Jumps in Credit Default Swap Spreads and Stock Returns

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In efficient capital markets, the price of financial claims should reflect the default risk of the issuer. If the value of a firm's assets is an increasing function of equity prices, a change in default probability will impact both equity and debt claims simultaneously even after adjusting the preferential treatments of financial claimants in the capital structure (see Merton [1974]; Black and Cox [1976]). In this framework, the no-arbitrage condition of the model restricts the correlation between corporate bond spreads and equity prices to be negative in all economic states. Reduced-form models, such that of Duffie and Singleton [1999] and Hull and White [2001], also establish an equivalent model-induced link between bond yields and credit default spreads.

The purpose of this article is to investigate the impact of single-issuer credit default swap (CDS) spreads on the underlying entity's equity prices. Specifically, we use an event-study methodology that isolates *severe* jumps in CDS spreads (defined as movements of more than three standard deviations) and traces their impact on abnormal equity returns. Two research questions are addressed:

1. What is the direction and intensity of the relationship between equity returns and credit risk as captured by sudden and drastic changes in CDS spreads?
2. Does this link intensify during particular time periods and for particular types of issuers?

Related evidence in the literature suggests that both these questions are important. Researchers such as Ericsson et al. [2009] and Tang and Yan [2010] posit that a significant portion of CDS spreads can be directly attributed to firm level determinants of credit risk.[1] Both studies argue that there should be an inverse relationship between CDS spread movements and equity prices as the value of a given firm's assets changes. This explanation also corresponds with Kwan [1996], who finds that information about the mean value of a firm's assets affects stock and bond prices in the same direction and provides evidence of a negative association between a firm's stock returns and changes in its bond yields.

Press releases also often allude to this inverse relationship in such statements as, "Bear's stock dropped $7.78 a share, or 11%, to $62.30, […] buyers of protection were committing to pay $600,000 annually for five years to insure $10 million of Bear's bonds from a default […]. Last Friday, that protection cost investors $458,000 annually, and six months ago, it cost just $145,000" (see Zuckerman and McKay [2008]).

However, the inverse correspondence between CDS spreads and equity returns is not uniformly identifiable for a broader sample.

For instance, when General Motors Corporation's bonds were downgraded to sub-investment-grade in mid-2005 by S&P and Moody's, CDS spreads widened significantly, but the company's share price also rose simultaneously. Such events which violate the predictions of structural credit risk models can lead to significant losses on trading strategies that are predicated on capital structure arbitrage (Buraschi, Trojani, and Vedolin [2008]). In addition, there is some evidence that the correlation between CDS spreads and the respective S&P 500 Index returns fluctuates significantly over time and ranges from 0 to, at best, –0.32 (IMF [2008]).

The current analysis uses CDS spreads data from Markit Group Ltd. that includes daily composite five-year CDS spreads for more than 1,200 North American issuers (as of May 2008). For the purpose of this analysis, however, we focus on a sample of 633 unique CDS spread events associated with 295 firms for the time period spanning April 2005 to March 2008—a period that witnessed a substantial maturation of the CDS market and greater trading activity.[2] Our reliance on the five-year term is justified considering that they were the most actively traded instruments during this period and represented over 85% of the single-name CDS market.

In general, our results indicate that jump events in spreads have a strong, but asymmetric, impact on equity prices. In other words, the impact is found to vary depending on whether the spread widens or contracts and also whether the credit event occurred during the period when credit market conditions were normal or when there was a marked deterioration in credit market conditions.

An examination of individual subperiods within the sample indicated that a severe widening of CDS spreads during the period prior to the financial crisis, between April 2005 and March 2007, results in significant positive abnormal equity returns for up to two days before the event date, a sign that equity markets seem to have anticipated the deterioration of the firm's credit conditions.[3] The significance of this link varies somewhat with subsamples of positive CDS movements but is fairly robust to the inclusion of sub-investment-grade issuers. Even after excluding events related to LBO activity, which is commonly associated with having value-creating effects for shareholders and value-deteriorating effects for credit investors, we find significant positive abnormal stock returns when CDS spreads widen.

In contrast, evidence from the crisis period, April 2007 to March 2008, indicates that increases in CDS spread movements are accompanied by negative abnormal returns, a finding that supports the predictions of structural credit risk models. For the subsample of issuers rated below investment grade, the CDS widening event shows a higher negative correspondence with abnormal equity returns, and once again equity returns seem to incorporate expectations of a deteriorating credit event prior to its announcement. On the other hand, equity markets respond contemporaneously when there is a significant decline in CDS spreads.

SINGLE-NAME CREDIT DEFAULT SWAPS

Several forms of CDS contracts have been used by the financial industry since the mid-1990s; however, because of the increased market interest in protecting against country risks most of these contracts were in the form of sovereign CDS securities. According to the British Bankers Association, the overall size of the CDS market in 1997 was about $350 billion.

During the past decade, there has been a strong demand for single-name CDS securities and this market expanded rapidly. A report by the Bank for International Settlements (BIS) reports that the notional value of credit derivatives outstanding as of 2007 was about $42.6 trillion. Out of this total amount, more than half (about $24.4 trillion) represented single-name CDS contracts, of which 94% refer to non-sovereign underlying securities. Currently, the size of the single-name CDS market outweighs the traditional equity and commodity OTC derivatives markets combined.[4]

