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The Impact of Earnings on the Pricing of Credit Default Swaps

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ABSTRACT: This study evaluates the impact of earnings on credit risk in the Credit Default Swap (CDS) market using levels, changes, and event study analyses. We find that earnings (cash flows, accruals) of reference firms are negatively and significantly correlated with the level of CDS premia, consistent with earnings (cash flows, accruals) conveying information about default risk. Based on the changes analysis, a 1 percent increase in ROA decreases CDS rates significantly by about 5 percent. We also find that (1) CDS premia are more highly correlated with below-median earnings than with above-median earnings and (2) CDS premia are more highly correlated with earnings of low-rated firms than with earnings of high-rated firms. Evidence indicates further that short-window earnings surprises are negatively and significantly correlated with CDS premia changes in the three-day window surrounding the preliminary earnings announcement, although the impact is concentrated in the shorter maturities.

Keywords: *credit default swaps; earnings; default risk; cash flows; accruals.*

JEL Classification: *M41, G13, G20, G32.*

Data Availability: *All data are publicly available.*

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I. INTRODUCTION

This study investigates the impact of earnings, accruals, and cash flows on firm credit risk as reflected in Credit Default Swaps (CDS). The CDS is essentially a ''pure credit'' default instrument, providing a far less noisy measure of credit risk in comparison to other debt instruments. Moreover, the credit derivative market, which is dominated by CDS contracts, is a *multi-trillion* dollar market (notional value) that has roughly doubled in size in the past five years. The existence of the CDS market and its burgeoning growth are prima facie evidence that other debt markets are unable to provide adequate solutions for the trading of credit risk. Thus, it is our contention that the CDS market is the best venue within which to investigate the extent to which earnings and its components are determinants of credit risk, and superior for this objective than the heterogeneous corporate bond and secondary loan markets.

We use three methodologies to examine the relation between CDS premia and earnings: a levels analysis, a changes (returns) analysis, and a short-window event study. A few contemporaneous studies (Benkert 2004; Batta 2006; Das et al. 2009) also incorporate some measure of earnings in a levels analysis of CDS rates. However, these studies do not examine the impact of accounting information on *changes* in CDS premia.[1] Changes and event study analyses provide more direct evidence concerning the credit risk information conveyed by earnings than does a levels analysis because the firm is its own control and heteroscedasticity concerns are mitigated. Furthermore, we find that levels of CDS premia, in contrast to changes, are uniformly nonstationary for all maturities and restructuring clauses. In addition, while Batta (2006) and Das et al. (2009) find that CDS rates and earnings levels are inversely related, Benkert (2004), using a much larger sample, finds a positive relation. This contradictory finding calls for a more comprehensive analysis using multiple methodologies.[2]

We also test for the potential asymmetry (nonlinearity) of CDS spreads to good news versus bad news, and to high- versus low-debt-rated firms. This issue is of interest to both accounting and finance researchers because prior research finds conflicting evidence of asymmetry in bond prices (e.g., Datta and Dhillon 1993; Easton et al. 2007). We also evaluate the impact of various CDS contract maturities on the earnings pricing relation. The relation between credit risk and maturity is potentially subtle (Ryan 2007, 96) and the evidence from the CDS market is relatively unexplored.[3]

Our analysis indicates that earnings, cash flows, and accruals have a statistically and economically significant impact on CDS premium. Using the levels (changes) analysis, we find that a 1 percent increase in ROA reduces CDS premia by close to 4.5 (2.8) basis points, or by about 9 (5) percent. Similarly, we find that the impact of 1 percent increase in cash flows scaled by total assets reduces CDS premia by 3.3 to 4.6 basis points, or 6 to 9 percent, whereas a similar change in accruals scaled by total assets reduces the premium by 2.7 to 4.2 basis points, or 5 to 8 percent.

We also find, as predicted, that the relations between CDS premia and each of earnings, cash flows, and accruals are significant for short to medium terms CDS, but are not significant for longer maturities. Further, the correlations decrease monotonically with maturity. In the changes analysis we find significant relations across most maturities.

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[1] Batta (2006) reports a spread changes analysis in one of his tables (VII). However, the table does not report coefficient estimates, their statistical significance, or whether the independent variables are levels or changes.

[2] In contrast to other studies, this study uses the exact filing date of the financial statements as the relevant date for the CDS premia, thereby minimizing the possibility that CDS premia may incorporate other information unrelated to the information in the financial statements.

[3] Das et al. (2008) control for maturity but, again, do not account for potential nonlinearities.

Furthermore, both the levels and changes analyses provide evidence consistent with nonlinear asymmetric payoff functions for debt holders. Specifically, CDS premia are more highly correlated with below-median earnings than with above-median earnings, and CDS premia are more highly correlated with the earnings of low-rated firms—BBB and below—than the earnings of high-rated firms.

The analysis of CDS premia across the three-day window surrounding preliminary earnings announcements indicates that CDS premia are inversely and significantly related to earnings surprises, especially for shorter maturities. CDS premia are also significantly related to the non-earnings information contained in cumulative equity returns over the same window. Again, short-window earnings changes convey CDS value-relevant information, primarily for firms with lower credit ratings.

Section II briefly describes the CDS market and indicates the reasons why the CDS market is superior to the corporate bond and the secondary loan markets for determining the relation between earnings and credit risk. Section III surveys the relevant CDS literature. Section IV develops the hypotheses to be tested. Section V describes the sample. Section VI presents the empirical analysis. Section VII briefly relates the findings of this study to the current global credit crisis and concludes.

II. THE CDS MARKET

Basics

Financial innovation led to the creation of credit derivatives to manage credit risk. The extraordinary growth in credit derivatives can be attributed to three main market participants. The largest group is comprised of large commercial banks, which are net buyers of credit derivative protection. Credit derivatives enable banks to transfer and diversify the credit risk of their loan portfolios but, in contrast to securitizations, without removing the loans from bank balance sheets and without directly involving borrowers. Insurance companies, the second largest group, are net sellers of credit derivatives, as they attempt to enhance investment yields by diversifying their exposure to risks that are uncorrelated with the existing insurance business. Global hedge funds have also become large players in the credit derivative market, operating both as protection buyers and sellers in an effort to carry out complex arbitrage strategies across various financial markets. Other miscellaneous participants include financial guarantors, which are net protection sellers, and pension funds.

The most common credit derivative is the single-name Credit Default Swap. The CDS market has grown rapidly, in no small part due to the standardization of CDS contracts by the International Swaps and Derivatives Association. A CDS is an over-the-counter contract between two parties that provides protection against credit risk, where the protection buyer pays a fixed premium, the spread, to the protection seller for a period of time. If a certain pre-specified credit event occurs to a specific company, called the reference entity, then the protection seller pays compensation to the protection buyer. The reference entity is not a party to the contract, and it is not necessary for the buyer or seller to obtain the reference entity's consent to enter into a CDS. Credit events in CDS contracts often include failure to pay, bankruptcy, and restructuring of the reference entity. If the protection buyer does not hold the reference bond, then compensation is in the form of a lump sum payment equal to the difference between the value of the reference entity's bond and its face value. Alternatively, if the protection buyer holds the bond, then the protection buyer either receives the cash difference or delivers the reference entity's bond to the protection seller for its face value. If no credit event occurs during the term of the swap, then the protection buyer continues to pay the swap premium until maturity. Maturities typically range from one to ten years, with the five-year maturity being the most common.

The premium paid by the protection buyer to the seller is quoted in basis points per annum of the contract's notional value—typically $10 million—and is usually paid quarterly. For example, suppose that the CDS spread for a five-year $10 million contract on British Airways is 125 basis points and the credit event is defined to be default of British Airway's bonds. This means that the protection buyer pays $31,250 (1.25/4 percent of $10M) per quarter to the protection seller for five years or until British Air defaults on its bonds. In the event that British Air defaults on its bonds, the protection buyer, in turn, has the right to sell British Air's bonds to the protection seller for their face value of $10 million.

A number of institutional differences between corporate bonds (and secondary loans) and the CDS market have contributed to the phenomenal growth in CDS trading. A CDS does not require initial funding, which allows for leveraged positions. A CDS transaction can be entered into even if a cash bond of the reference entity at a particular maturity is unavailable. Finally, by entering a CDS contract as a protection seller, an investor can easily create a short position in the reference entity's credit.

CDS Instruments versus Corporate Bonds and Secondary Loans

The credit-risk profile of a CDS is similar to that of a corporate bond of the reference entity. In fact, in the absence of (1) arbitrage opportunities, (2) contractual features such as embedded options, covenants, and guarantees, and (3) market frictions, the CDS premia and the corporate bond yield spread are identical for a floating rate corporate bond (Duffie 1999).

Nevertheless, CDS premia offer many advantages over corporate bond yield spreads and secondary loan spreads for analyzing the determinants of credit risk. First, bond spreads include factors unrelated to credit risk, such as systematic risk unrelated to default (Elton et al. 2001) and illiquidity (Longstaff et al. 2005). In fact, Huang and Huang (2002) conclude that less than 25 percent of the credit spread in corporate bonds is attributable to credit risk. Second, interest risk *drives* fixed-rate corporate bond yields and secondary market loan rates quite independently of credit risk. A positive relation between earnings and bond prices could well be due to changes in interest rates, if, say, risk-free interest rate decreases cause firm earnings to increase over time, rather than to credit risk. Third, in contrast to CDS instruments, corporate bonds and secondary market loans are replete with embedded options, guarantees, and covenants. Heterogeneity in these features potentially distorts the relationship between earnings and credit risk in cross-sectional studies. Even more problematic is that they may generate a spurious relation between earnings and credit risk. For example, the positive relation between earnings and corporate bond prices could be driven by earnings-based covenants rather than by credit risk, per se. With lower earnings, earnings-based covenants are more likely to be binding, increasing the probability of technical bankruptcy and concomitant expected transactions (renegotiation) costs and, thereby, leading to reduced bond prices. In contrast, except in rare cases, technical default is not a credit event in CDS contracts. Fourth, the available empirical evidence indicates that credit risk price discovery takes place first in the CDS market and only later in the bond market (Blanco et al. 2005; Zhu 2006; Daniels and Jensen 2005). The bond market's lagged reaction potentially distorts empirical studies relating earnings to bond prices. Fifth, unlike corporate bond yield spreads, no benchmark risk-free rate need be specified for CDS premia, minimizing potential misspecification of the appropriate risk-free rate proxy.[4] Finally, CDS rates are closely related to the par value of the reference bond, whereas corporate bond values (including their taxability characteristics) are affected by coupons. Heterogeneity in coupon rates potentially distorts the relationship between earnings and credit risk in cross-sectional studies.

