Credit default swap

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A **credit default swap** (**CDS**) is a credit derivative contract between two counterparties. The *buyer* makes periodic payments to the *seller*, and in return receives a payoff if an underlying financial instrument defaults.[1]

CDS contracts have been compared with insurance, because the buyer pays a premium and, in return, receives a sum of money if one of the specified events occur. However, there are a number of differences between CDS and insurance, for example:

- the seller need not be a regulated entity;
- in the United States CDS contracts are generally subject to mark to market accounting, introducing income statement and balance sheet volatility that would not be present in an insurance contract;
- Hedge Accounting may not available under US GAAP unless the requirements of FAS 133 (http://www.fasb.org/st/summary/stsum133.shtml) are met; if it were not possible to it could increase income statement and balance sheet volatility if the CDS was purchased to hedge an exposure;
- The buyer of a CDS does not need to own the underlying security or other form of credit exposure; in fact the buyer does not even have to suffer a loss from the default event.[2][3][4] Generally, to purchase insurance the insured is expected to have an insurable interest such as owning a debt.

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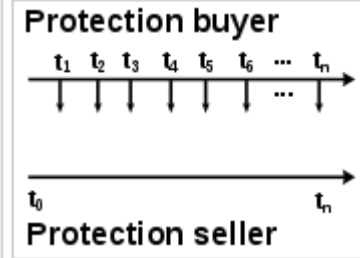
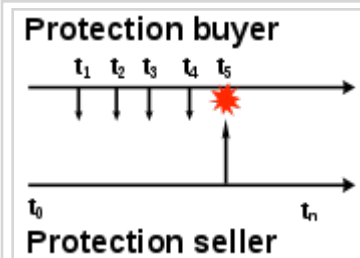
Description

A **credit default swap** (**CDS**) is a swap contract in which the buyer of the CDS makes a series of payments to the seller and, in exchange, receives a payoff if a credit instrument - typically a bond or loan - goes into default (fails to pay). Less commonly, the credit event that triggers the payoff can be a company undergoing restructuring, bankruptcy or even just having its credit rating downgraded. Credit Default Swaps can be bought by any (relatively sophisticated) investor; it is not necessary for the buyer to own the underlying credit instrument.[5]



Buyer purchased a CDS at time t_0 and makes regular premium payments at times t_1, t_2, t_3, and t_4. If the associated credit instrument suffers no credit event, then the buyer continues paying premiums at t_5, t_6 and so on until the end of the contract at time tn.



However, if the associated credit instrument suffered a credit event at t_5, then the Protection seller pays the buyer for the loss, and the buyer would cease paying premiums.

As an example, imagine that an investor buys a CDS from CITI Bank, where the reference entity is AIG Corp. The investor will make regular payments to CITI Bank, and *if* AIG Corp defaults on its debt (i.e., misses a coupon payment or does not repay it), the investor will receive a one-off payment from CITI Bank and the CDS contract is terminated. If the investor actually owns AIG Corp debt, the CDS can be thought of as hedging. But investors can also buy CDS contracts referencing AIG Corp debt, without actually owning any AIG Corp debt. This may be done for speculative purposes, to bet against the solvency of AIG Corp in a gamble to make money if it fails, or to hedge investments in other companies whose fortunes are expected to be similar to those of AIG.

If the reference entity (AIG Corp) defaults, one of two things can happen:

- Either the investor delivers a defaulted asset to CITI Bank for a payment of the par value. This is known as *physical settlement*.
- Or CITI Bank pays the investor the difference between the par value and the market price of a specified debt obligation (even if AIG Corp defaults, there is usually some *recovery*; i.e., not all

your money will be lost.) This is known as *cash settlement*.

The **spread** of a CDS is the annual amount the protection buyer must pay the protection seller over the length of the contract, expressed as a percentage of the notional amount. For example, if the CDS spread of AIG Corp is 50 basis points, or 0.5% (1 basis point = 0.01%), then an investor buying $10 million worth of protection from CITI Bank must pay the bank $50,000 per year. These payments continue until either the CDS contract expires, or until AIG Corp defaults.

All things being equal, at any given time, if the maturity of two credit default swaps is the same, then the CDS associated with a company with a *higher* CDS spread is considered *more likely* to default by the market, since a higher fee is being charged to protect against this happening. However, factors such as liquidity and estimated loss given default can impact the comparison.

Uses

Like most financial derivatives, credit default swaps can be used by investors for speculation, hedging and arbitrage.

Speculation

Credit default swaps allow investors to speculate on changes in an entity's credit quality, since generally CDS spreads will increase as credit-worthiness declines, and decline as credit-worthiness increases. Therefore an investor might buy CDS protection on a company in order to speculate that a company is about to default. Alternatively, an investor might sell protection if they think that a company is not going to default.

For example, a hedge fund believes that AIG Corp will soon default on its debt. Therefore it buys $10 million worth of CDS protection for 2 years from CITI Bank, with AIG Corp as the reference entity, at a spread of 500 basis points (=5%) per annum.

- If AIG Corp does indeed default after, say, one year, then the hedge fund will have paid $500,000 to CITI Bank, but will then receive $10 million (assuming zero recovery rate, and that CITI Bank has the liquidity to cover the loss), thereby making a tidy profit. CITI Bank, and its investors, will incur a $9.5 million loss unless the bank has somehow offset the position before the default.
- However, if AIG Corp does not default, then the CDS contract will run for 2 years, and the hedge fund will have ended up paying $1 million, without any return, thereby making a loss.

