivative instruments has the right to request full collateralization on the derivatives' net liability position. The net liability position of derivatives with credit risk-related contingent features was $35.0 and $21.5 as of
30 September 2009 and 2008, respectively. Because of the Company's current credit rating of A from Standard & Poor's and A2 from Moody's, no collateral has been posted on these liability positions.

Counterparty Credit Risk Management

The Company executes all derivative transactions with counterparties that are highly rated financial institutions and all of which are investment grade at this time. Some of the Company's underlying derivative agreements give the Company the right to require the institution to post collateral if its credit rating falls below A- from Standard & Poor's or A3 from Moody's. These are the same agreements referenced in Credit Risk-Related Contingent Features above. The collateral that the counterparties would be required to post is $14.7 as of 30 September 2009 and $14.1 as of 30 September 2008. No financial institution is required to post collateral at this time, as all have credit ratings at or above the threshold.

2. Microsoft, Fiscal Year 2009

We use derivative instruments to manage risks related to foreign currencies, equity prices, interest rates, and credit; to enhance investment returns; and to facilitate portfolio diversification. Our objectives for holding derivatives include reducing, eliminating, and efficiently managing the economic impact of these exposures as effectively as possible. Our derivative programs include strategies that both qualify and do not qualify for hedge accounting treatment under SFAS No. 133, *Accounting for Derivative Instruments and Hedging Activities*.

Foreign Currency

Certain forecasted transactions, assets, and liabilities are exposed to foreign currency risk. We monitor our foreign currency exposures daily to maximize the economic effectiveness of our foreign currency hedge positions. Options and forward contracts are used to hedge a portion of forecasted international revenue for up to three years in the future and are designated as cash-flow hedging instruments. Principal currencies hedged include the euro, Japanese yen, British pound, and Canadian dollar. As of June 30, 2009, the total notional amount of such foreign exchange contracts was $7.2 billion. Foreign currency risks related to certain non-U.S. dollar denominated securities are hedged using foreign exchange forward contracts that are designated as fair-value hedging instruments. As of June 30, 2009, the total notional amount of these foreign exchange contracts sold was $3.5 billion. Certain options and forwards not designated as hedging instruments are also used to manage the

variability in exchange rates on accounts receivable, cash, and intercompany positions, and to manage other foreign currency exposures. As of June 30, 2009, the total notional amounts of these foreign exchange contracts purchased and sold were $3.2 billion and $3.6 billion, respectively.

Equity

Securities held in our equity and other investments portfolio are subject to market price risk. Market price risk is managed relative to broad-based global and domestic equity indices using certain convertible preferred investments, options, futures, and swap contracts not designated as hedging instruments. From time to time, to hedge our price risk, we may use and designate equity derivatives as hedging instruments, including puts, calls, swaps, and forwards. As of June 30, 2009, the total notional amounts of designated and non-designated equity contracts purchased and sold were immaterial.

Interest Rate

Securities held in our fixed-income portfolio are subject to different interest rate risks based on their various maturities. The average maturity of the fixed-income portfolio is managed to achieve economic returns which correlate to certain broad-based fixed-income indices using exchange-traded option and futures contracts and over-the-counter swap and option contracts, none of which are designated as hedging instruments. As of June 30, 2009, the total notional amount of fixed-interest rate contracts purchased and sold were $2.7 billion and $456 million, respectively. In addition, we use “To Be Announced” forward purchase commitments of mortgage-backed assets to gain exposure to agency and mortgage-backed securities. These meet the definition of a derivative instrument under SFAS No. 133 in cases where physical delivery of the assets is not taken at the earliest available delivery date. As of June 30, 2009, the total notional derivative amount of mortgage contracts purchased was $1.3 billion.

Credit

Our fixed-income portfolio is diversified and consists primarily of investment-grade securities. We use credit default swap contracts, not designated as hedging instruments, to manage credit exposures relative to broad-based indices and facilitate portfolio diversification. We use credit default swaps as they are a low cost way of managing exposure to individual credit risks or groups of credit risks while continuing to improve liquidity. As of June 30, 2009, the total notional amounts of credit contracts purchased and sold were immaterial.