III. CDS LITERATURE SURVEY

The finance literature proposes three model types to explain the pricing of credit derivates: structural models, reduced form models, and hybrid models. Based upon the seminal study by Merton (1974), structural models imply that the main determinants of the likelihood and severity of default are financial leverage, the volatility of the firm's assets, and the risk-free rate of interest. Because structural models assume that (1) investors observe the reference entity's assets directly and (2) the reference entity's asset structure behaves according to a known stochastic process, neither earnings nor other accounting information play a role in the pricing of CDS in these models. Thus, from the perspective of these models, the null hypothesis that earnings play no part in the pricing of credit risk (as reflected in CDS premia) is quite credible.

Reduced-form models (Das 1995; Das and Sundaram 2000; Hull and White 2000a, 2000b) do a better job at directly pricing credit derivatives. Nevertheless, reduced form models leave no room for earnings as determinant of credit risk because they exogenously postulate the dynamics of default probabilities. Thus, reduced form models tend to be "black boxes" that are silent about the underlying determinants of the price of credit risky instruments.

Far better economic insights are provided by the hybrid model of Duffie and Lando (2001), which assumes that the rate of default is a function of the firm's asset value and capital structure. Unlike standard structural models, investors cannot observe the asset structure of the firm directly. Instead, investors receive periodic accounting reports that provide imperfect information about the true financial condition of the firm. Accounting information in the Duffie and Lando (2001) model is quite abstract. Except for the notion of noisy accounting information about the firm's asset structure, also referred to by the authors as accounting information transparency, no specific accounting variables are specified in the model. However, as Duffie and Lando (2001) point out in the generalization section of their article, their model can be readily extended to accommodate other types of accounting information, including accounting ratios and peer performance measures. Therefore, besides the standard structural model variables of conventional structural models, the hybrid model of Duffie and Lando (2001) also rationalizes accounting information transparency, earnings, cash flows, and accruals, as well as accounting information generally, as determinants of CDS pricing.

Rather then trying to directly price credit derivatives using a structural or hybrid model, we follow the regression approach of Collin-Dufresne et al. (2001, hereafter CGM). They "borrow" from the structural approach to identify the theoretical determinants of credit risk. These determinants are then used as independent variables to explain corporate credit spreads, rather than inputs to a particular structural model. Although CGM themselves estimate bond yield spreads, a similar approach using CDS premia is taken by Aunon-Nerin

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[4] See Houweling and Vorst (2005) on this issue. Another disadvantage of bond yield spreads includes the tax differentials in bond pricing. Elton et al. (2001) document a tax premium of 29 to 73 percent of the corporate bond spread, depending on the rating. See Longstaff et al. (2005) for other potential disadvantages of bond spreads as measures of credit risk relative to CDS premia.

et al. (2002), Benkert (2004), Abid and Naifar (2006), Ericsson et al. (2006, 2008), Batta (2006), and Das et al. (2009). Three of these empirical studies, two of which are essentially contemporaneous with ours, investigate the pricing implications of earnings on CDS prices using levels analyses. Benkert (2004) regresses *daily* five-year CDS premia on earnings to sales and earnings to interest, as well as on other determinants of CDS spreads such as leverage and volatility. Benkert (2004) obtains the counterintuitive result that, controlling for credit ratings, the earnings variables are significantly and *positively* related to CDS premia.[5] Batta (2006) regresses levels of five-year CDS premia on interest coverage ratios (i.e., earnings plus interest expense divided by interest expense) and other control variables. In contrast to Benkert (2004), Batta (2006) finds that interest coverage is significant and negatively related to CDS premia, primarily when the coverage ratio is non-positive. More recently, Das et al. (2009) implement a (regression) horse race between a market-based model of CDS rates and an accounting-based model of CDS rates inclusive of an earnings variable. They find that a levels model (using pooled data) based solely on accounting-based metrics—primarily ratios and growth rates—does as well in terms of R^2 as a pure market-based model and, in particular, they find that earnings is inversely related to CDS spreads.

IV. HYPOTHESES DEVELOPMENT

The hybrid model of Duffie and Lando (2001) partially motivates the hypotheses of this study. The price of a CDS instrument in their model is a function of (1) the factors that explain CDS pricing in standard structural models and (2) the imperfect information available to the CDS market about the firm's asset dynamics from periodic corporate financial reports. Although accounting information in the Duffie-Lando model is completely generic, we focus on earnings for two reasons. First, earnings are (arguably) the most important information variable used by investors to evaluate firm performance and, hence, future firm wealth, a major determinant of credit risk. Second, earnings can be used by investors to estimate the reference entity's true asset dynamics and, hence, its credit risk. More specifically, increased profitability of the reference entity, as measured by current accounting earnings, should reduce its credit risk since, with increased profitability, the reference entity is wealthier and less likely to default. Accounting studies have shown that current earnings are a good predictor of future earnings (Finger 1994; Nissim and Penman 2001), future cash flows (Dechow et al. 1998; Barth et al. 2001), and firm equity performance (Dechow 1994). In other words, an increase in earnings portends an increase in operating and equity performance and, hence, a reduced probability of bankruptcy. Also, earnings comprise a significant portion of the short-term change in firm assets (via clean surplus) and, therefore, provide information to investors about the firm's asset dynamics.

[5] We find a significant and negative relation between earnings and CDS premia for our sample even after controlling for ratings in the same fashion as Benkert (2004). We further investigate the disparity between Benkert's (2004) results and ours by replicating his study on our sample. His sample period is from 1999 through May 2002. When we restrict our sample to Benkert's sample period, we find that the coefficients on earnings to sales and earnings to interest are not statistically different from zero. One potential explanation for Benkert's finding is that he uses firm fixed effects in the regression. Since credit ratings are sticky, there is a very high correlation between the firm fixed effects and credit ratings. The problem is exacerbated by using daily CDS prices as does Benkert. Indeed, when we estimate Benkert's regression specification using a random-effects model, we find that the coefficient on earnings to sale is negative and significant. One caveat is that our sample for Benkert's period is far smaller than his; we have about 3,000 observations, whereas Benkert has more than 26,000. Thus, it is possible that the difference between our results and Benkert's are driven by sample size. When we estimate Benkert's regression using our entire sample (1999–2005, 285,275 observations) we find that the coefficient on earnings to sales (earnings to interest) is negative (positive) and significant. These results hold for the firm random-effects model as well.

Furthermore, the shorter the maturity of the CDS contract at initiation, the more likely is an increase (decrease) in profitability to provide positive (negative) information about the reference entity's ability to repay bondholders within the maturity period. Conversely, longer term (initial) maturities are less likely to be affected by current earnings, because earnings are less informative about long-term performance than short-term performance. Potential nonlinearities in the credit risk maturity relation, however, can offset these considerations. For example, credit risk can be positively (negatively) related to maturity for less (more) risky borrowers (Ryan 2007). Ultimately, the relation between CDS rates, earnings, and maturity is an empirical question.

These considerations yield the following set of hypotheses, stated in the alternative:

H1: The quarter-end CDS premium is inversely related to the reference entities' quarterly earnings; the relation between the variables is a decreasing function of CDS maturity.

H2: The percent change in the CDS premium over the quarter is inversely related to the *change* in the reference entities' quarterly earnings; the relation between the variables is a decreasing function of CDS maturity.

H3: The percent change in the CDS premium in the short window centered on the preliminary earnings announcement is inversely related to the reference entities' earnings surprise; the relation between the variables is a decreasing function of CDS maturity.

There appears to be a consensus among accounting scholars that both accruals and cash flows are value-relevant in equity markets. In particular, a large number of studies find that both accruals and cash flows are contemporaneously related to equity returns and current accruals and current cash flows can be used to predict future equity prices (e.g., Sloan, 1996; Cheng and Thomas 2006; Livnat and Lopez-Espinosa 2008). This literature suggests that, similar to earnings, accruals and cash flows convey information about the reference entity's future wealth and about its true asset dynamics and, hence, its credit risk. However, unlike cash flows, accruals are subject to manipulation, suggesting that accruals are less predictive of firm wealth than cash flows. Moreover, higher accruals may reflect higher credit risk because there may be less cash to satisfy the claims of creditors for a given level of earnings. Hence, accruals are either negatively related to credit risk, but less so than cash flows, or accruals are positively related to credit risk.

H4: The (change in the) CDS premium is inversely related to the (change in the) reference entities' cash flows. The (change in the) cash flows have (has) a greater negative association with credit risk than accruals.

As we have argued, earnings can convey credit-risk-relevant information because earnings are informative about the current wealth of the firm, the future operating and equity performance of the firm, and the dynamics of the asset structure. Viewing the equity of the firm as an option on the firm's assets suggests that debt holders will have a nonlinear payoff function: namely, they will react more to information that presages potential bankruptcy than information that presages additional profits. One possible means of testing for this nonlinearity is to see whether there is an asymmetry in the response of CDS premia to losses versus profits. Extant evidence of such nonlinearities in the corporate bond market is mixed. Datta and Dhillon (1993) find that corporate bond yields do *not* react more to (unexpected) losses than to (unexpected) profits, whereas Easton et al. (2007) and DeFond and Zhang (2008) find such an asymmetry. Since CDS reference firms are typically quite large and rarely incur losses, we examine whether CDS spreads react more to earnings of firms with below the three-digit industry median profitability than to earnings of firms with above industry-median profitability.