Note that there is a third possibility in the above scenario; the hedge fund could decide to liquidate its position after a certain period of time in an attempt to *lock in* its gains or losses. For example:

- After 1 year, the market now considers AIG Corp *more likely* to default, so its CDS spread has *widened* from 500 to 1500 basis points. The hedge fund may choose to *sell* $10 million worth of protection for 1 year to CITI Bank at this higher rate. Therefore over the two years the hedge fund will pay the bank 2 * 5% * $10 million = $1 million, but will receive 1 * 15% * $10 million = $1.5 million, giving a total profit of $500,000 (so long as AIG Corp does not default during the

second year).
- In another scenario, after one year the market now considers AIG much *less likely* to default, so its CDS spread has *tightened* from 500 to 250 basis points. Again, the hedge may choose to *sell* $10 million worth of protection for 1 year to CITI Bank at this lower spread. Therefore over the two years the hedge fund will pay the bank 2 * 5% * $10 million = $1 million, but will receive 1 * 2.5% * $10 million = $250,000, giving a total loss of $750,000 (so long as AIG Corp does not default during the second year). This loss is smaller than the $1 million loss that would have occurred if the second transaction had not been entered into.

Transactions such as these do not even have to be entered into over the long-term. If AIG Corp's CDS spread had widened by just a couple of basis points over the course of one day, the hedge fund could have entered into an offsetting contract immediately and made a small profit over the life of the two CDS contracts.

Hedging

Credit default swaps are often used to manage the credit risk (i.e. the risk of default) which arises from holding debt. Typically, the holder of, for example, a corporate bond may hedge their exposure by entering into a CDS contract as the *buyer* of protection. If the bond goes into default, the proceeds from the CDS contract will cancel out the losses on the underlying bond.

Pension fund example: A pension fund owns $10 million of a five-year bond issued by Risky Corp. In order to manage the risk of losing money if Risky Corp defaults on its debt, the pension fund buys a CDS from Derivative Bank in a notional amount of $10 million. The CDS trades at 200 basis points (200 basis points = 2.00 percent). In return for this credit protection, the pension fund pays 2% of 10 million ($200,000) per annum in quarterly installments of $50,000 to Derivative Bank.

- If Risky Corporation does not default on its bond payments, the pension fund makes quarterly payments to Derivative Bank for 5 years and receives its $10 million back after 5 years from Risky Corp. Though the protection payments totaling $1 million reduce investment returns for the pension fund, its risk of loss due to Risky Corp defaulting on the bond is eliminated.
- If Risky Corporation defaults on its debt 3 years into the CDS contract, the pension fund would stop paying the quarterly premium, and Derivative Bank would ensure that the pension fund is refunded for its loss of $10 million (either by physical or cash settlement - see above). The pension fund still loses the $600,000 it has paid over three years, but without the CDS contract it would have lost the entire $10 million.

Hedging issues related to hedging for banks and corporations subject to taxation or using US GAAP for financial reporting: While the economics of entering into a CDS contract to hedge the credit risk in an asset is the same for a pension fund and banks and corporations there are two significant practical differences in how hedges using CDS contracts banks and corporations compared to pension plans:

- Taxes - - the tax treatment on the loss incurred on the Risky Corp.'s debt may be treated very differently from either the payout by the Derivative Bank to either a corporation or a bank. This will not be addressed in if the loss on the asset is taxed at a different rate from the profit made on

the hedge then amount of the CDS swap needed to create a hedge of the Risky Corp.'s debt to the bank or corporation would differ from the [principle] amount of the debt. See Tax Treatment following.
- Financial reporting treatment may not parallel the economic effects. For example, GAAP generally require that Credit Default Swaps be reported on a mark to market basis, and assets that are held for investment, such as a commercial loan or bonds, be reported at cost unless a probable and significant loss is expected. Thus, hedging a commercial loan, using a CDS for example, can induce considerable volatility into the income statement and balance sheet can be induced as the CDS changes value over its life due to market conditions and due to the tendency for shorter dated CDS to sell at lower prices then longer dated CDS. Clearly, one can try and account for the CDS as a hedge under FASB 133 (http://www.fasb.org/st/summary/stsum133.shtml) but in practice that can prove very difficult unless the risky asset owned by the bank or corporation is exactly the same as the Reference Obligation used for the particular CDS swap that was bought.

Risk

When entering into a CDS both the buyer and seller of credit protection creates counter party risk. Examples of counter party risks:

- The buyer of protections takes the risk that the Derivative Bank will not perform its duties under the CDS if required to do so, i.e. Risky Corp. defaults on a reference obligation. In effect, the buyer of the CDS would not be able to collect from Derivative Bank.
- The seller of protection, Derivative Bank in this example, bears a risk that the buyer of protection will not pay for the protection contracted, thus they may forgo a revenue stream. Also, when Derivative Bank sold protection it would normally buy protection from another party, hopefully at a lower price. Thus, should Derivative Bank's client break its contract Derivative Bank would then become long Risky Corp. risk and be paying for that position. In such a situation, Derivative Bank would usually seek to square its long position in Risky Corp. by selling protection to a third party; but that may be at a lower price than they had been receiving depending on market conditions.