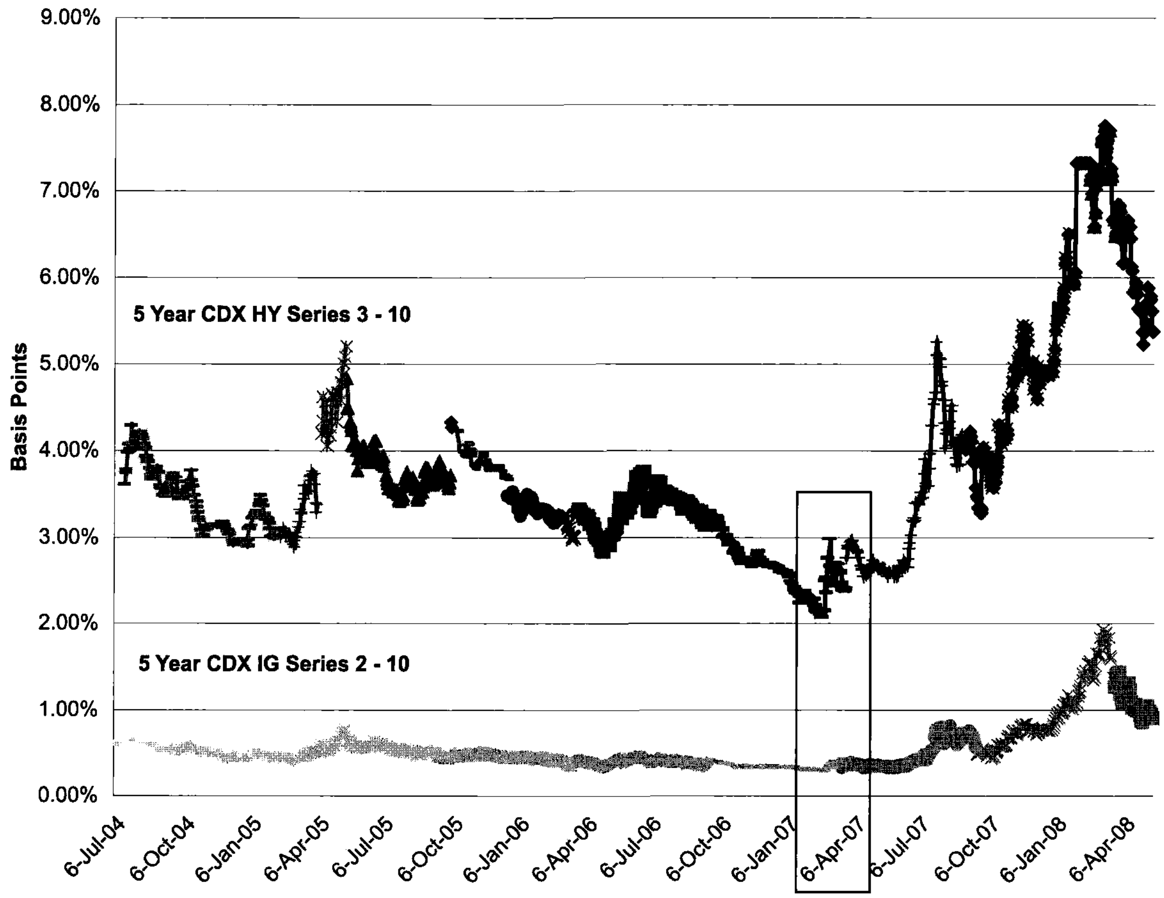
CDS instruments gained some notoriety in recent years because of their possible role in precipitating the credit-led global financial market crisis in 2008.[5] Before the onset of the crisis, capital markets were buoyant as evinced by historically low corporate default rates, greater liquidity, and lower implied volatility. However, beginning in 2008, U.S. capital markets participants came under tremendous financial stress resulting from the collapsing real estate market and its collateral impact on the financial services industry. Structured and leveraged credit issuances dried up overnight and sub-investment-grade single-name CDS spreads widened sharply, reflecting soaring corporate default rates of up to 12%, significantly above the historical average of 4.35% (see Mayo [2008] and Vazza [2008]). During the initial stages of the crisis, the stock market appeared to be somewhat resilient in the face of credit market disruptions. However, the mood began to change quickly towards the end of 2008. As the full ramifications of the credit crunch became more clearly visible, equity prices plummeted and the conflagration of credit problems quickly spread to different securities and overseas financial markets. The rationale for the two time periods is provided in Exhibit 1, which clearly shows that there was a sudden and pronounced widening of CDS spreads in April 2007 (reflected in both high-yield and investment-grade CDX indices) following a prolonged period of relatively flat or even tightening CDS.

Single-name CDS contracts enable one to trade credit risk that is associated with clearly defined events affecting the debt of a specified issuer. These credit events, which are standardized and governed by the International Swaps and Derivatives Association (ISDA), include bankruptcy, failure to pay, acceleration of obligations, repudiation, moratorium, or various forms of restructuring (Blanco, Brennan, and Marsh [2005]). In addition, counterparties to the CDS contract are free to negotiate individual terms under a long-form confirmation for bespoke and highly structured transactions.

CDS contracts are contingent claim contracts where the protection seller assumes the credit risk of a reference entity in return for a fixed premium (or spread)[6] that is received periodically from the buyer of the protection until

Exhibit 1

Five-Year CDX Index High-Yield (HY) and Investment-Grade (IG) Series



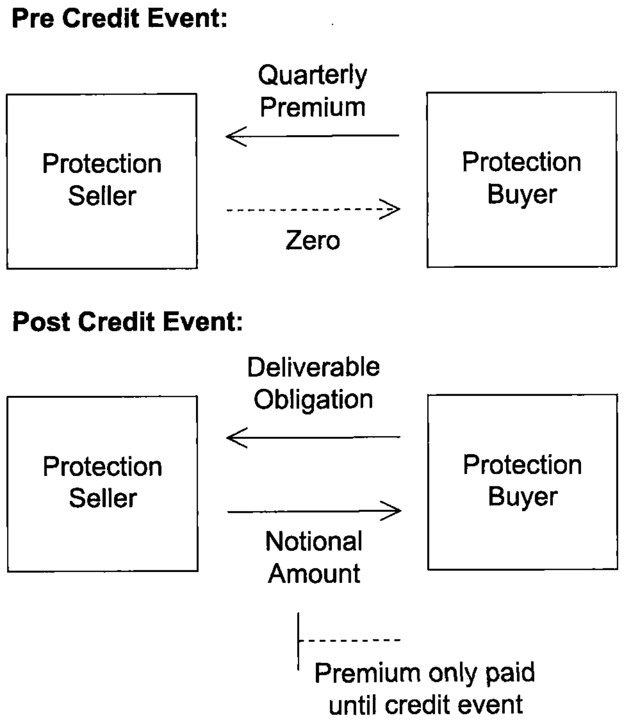
Notes: CDX composite data as per Markit Group Limited. Markit provides the index methodology for CDX indices (published as of August 31, 2007): The CDX.NA.IG Index and the CDX.NA.HY Index are composed of 125 investment-grade and 100 high-yield North America domiciled reference entities, respectively. Each single-name CDS spread is equally weighted. Each index begins on March 20 and September 20 or the next business day (in case these dates do not fall on a business day). Upon the index roll dates, the administrator and contributing banks decide on names that will be excluded or included in the new series.

either default occurs or the swap contract matures.[7] In the event of a pre-defined credit event (or trigger), the protection seller compensates the buyer by paying the notional amount of the swap and the contract is terminated. The nature of a CDS transaction is shown in Exhibit 2.