Commodity

We use broad-based commodity exposures to enhance portfolio returns and facilitate portfolio diversification. We use swap and futures contracts, not designated as hedging instruments, to generate and manage exposures to broad-based commodity indices. We use derivatives on commodities as they are low-cost alternatives to the purchase and storage of a variety of commodities, including, but not limited to, precious metals, energy, and grain. As of June 30, 2009, the total notional amounts of commodity contracts purchased and sold were $543 million and $33 million, respectively.

Credit-Risk-Related Contingent Features

Certain of our counterparty agreements for derivative instruments contain provisions that require our issued and outstanding long-term unsecured debt to maintain an investment grade credit rating and require us to maintain a minimum liquidity of $1.0 billion. To the extent we fail to meet these requirements, collateral will be required for posting, similar to the standard convention related to over-the-counter derivatives. As of June 30, 2009,

our long-term unsecured debt rating was AAA, and cash investments were in excess of $1.0 billion. As a result, no collateral is required to be posted.

Gross Fair Values of Derivative Instruments (Excluding FIN No. 39[a] Netting)

	June 30, 2009					
(In millions)	Foreign Exchange Contracts	Equity Contracts	Interest Rate Contracts	Credit Contracts	Commodity Contracts	Total Derivatives
Assets						
Derivatives not designated as hedging instruments						
Short-term investments	$ 9	$78	$ 44	$ 21	$ 2	$ 154
Other current assets	48	–	–	–	–	48
Total	$ 57	$78	$ 44	$ 21	$ 2	$ 202
Derivatives designated as hedging instruments						
Short-term investments	$ 12	$ –	$ –	$ –	$ –	$ 12
Other current assets	417	–	–	–	–	417
Equity and other investments	–	2	–	–	–	2
Total	$ 429	$ 2	$ –	$ –	$ –	$ 431
Total assets[b]	$ 486	$80	$ 44	$ 21	$ 2	$ 633

Liabilities

Derivatives not designated as hedging instruments						
Other current liabilities	**$(183)**	**$ (3)**	**$(20)**	**$(62)**	**$(6)**	**$(274)**
Derivatives designated as hedging instruments						
Other current liabilities	**$ (75)**	**$ –**	**$ –**	**$ –**	**$ –**	**$ (75)**
Total liabilities[(b)]	**$(258)**	**$ (3)**	**$(20)**	**$(62)**	**$(6)**	**$(349)**

(a) FIN No. 39, *Offsetting of Amounts Related to Certain Contracts – an interpretation of APB No. 10 and FASB Statement No. 105*, permits the netting of derivative assets and derivative liabilities when a legally enforceable master netting agreement exists. These amounts include fair value adjustments related to our own credit risk and counterparty credit risk.
(b) See Note 6 – Fair Value Measurements.

Fair-Value Hedges

For a derivative instrument designated as a fair-value hedge, the gain (loss) is recognized in earnings in the period of change together with the offsetting loss or gain on the hedged item attributed to the risk being hedged. For options designated as fair-value hedges, changes in the time value are excluded from the assessment of hedge effectiveness and are recognized in earnings.

During fiscal year 2009, we recognized in other income (expense) the following gains (losses) on fair value hedged derivatives and their related hedged items:

(In millions)	**Foreign Exchange Contracts**	**Equity Contracts**
Derivatives	**$121**	**$191**
Hedged items	**(120)**	**(211)**
Total	**$ 1**	**$ (20)**

Cash-Flow Hedges

For a derivative instrument designated as a cash-flow hedge, the effective portion of the derivative's gain (loss) is initially reported as a component of other comprehensive income ("OCI") and is subsequently recognized in earnings when the hedged exposure is recognized in earnings. For options designated as cash-flow hedges, changes in the time value are excluded from the assessment of hedge effectiveness and are recognized in earnings. Gains (losses) on derivatives representing either hedge components excluded from the assessment of effectiveness or hedge ineffectiveness are recognized in earnings. During fiscal year 2009, we recognized the following gains (losses) related to foreign exchange contracts:

(In millions)	
Effective portion:	
Gain recognized in OCI, net of tax effect of **$472**	**$ 876**
Gain reclassified from accumulated OCI into revenue	**$ 884**
Amount excluded from effectiveness assessment and ineffective portion:	
Loss recognized in other income (expense)	**$(314)**

We estimate that $528 million of net derivative gains included in OCI will be reclassified into earnings within the next 12 months. No significant amounts of gains (losses) were reclassified from OCI into earnings as a result of forecasted transactions that failed to occur during fiscal year 2009.

Non-Designated Derivatives

Gains (losses) from changes in fair values of derivatives that are not designated as hedges are recognized in other income (expense). Other than those derivatives entered into for investment purposes, such as commodity contracts, the gains (losses) below are generally economically offset by unrealized gains (losses) in the underlying securities and are recorded as a component of OCI. The amounts recognized during fiscal year 2009 were as follows:

(In millions)	
Foreign exchange contracts	**$(234)**
Equity contracts	**(131)**
Interest-rate contracts	**5**
Credit contracts	**(18)**
Commodity contracts	**(126)**
Total	**$(504)**

Gains (losses) for foreign exchange, equity, interest rate, credit, and commodity contracts presented in other income statement line items were immaterial for fiscal year 2009 and have been excluded from the table above.

Appendix B

Table B.1
Loan spreads and derivatives

This table presents results from regressions of loan spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. In Panel A, derivatives positions are indicated by dummy variables. In Panel B, derivatives positions are notional values divided by total assets.

Panel A: Indicators

				Conditional on Reporting	
	(1)	(2)	(3)	(4)	(5)
Derivatives	-0.018	0.043			
	(-0.25)	(0.88)			
Derivatives - DH			-0.062		
			(-1.32)		
Derivatives - NDH			0.108	0.203	0.116
			(2.86)	(3.72)	(2.89)
Size		0.010	0.000		-0.004
		(0.35)	(0.00)		(-0.15)
Leverage		-0.012	-0.018		-0.047
		(-0.07)	(-0.10)		(-0.28)
Profitability		0.316	0.268		0.306
		(0.89)	(0.77)		(0.84)
Tangibility		0.162	0.174		0.176
		(1.32)	(1.44)		(1.42)
Z-Score		-0.021	-0.021		-0.024
		(-1.88)	(-1.87)		(-1.97)
MB		-0.098	-0.095		-0.100
		(-3.20)	(-3.08)		(-2.98)
IV		0.362	0.327		0.255
		(1.43)	(1.33)		(0.95)
Credit Spread		0.325	0.329		0.342
		(7.95)	(7.94)		(7.85)
Term Spread		0.215	0.211		0.207
		(15.09)	(14.72)		(14.03)
VIX		1.438	1.449		1.371
		(3.70)	(3.72)		(3.34)
Adj-R^2	0.538	0.721	0.723	0.558	0.722
Observations	2159	2159	2159	1928	1928
Rating FE	X	X	X	X	X
Industry FE	X	X	X	X	X

Panel B: Notionals

				Conditional on Reporting	
	(1)	(2)	(3)	(4)	(5)
Derivatives	0.280	0.245			
	(1.47)	(1.44)			
Derivatives - DH			-0.196		
			(-0.81)		
Derivatives - NDH			0.717	0.902	0.678
			(3.16)	(3.41)	(2.71)
Size		-0.010	-0.017		-0.004
		(-0.28)	(-0.49)		(-0.09)
Leverage		-0.299	-0.325		-0.392
		(-1.16)	(-1.24)		(-1.39)
Profitability		0.623	0.621		0.943
		(1.24)	(1.22)		(1.66)
Tangibility		0.338	0.364		0.230
		(2.08)	(2.29)		(1.34)
Z-Score		-0.004	-0.004		-0.014
		(-0.17)	(-0.17)		(-0.54)
MB		-0.150	-0.149		-0.169
		(-3.43)	(-3.45)		(-3.47)
IV		-0.138	-0.175		-0.475
		(-0.47)	(-0.61)		(-1.58)
Credit Spread		0.409	0.403		0.459
		(6.72)	(6.93)		(6.41)
Term Spread		0.180	0.176		0.164
		(7.60)	(7.40)		(6.41)
VIX		1.976	2.059		2.142
		(3.36)	(3.65)		(3.25)
Adj-R^2	0.444	0.663	0.666	0.462	0.663
Observations	1007	1007	1007	787	787
Rating FE	X	X	X	X	X
Industry FE	X	X	X	X	X