A form of liquidity risk can be created by entering into a CDS contract due to possible margin calls which may require posting additional collateral by one of the counter parties. This can occur because, depending on the terms negotiated between the buyer of protection and the seller of protection, it is common for one or both parties to a CDS contract to be required to post collateral. The amount of the required collateral will depend on agreement between the counter parties, but is common for the required margin to vary over the life of the CDS contract for reasons such as a change in the market price (http://en.wiktionary.org/wiki/market_price) for the CDS contract, or the credit rating of one of the counter parties.

Arbitrage

Capital Structure Arbitrage is an example of an arbitrage strategy which utilises CDS transactions.[6] This technique relies on the fact that a company's stock price and its CDS spread should exhibit negative correlation; i.e. if the outlook for a company improves then its share price should go up and its CDS spread should tighten, since it is less likely to default on its debt. However if its outlook worsens then its CDS spread should widen and its stock price should fall. Techniques reliant on this are known as capital

structure arbitrage because they exploit market inefficiencies between different parts of the same company's capital structure; i.e. mis-pricings between a company's debt and equity. An arbitrageur will attempt to exploit the *spread* between a company's CDS and its equity in certain situations. For example, if a company has announced some bad news and its share price has dropped by 25%, but its CDS spread has remained unchanged, then an investor might expect the CDS spread to increase relative to the share price. Therefore a basic strategy would be to go long on the CDS spread (by buying CDS protection) while simultaneously hedging oneself by buying the underlying stock. This technique would benefit in the event of the CDS spread widening relative to the equity price, but would lose money if the company's CDS spread tightened relative to its equity.

An interesting situation in which the inverse correlation between a company's stock price and CDS spread breaks down is during a leveraged buyout (LBO). Frequently this will lead to the company's CDS spread widening due to the extra debt that will soon be put on the company's books, but also an *increase* in its share price, since buyers of a company usually end up paying a premium.

Another common arbitrage strategy aims to exploit the fact that the swap adjusted spread of a CDS should trade closely with that of the underlying cash bond issued by the reference entity. Misalignments in spreads may occur due to technical reasons such as specific settlement differences, shortages in a particular underlying instrument, and the existence of buyers constrained from buying exotic derivatives. The difference between CDS spreads and asset swap spreads is called the *basis* and should theoretically be close to zero. Basis trades can aim to exploit any differences to make risk-free profits.

History

Conception

Credit Default Swaps were invented in 1997 by a team working for JPMorgan Chase[7][8][9]. They were designed to shift the risk of default to a third-party, and were therefore less punitive in terms of regulatory capital.[10]

Credit Default Swaps became exempt from regulation with the Commodity Futures Modernization Act of 2000, which was also responsible for the Enron loophole. U.S. Sen. Phil Gramm (R-TX) introduced the Act on behalf of financial industry lobbyists. The Modernization Act was rushed through Congress as a companion bill to the omnibus spending bill, the last day before the Christmas holiday[11]. It by-passed the substantive policy committees in both the House and the Senate so that there were neither hearings nor opportunities for recorded committee votes [12]. The omnibus spending bill, which was 11,000 pages long, is the financial plan the government requires for everyday operations. President Clinton signed the bill into Public Law (106-554) on December 21, 2000.

Market growth

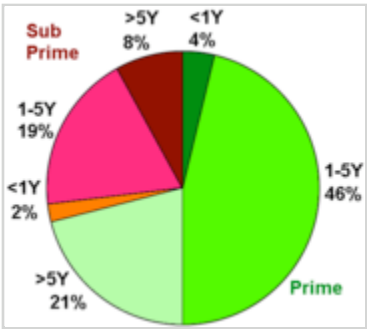
The Modernization Act allowed for even more regulatory bypasses. It became difficult to determine the financial strength of the sellers of protection. CDS came to be issued for Structured Investment Vehicles, which did not have a known entity to follow to determine the strength of a particular bond or loan. The market became rampant with gambling as sellers and buyers of CDS were no longer owners of the

underlying asset (bond or loan). Before the Act, the CDS markets value was 900 billion. By the end of 2007, the CDS market had a notional value of $45 trillion, of which the corporate bond, municipal bond, and structured investment vehicles market totaled less than $25 trillion. Therefore, a minimum of $20 trillion were speculative "bets" on the possibility of a credit event of a specific credit asset not owned by either party to the CDS contract.[13]

As the market matured CDSs were increasingly used by investors wishing to bet for or against the likelihood that particular companies or portfolios would suffer financial difficulties; rather than to insure against bad debt -see above. The market size for Credit Default Swaps began to grow rapidly from 2003, by late 2007 it was approximately ten times as large as it had been four years previously. [14]

Market as of 2008

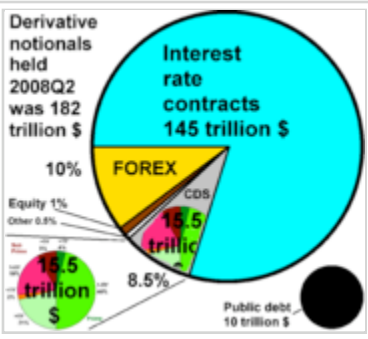
Credit default swaps are by far the most widely traded credit derivative product.[15] the Depository Trust and Clearing Corp, which maintains a database holding around 90% of all credit derivative transactions, held $29.2 trillion of outstanding CDS trades as of 26 December 2008.



Composition of the United States 15.5 trillion US dollar CDS market at the end of 2008 Q2. Green tints show Prime asset CDSs, reddish tints show sub-prime asset CDSs. Numbers followed by "Y" indicate years until maturity.