Since 2002, most CDS contracts have standardized quarterly payments and maturity schedules on the 20th of March, June, September, and December. The most common maturity for CDS contracts is five years, but given the over-the-counter nature of this market, any time horizon can be negotiated, and as such, some CDS contracts extend as long as 30 years.

The default probability of the reference entity typically is the main component of pricing a CDS contract. Given that a protection buyer receives the difference between par and assumed recovery value of the underlying,[8] this amount would consequently represent the protection seller's deficit. The CDS spread should reflect this default-probability-weighted expected loss. Although a broad variety of sophisticated pricing models have been developed in the recent past,[9] CDS valuation is primarily based on asset swap levels (Duffie [1999]). In other words, a seller of protection would accept the same spread for a CDS as the spread over his funding cost for investing in the underlying asset (assuming he can also hedge out the interest rate risk). A widely accepted approach in extracting the implied default risk entails taking the CDS spread and standard recovery assumptions into account and interpolating a time series of survival probabilities.[10] It is widely believed that CDS instruments represent the cleanest isolation of an obligor's default probability and therefore provide the most suitable basis for analyzing the impact of changes in default risk on the equity claims of the respective issuer (Schönbucher [2003]).

EXHIBIT 2
CDS Mechanics and Cash Flows



LITERATURE REVIEW

A considerable amount of research explores the relationship of stock returns and bond spreads at the firm level. In surveying the link between bond and equity prices, it is interesting to note that while much of the early research focused on portfolio performance, subsequent research examined the lead–lag relationship between bond and equity prices at the individual firm level. Hotchkiss and Ronen [2002] employ a vector autoregressive model to investigate the efficiency of bond and equity prices for sub-investment-grade issuers based on daily and hourly data from 1995. The authors do not detect a clear lead–lag relationship for stock and bond returns and thus conclude that both markets are equally information efficient. These findings stand in contrast to Kwan's [1996] analysis that uses time series regressions of weekly bonds over Treasury spreads against equity returns. Consistent with theoretical considerations, the study provides evidence that stock returns are negatively correlated to bond yields. However, equity returns appear to lead changes in bond yields.

Alexander, Edwards, and Ferri [2000] analyze the link between daily sub-investment-grade bonds and excess equity returns at the firm level from 1994 to 1997 and show a significantly positive, albeit economically weak, correlation between equity and bond returns and discover an inverse relationship for events of wealth transfer.[11] Furthermore, the study reveals generally positive, but occasionally also negative, comovements depending on the period examined. Importantly, the authors emphasize the importance of analyzing abnormal returns around specific corporate credit events to shed light on the price discovery process. They argue that time series correlations suffer from several shortcomings; most importantly, they do not adequately capture the dynamic links between equity holders and bond holders. Additionally, wealth transfers between equity and bond investors do not tend to occur as trends, but rather periodically at particular points in time.

The contradicting empirical evidence in the literature is commonly attributed to the varying time periods investigated and, notably, the limitations of corporate bond yields in capturing pure credit default risk. Bond prices are affected by various factors that may not be directly related to credit developments. For instance, Chen, Lesmond, and Wei [2007] provide evidence that more illiquid bonds are associated with higher yield spreads and that improving liquidity may cause yield spreads to contract.

Given the recent introduction of single-issue CDS instruments and the availability of suitable data, empirical work on the link between spread changes and equity returns have become popular. Longstaff, Mithal, and Neis [2003] were among the first to comment on this relationship. Their sample contains weekly data for 68 firms provided by Citigroup for the period from March 2001 to October 2002. Although the focus of their study was on examining the relationship between the bond and CDS market, the authors' document that CDS spread changes led equity returns for the majority of firms in their sample.[12] Moreover, their analysis reveals that both equity returns and CDS spreads tend to reflect credit information before it is priced into the corporate bond market.

Norden and Weber [2009] also examine the link between CDS, bond and equity markets, and replicate large parts of the study by Longstaff, Mithal, and Neis [2003]. They focus on an international dataset for 58 firms during the period from 2000 to 2002, expanding the vector autoregression analysis by cointegration tests to investigate weekly and daily lead–lag relationships between CDS and bonds. Results indicate that weekly and daily equity returns are negatively associated with changes of CDS and bonds spreads. However, in contrast with Longstaff, Mithal, and Neis [2003], the authors detect that stock returns lead the CDS and bond market and that the relationship of CDS spread movements and equity returns intensifies when credit quality deteriorates. Notably, the negative inter-temporal relationship with equity returns appears to be more pronounced for CDS spreads than for bond spreads.

Adopting a different tack, Acharya and Johnson [2007] provide evidence to substantiate claims of insider trading in CDS markets based on 79 North American entities for the period from January 2001 to October 2004. The study employs both cross-correlation and individual time series regressions (regressing changes in CDS spreads on contemporaneous stock returns) on the firm level and introduces the definition of a significant credit event as a CDS spread move that exceeds 50 basis points. The authors document that credit deterioration events lead negative equity returns and conclude that price discovery, especially those related to unfavorable credit events, occurs in the CDS market.[13]

Berndt and Ostrovnaya [2008] extend the research by Acharya and Johnson [2007] and investigate the relationship between CDS, options, and equity returns, based on daily data for 144 non-financial U.S. firms for the period from January 2002 to November 2006. Cross-correlation and regression analyses identify incremental revelation of information across all three markets around negative credit events, distinguishing between two types: "value deteriorating" (bad news for both equity and debt investors; e.g., adverse earnings announcements) and "debt deteriorating" (bad news solely for bondholders but good news for stockholders; e.g., leveraged buyout, LBO, activity). With respect to the relationship between CDS and equity returns, the authors find strong incremental spillover effects from CDS spreads to equity prices only for value-deteriorating events. Further, the relationship moves in the opposite direction for leveraged buyout events. This robust conditional relationship compares to a very weak negative unconditional link between CDS and equity markets. These findings of credit markets leading equity adjustments are in contrast to the evidence provided by Norden and Weber [2009] who observe lagged equity returns.