Another means of testing for nonlinearity in CDS premia is through credit ratings. Specifically, earnings should be more highly associated with CDS premia for those firms for which the likelihood of bankruptcy is greater, as measured by credit ratings. To proxy for the likelihood of bankruptcy, we divide firms into two groups based on credit ratings.[6] Firms with credit ratings BBB and below (splitting the sample into two equal groups) are assumed to be more likely to go bankrupt than firms with higher ratings. This classification is also consistent with the CDS literature that maintains that CDS prices are nonlinear in the reference entities' credit ratings (e.g., Aunon-Nerin et al. 2002). These considerations lead to our last hypothesis.

H5: The relation between (changes in) each of earnings, accruals, and cash flows and (percentage changes in) CDS premia is greater in absolute value for firms with low credit ratings (below median earnings) than for firms with high credit ratings (above median earnings)

V. DATA

CDS data for 2002 through 2005 are obtained from Lombard Risk. For a given date and reference firm, this database reports a composite at-market CDS rate for the initial maturity. This composite rate is derived from the mid-market quotes contributed by up to 25 investment banks and default-swap brokers. All quotes are for the initial maturity only. Besides quotes, the database includes, for each date, the referenced firm identifier (primarily ticker symbol), the seniority (senior or subordinated), the currency of the underlying debt, the initial maturity of the CDS contract (1, 3, 5, 7, or 10 years), the standard deviation of the mid-market quotes, and the restructuring clause applied in the contract. Also reported is the average recovery rate used by the quote providers. The frequency of observations has increased over time. The database contains biweekly information from January 2002 to June 2002, weekly data from July 2002 to May 2003, and daily quotes starting May 15, 2003. The initial sample comprises 2,127,526 CDS contracts for 798 firms.

Using the Preliminary Compustat database available to us through Charter Oak (and now available through WRDS), we identify for each firm on Compustat the quarterly preliminary earnings release date. In addition, we obtain SEC filing dates for sample firms from S&P's SEC Filing Dates Database (also available through WRDS). We use ticker symbols to merge the Compustat and SEC filing dates data with the CDS data set. Requiring CDS data around the preliminary earnings release date or around the financial statement filing date results in a sample of 598 (4,890) firms (firm-quarters) and 46,602 CDS contracts. To enhance the homogeneity of the sample, we eliminate contracts with non-seniority clauses (1,127 contracts), contracts with Modified-Modified Restructuring clauses (1,024 contracts), and contracts not denominated in U.S. dollars (7,382 contracts). These restrictions reduce the sample size to 37,069 contracts for 577 firms (4,837 firm-quarters). We

[6] To proxy closeness to default, Berndt et al. (2006) use Merton's (1974) "distance to default" measure defined roughly as the number of standard deviations of asset growth by which a firm's market value of assets exceeds a liability measure. This measure is highly correlated with stock return volatility, an important variable in our analysis. We use high/low credit ratings instead as a proxy of closeness to default.

further require that each observation has sufficient data to compute either the change in CDS premium around the preliminary earnings release date (for the event study) or the change in CDS premium in the most recent quarter or the CDS premium one day after the SEC filing date, resulting in a sample of 21,839 contracts for 536 firms (3,089 firm-quarters). Merging this sample with Compustat and CRSP and requiring non-missing earnings, market value of equity greater than $100 million, and positive book value of equity, results in a final sample of 20,328 contracts for 508 firms (2,800 firm-quarters). Table 1 describes the data and sample filters. Except for Benkert (2004), who uses daily data, this sample is significantly larger than those of the prior CDS studies referenced above.

Table 2 presents descriptive statistics for our sample observations. The firms covered in the database are large; the mean (median) firm has a market value of $13.09 (6.70) billion. Thus, the results reported in this study are unlikely to generalize to smaller firms. The percentage change of the CDS premium in the three-day window centered on the preliminary earnings announcement date has a mean of 0.7 percent and a median of 0.0 percent. The percentage change in the CDS premium from one day after the SEC filing date of the previous quarter through one day after the SEC filing date of the current quarter, *CDS_QTR*, has a mean (median) of 0.0 (−7) percent, suggesting that the median CDS premium tends to decrease with the additional information learned throughout the quarter. The log of the CDS premium on the first day after the SEC filing date, *CDS_PRM*, has an average (median) value of 4.08 (3.95), representing a premium of 59 (52) basis points.

The mean (median) quarterly return on assets (*ROA*), defined as income before extraordinary items and discontinued operations scaled by total assets at the end of the quarter, is 1.2 (1.1) percent, which is reasonable considering the large firm bias in the sample. The

TABLE 1
Data Filters

Sample Structure	**Observations**
Number of observations in the CDS daily dataset with non-missing maturity and premium (2002–2005)	2,127,526 daily observations of 798 firms
Interaction of CDS daily dataset and the preliminary Compustat data (note that each firm quarter usually contains a number of CDS contracts that differ in their maturity, restructuring clauses, etc.)	46,602 CDS contracts, 4,890 firm-quarters of 598 firms
Excluding subordinated CDS contracts	45,475 CDS contracts, 4,854 firm-quarters of 582 firms
Excluding CDS contracts with XMMR restructuring clause	44,451 CDS contracts, 4,847 firm-quarters of 580 firms
Excluding CDS contracts denominated in currency other than U.S.$	37,069 CDS contracts, 4,837 firm-quarters of 577 firms
Requiring that each observation has either CDS premium a day after the filing date, or CDS premium around the preliminary earnings release date	21,839 CDS contracts, 3,089 firm-quarters of 536 firms
Merging the data with the Compustat database for 2002–2005	21,022 CDS contracts, 2,905 firm-quarters of 526 firms
Eliminating firms with MV below $100 million and negative book value of equity	20,328 CDS contracts, 2,800 firm-quarters of 508 firms

TABLE 2
Descriptive Statistics

Variable	n	Mean	SD	Q1	Median	Q3
MV	20328	13,088	22,900	3,098	6,696	14,083
DEL_CDS_PRL	14044	0.007	0.144	−0.030	0.000	0.022
DEL_CDS_QTR	10992	0.000	0.448	−0.239	−0.070	0.117
CDS_PRM	18222	4.080	1.046	3.360	3.951	4.723
ROA	20328	0.012	0.023	0.004	0.011	0.021
DEL_ROA	20310	0.002	0.029	−0.002	0.001	0.005
LEV	20328	0.446	0.203	0.295	0.425	0.576
DEL_LEV	20328	−0.006	0.039	−0.026	−0.007	0.013
ACC	19828	−0.012	0.030	−0.022	−0.011	−0.001
OCF	19839	0.024	0.027	0.010	0.022	0.037
RATE	14936	10.395	3.006	9.000	11.000	12.000
EAR_SUR	19601	0.001	0.009	0.000	0.000	0.002
SD_RET	20318	0.018	0.009	0.013	0.016	0.022
SPOT	20328	2.285	0.910	1.270	2.120	3.320

This table provides descriptive statistics of the main variables used in the paper.

Variable Definitions:

MV = market value (in $MM) of equity at the end of fiscal quarter;
DEL_CDS_PRL = change in CDS premium in the three-day window centered on the preliminary earnings release date. It is computed as the CDS premium on the last day of the window divided by the CDS premium on the first day of the window minus 1;
DEL_CDS_QTR = change in the CDS premium during the quarter. It is computed as the premium on the first day after the SEC filing date of the current period divided by the premium on the first day after the SEC filing date of the previous quarter minus 1;
CDS_PRM = log of the CDS premium (in basis points) on the first day after the SEC filing date;
ROA = the return on assets, computed as quarterly net income before extraordinary items divided by total assets;
DEL_ROA = change in *ROA* and it is computed as *ROA* for current quarter minus *ROA* in the same quarter of the previous year;
LEV = leverage, computed as long-term debt scaled by the value of assets (market value of equity + book value total liabilities);
DEL_LEV = change in leverage;
ACC (*OCF*) = total quarterly accruals (operating cash flows) scaled by total assets in the previous quarter. Accruals are net income before extraordinary items minus net operating cash flows;
RATE = S&P short-term credit rating;
EAR_SUR = earnings surprise; it is calculated as actual I/B/E/S earnings minus the median analysts' forecast, scaled by price at quarter-end;
SD_RET = standard deviation of daily returns during the firm's current fiscal quarter; and
SPOT = one-year T-Bill rate.

change in *ROA* from the previous quarter has a mean (median) of 0.2 (0.1) percent, indicating that most firms exhibit positive earnings growth, which is consistent with the negative percentage change in the median CDS premium over the quarter. Leverage (*LEV*), estimated as total debt divided by market value of assets (computed as market value of equity plus total liabilities) at quarter end, has a mean (median) of 0.45 (0.43). The change in *LEV* over the quarter has a mean of −0.006, indicating a slight decrease in leverage. The quarterly net operating cash flow (accrual) scaled by total assets at the previous quarter-end has a mean (median) of 2.4 (−1.2) percent, which is in line with prior studies. The S&P senior debt rating for the sample observations (*RATE*) shows considerable variation, with ratings of AAA (code 2) through B− (Code 18) with a median rating of BBB (code 11). The earnings surprise (*EAR_SUR*) is computed as actual I/B/E/S EPS minus the most recent median forecast, scaled by share price. Table 2 shows that the mean earnings surprise for our sample firms is 0.001. Other variables that are important in determining CDS premia (the volatility of returns and the risk-free interest rate) show considerable variation during our sample period. Finally, untabulated results show that 17 percent, 22 percent, 23 percent, 20 percent, and 18 percent of the sample CDS contracts have initial maturities of 1, 3, 5, 7, and 10 years, respectively.