It is important to note that since default is a relatively rare occurrence (historically around 0.2% of investment grade companies will default in any one year[16]), in most CDS contracts the only payments are the spread payments from buyer to seller. Thus, although the above figures for outstanding notionals sound very large, the net cashflows will generally only be a small fraction of this total.

There is no centralised exchange or clearing house for CDS transactions; they are all done over the counter (OTC). This has led to recent calls for the market to open up in terms of transparency and regulation[17]. In November 2008, DTTC, which runs a warehouse for CDS trade confirmations accounting for around 90% of the total market[18], announced that it will release market data on the outstanding notional of CDS trades on a weekly basis.[19] The data can be accessed on the DTCC's website here: [3] (http://www.dtcc.com /products/derivserv/data/index.php?lpos=home_splash_promo& lid=index.php) The U.S. Securities and Exchange Commission granted an exemption for Intercontinental Exchange Inc. to begin guaranteeing credit-default swaps. The company said it would begin clearing next week.



Proportion of CDSs nominals (lower left) held by United States banks compared to all derivatives, in 2008Q2. The black disc represents the 2008 public debt.

The SEC exemption represented the last regulatory approval needed by Atlanta-based Intercontinental. Its larger competitor, CME Group Inc., hasn't received an SEC exemption, and agency spokesman John Nester said he didn't know when a decision would be made.

U.S. and European regulators are developing separate plans to stabilize

the derivatives market after American International Group Inc., once the world's largest insurer, almost went bankrupt last year from its use of credit-default swaps. A clearinghouse, and changes to the contracts to standardize them, will probably boost activity, said Sivan Mahadevan, a derivatives strategist at Morgan Stanley in New York.

"Trading will be much easier," he said. "We'll see new players come to the market because they'll like the idea of this being a better and more traded product. We also feel like over time we'll see the creation of different types of products."

Intercontinental plans to begin backing trades in the $27 trillion market on March 9, according to a company statement today.

CME Group spokesman Allan Schoenberg didn't immediately respond to a request for comment.

Government Approvals

The SEC approval is the third government action granted to Intercontinental this week. On March 3, its proposed acquisition of Clearing Corp., a Chicago clearinghouse owned by eight of the largest dealers in the credit-default swap market, was approved by the Federal Trade Commission and the Justice Department. Yesterday the Federal Reserve Board, which will oversee the clearinghouse, granted a request to begin clearing.

Clearing Corp. shareholders including JPMorgan Chase & Co., Goldman Sachs Group Inc. and UBS AG, received $39 million in cash from Intercontinental in the acquisition, as well as the Clearing Corp.'s cash on hand and a 50-50 profit-sharing agreement with Intercontinental on the revenue generated from processing the swaps. '

"For several months the SEC and our fellow regulators have worked closely with all of the firms wishing to establish central counterparties," Nester said. "We believe that CME should be in a position soon to provide us with the information necessary to allow the commission to take action on its exemptive requests."

The SEC granted Intercontinental an exemption from rules that would have prevented the company from processing credit- default swaps. It gives the regulator time to review the exchange's business to determine whether to make the changes permanent.

Member Requirements

Members of the Intercontinental clearinghouse will have to have a net worth of at least $5 billion and a credit rating of A or better to clear their credit-default swap trades. Intercontinental said in the statement today that all market participants such as hedge funds, banks or other institutions are open to become members of the clearinghouse as long as they meet these requirements.

A clearinghouse acts as the buyer to every seller and seller to every buyer, reducing the risk of a counterparty defaulting on a transaction. In the over-the-counter market, where credit- default swaps are currently traded, participants are exposed to each other in case of a default. A clearinghouse also provides one location for regulators to view traders' positions and prices.

Other proposals to clear credit-default swaps have been made by NYSE Euronext, Eurex AG and LCH.Clearnet Ltd. Only the NYSE effort is available now for clearing after starting on Dec. 22. As of Jan. 30, no swaps had been cleared by the NYSE's London- based derivatives exchange, according to NYSE Chief Executive Officer Duncan Niederauer. http://www.bloomberg.com /apps/news?pid=20601087&sid=afJz1FLOy1nI&refer=home

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A clearing house would become the central counterparty to both sides of a CDS transaction, thereby reduci
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Terms of a typical CDS contract

A CDS contract is typically documented under a *confirmation* referencing the credit derivatives definitions as published by the International Swaps and Derivatives Association.[20] The confirmation typically specifies a *reference entity*, a corporation or sovereign that generally, although not always, has debt outstanding, and a *reference obligation*, usually an unsubordinated corporate bond or government bond. The period over which default protection extends is defined by the contract *effective date* and *scheduled termination date*.

The confirmation also specifies a *calculation agent* who is responsible for making determinations as to *successors* and *substitute reference obligations* (for example necessary if the original reference obligation was a loan that is repaid before the expiry of the contract), and for performing various calculation and administrative functions in connection with the transaction. By market convention, in contracts between CDS dealers and end-users, the dealer is generally the calculation agent, and in contracts between CDS dealers, the protection seller is generally the calculation agent. It is not the responsibility of the calculation agent to determine whether or not a credit event has occurred but rather a matter of fact that, pursuant to the terms of typical contracts, must be supported by *publicly available information* delivered along with a *credit event notice*. Typical CDS contracts do not provide an internal mechanism for challenging the occurrence or non-occurrence of a credit event and rather leave the matter to the courts if necessary, though actual instances of specific events being disputed are relatively rare.