Jorion and Zhang [2007] examine the information transfer effect of credit events, as reflected in CDS spreads and equity prices, employing an event-study methodology. While the focus of that study lies on intra-industry contagion effects from severe CDS spread widening, Chapter 11 (reorganization), and Chapter 7 (liquidation) bankruptcy filings, it strongly relates to our approach by introducing an unanticipated credit event as a large jump in a company's CDS spread. The examined dataset includes CDS spreads for North American firms during the period from January 2001 to December 2004 and identifies 294 bankruptcy filing events as well as 170 CDS jump events. The latter are defined as a CDS spread widening by over 97.5 bps, corresponding to the 99.9th percentile value. The results show the strongest industry contagion in the case of a jump event, followed by Chapter 11 filings. In the case of Chapter 7 bankruptcies competitive effects dominate.[14]

DATA AND METHODOLOGY

Data

We analyze the daily prices of single-name five-year maturity CDS between April 2005 and March 2008. The study uses CDS data from Markit Group Ltd. and daily equity returns data from Datastream. The overall sample period is divided into two non-overlapping subperiods—April 2005 to March 2007 and April 2007 to March 2008—that roughly correspond with the pre-crisis and crisis periods, respectively.[15]

The following selection criteria are used to construct our sample:

1. We consider corporations based in North America and whose stock is traded on a U.S. stock exchange.
2. Daily equity and stock index prices should be available during the entire sample period.
3. A "severe credit event" is identified as changes in the CDS spread that are larger than three standard deviations based on all available historic data in the respective time series.
4. CDS spreads are available for at least 300 days since May 2001.
5. There is no reversal in severe CDS spread movement during the 40 days before and after the event date.
6. Event dates that are associated with leveraged buyout (LBO) announcements or rumors in the press are marked and eventually excluded.
7. Moody's senior unsecured credit rating for the firm is publicly available for the event date.

Note that we consider only severe CDS spread changes when determining the credit event dates (criterion 3). By using a three-standard-deviation threshold for upward or downward movements based on the respective individual time series, we are able to overcome three main shortcomings encountered by previous studies. First, we consider events of positive unexpected developments in credit quality that are reflected in drastically decreasing CDS spread levels. Second, we create a consistent threshold across all firms but tailor it to the individual CDS spread level and historical volatility. The three-standard-deviation threshold based on historical data eliminates potential elevation of credit events associated with very volatile CDS spread time series. In other words, a CDS spread move for a firm that generally shows very strong swings in either direction would consequently have to be much more powerful to qualify as a credit event. Third, the identification of a credit event is independent of time series imperfections; that is, missing data for some trading days may be problematic for certain forms of cross-correlation and regression analysis.

In order to make the selection of three standard deviations meaningful, there has to be sufficient historical data. We therefore require more than 300 days of composite CDS data to be available (criterion 4). Since we intend to isolate single credit events—that is, changes in the underlying credit default risk—we eliminate cases that show opposing CDS spread movements within a short timeframe since this might just be an indication of erratic trading or market uncertainty around credit quality. Furthermore, the 40-day boundary before and after a potential event avoids an overlapping of event windows defined as a [–20; 20] interval (criterion 5).

LBO activity deserves special attention in examining the link between equity and credit markets. Therefore, we identify credit widening events related to LBO announcements or rumors in the press and eventually hold them out for separate analysis (criterion 6). Similarly, given the importance of credit ratings in determining CDS spreads (see Kenneth and Jensen [2005] and Anderson, Maxwell, and Barnhill [2002]), we create separate subsamples of investment-grade and sub-investment-grade issuers by using publicly available Moody's senior unsecured company rating as of each event date (criterion 7). Exhibits 3 and 4 provide descriptive information on the number of firms that met the various selection criteria and the frequency distribution, respectively, of the credit ratings for two subperiods.

Exhibit 3 shows how the universe of firms with available CDS data results in a smaller sample of firms that produces the relevant credit events that are analyzed in our study. Given our requirement that changes in CDS need to exceed three standard deviations in order to qualify as a jump event, we draw on all available historic data since January 2001 to calculate the three-standard-deviation threshold for each time series (with at least 300 available data points being available). The original dataset of firms with CDS data is split into two samples: The first

Exhibit 3
Descriptive Statistics of CDS Data

Panel A: Number of CDS observations for a given issuer between January 2001 and March 2007

	Number of firms	Mean	Std Dev	Median	Max	Min
All firms	1143	679	397	733	1157	1
Selection Criteria (i) & (ii)	453	694	361	733	1157	5
Selection Criteria (iii), (iv) & (v)	363	831	258	840	1157	301
Selection Criteria (vi) & (vii)	291	849	253	853	1157	301

Panel B: Number of CDS observations for a given issuer between January 2001 and March 2008

	Number of firms	Mean	Std Dev	Median	Max	Min
All firms	1247	771	484	850	1379	1
Selection Criteria (i) & (ii)	356	915	428	1023	1379	14
Selection Criteria (iii), (iv) & (v)	307	1039	312	1103	1379	305
Selection Criteria (vi) & (vii)	266	1071	296	1143	1379	310

Note: For Panel B, after adjusting for firms with more than one credit event, there are a total of 295 unique firms over the entire sample period.

Exhibit 4
Moody's Default Rating of Firm on Day of Credit Event

	Total	Aaa - A3	Baa1 - Baa3	Ba1 - Ba3	B1 - B3	Caa1 - below	Investment Grade	Subinvestment Grade
Panel A: Default rating during benign credit market conditions								
Number of events	370	84	164	63	48	11	248	122
Percentage	100%	23%	44%	17%	13%	3%	67%	33%
Panel B: Default rating during credit market crisis								
Number of events	263	66	92	45	46	14	158	105
Percentage	100%	25%	35%	17%	17%	5%	60%	40%

sample (Panel A) contains a total of 1,143 firms for the period between January 2001 and March 2007; the second sample (Panel B) considers 1,247 firms for the period from January 2001 to March 2008. CDS data pertaining to firms in both samples are identical for the period January 2001 to March 2007.

Credit ratings are critical to sort our subsamples into investment and sub-investment grades. Exhibit 4 provides descriptive information on the frequency distribution of the credit ratings related to the identified 633 credit events for the two subperiods. Overall, the screening process results in a final sample size of 295 unique firms (after adjusting for firms with more than one credit event) that ultimately provides 633 credit events with available abnormal equity return data for the overall period. A total of 370 events (distributed as 224 widening events and 146 contracting events) were identified for the April 2005 to March 2007 period, and 263 events (distributed as 176 widening events and 87 contracting events) for April 2007 to March 2008. A breakdown by industry with those accounting for 50% of the overall samples appears in Exhibit 5. The exhibit indicates that firms are distributed across a diverse set of businesses with Oil, Chemicals, and Telecommunications industries accounting for about 18% of the sample during both subperiods.