VI. RESULTS

Control Variables

The tests in this study are based primarily upon cross-sectional analysis. Thus, it is crucial to control for factors other than earnings that are known to affect swap spreads. The main firm-level determinants of the likelihood and severity of default in structural and hybrid models are financial leverage, the volatility of the firm's assets, the riskless rate of interest, and the (initial) maturity of the contact. More specifically, the higher the leverage and the more volatile the assets of the reference entity, the higher is the probability of a credit event and so the higher is the swap premium. In contrast, the higher the riskless rate of interest, the lower is the swap premium. Intuitively, a higher rate of interest increases the firm's wealth and makes bankruptcy less likely. The swap premium increases with the initial maturity of the contract because longer contract maturities increase the probability that a credit event will occur. We also control for credit ratings and the restructuring provisions of the CDS contract.[7] Credit ratings provide a noisy measure of credit risk and are employed in all the empirical CDS studies referenced above. We expect that the lower the credit rating of the reference entity, the higher is the swap premium.

Our tests involve firm random effects with year fixed effects panel-data regressions, for which the dependent variables are either levels or (percentage) changes in CDS premia and the independent variables are (changes in) earnings, and other model-driven and control variables specified above that are potentially important in explaining CDS premia.[8] Because the data include various CDS contracts for the same firm, significance of the coefficients is based on firm-clustered (Rogers) standard errors, following Petersen (2009). To reduce potential multicollinearity induced by interaction terms, we demean all continuous independent variables (Aiken and West 1991).

Levels Analysis

Table 3 presents the levels analysis (H1). The *BASE* column of Table 3, Panel A provides the baseline regression derived from structural models of CDS pricing. Except for the restructuring controls, *CUMR* and *EXR* (defined below), this regression is common to virtually all of the CDS studies cited. In the *BASE* regression, the log of the level of CDS premia one day after the SEC filing date is regressed on leverage (*LEV*), the risk-free rate of interest (*SPOT*), the volatility of returns (*SD_RET*), and the S&P credit rating (*RATE*). The indicator variables *CUMR* and *EXR* denote full restructuring and no restructuring, respectively. *Inter alia*, the intercept captures modified restructuring. The indicator variables *D_3* through *D_10* denote CDS maturities of three through ten years. Thus, the intercept captures CDS of one-year maturity as well.

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7 In contradistinction to the three earnings-related CDS levels studies surveyed above, we control for restructuring clauses since recent empirical and theoretical work by Packer and Zhu (2005) and Berndt et al. (2006) indicate that restructuring clauses are important determinants of CDS pricing.

8 Breusch-Pagan Lagrange Multiplier tests reject firm fixed effects in favor of firm random effects in all regressions.

TABLE 3
Levels Regression

Panel A: Regressions of CDS Premium on Earnings, and Cash Flow and Accruals[a]

	BASE	*ROA*	*CF_ACC*
Intercept	2.863***	6.261***	6.299***
	(0.000)	(0.000)	(0.000)
ROA		−3.242***	
		(0.005)	
OCF			−3.605***
			(0.002)
ACC			−2.921**
			(0.017)
LEV	2.343***	1.155***	1.136***
	(0.000)	(0.000)	(0.000)
SPOT	−0.134***	−0.118***	−0.116***
	(0.000)	(0.000)	(0.000)
SD_RET	16.067***	15.768***	15.708***
	(0.000)	(0.000)	(0.000)
RATE	0.046**	0.037**	0.037**
	(0.025)	(0.050)	(0.049)
CUMR	0.008	0.005	0.005
	(0.510)	(0.681)	(0.689)
EXR	−0.079***	−0.076***	−0.076***
	(0.000)	(0.000)	(0.000)
D_3	0.261***	0.261***	0.261***
	(0.000)	(0.000)	(0.000)
D_5	0.466***	0.467***	0.467***
	(0.000)	(0.000)	(0.000)
D_7	0.564***	0.565***	0.565***
	(0.000)	(0.000)	(0.000)
D_10	0.682***	0.682***	0.682***
	(0.000)	(0.000)	(0.000)
SIZE		−0.328***	−0.331***
		(0.000)	(0.000)
Adj. R^2	0.471	0.530	0.530
Chi-square	2,409***	2,586***	2,607***
n		12,242 contracts; 423 firms	

Panel B: Levels Regressions with Maturity Interaction[b]

	ROA	*CF_ACC*
Intercept	6.234***	6.263***
	(0.000)	(0.000)
ROA	−5.265***	
	(0.000)	
ROA_3	−0.387	
	(0.604)	
ROA_5	1.688*	
	(0.088)	

(*continued on next page*)

TABLE 3 (continued)

	ROA	***CF_ACC***
ROA_7	3.785*** (0.001)	
ROA_10	6.210*** (0.000)	
OCF		−5.361*** (0.000)
OCF_3		−0.633 (0.383)
OCF_5		1.344 (0.168)
OCF_7		3.423*** (0.002)
OCF_10		6.023*** (0.000)
ACC		−5.685*** (0.001)
ACC_3		−0.047 (0.960)
ACC_5		2.675** (0.034)
ACC_7		5.037*** (0.000)
ACC_10		7.415*** (0.000)
LEV	1.153*** (0.000)	1.135*** (0.000)
SPOT	−0.120*** (0.000)	−0.118*** (0.000)
SD_RET	15.811*** (0.000)	15.752*** (0.000)
RATE	0.037** (0.049)	0.037** (0.048)
CUMR	0.005 (0.683)	0.005 (0.692)
EXR	−0.075*** (0.000)	−0.075*** (0.000)
D_3	0.263*** (0.000)	0.264*** (0.000)
D_5	0.469*** (0.000)	0.469*** (0.000)
D_7	0.566*** (0.000)	0.567*** (0.000)
D_10	0.685*** (0.000)	0.685*** (0.000)
SIZE	−0.330*** (0.000)	−0.333*** (0.000)
Adj. R^2	0.531	0.531
Chi-square	3,230***	3,289***
n	12,242 contracts; 423 firms	

(*continued on next page*)

TABLE 3 (continued)

Panel C: Tests for Earnings, Accruals, and Cash Flows across Maturities[c]

	ROA	Accruals	Cash Flows
1-Year CDS	−5.265***	−5.685***	−5.361***
	(0.000)	(0.000)	(0.000)
3-Year CDS	−5.651***	−5.733***	−5.994***
	(0.000)	(0.000)	(0.000)
5-Year CDS	−3.577***	−3.010**	−4.017***
	(0.000)	(0.012)	(0.000)
7-Year CDS	−1.480	−0.648	−1.938
	(0.212)	(0.600)	(0.105)
10-Year CDS	0.945	1.730	0.663
	(0.424)	(0.163)	(0.580)

*, **, *** Indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

[a] Panel A shows the panel data regressions results of CDS premia on earnings, and on cash flows and accruals. The dependent variable is the (log of) CDS premium one day after the SEC filing date. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm. The two-tailed p-values of the coefficients are in parentheses.

[b] Panel B extends the results of the regressions in Panel A above by interacting earnings (*ROA*), and accruals and cash flows with the maturity indicator variables. The *ROA* coefficients with suffix i (i = 3,5,7,10) represent the interaction of *ROA* with *D_i*, an indicator variable equal to 1 if the CDS contract maturity is i years and 0 otherwise (i = 3,5,7,10). Thus, *ROA_i* represents the incremental effect of *ROA* on the premium of the CDS contract with maturity i over the impact of *ROA* on the premium of the CDS contract with one year to maturity. The *CF_ACC* column shows the results when we replace *ROA* with accruals and cash flows, respectively. To avoid potential multicollinearity and to be able to interpret the interactions correctly, *ROA, ACC* and *OCF* are demeaned prior to creating the interaction variables. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm.

[c] Panel C shows the overall coefficients for *ROA*, *ACC*, and *OCF* for the different maturities. For example, the *ROA* coefficient on the three-year CDS is equal to the *ROA* coefficient plus the *ROA_3* coefficient from Panel B. The two-tailed p-values of the coefficients are in parentheses.

Variable Definitions:

CUMR (EXR) = an indicator variable with 1 if the CDS contract has full restructuring clause (exclude restructuring) and 0 otherwise;

D_i = an indicator variable with 1 if the maturity of the contract equals i, and 0 otherwise, where i = 3,5,7,10;

SIZE = the log of market value; and

n = number of observations (CDS contracts and firms).

All other variables are defined in the notes of Table 2.

The highly significant *BASE* levels regression yields results that are consistent with the underlying theory of structural models. The coefficients for leverage and the volatility of returns are positive and highly significant ($p < 0.001$, two-tailed). The coefficient for the risk-free rate of interest is negative and highly significant ($p < 0.001$, two-tailed). The credit rating—the higher is the *RATE* variable, the lower the credit rating—is positive and significant ($p = 0.025$, two-tailed). As expected, CDS contracts without restructuring clauses (*EXR*) have significantly lower CDS premia than CDS contracts with restructuring clauses ($p < 0.001$, two-tailed). The insignificance of the *CUMR* coefficient indicates that there is no significant difference between full and modified restructuring clauses. Further, CDS premia increase significantly and monotonically with (initial) contract maturity ($p < 0.001$, two-tailed), consistent with the option-pricing theory underlying CDS contracts.

The *ROA* column includes earnings normalized by total assets (*ROA*) and firm size (*SIZE*) in addition to the structural model variables and bond ratings. *SIZE* is a proxy for accounting information certainty/transparency. The larger the firm, the less uncertain/more transparent is the accounting information. The inclusion of these latter variables is consistent with the hybrid model of Duffie and Lando (2001).[9] As expected, both the earnings and size coefficients are negative and highly significant ($p < 0.010$, two-tailed). The remaining coefficients are qualitatively similar to those of the *BASE* regression.