CDS confirmations also specify the *credit events* that will give rise to payment obligations by the protection seller and delivery obligations by the protection buyer. Typical credit events include *bankruptcy* with respect to the reference entity and *failure to pay* with respect to its direct or guaranteed bond or loan debt. CDS written on North American investment grade corporate reference entities, European corporate reference entities and sovereigns generally also include *restructuring* as a credit event, whereas trades referencing North American high yield corporate reference entities typically do not. The definition of restructuring is quite technical but is essentially intended to respond to circumstances where a reference entity, as a result of the deterioration of its credit, negotiates changes in the terms in its debt with its creditors as an alternative to formal insolvency proceedings (i.e., the debt is *restructured*). This practice is far more typical in jurisdictions that do not provide protective status to insolvent debtors similar to that provided by Chapter 11 of the United States Bankruptcy Code. In particular, concerns arising out of Conseco's restructuring in 2000 led to the credit event's removal from North American high yield trades.[21]

Finally, standard CDS contracts specify *deliverable obligation characteristics* that limit the range of

obligations that a protection buyer may deliver upon a credit event. Trading conventions for deliverable obligation characteristics vary for different markets and CDS contract types. Typical limitations include that deliverable debt be a bond or loan, that it have a maximum maturity of 30 years, that it not be subordinated, that it not be subject to transfer restrictions (other than Rule 144A), that it be of a standard currency and that it not be subject to some contingency before becoming due.

Settlement

As described in an earlier section, if a credit event occurs then CDS contracts can either be *physically settled* or *cash settled*.

- **Physical settlement**: The protection seller pays the buyer par value, and in return takes delivery of a debt obligation of the reference entity. For example, a hedge fund has bought $5 million worth of protection from a bank on the senior debt of a company. In the event of a default, the bank will pay the hedge fund $5 million cash, and the hedge fund must deliver $5 million face value of senior debt of the company (typically bonds or loans, which will typically be worth very little given that the company is in default).
- **Cash settlement**: The protection seller pays the buyer the difference between par value and the market price of a debt obligation of the reference entity. For example, a hedge fund has bought $5 million worth of protection from a bank on the senior debt of a company. This company has now defaulted, and its senior bonds are now trading at 25 (i.e. 25 cents on the dollar) since the market believes that senior bondholders will receive 25% of the money they are owed once the company is wound up. Therefore, the bank must pay the hedge fund $5 million * (100%-25%) = $3.75 million.

The development and growth of the CDS market has meant that on many companies there is now a much larger outstanding notional of CDS contracts than the outstanding notional value of its debt obligations. (This is because many parties made CDS contracts for speculative purposes, without actually owning any debt for which they wanted to insure against default.) For example, at the time it filed for bankruptcy on 14 September 2008, Lehman Brothers had approximately $155 billion of outstanding debt[22] but around $400 billion notional value of CDS contracts had been written which referenced this debt.[23] Clearly not all of these contracts could be physically settled, since there was not enough outstanding Lehman Brothers debt to fulfill all of the contracts, demonstrating the necessity for cash settled CDS trades. The trade confirm produced when a CDS is traded will state whether the contract is to be physically or cash settled.

Auctions

When a credit event occurs on a major company on which a lot of CDS contracts are written, an auction (also known as a *credit-fixing event*) may be held to facilitate settlement of a large number of contracts at once, at a fixed cash settlement price. During the auction process participating dealers (eg the big investment banks) submit prices at which they would buy and sell the reference entity's debt obligations, as well as net requests for physical settlement against par. A second stage Dutch auction is held following the publication of the initial mid-point of the dealer markets and what is the net open interest to deliver or be delivered actual bonds or loans. The final clearing point of this auction sets the final

price for cash settlement of all CDS contracts and all physical settlement requests as well as matched limit offers resulting from the auction are actually settled. According to the International Swaps and Derivatives Association (ISDA), who organised them, auctions have recently proved an effective way of settling the very large volume of outstanding CDS contracts written on companies such as Lehman Brothers and Washington Mutual.[24]

Below is a list of the auctions that have been held since 2005.[25]

Date	Name	Final price as a percentage of par
2005-06-14	Collins & Aikman - Senior	43.625
2005-06-23	Collins & Aikman - Subordinated	6.375
2005-10-11	Northwest Airlines	28
2005-10-11	Delta Airlines	18
2005-11-04	Delphi Corporation	63.375
2006-01-17	Calpine Corporation	19.125
2006-03-31	Dana Corporation	75
2006-11-28	Dura - Senior	24.125
2006-11-28	Dura - Subordinated	3.5
2007-10-23	Movie Gallery	91.5
2008-02-19	Quebecor	41.25
2008-10-02	Tembec Inc	83
2008-10-06	Fannie Mae - Senior	91.51
2008-10-06	Fannie Mae - Subordinated	99.9
2008-10-06	Freddie Mac - Senior	94
2008-10-06	Freddie Mac - Subordinated	98
2008-10-10	Lehman Brothers	8.625
2008-10-23	Washington Mutual	57
2008-11-04	Landsbanki - Senior	1.25
2008-11-04	Landsbanki - Subordinated	0.125
2008-11-05	Glitnir - Senior	3
2008-11-05	Glitnir - Subordinated	0.125
2008-11-06	Kaupthing - Senior	6.625
2008-11-06	Kaupthing - Subordinated	2.375