Methodology

The article uses the standard event-study methodology to estimate abnormal returns. The expected returns

Exhibit 5

Number of Firms, Sorted by Industry, That Account for 50% of Overall Sample

Panel A: Benign credit market period (April 2005 to March 2007)

Sector	Number of firms	Percentage
OIL	20	6%
CHEMICALS	19	6%
TELECOMMUNICATIONS	17	6%
PRINTING & PUBLISHING	11	4%
FOREST PRODUCTS & PAPER	9	3%
METALS & MINING	9	3%
FOOD & SOFT DRINKS	9	3%
OIL SERVICE	8	3%
DRUGS & COSMETICS	7	2%
CABLE T.V.	7	2%
HEALTHCARE SERVICES & EQUIPMENT	7	2%
PHARMACEUTICALS	6	2%
AUTOMOTIVES	6	2%
HOME BUILDING	6	2%
HOTELS	6	2%
CASINOS	5	2%

Panel B: Credit market crisis period (April 2007 to March 2008)

Sector	Number of firms	Percentage
OIL	18	7%
CHEMICALS	15	6%
TELECOMMUNICATIONS	14	5%
FOOD & SOFT DRINKS	12	5%
CASINOS	10	4%
CABLE T.V.	9	3%
COMPUTERS & PERIPHERALS	8	3%
DIVERSIFIED	8	3%
PRINTING & PUBLISHING	7	3%
AEROSPACE & DEFENSE	7	3%
FOREST PRODUCTS & PAPER	7	3%
OIL SERVICE	6	2%
HOME BUILDING	6	2%
CONSUMER PRODUCTS	6	2%

are based on a market model that is estimated using an ordinary least squares (OLS) regression. Our estimation window comprises 200 trading days, the interval ranging from the 220 to 21 days before the credit event date. In order to determine whether the average cumulated abnormal returns are statistically significant, we employ the cross-sectional standardized method of Boehmer, Musumeci, and Poulsen [1991] (or the BMP test), which is considered to provide robust test statistics when dealing with event-induced variance. This conceptual feature is particularly important given that we focus on events that are likely to be associated with changes in idiosyncratic risk. The BMP test relies on the assumption that abnormal returns are contemporaneously uncorrelated (Aktas, De Bodt, and Cousin [2007]).

It must also be noted that an event-study methodology, especially in the context of this study, offers several advantages over a traditional vector autoregression (VAR) type analysis. In particular, an event-study approach is advantageous because our focus lies on isolating severe changes in underlying credit default risk (reflected in CDS spread jump events) and evaluating whether there are any significant changes in equity prices prior to the credit event. The VAR model, however, would be helpful when examining continuous lead–lag relationships between equity and credit markets for certain periods of time. The high volatility and potential stationarity during the period of heightened stress also pose additional challenges for a VAR analysis, while the three-standard-deviation event threshold and the BMP test can more appropriately deal with heightened idiosyncratic risks. Furthermore, many incomplete CDS time series are often not suitable for a VAR analysis given the lack of trading days; only the most actively traded names show sufficient data points to match the respective equity time series. Unlike equity shares, CDS for some underlyings are not traded every day, and therefore we simply often find gaps in CDS time series that make standard regression type analysis quite difficult to implement.

RESULTS

Severe CDS Spread Movements during the Benign Credit Environment

Exhibit 6 documents the cumulative average abnormal returns (CAAR) and corresponding test statistics for the period spanning April 2005 to March 2007. The impact of credit widening and contracting events on stock returns are reported in Panels A and B, respectively. The evidence in Panel A of Exhibit 6 indicates that severe increases in CDS spreads are associated with highly significant and positive abnormal returns up to two days before the event date (and up to five days if results are interpreted at the 5% level of statistical significance), suggesting that equity markets incorporated deteriorating credit events into stock prices before changes in CDS spreads took place.

The positive association between CDS widening events and stock returns seem to be in conflict with the predictions of structural credit risk models. In order to investigate whether LBO events were responsible for the positive stock price response, the sample announcements

EXHIBIT 6

Stock Market Reaction around CDS Spread Jump Events during the Pre-Crisis Period (April 2005 to March 2007)

Panel A: CDS Widening Events

	All CDS Widening Events (N = 224)			LBO activity excluded (N = 195)			Thereof HY firms only (N = 62)		
Event Time Period	CAAR	z-test Value	t-test Value	CAAR	z-test Value	t-test Value	CAAR	z-test Value	t-test Value
[–20; 0]	0.48%	0.84	0.82	0.05%	-0.2	0.09	0.85%	0.81	0.68
[–10; 0]	0.77%	1.63	1.5	0.21%	0.24	0.44	0.86%	0.76	0.71
[–5; 0]	0.90%	2.40**	2.09**	0.35%	0.97	0.94	1.06%	1.30	1.08
[–2; 0]	1.06%	3.18***	2.73***	0.58%	2.22**	1.82	1.46%	2.03**	1.67
[–1; 0]	0.93%	3.15***	2.66***	0.41%	1.90	1.37	1.27%	2.02**	1.55
[0]	0.64%	2.35**	1.98**	0.14%	0.72	0.48	0.53%	1.07	0.71
[0; 1]	0.66%	1.95	1.95	0.22%	0.56	0.77	0.83%	1.38	1.17
[0 ; 2]	0.56%	1.58	1.59	0.12%	0.16	0.36	1.06%	1.72	1.46
[0 ; 5]	0.68%	1.94	1.79	0.08%	0.20	0.21	1.15%	1.67*	1.42
[0; 10]	0.85%	1.91	1.91	0.17%	0.25	0.39	1.60%	1.72	1.55
[0; 20]	0.78%	1.42	1.59	-0.09%	-0.2	0.20	0.88%	1.15	0.85
[–20; 20]	0.62%	0.64	0.92	-0.18%	-0.6	0.28	1.21%	1.00	0.85
[–10; 10]	0.99%	1.51	1.65	0.24%	0.05	0.42	1.93%	1.40	1.46
[–5; 5]	0.94%	2.14**	1.98**	0.29%	0.57	0.69	1.68%	1.84	1.69
[–2; 2]	0.98%	2.51**	2.40**	0.56%	1.52	1.68	1.99%	2.78***	2.51***
[–1; 1]	0.95%	2.74***	2.62***	0.50%	1.62	1.63	1.57%	2.41**	2.08**