Table B.2
Loan spreads and derivatives, by category

This table presents results from regressions of Loan spreads on derivatives positions, as well as a vector of firm characteristics and macroeconomic control variables. Derivatives positions are disaggregated by type. Types are: Interest rate (Columns 1 and 2); FX (Columns 3 and 4); Commodity (Columns 5 and 6); Other (Columns 7 and 8). The Other Than Type variables reflect the difference between the sum of all reported categories of positions and the positions of a given type. In Panel A, derivatives positions are indicated by dummy variables. In Panel B, derivatives positions are notional values divided by total assets. All control variables are defined in Tables 1 and 3. Standard errors are clustered at the firm level. *t*-statistics are presented in parentheses.

Panel A: Indicators

	Interest		FX		Commodity		Other	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Derivatives	-0.017		-0.067		-0.037		-0.091	
	(-0.52)		(-1.80)		(-0.70)		(-1.31)	
Derivatives - DH		-0.017		-0.093		-0.065		0.139
		(-0.56)		(-2.47)		(-1.30)		(1.15)
Derivatives - NDH		-0.031		0.068		0.003		-0.042
		(-0.61)		(1.78)		(0.06)		(-0.32)
Size	-0.004	-0.010	0.015	0.016	0.006	-0.004	0.008	-0.006
	(-0.15)	(-0.38)	(0.54)	(0.57)	(0.21)	(-0.16)	(0.27)	(-0.21)
Leverage	0.104	0.100	0.000	0.005	0.017	-0.014	-0.104	-0.097
	(0.59)	(0.56)	(0.00)	(0.03)	(0.10)	(-0.08)	(-0.63)	(-0.57)
Profitability	0.150	0.114	0.271	0.277	0.391	0.391	0.623	0.570
	(0.39)	(0.30)	(0.71)	(0.72)	(1.16)	(1.16)	(1.81)	(1.68)
Tangibility	0.088	0.111	0.074	0.155	0.172	0.228	0.145	0.158
	(0.72)	(0.91)	(0.69)	(1.38)	(1.45)	(1.97)	(1.14)	(1.25)
Z-Score	-0.018	-0.019	-0.022	-0.023	-0.021	-0.022	-0.031	-0.029
	(-1.58)	(-1.63)	(-1.99)	(-2.06)	(-1.82)	(-1.89)	(-2.47)	(-2.29)
MB	-0.105	-0.101	-0.085	-0.081	-0.103	-0.103	-0.093	-0.092
	(-3.31)	(-3.25)	(-2.71)	(-2.60)	(-3.37)	(-3.38)	(-2.98)	(-2.95)
IV	0.066	0.069	0.149	0.138	0.081	0.076	0.277	0.288
	(0.30)	(0.31)	(0.66)	(0.59)	(0.38)	(0.35)	(1.13)	(1.17)
Credit Spread	0.332	0.341	0.318	0.318	0.324	0.331	0.323	0.329
	(8.06)	(8.29)	(7.80)	(7.74)	(7.95)	(8.05)	(7.54)	(7.65)
Term Spread	0.214	0.211	0.219	0.218	0.219	0.217	0.216	0.213
	(14.40)	(14.18)	(14.61)	(14.35)	(15.20)	(14.97)	(14.73)	(14.42)
VIX	1.672	1.634	1.635	1.640	1.637	1.601	1.546	1.492
	(4.18)	(4.08)	(4.36)	(4.36)	(4.45)	(4.19)	(4.00)	(3.79)
Derivatives Other Than Type	-0.019		-0.003		-0.006		0.055	
	(-0.40)		(-0.06)		(-0.15)		(1.16)	
Derivatives Other Than Type — DH		-0.061		-0.010		-0.013		-0.023
		(-1.58)		(-0.26)		(-0.35)		(-0.52)
Derivatives Other Than Type — NDH		0.107		-0.040		0.068		0.107
		(2.97)		(-0.89)		(1.88)		(2.98)
Adj-R^2	0.725	0.727	0.721	0.722	0.720	0.721	0.717	0.719
Observations	2087	2087	2023	2023	2127	2127	2138	2138
Rating FE	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X