2008-12-09	Masonite [4] (http://www.masonite.com/) - LCDS	52.5
2008-12-17	Hawaiian Telcom - LCDS	40.125
2009-01-06	Tribune - CDS	1.5
2009-01-06	Tribune - LCDS	23.75
2009-01-14	Republic of Ecuador	31.375
2009-02-03	Millennium America Inc	7.125
2009-02-03	Lyondell - CDS	15.5
2009-02-03	Lyondell - LCDS	20.75
2009-02-03	EquiStar	27.5
2009-02-05	Sanitec [5] (http://www.sanitec.com/) - 1st Lien	33.5
2009-02-05	Sanitec [6] (http://www.sanitec.com/) - 2nd Lien	4.0
2009-02-09	British Vita [7] (http://www.britishvita.com/)	TBA

Pricing and valuation

There are two competing theories usually advanced for the pricing of credit default swaps. The first, which for convenience we will refer to as the 'probability model', takes the present value of a series of cashflows weighted by their probability of non-default. This method suggests that credit default swaps should trade at a considerably lower spread than corporate bonds.

The second model, proposed by Darrell Duffie, but also by Hull and White, uses a no-arbitrage approach.

Probability model

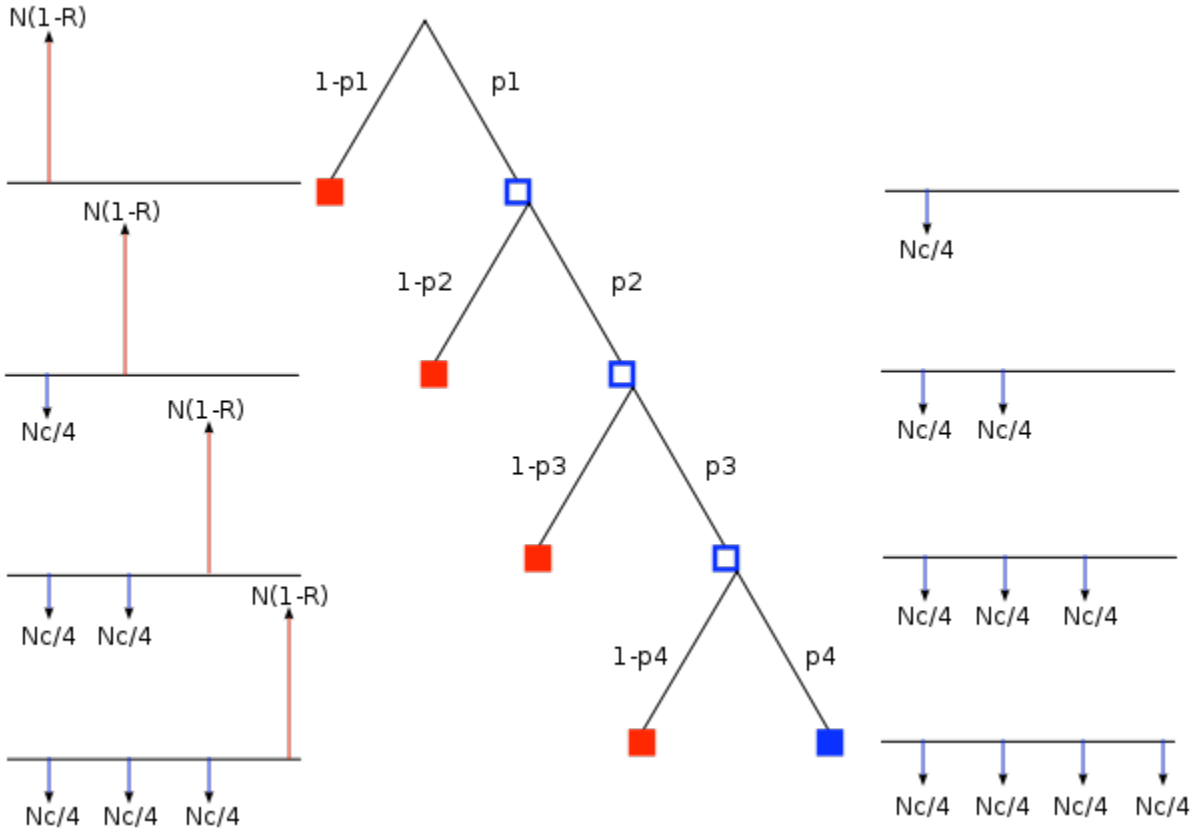
Under the probability model, a credit default swap is priced using a model that takes four inputs:

- the **issue premium**,
- the recovery rate (percentage of notional repaid in event of default)**,**
- the **credit curve** for the reference entity and
- the **LIBOR curve**.

If default events never occurred the price of a CDS would simply be the sum of the discounted premium payments. So CDS pricing models have to take into account the possibility of a default occurring some time between the effective date and maturity date of the CDS contract. For the purpose of explanation we can imagine the case of a one year CDS with effective date t_0 with four quarterly premium payments occurring at times t_1, t_2, t_3, and t_4. If the nominal for the CDS is N and the issue premium is c then the size of the quarterly premium payments is Nc / 4. If we assume for simplicity that defaults can only

occur on one of the payment dates then there are **five ways the contract could end**: **either it does not have any default at all, so the four premium payments are made and the contract survives until the maturity date**, or **a default occurs on the first, second, third or fourth payment date.** To price the CDS we now need to **assign probabilities to the five possible outcomes,** then **calculate the present value of the payoff for each outcome**. The present value of the CDS is then simply the present value of the **five payoffs multiplied by their probability of occurring**.