The *CF_ACC* column replaces *ROA* after decomposing earnings into its accrual/cash flow components. These components are scaled by total assets. Consistent with H4, both the accruals and cash flow components are negative and highly significant ($p < 0.020$ and $p < 0.010$, respectively, two-tailed). Although the accruals coefficient is smaller in absolute value than the cash flow coefficient, suggesting that accrual earnings are less credible to investors than cash flows, the difference is not significant based on clustered standard errors, but is significantly different using conventional robust standard errors (p-value = 0.002). The remaining coefficients are qualitatively similar to those from the *BASE* and *ROA* regressions.

The impact of earnings on CDS premia is likely to depend upon the (initial) maturity of the CDS contract—the shorter the maturity, the greater should be the impact of earnings on CDS premia. Panel B of Table 3 replicates the *ROA* and *CF_ACC* levels regressions of Panel A after interacting earnings, accruals, and cash flows with the maturity indicator variables, respectively. *ROA_i* represents the *incremental* effect of earnings on the CDS premium of maturity contract *i*, relative to the one-year maturity (*ROA*) contract, *i* = 3,5,7,10. (Similar notation is used for cash flows and accruals.) The ROA column regression in Panel B shows that increased earnings reduces CDS premia significantly for one-year maturities ($p < 0.001$, two-tailed). The *marginal* interaction coefficients are positive and significant (with the exception of the three-year maturity) and increase monotonically with maturity, as predicted, indicating weaker association as maturity increases. Similar monotonic relationships hold for both cash flows and accruals in the *CF_ACC* column. All other coefficients are qualitatively similar to those of the Panel A regressions.

Panel C of Table 3 shows the total (instead of marginal as in Panel B) maturity effects, computed by adding the marginal coefficient to the base one-year coefficient. The *ROA* column of Panel C indicates an almost monotonic inverse relation between earnings and CDS premia. The relation is significant for all but the seven- and ten-year maturities. The same near-monotonic relation holds for both cash flows and accruals. Similar to *ROA*, the relations are significant for all maturities except for the seven- and ten-year maturities.

We also estimate the economic impact of *ROA*, accruals, and cash flows, for the different maturities. We find that the impact of a 1 percent change in *ROA* would change the CDS premium by between 5 to 6 basis points irrespective of the contract maturity. Similar patterns characterize cash flows and accruals. A 1 percent change in cash flows scaled by total assets (accruals scaled by total assets) would change the CDS premium by between 5 to 6 (4 to 5) basis points, irrespective of the maturity.[10]

Overall, the results in Table 3 are consistent with H1 and H4. Earnings, cash flows and accruals are significantly and inversely related to CDS premia for all but the longest CDS maturities, and the relations decline almost monotonically with maturity.

[9] Initially, we also included the standard deviation of earnings as an additional measure of accounting information certainty/transparency, but it proved to be insignificant in all regressions.

[10] We obtain economic significance by measuring the dependent variable as a percent (number of basis points divided by 100). This specification is more convenient for estimating the economic impact because the coefficients of the independent variables represent the impact of 1 percent change in the variables on CDS premia (in basis points).

Changes Analysis

The panel data levels analysis assumes *inter alia* that CDS premia are stationary. If CDS premia are nonstationary, then levels regressions will generally yield biased coefficient estimates and biased standard errors. To test for intercept and trend stationarity, we use the KPSS test statistic (Kwiatkowski et al. 1992) for (unbalanced) panel data developed by Hadri and Larsson (2005). We find that stationarity of CDS premia levels can be uniformly rejected for all maturities and for all restructuring clauses. In contrast, stationarity often cannot be rejected for changes in CDS premia. To mitigate concerns about stationarity and omitted correlated variables, we investigate the relation between earnings and CDS rates using a changes analysis.

Table 4 tests H2 regarding quarterly changes in CDS premia. Since CDS instruments trade in an over-the-counter market, it is not possible to see how CDS rates change over time for the same contract. Instead, we measure quarterly changes by comparing two different contracts with the same contractual features for the same reference entity. The existence of multiple contracts from the same reference entity makes such an analysis possible. To the extent that this induces noise into the dependent variable, it should bias against finding meaningful results.[11]

The dependent variable is the quarterly percentage change in the CDS premium as computed from one day after the prior quarter's SEC filing date to one day after the current quarter's SEC filing date.[12] We favor this window because all quarterly financial statement information becomes available to the market on the SEC filing date. Except for the indicator variables, the independent variables in Table 4 are the quarterly changes in the independent variables of the levels analysis (Table 3). Because positive changes in ratings have different implications for credit risk than negative changes, we separate ratings changes into positive and negative components.

The *BASE* column in Panel A of Table 4 provides coefficient estimates for the baseline changes model. The change in the CDS premium is positively and significantly related to the change in leverage ($p = 0.022$, two-tailed). As expected, the change in the CDS premium is positively (negatively) and significantly related to the change in the volatility of returns (the risk-free rate) ($p < 0.010$, two-tailed). The change in the CDS premium is also positively and significantly related to decreases in the credit rating ($p = 0.004$, two-tailed), but is not significantly related to increases in the credit rating ($p = 0.674$, two-tailed). Further, the change in the CDS premium is monotonically related to maturity, but the relation is significant only for higher maturities. Finally, changes in CDS premia are unrelated to restructuring clauses, probably reflecting the fact that restructuring clauses for our sample are sticky over time.

The *ROA* column in Panel A of Table 4 includes changes in *ROA and* the equity stock return in addition to the *BASE* regression explanatory variables. The change in *ROA* coefficient is negative and significant ($p = 0.023$, two-tailed) consistent with H2. The equity return variable is also negative and significant ($p < 0.001$, two-tailed). These results indicate that earnings convey information about firm credit risk beyond the information contained in equity returns. Except for leverage, which remains positive but insignificant at conventional levels, the remaining coefficients are qualitatively similar to the *BASE* regression.

The *CF_ACC* column breaks down the change in earnings into changes in accruals and cash flows. Both the changes in accruals ($p = 0.042$, two-tailed) and cash flows (p

[11] Some noise is inevitable since no data are available regarding the parties to the transactions beyond the same reference entity. Thus, the contracts whose rates are compared may involve different contracting parties, and consequently different counterparty risk.

[12] Similar results obtain when the dependent variables is measured as the change in CDS premia.

TABLE 4
Regressions of the Changes in Quarterly CDS Premia (Premice)

Panel A: Regression of the Change in Quarterly CDS Premium on the Change in Earnings, Cash Flows, and Accruals[a]

	BASE	*ROA*	*CF_ACC*
Intercept	−0.015 (0.813)	−0.023 (0.717)	−0.023 (0.705)
DEL_ROA		−1.693** (0.023)	
DEL_OCF			−2.088** (0.024)
DEL_ACC			−1.539** (0.042)
DEL_LEV	0.813** (0.022)	0.407 (0.235)	0.381 (0.258)
DEL_SPOT	−0.329*** (0.001)	−0.329*** (0.000)	−0.328*** (0.000)
DEL_SDRET	7.483*** (0.000)	7.195*** (0.000)	7.307*** (0.000)
POS_DRATE	−0.027 (0.674)	−0.037 (0.490)	−0.038 (0.485)
NEG_DRATE	0.212*** (0.004)	0.177*** (0.004)	0.177*** (0.004)
CUMR	−0.012 (0.425)	−0.004 (0.776)	−0.004 (0.777)
EXR	−0.008 (0.391)	−0.009 (0.338)	−0.009 (0.341)
D_3	−0.004 (0.662)	−0.006 (0.527)	−0.006 (0.546)
D_5	0.014 (0.188)	0.011 (0.279)	0.012 (0.266)
D_7	0.019* (0.098)	0.014 (0.196)	0.014 (0.190)
D_10	0.024** (0.040)	0.020* (0.082)	0.020* (0.080)
EQ_RET		−0.669*** (0.000)	−0.668*** (0.000)
Adj. R^2	0.29	0.332	0.333
Chi-square	358***	406***	408***
n		7,225 contracts; 362 firms	

Panel B: Changes Regressions with Maturity Interaction[b]

	ROA	*CF_ACC*
Intercept	−0.027 (0.660)	−0.027 (0.657)
DEL_ROA	−1.152 (0.269)	
DEL_ROA_3	−0.757 (0.193)	

(*continued on next page*)

TABLE 4 (continued)

	ROA	***CF_ACC***
DEL_ROA_5	−0.613	
	(0.379)	
DEL_ROA_7	−0.796	
	(0.309)	
DEL_ROA_10	−0.342	
	(0.674)	
DEL_OCF		−2.142*
		(0.087)
DEL_OCF_3		−0.189
		(0.788)
DEL_OCF_5		0.169
		(0.837)
DEL_OCF_7		−0.133
		(0.880)
DEL_OCF_10		0.439
		(0.631)
DEL_ACC		−0.833
		(0.434)
DEL_ACC_3		−0.815
		(0.192)
DEL_ACC_5		−0.796
		(0.272)
DEL_ACC_7		−0.994
		(0.220)
DEL_ACC_10		−0.651
		(0.447)
DEL_LEV	0.406	0.384
	(0.236)	(0.252)
DEL_SPOT	−0.329***	−0.330***
	(0.000)	(0.000)
DEL_SDRET	7.203***	7.299***
	(0.000)	(0.000)
POS_DRATE	−0.037	−0.037
	(0.493)	(0.487)
NEG_DRATE	0.177***	0.176***
	(0.004)	(0.004)
CUMR	−0.004	−0.004
	(0.770)	(0.789)
EXR	−0.009	−0.009
	(0.335)	(0.347)
D_2	−0.006	−0.006
	(0.519)	(0.553)
D_3	0.011	0.012
	(0.277)	(0.254)
D_4	0.014	0.015
	(0.194)	(0.177)
D_5	0.020*	0.021*
	(0.082)	(0.072)

(*continued on next page*)

TABLE 4 (continued)

	ROA		CF_ACC
EQ_RET	−0.669***		−0.665***
	(0.000)		(0.000)
Adj. R^2	0.329		0.330
Chi-square	419***		466***
n		7,225 contracts; 362 firms	

Panel C: Tests for Change in Earnings, Accruals, and Cash Flows across Maturities[c]

	DEL_ROA	*DEL_ACC*	*DEL_OCF*
1-Year CDS	−1.152	−0.833	−2.142*
	(0.269)	(0.434)	(0.087)
3-Year CDS	−1.909**	−1.649*	−2.331**
	(0.028)	(0.066)	(0.023)
5-Year CDS	−1.765**	−1.630**	−1.973**
	(0.013)	(0.024)	(0.024)
7-Year CDS	−1.948**	−1.827**	−2.275**
	(0.012)	(0.017)	(0.018)
10-Year CDS	−1.494**	−1.485**	−1.703*
	(0.050)	(0.050)	(0.073)

*, **, *** Indicates statistical significance at the 10 percent, 5 percent, 1 percent levels, respectively.