Panel B: CDS Contracting Events

	All CDS Contraction Events		(N = 146)	Thereof HY firms only		(N = 60)
Event Time Period	CAAR	z-test Value	t-test Value	CAAR	z-test Value	t-test Value
[–20; 0]	3.17%	3.35***	3.59***	5.21%	2.28**	2.77***
[–10; 0]	2.49%	3.22***	3.67***	3.91%	2.09**	2.80***
[–5; 0]	1.96%	3.03***	3.34***	3.23%	2.12**	2.68***
[–2; 0]	1.99%	3.12***	3.67***	3.55%	2.55**	3.24***
[–1; 0]	1.90%	3.03***	3.59***	3.56%	2.65***	3.32***
[0]	1.56%	2.83***	3.34***	3.11%	2.63***	3.34***
[0; 1]	1.72%	3.22***	3.66***	3.32%	2.87***	3.68***
[0 ; 2]	1.84%	3.37***	3.82***	3.46%	2.99***	3.65***
[0 ; 5]	1.77%	3.12***	3.58***	3.72%	3.52***	3.95***
[0; 10]	1.82%	2.77***	3.34***	4.25%	4.05***	4.40***
[0; 20]	2.16%	2.69***	3.26***	4.60%	3.53***	3.86***
[–20; 20]	3.77%	3.28***	3.62***	6.70%	2.81***	3.11***
[–10; 10]	2.74%	3.20***	3.76***	5.05%	3.21***	3.60***
[–5; 5]	2.17%	3.29***	3.41***	3.84%	2.82***	2.93***
[–2; 2]	2.27%	3.63***	3.98***	3.90%	2.88***	3.34***
[–1; 1]	2.06%	3.44***	3.91***	3.77%	2.90***	3.61***

*Note: This analysis employs the test-statistic by Boehmer, Musumeci, and Poulsen [1991] (z-test) and the standard t-test (t-test). The statistical significance at the 1% and 5% level is denoted with *** and **, respectively.*

are adjusted for credit events associated with LBOs, and abnormal returns are estimated again.

We notice that the CAARs are, on average, still uniformly positive but are statistically less significant.[16] The results suggest that the seemingly perverse market response to credit widening events may partly be the result of confounding LBO events and the prevailing market conditions during this period. Buraschi, Trojani, and Vedolin [2008], for instance, indicate that difference in beliefs is a significant factor in explaining a positive relationship between credit spreads and stock returns. In particular, the authors posit that credit spreads widen when there are differences in beliefs and this, in turn, can result in positive stock price movements. Building on this line of reasoning, it is possible that heterogeneous beliefs among market participants may have been more pronounced particularly during benign credit market conditions and, as a result, partly responsible for the documented positive response of stock returns to credit widening events. Furthermore, in the case of speculative-grade or high-yield (HY) issues one would expect the link between equity and credit markets to be more pronounced since changes in the probability of default take on additional importance. Our results provide support for this view and particularly are less significant with regard to equity markets leading changes in CDS spreads, i.e., both markets tend to adjust simultaneously for HY issuers.

The response of equity markets to CDS contracting events are provided in Panel B of Exhibit 6. Consistent with theoretical predictions, tightening CDS spreads are associated with positive abnormal equity returns for all different event windows. For instance, the CAAR for the overall event window [–20; 20] is 3.77% and is statistically significant at the 1% level. By comparison, the magnitude of the impact is even more pronounced for the sample of firms with sub-investment-grade or HY debt issues. The corresponding CAAR for this sample is 6.70% during the [–20; 20] interval. Furthermore, the magnitude of the abnormal returns for the overall event window exceeds the 5.21% CAAR documented for the [–20; 0] pre-event window and is more significant. This may be interpreted as evidence that severe changes in CDS spreads lead stock market activity, especially for HY issues, which are more closely monitored by CDS and debt market participants.

Severe CDS Spread Movements during the Credit Crisis

Exhibit 7 examines the equity market response during the credit crisis environment between April 2007 and March 2008. The results in Panel A of Exhibit 7 indicate that a severe widening of spreads has a negative impact on stock returns but is statistically significant only for the subset of firms with HY issues. The magnitude of the abnormal returns is also much higher for HY firms. For instance, the CAARs for the [–10; 10] and [–5; 5] window are, respectively, –4.89% and –2.85% for HY issues compared with –1.62% and –1.23% for the broader sample. In addition, the CAAR results are most conspicuous for the pre-event interval [–10;0] and [–5;0], which is again indicative of the notion that equity markets adjust to worsening credit conditions earlier than changes to CDS spreads.

The evidence from severe CDS tightening events is presented in Panel B of Exhibit 7. The results for the entire sample of firms indicate that credit tightening is associated with positive CAARs but is not statistically significant for the whole sample and for HY firms. The results suggest that during this period the signaling content of credit improvements were either not credible or considered to be not important in eliciting a significant equity market response. One could also make a case that a significant contraction of CDS spreads without an accompanying response from equity markets is indicative of a general breakdown in the relationship between the two markets and evidence that CDS jump events during this period were more reflective of the firm's credit condition.

In order to support our findings of a regime-dependent relationship between credit and equity markets, we also investigate cumulative abnormal returns for the entire sample period—April 2005 and March 2008—comprising 400 CDS widening events and 233 contraction events, including the entire sample (LBO events are not excluded). The results are provided in Exhibit 8.

The results indicate that changes in spreads have a significant impact on equity markets. Interestingly, the market response is more perceptible for contracting events than widening events, suggesting that these results seems to be driven by conditions during the first subperiod. Furthermore, in conflict with theory, CAARs are seen to respond positively to credit widening events. Although puzzling at first, we argue that this might be an artifact of the influence of LBO events that coincides with credit widening events. Given the significant abnormal returns for up to two days prior to the event window (CAAR of 2.29%), there is evidence that the equity market may be more efficient in incorporating credit improvements than the CDS market. Importantly, the results confirm the importance of examining the CDS–equity market relationship by splitting the sample into two periods. Failure to do so would mask important relationships that are unique to each period.