This is illustrated in the following tree diagram where at each payment date either the contract has a default event, in which case it ends with a payment of $N(1 - R)$ shown in red, where R is the recovery rate, or it survives without a default being triggered, in which case a premium payment of $Nc / 4$ is made, shown in blue. At either side of the diagram are the cashflows up to that point in time with premium payments in blue and default payments in red. If the contract is terminated the square is shown with solid shading.



The probability of surviving over the interval t_{i-1} to t_i without a default payment is p_i and the probability of a default being triggered is $1 - p_i$. The calculation of present value, given discount factors of δ_1 to δ_4 is then

Description	Premium Payment PV	Default Payment PV	Probability
Default at time t_1	0	$N(1-R)\delta_1$	$1-p_1$

Default at time t_2	$-\frac{Nc}{4}\delta_1$	$N(1-R)\delta_2$	$p_1(1-p_2)$
Default at time t_3	$-\frac{Nc}{4}(\delta_1+\delta_2)$	$N(1-R)\delta_3$	$p_1p_2(1-p_3)$
Default at time t_4	$-\frac{Nc}{4}(\delta_1+\delta_2+\delta_3)$	$N(1-R)\delta_4$	$p_1p_2p_3(1-p_4)$
No defaults	$-\frac{Nc}{4}(\delta_1+\delta_2+\delta_3+\delta_4)$	0	$p_1 \times p_2 \times p_3 \times p_4$

The probabilities p_1, p_2, p_3, p_4 can be calculated using the credit spread curve. The probability of no default occurring over a time period from t to $t + \Delta t$ decays exponentially with a time-constant determined by the credit spread, or mathematically $p = exp(- s(t)\Delta t)$ where $s(t)$ is the credit spread zero curve at time t. The riskier the reference entity the greater the spread and the more rapidly the survival probability decays with time.

To get the total present value of the credit default swap we multiply the probability of each outcome by its present value to give

$$\begin{aligned} PV = & (1-p_1)N(1-R)\delta_1 \\ & +p_1(1-p_2)[N(1-R)\delta_2 - \frac{Nc}{4}\delta_1] \\ & +p_1p_2(1-p_3)[N(1-R)\delta_3 - \frac{Nc}{4}(\delta_1+\delta_2)] \\ & +p_1p_2p_3(1-p_4)[N(1-R)\delta_4 - \frac{Nc}{4}(\delta_1+\delta_2+\delta_3)] \\ & -p_1p_2p_3p_4(\delta_1+\delta_2+\delta_3+\delta_4)\frac{Nc}{4} \end{aligned}$$

No-arbitrage model

In the 'no-arbitrage' model proposed by both Duffie, and Hull and White, it is assumed that there is no risk free arbitrage. Duffie uses the LIBOR as the risk free rate, whereas Hull and White use US Treasuries as the risk free rate. Both analyses make simplifying assumptions (such as the assumption that there is zero cost of unwinding the fixed leg of the swap on default), which may invalidate the no-arbitrage assumption. However the Duffie approach is frequently used by the market to determine theoretical prices. Under the Duffie construct, the price of a credit default swap can also be derived by calculating the asset swap spread of a bond. If a bond has a spread of 100, and the swap spread is 70 basis points, then a CDS contract should trade at 30. However there are sometimes technical reasons why this will not be the case, and this may or may not present an arbitrage opportunity for the canny investor. The difference between the theoretical model and the actual price of a credit default swap is

known as the basis.

Criticisms

Critics of the huge credit default swap market have claimed that it has been allowed to become too large without proper regulation and that, because all contracts are privately negotiated, the market has no transparency. Furthermore, there have even been claims that CDSs exacerbated the 2008 global financial crisis by hastening the demise of companies such as Lehman Brothers and AIG.[26]

In the case of Lehman Brothers, it is claimed that the widening of the bank's CDS spread reduced confidence in the bank and ultimately gave it further problems that it was not able to overcome. However, proponents of the CDS market argue that this confuses cause and effect; CDS spreads simply reflected the reality that the company was in serious trouble. Furthermore, they claim that the CDS market allowed investors who had counterparty risk with Lehman Brothers to reduce their exposure in the case of their default.

It was also reported after Lehman's bankruptcy that the $400 billion notional of CDS protection which had been written on the bank could lead to a net payout of $366 billion from protection sellers to buyers (given the cash-settlement auction settled at a final price of 8.625%) and that these large payouts could lead to further bankruptcies of firms without enough cash to settle their contracts.[27] However, industry estimates after the auction suggested that net cashflows would only be in the region of $7 billion.[27] This is because many parties held offsetting positions; for example if a bank writes CDS protection on a company it is likely to then enter an offsetting transaction by buying protection on the same company in order to hedge its risk. Furthermore, CDS deals are marked-to-market frequently. This would have led to margin calls from buyers to sellers as Lehman's CDS spread widened, meaning that the net cashflows on the days after the auction are likely to have been even lower.[24] Senior bankers have argued that not only has the CDS market functioned remarkably well during the financial crisis, but that CDS contracts have been acting to distribute risk just as was intended, and that it is not CDSs themselves that need further regulation, but the parties who trade them. [28]