[a] Panel A shows the regression results of the quarterly change in CDS premia on the change in earnings and the change in accruals and cash flows. The dependent variable is the change in CDS premium during the quarter (*CDS_QTR*). The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm. The two-tailed p-values of the coefficients are in parentheses.

[b] Panel B shows the results of the regressions in Panel A above when interacting *DEL_ROA*, *DEL_ACC*, and *DEL_OCF* with the maturity dummies. The *DEL_ROA* coefficients with suffix i (i = 3,5,7,10) represent the interaction of *DEL_ROA* with *D_i*, an indicator variable equal to 1 if the CDS contract maturity is i, and 0 otherwise. Thus, *DEL_ROA_i* represents the incremental effect of *DEL_ROA* on the premium of the CDS contract with maturity i over the impact of *DEL_ROA* on the premium of the CDS contract with 1 year to maturity. The *CF_ACC* column replaces *DEL_ROA* with *DEL_ACC* and *DEL_OCF*. To avoid potential multicollinearity and to be able to interpret interactions correctly, *DEL_ROA*, *DEL_ACC*, and *DEL_OCF* are demeaned prior to creating the interaction variables. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm.

[c] Panel C shows the overall coefficients for *DEL_ROA*, *DEL_ACC*, and *DEL_OCF* for the different maturities. For example, the *DEL_ROA* coefficient on the three-year CDS equals the *DEL_ROA* coefficient plus the *DEL_ROA_3* coefficient from Panel B. The two-tailed p-values of the coefficients are in parentheses.

Variable Definitions:
DEL_ACC (*DEL_OCF*) = change in accruals (cash flows);
DEL_SPOT = change in the one-year T-Bill rate;
DEL_SDRET = change in the standard deviation of the firm's stock return during the quarter from the previous quarter;
NEG_DRATE (*POS_DRATE*) = an indicator variable equal 1 if the firm experienced a decrease (increase) in credit rating, and 0 otherwise;
EQ_RET = firm's stock return from the first day after the previous SEC filing date to the first day after the current quarter SEC filing date; and
n = number of observations (*CDS* contracts and firms).
All other variables are as defined in previous tables.

= 0.024, two-tailed) are significant and negative. Again, the accruals changes coefficient is smaller in absolute value than the cash flow changes coefficient, suggesting that accrual earnings are less credible to investors than cash flows. However, the *difference* between the cash flow and accrual earnings coefficients is not significant at conventional levels based on robust clustered standard errors. Using conventional robust standard errors instead, we reject the hypothesis that the coefficients are equal ($p = 0.007$). Further, the coefficient on the change in leverage is significant ($p = 0.001$). The remaining coefficients are qualitatively similar to those obtained in the *BASE* and *ROA* regressions.

Panel B of Table 4 replicates Panel A, inclusive of interaction terms in which maturity is interacted with changes in *ROA*, accruals, and cash flows. Although negatively related to changes in CDS premia, and almost monotonically decreasing in absolute value with maturity, none of the *marginal* interaction terms are significant in the *ROA* column. Similarly, none of the cash flow or accrual changes interaction terms are significant.

Panel C of Table 4 lists the total (as opposed to marginal) coefficients for all maturities. The change in the CDS premium is negatively related to changes in *ROA*, changes in cash flows and changes in accruals, significantly so for all but the one-year maturity. There is no apparent explanation for why the one-year maturity differs from the other maturities. When we replicate the same regressions for only the one-year maturity earnings, accruals, and cash flows (untabulated) we still find that the coefficients on earnings ($p = 0.150$, two-tailed) and accruals ($p = 0.300$, two-tailed) are not statistically significant, while the coefficient on cash flows is significant ($p < 0.050$). Thus, the insignificance of the change in earnings appears to be driven by the lack of significance of accruals, which tend to reverse within one year.

The economic impact of *ROA*, accruals, and cash flows is fairly similar across different maturities. Specifically, a 1 percent change in *ROA* modifies the CDS premium by between 3.5 and 4.5 basis points. Repeating the analysis for accruals and cash flows, we find that a 1 percent change in cash flows (accruals) scaled by total assets alters the CDS premium by about 5 (4) basis points, irrespective of contract maturity.

Event Study Analysis

Table 5 tests H3, the relation between short-window changes in CDS premia in the three days centered on the preliminary earnings announcements. As with our earlier analyses, these changes are measured by comparing two different contracts with the same contractual features for the same reference entity over the short window. Panel A of Table 5 regresses the percentage change of the CDS premium on the earnings surprise, controlling for restructuring clauses and contract maturity. The first column of Panel A shows that there is a significant inverse relation between the earnings surprise and the changes in the CDS premium over this short window ($p = 0.017$, two-tailed).

Following Ball and Brown (1968), a large literature indicates that security returns incorporate the information conveyed by earnings. Thus, it is possible that earnings per se will not provide the CDS market with credit default information beyond that contained in equity markets. Column (2) of Table 5, Panel A controls for cumulative equity returns over the same three-day window. The earnings surprise coefficient remains negative but only marginally significant ($p = 0.091$, two-tailed). The equity return is negative and highly significant ($p < 0.001$, two-tailed).

Column (3) of Table 5, Panel A includes interaction terms of earnings with maturity (denoted by *EAR_SUR* for the one-year maturity and *EAR_SUR_i* for maturities $i = 3,5,7,10$). Results indicate that marginal impact of earnings is negative and significant ($p = 0.013$, two-tailed) for the one-year maturity CDS instruments. Together with Panel B, which shows total earnings coefficients, evidence indicates that the information conveyed by earnings alone (beyond the earnings information contained in equity returns) is concentrated in shorter term maturities (one and three years).

TABLE 5
Changes in CDS Premia around Preliminary Earnings Release Date

Panel A: Regression of the Change in CDS Premium on Earnings Surprise[a]

	1	2	3	4	5
Intercept	−0.007	−0.004	−0.005	−0.004	−0.005
	(0.484)	(0.688)	(0.647)	(0.670)	(0.600)
EQ_RET		−0.313***	−0.313***		
		(0.000)	(0.000)		
RES_RET				−0.319***	−0.319***
				(0.000)	(0.000)
EAR_SUR	−1.400**	−0.811*		−1.392***	
	(0.017)	(0.091)		(0.002)	
EAR_SUR_3			−1.265**		−1.834***
			(0.013)		(0.001)
EAR_SUR_5			0.302		0.288
			(0.700)		(0.711)
EAR_SUR_7			0.642		0.635
			(0.418)		(0.419)
EAR_SUR_10			0.722		0.702
			(0.414)		(0.425)
CUMR			0.445		0.434
			(0.595)		(0.601)
EXR	0.002	0.002	0.002	0.002	0.002
	(0.558)	(0.644)	(0.648)	(0.621)	(0.621)
D_3	0.002	0.002	0.002	0.002	0.002
	(0.336)	(0.443)	(0.441)	(0.434)	(0.431)
D_5	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.913)	(0.873)	(0.861)	(0.873)	(0.862)
D_7	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.924)	(0.930)	(0.924)	(0.924)	(0.918)
D_10	0.002	0.002	0.002	0.002	0.002
	(0.484)	(0.501)	(0.505)	(0.490)	(0.493)
Adj. R^2	0.009	0.043	0.043	0.043	0.043
Chi-square	12.39	62***	74***	62***	74***
n	9,109 contracts; 383 firms				

Panel B: Tests for Earnings Surprise across Maturities[b]

	EQ_RET	*RES_RET*
1-Year CDS	−1.265**	−1.834***
	(0.013)	(0.000)
3-Year CDS	−0.963*	−1.546***
	(0.066)	(0.001)
5-Year CDS	−0.623	−1.199**
	(0.234)	(0.015)
7-Year CDS	−0.543	−1.132*
	(0.620)	(0.054)
10-Year CDS	−0.820	−1.400***
	(0.156)	(0.010)

(*continued on next page*)

TABLE 5 (continued)

*, **, *** Indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

[a] Panel A shows the results of the analysis of the change in CDS premia in the three-day window around the preliminary earnings release date. The dependent variable is the change in CDS premium over the three days centered on the preliminary earnings release date.

[b] Panel B shows the overall coefficients for *EAR_SUR* for the different maturities. For example, the *EAR_SUR* coefficient on the three-year CDS equals to the *EAR_SUR* coefficient plus the *EAR_SUR_3* coefficient from Panel B.