Overall, our study confirms the importance of CDS spread changes on stock returns. The nature of the relationship between the two variables is regime dependent and contingent on whether or not it is a credit widening or contracting event. Credit widening events have a positive impact on stock returns during the pre-crisis period, and this seems to be primarily driven by coinciding LBO

EXHIBIT 7

Stock Market Reaction around CDS Spreads Jump Events during the Crisis Period (April 2007 to March 2008)

Panel A: CDS Widening Events

	All CDS Widening Events		(N = 176)	Thereof HY firms only		(N = 57)
Event Time Period	**CAAR**	**z-test Value**	**t-test Value**	**CAAR**	**z-test Value**	**t-test Value**
[–20; 0]	–1.33%	0.93	1.47	–3.08%	1.29	1.40
[–10; 0]	–1.39%	1.14	1.83**	–3.68%	1.87**	1.98**
[–5; 0]	–1.04%	1.30	1.88**	–2.48%	1.93**	2.10**
[–2; 0]	–0.56%	0.26	1.11	–1.87%	1.31	1.70
[–1; 0]	–0.42%	0.19	0.90	–1.63%	1.22	1.66
[0]	–0.06%	0.33	0.14	–0.66%	0.37	0.79
[0; 1]	0.02%	0.17	0.04	0.06%	0.19	0.06
[0 ; 2]	–0.10%	0.38	0.20	–0.12%	0.16	0.11
[0 ; 5]	–0.25%	0.62	0.40	–1.02%	0.98	0.70
[0; 10]	–0.28%	0.16	0.38	–1.86%	1.14	1.06
[0; 20]	–0.72%	1.01	0.72	–0.93%	0.58	0.46
[–20; 20]	–1.99%	1.24	1.86**	–3.36%	1.50	1.68
[–10; 10]	–1.62%	1.13	1.83**	–4.89%	2.33**	2.50**
[–5; 5]	–1.23%	1.73	1.91**	–2.85%	2.10**	2.13**
[–2; 2]	–0.60%	0.84	1.16	–1.34%	1.13	1.29
[–1; 1]	–0.34%	0.29	0.70	–0.92%	0.64	0.91

Panel B: CDS Contracting Events

	All CDS Contraction Events		(N = 87)	Thereof HY firms only		(N = 57)
Event Time Period	**CAAR**	**z -test Value**	**t-test Value**	**CAAR**	**z-test Value**	**t-test Value**
[–20; 0]	0.63%	0.68	0.44	0.06%	–0.0	0.02
[–10; 0]	0.20%	0.33	0.16	–0.62%	–0.5	0.33
[–5; 0]	0.50%	0.75	0.46	–0.68%	–0.4	0.44
[–2; 0]	0.62%	0.72	0.56	–0.44%	–0.5	0.26
[–1; 0]	0.88%	0.96	0.88	0.26%	0.36	0.18
[0]	1.14%	1.07	1.52	1.13%	1.95	1.79
[0; 1]	1.56%	1.36	1.85	1.62%	1.49	1.63
[0 ; 2]	1.96%	1.32	1.9	2.62%	1.85	1.68
[0 ; 5]	1.99%	1.00	1.55	2.74%	0.61	1.27
[0; 10]	2.60%	1.30	1.67	3.47%	1.20	1.27
[0; 20]	2.95%	1.38	1.65	4.37%	1.40	1.36
[–20; 20]	2.45%	1.03	1.31	3.30%	0.53	1.04
[–10; 10]	1.66%	0.66	1.32	1.73%	–0.1	0.92
[–5; 5]	1.35%	0.74	1.24	0.93%	–0.5	0.56
[–2; 2]	1.45%	0.97	1.64	1.05%	–0.0	0.96
[– 1; 1]	1.30%	1.23	1.47	0.75%	0.48	0.70

*Note: This analysis employs the test-statistic by Boehmer, Musumeci, and Poulsen [1991] (z-test) and the standard t-test (t-test). The statistical significance at the 1% and 5% level is denoted with *** and **, respectively.*

activity that is perceived to be beneficial to stockholders. On the other hand, credit widening events have a negative and significant impact on stock prices during the stressful financial market environment. In both cases, equity markets seem to respond faster to worsening credit events than CDS spreads. Interestingly, when financial markets were experiencing crisis, equity markets seem to largely ignore any positive indications of credit improvement. Finally, the heightened sensitivity of equity prices to spreads is noted for HY firms.

EXHIBIT 8

Stock Market Reaction around CDS Spread Jump Events during the Entire Sample Period (April 2005 to March 2008)

	All CDS Widening Events		(N = 400)	All CDS Contraction Events		(N = 233)
Event Time Period	**CAAR**	**z-test Value**	**t-test Value**	**CAAR**	**z-test Value**	**t-test Value**
[–20; 0]	–0.18%	0.01	0.35	2.07%	2.82***	2.69***
[–10; 0]	–0.06%	0.47	0.14	1.43%	2.44**	2.22**
[–5; 0]	0.14%	1.00	0.41	1.18%	2.51**	2.12**
[–2; 0]	0.44%	2.29**	1.40	1.28%	2.54**	2.36***
[–1; 0]	0.43%	2.28**	1.51	1.39%	2.71***	2.73***
[0]	0.41%	2.01**	1.61	1.26%	2.68***	3.00***
[0; 1]	0.46%	1.61	1.70	1.49%	3.05***	3.33***
[0 ; 2]	0.35%	0.95	1.21	1.73%	3.18***	3.45***
[0 ; 5]	0.36%	0.81	1.06	1.66%	2.88***	2.88***
[0; 10]	0.45%	1.10	1.11	1.86%	2.99***	2.76***
[0; 20]	0.23%	–0.70	0.44	2.18%	3.11***	2.76***
[–20; 20]	–0.36%	–1.01	0.60	2.99%	3.31***	3.13***
[–10; 10]	–0.02%	0.22	0.03	2.03%	2.91***	3.01***
[–5; 5]	0.09%	0.26	0.24	1.57%	2.77***	2.67***
[–2; 2]	0.38%	1.40	1.17	1.75%	3.04***	3.48***
[–1; 1]	0.49%	1.91	1.63	1.62%	3.08***	3.34***

*Note: This analysis employs the test-statistic by Boehmer, Musumeci, and Poulsen [1991] (z-test) and the standard t-test (t-test). The statistical significance at the 1% and 5% level is denoted with *** and **, respectively.*

The backdrop of the prevailing conditions during this period may help us better appreciate the results. Notably, credit and equity markets experienced extreme and widespread volatility when the benign credit conditions came to an end. These market disruptions along with the breakdown of historical asset price relationships are likely to have affected trading strategies across the board and affected the response of equity markets.