Panel B: Notionals

	Interest		FX		Commodity		Other	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Derivatives	-0.113		0.095		0.222		3.875	
	(-0.26)		(0.34)		(0.93)		(1.01)	
Derivatives - DH		0.065		-1.352		-0.050		4.474
		(0.14)		(-3.33)		(-0.19)		(1.24)
Derivatives - NDH		-0.890		1.168		0.346		4.128
		(-1.39)		(2.70)		(0.94)		(0.08)
Size	-0.037	-0.037	-0.021	-0.033	-0.017	-0.023	-0.043	-0.045
	(-1.19)	(-1.23)	(-0.71)	(-1.14)	(-0.47)	(-0.61)	(-1.11)	(-1.16)
Leverage	0.162	0.195	0.142	0.066	0.004	-0.013	-0.194	-0.203
	(0.65)	(0.78)	(0.62)	(0.30)	(0.02)	(-0.06)	(-1.24)	(-1.32)
Profitability	0.287	0.284	0.168	0.165	0.634	0.607	1.264	1.263
	(0.56)	(0.56)	(0.34)	(0.33)	(1.48)	(1.41)	(2.41)	(2.36)
Tangibility	0.189	0.188	0.303	0.304	0.173	0.169	0.398	0.376
	(1.19)	(1.20)	(2.05)	(2.07)	(1.27)	(1.25)	(2.37)	(2.26)
Z-Score	-0.016	-0.013	0.015	0.015	-0.004	-0.004	0.006	0.006
	(-0.99)	(-0.84)	(0.88)	(0.98)	(-0.26)	(-0.27)	(0.27)	(0.29)
MB	-0.133	-0.133	-0.154	-0.146	-0.154	-0.154	-0.153	-0.155
	(-2.92)	(-2.98)	(-3.59)	(-3.65)	(-3.55)	(-3.56)	(-2.86)	(-2.81)
IV	0.242	0.236	0.060	0.023	0.266	0.230	-0.353	-0.404
	(0.88)	(0.86)	(0.22)	(0.09)	(1.02)	(0.89)	(-1.08)	(-1.23)
Credit Spread	0.362	0.370	0.396	0.397	0.452	0.451	0.171	0.183
	(6.69)	(6.87)	(7.06)	(7.06)	(8.84)	(8.93)	(1.54)	(1.65)
Term Spread	0.179	0.178	0.185	0.181	0.165	0.160	0.127	0.129
	(9.23)	(9.09)	(8.98)	(8.79)	(8.11)	(7.75)	(3.42)	(3.51)
VIX	1.553	1.509	1.950	2.024	1.541	1.575	2.755	2.806
	(3.21)	(3.14)	(3.88)	(4.06)	(3.21)	(3.38)	(2.37)	(2.46)
Derivatives Other Than Type	0.190		0.203		0.029		0.068	
	(1.06)		(0.88)		(0.12)		(0.40)	
Derivatives Other Than Type — DH		-0.359		0.491		-0.315		-0.084
		(-1.31)		(1.70)		(-0.97)		(-0.41)
Derivatives Other Than Type — NDH		0.677		0.332		0.781		0.266
		(1.84)		(0.85)		(2.01)		(1.03)
Adj-R^2	0.599	0.601	0.630	0.639	0.604	0.605	0.614	0.614
Observations	1754	1754	1430	1430	1604	1604	620	620
Rating FE	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X