Variable Definitions:

EAR_SUR = earnings surprise (see exact definition in the notes to Table 2);
EQ_RET = equity return during the three-day preliminary earnings window;
RES_RET = residual from the regression of *EQ_RET* on *EAR_SUR*. The *EAR_SUR* coefficients with suffix *i* (i = 3,5,7,10) represent the interaction of *EAR_SUR* with *D_i*, an indicator variable equal 1 if the CDS contract maturity is *i*, and 0 otherwise. Thus, *EAR_SUR_i* represents the incremental effect of *EAR_SUR* on the premium of the CDS contract with maturity *i* over the impact of *EAR_SUR* on the premium of the CDS contract with one year to maturity. To avoid potential multicollinearity and to be able to interpret interactions correctly, *EAR_SUR* is demeaned prior to creating the interaction variables; and
n = number of observations (*CDS* contracts and firms).

The other control variables are defined in previous tables. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm. The two-tailed p-values of the coefficients are in parentheses.

Although it may be that earnings convey little credit risk information beyond equity returns, this does not mean that earnings in total have a marginal impact on CDS pricing since, after all, cumulative equity returns around earnings announcements are driven primarily by earnings information.[13] To see the extent to which earnings per se convey credit risk information over the short window, whether directly or indirectly through equity prices, we regress cumulative equity returns over the short window on earnings. The residual of this regression (denoted *RES_RET*) measures the information contained in equity prices *other than earnings*. Column (4) of Table 5 regresses CDS rates on the earnings surprise and on *RES_RET*. Both the earnings surprise and *RES_RET* coefficients are negative and highly significant ($p = 0.002$ and $p < 0.001$, two-tailed, respectively). Column (5) replicates this regression after interacting the earnings surprise with the different CDS contract maturities. Panel B shows that once earnings are defined all-inclusively to include the earnings information about credit risk conveyed by equity prices, earnings provide significant credit risk information for all CDS maturities.

Tables 6 and 7 test for the nonlinearity of debt holder payoff functions in CDS markets. Table 6 shows the levels, quarterly changes, and short-window results when the firms are divided into high- and low-ratings firms, with a rating of BBB and below defined as low. Panel A shows the levels regression. The column labeled *ROA* regresses CDS premia on earnings decomposed into earnings for high- and low-ratings firms. The coefficient for low-ratings firms is negative and highly significant ($p = 0.005$, two-tailed), whereas the coefficient for high-ratings firms is negative and only significant at the one-tailed level ($p = 0.132$, two-tailed). Moreover, the low-ratings coefficient is larger in absolute value than the high-ratings coefficient, although the difference is not statistically different at conventional levels.[14] The column labeled *CF_ACC* decomposes earnings into cash flows and

[13] Although Callen et al. (2006) show that both risk and earnings drive security returns around short-window preliminary earnings announcements, earnings are by far the primary driver.

[14] Again, using a conventional or robust standard error, we would reject equality.

TABLE 6
Nonlinearity of the CDS Premium and Earnings Relation by High/Low Credit Ratings

Panel A: Levels Analysis[a]

	ROA	*CF_ACC*
Intercept	6.238***	6.227***
	(0.000)	(0.000)
ROA_HI	−2.261	
	(0.132)	
ROA_LO	−4.240***	
	(0.005)	
OCF_HI		−2.416
		(0.105)
OCF_LO		−4.590***
		(0.003)
ACC_HI		−2.581*
		(0.098)
ACC_LO		−3.264*
		(0.050)
LEV	1.146***	1.139***
	(0.000)	(0.000)
SPOT	−0.117***	−0.114***
	(0.000)	(0.000)
SD_RET	15.808***	15.857***
	(0.000)	(0.000)
RATE	0.039**	0.042**
	(0.041)	(0.032)
CUMR	0.004	0.005
	(0.706)	(0.640)
EXR	−0.075***	−0.075***
	(0.000)	(0.000)
D_3	0.261***	0.261***
	(0.000)	(0.000)
D_5	0.467***	0.467***
	(0.000)	(0.000)
D_7	0.565***	0.565***
	(0.000)	(0.000)
D_10	0.682***	0.682***
	(0.000)	(0.000)
SIZE	−0.328***	−0.330***
	(0.000)	(0.000)
Adj. R^2	0.529	0.529
Chi-square	2670***	2740***
n	12,220 contracts; 423 firms	

Panel B: Changes in Quarterly CDS Premiums[b]

	ROA	*CF_ACC*
Intercept	−0.014	−0.014
	(0.829)	(0.818)
DEL_ROA_HI	−2.342	
	(0.160)	

(*continued on next page*)

TABLE 6 (continued)

	ROA	*CF_ACC*
DEL_ROA_LO	−1.203* (0.096)	
DEL_OCF_HI		−2.496 (0.143)
DEL_OCF_LO		−1.598 (0.159)
DEL_ACC_HI		−2.271 (0.194)
DEL_ACC_LO		−0.972 (0.177)
DEL_LEV	0.306 (0.388)	0.287 (0.412)
DEL_SPOT	−0.304*** (0.001)	−0.303*** (0.001)
DEL_SDRET	6.628*** (0.000)	6.733*** (0.000)
NEG_DRATE	−0.031 (0.565)	−0.031 (0.571)
POS_DRATE	0.178*** (0.003)	0.178*** (0.003)
CUMR	−0.007 (0.651)	−0.007 (0.632)
EXR	−0.011 (0.243)	−0.011 (0.249)
D_2	−0.006 (0.520)	−0.006 (0.537)
D_3	0.011 (0.278)	0.012 (0.270)
D_4	0.014 (0.204)	0.014 (0.198)
D_5	0.020* (0.097)	0.020* (0.095)
EQ_RET	−0.697*** (0.000)	−0.695*** (0.000)
Adj. R^2	0.333	0.333
Chi-square	410***	427***
n	7,102 contracts; 350 firms	

Panel C: Changes in CDS Premia around Preliminary Earnings Announcements[c]

	1	2
Intercept	−0.004 (0.685)	−0.004 (0.639)
EQRET	−0.314*** (0.000)	
RES_RET		−0.314*** (0.000)
EAR_SUR_LO	−0.847* (0.093)	−1.450*** (0.002)

(*continued on next page*)

TABLE 6 (continued)

	1	**2**
EAR_SUR_HI	−0.178 (0.919)	−0.781 (0.652)
CUMR	0.002 (0.639)	0.002 (0.639)
EXR	0.002 (0.434)	0.002 (0.434)
D_3	−0.000 (0.876)	−0.000 (0.876)
D_5	−0.000 (0.933)	−0.000 (0.933)
D_7	0.002 (0.501)	0.002 (0.501)
D_10	0.003 (0.278)	0.003 (0.278)
Adj. R^2	0.043	0.043
Chi-square	62***	62**
n	9,109 contacts; 383 firms	

*, **, *** Indicates statistical significance at the 10 percent, 5 percent, 1 percent level, respectively.

Table 6 shows the results of the analysis of the impact of earnings on CDS premia conditioned on high/low credit ratings. We define high ratings as BBB+ (Code 10) and up, and low ratings as BBB (Code 11) and below. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm.

[a] Panel A shows the levels analysis.

[b] Panel B shows the quarterly regression analysis.

[c] Panel C shows the analysis of the change in CDS premiums in the three-day window around the preliminary earnings release date.

Variable Definitions:

ROA_HI (*ROA_LO*) = *ROA* if credit rating is high (low) and 0 otherwise; *OCF_HI* (*OCF_LO*) and *ACC_HI* (*ACC_LO*) are defined similarly;

DEL_ROA_HI (*DEL_ROA_LO*) = *DEL_ROA* if credit rating is high (low) and 0 otherwise; *DEL_OCF_HI* (*DEL_OCF_LO*) and *DEL_ACC_HI* (*DEL_ACC_LO*) are defined similarly;

EAR_SUR_HI (*EAR_SUR_LO*) = *EAR_SUR* if credit rating is high (low); and

n = number of observations.

All other variables are defined in Tables 3, 4, and 5.

accruals for high-/low-ratings firms. Coefficients other than cash flow high ratings are negative and significant at conventional two-tailed levels. The coefficient for cash flow high-ratings firms is negative and marginally significant (p = 0.105, two-tailed). Again, the low-ratings coefficients are larger than the high-ratings coefficients in absolute values for both cash flows and accruals, but the differences are not significant at conventional levels. Note that the cash flow low-ratings coefficient is larger in absolute value than the accrual low-ratings coefficient (p-value = 0.09, two-tailed) consistent with accruals conveying less information about credit risk than cash flows.

Nonlinearity is also apparent when examining the economic impact of earnings, cash flows, and accruals for high-/low-ratings firms. Earnings information has much greater economic impact on CDS for low-ratings firms. Specifically, a 1 percent change in *ROA*, cash flows, or accruals of low-ratings firms changes CDS premia by close to 10 basis points (approximately 20 percent), whereas a similar change in any of these variables for high-ratings firms has almost no economically or statistically significant impact on CDS premia.

Panel B of Table 6 shows the quarterly changes regression. The column labeled *ROA* shows the regression of the quarterly change in CDS premia on the change in earnings, decomposed into changes in earnings for high- and low-ratings firms. The low-ratings earnings coefficient is significant and negative ($p = 0.096$, two tailed). The high-ratings earnings coefficient is significant and negative only at the one-tailed level ($p = 0.160$, two-tailed). The further breakdown of earnings into accruals and cash flows yields negative but insignificant coefficients. Similarly, the changes analysis indicates no significant difference between high-/low-ratings firms regarding earnings and its components.

Column 1 of Table 6, Panel C shows the short-window analysis, with the earnings surprise decomposed into high- and low-ratings firms controlling for stock returns. The high-ratings earnings surprise coefficient is not significant, whereas the low-ratings coefficient is negative and significant ($p = 0.093$, two-tailed). The equity return is negative and highly significant. Column 2 shows the results when we replace equity return with the residual from the regression of stock return on the earnings surprise. The results are virtually identical—the earnings surprise coefficient is significant only for low credit ratings firms.