CONCLUSIONS

This study investigates the impact of severe changes in default risk, as measured by jumps in CDS spreads, on equity returns. During the benign credit market environment, we document that both credit widening and contracting events are associated with positive stock returns, especially for firms with sub-investment-grade bonds. In the case of CDS widening events, the evidence is consistent with the notion that equity holders did not view such "debt deteriorating" events as necessarily "value deteriorating"—in fact, equity markets react favorably and seem to anticipate these events during benign credit conditions. Furthermore, during this period, events of improving credit default risk provide the economically strongest and most significant results. Consistent with finance theory, tightening CDS spreads coincide with positive abnormal returns, and again this link intensifies for high-yield issues.

Under conditions of market crisis, the relationship between abnormal returns and severe CDS spread movements is markedly different as indicated by negative abnormal stock returns with CDS widening events, and there is a general lack of correspondence between equity returns and CDS tightening events. These results can perhaps be explained by market disruptions during this period. Our findings support the regime-dependent nature of the relationship between CDS spread movements and equity returns. They also highlight the sample of sub-investment-grade issuers that seem to provide for a theoretically and empirically more consistent relationship between equity prices and credit events.

It bears noting that our study focuses on severe changes (jumps) in CDS that reference nonfinancial firms. It would be interesting to expand our research to investigate the relationship between equity and credit spreads pertaining to financial institutions, in particular as these institutions were at the epicenter of the credit crisis. This is left for future research.

ENDNOTES

[1]It is instructive to note that the application of CDS offers several advantages over corporate bonds. First, CDS serve as a relatively pure pricing measure of the underlying entity's credit risk. These instruments are quite liquid and are traded on standardized terms. Credit risk that is measured using corporate bonds, on the other hand, can be affected by contractual stipulations, including seniority, coupon rates, embedded options, and varying durations. Second, because of the unfunded nature of CDS and the lack of restrictions prohibiting short sales, there is evidence that CDS in the short run tend to respond more quickly than bonds to changes in credit market conditions (see Zhu [2004]; Blanco et al. [2005]).

[2]Markit receives contributed CDS data from market makers from their official books and records on a daily basis. This data undergo a rigorous cleaning process and are tested for staleness, flat curves, outliers, and inconsistent data. This dataset has been used by Zhu [2004] and Jorion and Zhang [2007], among others.

[3]We excluded the period prior to April 2005 for two main reasons. First, prior to 2005, the time series of single-name credit default swaps are often scattered and sparse. It was only in 2005 when the CDS market reached a volume of about USD 10 trillion. Second, years prior to 2005 may still have been affected by the preceding downturn, which saw significant negative credit events, such as WorldCom and Enron.

[4]BIS provides comprehensive data on the notional size of over-the-counter (OTC) derivatives instruments on a semi-annual basis and for CDS since the second half of 2004 (see Fornari [2005]). As of June 2007, equity-linked contracts (forwards, swaps, and options) and commodity contracts (including gold) amounted to USD 9.2 trillion and USD 7.6 trillion, respectively. The derivatives market for interest rate contracts remains by far the largest with a notional size of USD 346.9 trillion.

[5]CDS instruments figured prominently in the U.S. taxpayer bailouts of such financial institutions as AIG, Bear Stearns, and Bank of America.

[6]Recently the CDS market evolved to trade all single-name contracts with a fixed coupon (e.g., 100 or 500 depending on credit quality) and upfront payment.

[7]Settlement can be in the form of physical delivery of specified underlying securities (e.g., eligible loans or bonds) or a defined debt class (e.g., senior unsecured obligations). Alternatively, contracts can be settled in cash for the difference between the notional and market value of the reference obligations, determined by the settlement agent by polling various bond market makers (Hull [2003]).

[8]The recovery value of the reference obligation also plays an important role in determining the CDS premium. Historically realized recovery rates show strong dispersion around the mean of certain asset classes. However, for practical purposes, market participants often operate on the basis of standard assumptions (e.g., 40% for senior unsecured corporate bonds). See also Hull [2003] and Andritzky and Singh [2006].

[9]For an extensive summary of purely theoretical modeling approaches for often complex credit derivatives (e.g., CDO tranches) see Longstaff, Mithal, and Neis [2003] and Schönbucher [2003].

[10]The survival probability is defined as (1 – the probability of default). Given that we can use a database of composite CDS spreads, we disregard the pricing impact of the joint probability of default and default correlations between protection seller and underlying reference asset (see also Hull and White [2000]).

[11]Note that the positive correlation of equity and bond returns corresponds to the inverse relationship between equity returns and bond over Treasury yields.

[12]Note, the original paper by Longstaff, Mithal, and Neis [2003] evolved to Longstaff, Mithal, and Neis [2004] and Longstaff, Mithal, and Neis [2005]. The latter two amended versions focus on the size of the default and non-default components in corporate spreads.

[13]We agree with Berndt and Ostrovnaya [2008] that a 50 bp movement in CDS spreads does not adequately represent a significant credit event given its relatively small size in the realm of sub-investment-grade firms that exhibit wide variability in spreads. We address this issue by using a three-standard-deviation methodology: Only severe movements that have a critical size vis-à-vis the usual level of changes in CDS spreads of a given underlying are considered jump events for purpose of our analysis.

[14]See also Greatrex [2008] for an event-study methodology to investigate the effect of earnings announcements and a potential post-earnings announcement drift in CDS and stock markets.

[15]We have chosen March 2007 as the cut off for the benign credit environment given the strong indications at this point in time indicating a turn of the cycle, for example, sharply increased 60-day subprime mortgage delinquencies and the sudden widening of the High-Yield CDX spread (see also Exhibit 1).

[16]We test further subsamples of CDS widening events. Most noteworthy are the subsets 1) for CDS spreads above the average of 125 basis points, 2) excluding firms from the commodities sector, 3) of investment-grade issuers, and 4) of sub-investment-grade firms. Results from all these groups are qualitatively similar.

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