Some general criticism of financial derivatives is also relevant to credit derivatives. Warren Buffett famously described derivatives bought speculatively as "financial weapons of mass destruction." In Berkshire Hathaway's annual report to shareholders in 2002, he said, "*Unless derivatives contracts are collateralized or guaranteed, their ultimate value also depends on the creditworthiness of the counterparties to them. In the meantime, though, before a contract is settled, the counterparties record profits and losses—often huge in amount—in their current earnings statements without so much as a penny changing hands. The range of derivatives contracts is limited only by the imagination of man (or sometimes, so it seems, madmen).*"[29] It is true that entering a CDS transaction gives you counterparty risk, but bear in mind that it is also possible to hedge this risk by buying CDS protection on your counterparty! Furthermore, it is not strictly true to say that profit and loss is recorded without any money changing hands since positions are marked-to-market daily and collateral will pass from buyer to seller (or vice versa) to protect both parties against counterparty default. It is also worth noting that Buffett seems to have since changed his stance on derivatives since he made this statement, since in October 2008 Berkshire Hathaway was forced to reveal to regulators that it has entered into at least $4.85 billion

in derivative transactions.[30] In addition, Berkshire Hathaway was a large owner of Moody's stock during the period that it was one of two primary rating agencies for subprime CDOs, a form of mortgage security derivative dependant on the use of credit default swaps.

Systemic risk

The risk of counterparties defaulting has been amplified during the 2008 financial crisis, particularly because Lehman Brothers and AIG were counterparties in a very large number of CDS transactions. This is an example of systemic risk, risk which threatens an entire market, and a number of commentators have argued that size and deregulation of the CDS market have increased this risk.

For example, imagine if a hypothetical mutual fund had bought some Washington Mutual corporate bonds in 2005 and decided to hedge their exposure by buying CDS protection from Lehman Brothers. After Lehman's default, this protection was no longer active, and Washington Mutual's sudden default only days later would have led to a massive loss on the bonds, a loss that should have been insured by the CDS. There was also fear that Lehman Brothers and AIG's inability to pay out on CDS contracts would lead to the unraveling of complex interlinked chain of CDS transactions between financial institutions.[31] So far this does not appear to have happened, although some commentators have noted that because the total CDS exposure of a bank is not public knowledge, the fear that one could face large losses or possibly even default themselves was a contributing factor to the massive decrease in lending liquidity during September/October 2008.[32]

Chains of CDS transactions can arise from a practice known as "netting".[33] Here, company B may buy a CDS from company A with a certain annual "premium", say 2%. If the condition of the reference company worsens, the risk premium will rise, so company B can sell a CDS to company C with a premium of say, 5%, and pocket the 3% difference. However, if the reference company defaults, company B might not have the assets on hand to make good on the contract. It depends on its contract with company A to provide a large payout, which it then passes along to company C. The problem lies if one of the companies in the chain fails, creating a "domino effect" of losses. For example, if company A fails, company B will default on its CDS contract to company C, possibly resulting in bankruptcy, and company C will potentially experience a large loss due to the failure to receive compensation for the bad debt it held from the reference company. Even worse, because CDS contracts are private, company C will not know that its fate is tied to company A; it is only doing business with company B.

As described above, the establishment of a central exchange or clearing house for CDS trades would help to solve the "domino effect" problem, since it would mean that all trades faced a central counterparty guaranteed by a consortium of dealers.

Tax treatment

The U.S federal income tax treatment of credit default swaps is uncertain.[34] Commentators generally believe that, depending on how they are drafted, they are either notional principal contracts or options for tax purposes,[35] but this is not certain. There is a risk of having credit default swaps recharacterized as different types of financial instruments because they resemble put options and credit guarantees. In

particular, the degree of risk depends on the type of settlement (physical/cash and binary/FMV) and trigger (default only/any credit event).[36] If a credit default swap is a notional principal contract, periodic and nonperiodic payments on the swap are deductible and included in ordinary income.[37] If a payment is a termination payment, its tax treatment is even more uncertain.[38] In 2004, the Internal Revenue Service announced that it was studying the characterization of credit default swaps in response to taxpayer confusion,[39] but it has not yet issued any guidance on their characterization. A taxpayer must include income from credit default swaps in ordinary income if the swaps are connected with trade or business in the United States.[40]

LCDS

A new type of default swap is the "loan only" credit default swap (LCDS). This is conceptually very similar to a standard CDS, but unlike "vanilla" CDS, the underlying protection is sold on syndicated secured loans of the Reference Entity rather than the broader category of "Bond or Loan". Also, as of May 22, 2007, for the most widely traded LCDS form, which governs North American single name and index trades, the default settlement method for LCDS shifted to auction settlement rather than physical settlement. The auction method is essentially the same that has been used in the various ISDA cash settlement auction protocols, but does not require parties to take any additional steps following a credit event (i.e., adherence to a protocol) to elect cash settlement. On October 23, 2007, the first ever LCDS auction was held for Movie Gallery.[8] (http://www.creditfixings.com/information/affiliations/fixings/auctions/2007/movie_gallery.html)

Because LCDS trades are linked to secured obligations with much higher recovery values than the unsecured bond obligations that are typically assumed to be cheapest to deliver in respect of vanilla CDS, LCDS spreads are generally much tighter than CDS trades on the same name.

See also

- Credit default option
- Credit default swap index
- Constant maturity credit default swap
- Credit derivative
- Monoline
- Recovery swap
- Swap (finance)
- Bucket shop (stock market)

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