Table 7, Panel A shows the levels regression for firms with *ROA* above and below the industry median. We define an indicator variable (*LOWEARN*) equal to 1 if earnings are below the median, and 0 otherwise. In addition to the separate regressors *ROA* and *LOWEARN*, the independent variables also include their interaction (*LOWEARN* * *ROA*). The column labeled *ROA* shows that *LOWEARN* is positive and highly significant ($p = 0.006$, two-tailed) consistent with CDS premia being higher for below median earnings firms. More importantly, although the above median earnings coefficient is not significant, Panel B indicates that the below median earnings coefficient of -3.119 ($= 1.234 - 4.353$) is negative and significant ($p = 0.062$, two-tailed). The asymmetric reaction of CDS premia to earnings is consistent with debt holders being more concerned with poor earnings. The column labeled *CF_ACC* in Panel A and the analysis in Panel B show similar results for cash flows and accruals. More specifically, the cash flow coefficient of -3.453 ($= 0.978 - 4.431$) is negative and significant ($p = 0.051$, two-tailed) for below median earnings firms and insignificant for above median earnings firms. The accruals coefficient is negative and significant only at the one-tailed level for above median earnings firms ($p = 0.111$, two-tailed). As with high-/low-ratings firms, we find that the economic impact of *ROA*, cash flows, and accruals is economically and statistically significant for firms with earnings below the median. A 1 percent change in *ROA*, cash flows, or accruals for firms that have *ROA* below the median would change the CDS premium by 7, 7.2, and 6.5 basis points, respectively. The impact of a change in either variable for firms with ROA above the median is not economically or statistically significant.

Panels C and D of Table 7 show a similar but stronger pattern of results for the changes regression. Specifically, we find that the change in *ROA* (accruals, cash flow) is significantly and negatively related to the change in CDS premia only for firms with *ROA* (accruals, cash flow) below the median. Consistent with the levels analysis, the changes analysis also indicates that changes in *ROA*, cash flows, and accruals have a significant economic impact on CDS premia only for firms with *ROA* below the median. For these firms, a 1 percent change in *ROA*, cash flows, or accruals alters the CDS premium by 4.4, 6, and 4 basis points, respectively. In contrast, untabulated results indicate that the short-window event study analysis does not confirm the asymmetry findings of the levels and changes analyses, consistent with Datta and Dhillon (1993) and in contradiction to those of Easton et al. (2007) and DeFond and Zhang (2008) in the corporate bond market.

To test the robustness of our results, we undertook a number of further (untabulated) analyses. We examine whether results are sensitive to the inclusion of the standard deviation

TABLE 7
Nonlinearity of the CDS Premium and Earnings Relation by ROA Above/Below the Industry Median

Panel A: Levels Analysis[a]

	ROA	*CF_ACC*
Intercept	6.177***	6.192***
	(0.000)	(0.000)
LOWEARN	0.150***	0.151***
	(0.006)	(0.005)
ROA	1.234	
	(0.528)	
*LOWEARN * ROA*	−4.353	
	(0.104)	
OCF		0.978
		(0.611)
*LOWEARN * OCF*		−4.431
		(0.107)
ACC		1.792
		(0.402)
*LOWEARN * ACC*		−4.403
		(0.110)
LEV	1.103***	1.094***
	(0.000)	(0.000)
SPOT	−0.116***	−0.113***
	(0.000)	(0.000)
SD_RET	15.965***	15.906***
	(0.000)	(0.000)
RATE	0.037**	0.037**
	(0.050)	(0.048)
CUMR	0.005	0.005
	(0.651)	(0.643)
EXR	−0.075***	−0.075***
	(0.000)	(0.000)
D_3	0.261***	0.261***
	(0.000)	(0.000)
D_5	0.467***	0.467***
	(0.000)	(0.000)
D_7	0.565***	0.565***
	(0.000)	(0.000)
D_10	0.683***	0.683***
	(0.000)	(0.000)
SIZE	−0.331***	−0.331***
	(0.000)	(0.000)
Adj. R^2	0.534	0.534
Chi-square	2626***	2659***
n	12,220 contracts; 423 firms	

(*continued on next page*)

TABLE 7 (continued)

Panel B: Tests for Earnings below the Median[b]

*DEL_ROA + LOWEARN * DEL_ROA*	−3.119* (0.062)	
*DEL_OCF + LOWEARN * DEL_OCF*		−3.453* (0.051)
*DEL_ACC + LOWEARN * DEL_ACC*		−2.611 (0.111)

Panel C: Changes in Quarterly CDS Premiums[c]

	ROA	***CF_ACC***
Intercept	−0.033 (0.595)	−0.035 (0.564)
LOWEARN	0.019 (0.520)	0.021 (0.469)
DEL_ROA	−0.576 (0.683)	
*LOWEARN * DEL_ROA*	−1.459 (0.379)	
DEL_OCF		−0.638 (0.664)
*LOWEARN * DEL_OCF*		−2.356 (0.224)
DEL_ACC		−0.496 (0.743)
*LOWEARN * DEL_ACC*		−1.300 (0.456)
DEL_LEV	0.399 (0.243)	0.374 (0.259)
DEL_SPOT	−0.331*** (0.000)	−0.325*** (0.000)
DEL_SDRET	7.282*** (0.000)	7.369*** (0.000)
POS_DRATE	−0.041 (0.447)	−0.042 (0.441)
NEG_DRATE	0.178*** (0.004)	0.177*** (0.004)
CUMR	−0.005 (0.747)	−0.005 (0.728)
EXR	−0.008 (0.352)	−0.008 (0.384)
D_3	−0.006 (0.546)	−0.005 (0.572)
D_5	0.012 (0.270)	0.012 (0.255)
D_7	0.014 (0.197)	0.015 (0.187)
D_10	0.020* (0.085)	0.020* (0.081)

(*continued on next page*)

TABLE 7 (continued)

	ROA	*CF_ACC*
EQRET	−0.669***	−0.662***
	(0.000)	(0.000)
Adj. R^2	0.334	0.335
Chi-square	409***	412***
n	7,225 contracts; 362 firms	
Panel D: Tests for Earnings below the Median[d]		
*DEL_ROA + LOWEARN * DEL_ROA*	−2.036**	
	(0.017)	
*DEL_OCF + LOWEARN * DEL_OCF*		−2.994**
		(0.026)
*DEL_ACC + LOWEARN * DEL_ACC*		−1.796**
		(0.034)

*, **, *** Indicates statistical significance at the 10 percent, 5 percent, 1 percent levels, respectively. The regressions are estimated using firm random effects with year fixed effects (suppressed). We use robust standard errors clustered by firm. The two-tailed p-values of the coefficients are in parentheses.

[a] Panel A shows the results of the analysis of the impact of earnings on CDS premia conditioned on *ROA* below/above the three-digit industry median *ROA*.

[b] Panel B shows the overall coefficients for *ROA*, *ACC*, and *OCF* for low *ROA* firms. For example, the coefficient on *ROA* below the median equals the *ROA* coefficient plus the *LOWEARN * ROA* coefficient.

[c] Panel C shows the results of the analysis of the impact of earnings changes on changes in CDS premia conditioned on *ROA* below/above the three-digit industry median *ROA*. *LOWEARN * DEL_ROA*, *LOWEARN * DEL_ACC*, and *LOWEARN * DEL_OCF* are the interaction variables of *LOWEARN* with *DEL_ROA*, *DEL_ACC*, and *DEL_OCF*, respectively.

[d] Panel D shows the overall coefficients for *DEL_ROA*, *DEL_ACC*, and *DEL_OCF* for low *ROA* firms. For example, the coefficient on *DEL_ROA* below the median equals the *DEL_ROA* coefficient plus the *LOWEARN * DEL_ROA* coefficient.

Variable Definitions:

LOWEARN = an indicator variable with 1 if *ROA* is below the industry median *ROA*, and 0 otherwise; *LOWEARN * ROA*, *LOWEARN * ACC*, and *LOWEARN * OCF* are the interaction variables of *LOWEARN* with *ROA*, *ACC* and *OCF*, respectively; and

n = number of observations.

All other variables defined in Tables 3 and 4.

of *ROA* and the market-to-book ratio. In the levels analysis, we include stock returns and the return on the S&P 500 index as proxies for changes in the economic condition of the company and the economy in general. We also control for the slope of the yield curve, defined as the difference between the ten-year and one-year Treasury Bill rates, which serves as a proxy for expectations about future interest rate changes. In the changes regression of Table 3, we include the return on the S&P 500 and the level of earnings among the independent variables and also control for size. We further interact equity returns and all other control variables with maturities. We also redefine leverage to be long-term debt to total assets and redefine the earnings surprise to be standardized unexpected earnings (or its rank), estimated as earnings for quarter t minus earnings for quarter $t-4$ less a drift term scaled by the standard deviation of earnings surprises in the previous eight quarters. The results are robust to these changes.

VII. CONCLUSION

This study examines the relation between CDS and accounting information. Notwithstanding the role of CDS in risk management, overexposure to CDS is seen as one of the drivers of the recent financial crisis. The sharp increase in CDS rates are believed to have played a role in the collapse of Lehman Brothers Holdings Inc. They also likely helped push AIG to seek shelter in the arms of the government (Scannell et al. 2008). At the time this study is written, calls for regulation of CDS have ramped up as these financial instruments have been identified as one of the culprits of the current market stress.

The phenomenal growth in CDS market together with the recent financial crisis demonstrate the importance of swaps to the economy, and consequently the need to further study how CDS prices are determined. Our study contributes by showing that earnings levels (changes) are significantly and negatively correlated with the level of (changes in) CDS premia, consistent with earnings conveying information about default risk. Importantly, the impact of earnings on CDS premia is economically significant. At the median, a 1 percent increase in earnings (normalized by total assets) reduces the CDS premium by 9 percent in the levels regression and by 5 percent in the changes regression. Other determinants of CDS premia are also significant and in the directions predicted by the theory.

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