An Overview of the Use of Credit Spreads in Fair Valuation

STRATEGIC TREASURER

CONSULTANTS IN TREASURY

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REPRINTED FROM TREASURY UPDATE
VOLUME 4, ISSUE 1
SPRING / SUMMER 2010

1 Introduction

Credit, or default, risk refers to the risk [or possibility] that the issuer of a fixed income security, [a corporate bond, for example], may default, (i.e., the issuer will be unable to make timely principal and interest payments on the security). Credit risk is gauged by quality ratings assigned by rating [agencies]." (Fabozzi F. The handbook of fixed income securities. 3rd ed. p. 33.) This risk impacts the net yield—the "credit spread"—of a corporate bond over the "risk-free" rate of government bonds. As pointed out by Fabozzi, investors in corporate debt, however, are more concerned with changes in the "perceived" credit risk of an issuer rather than with the actual risk of default since the perceived risk impacts the valuation of their investment through the adjustment of the credit spread. As other investors anticipate a worsening situation for a corporate bond issuer, the yield they would require over the risk-free rate increases (the credit spread widens), which lowers the fair market value they are willing to pay for the bond. Yields / interest rates and bond prices have an inverse relationship.

"In light of the confusion, practitioners have endured a number of challenges in fair valuing their derivative hedge instruments specifically related to the credit adjustment component."

Corporate practitioners engaged in hedging their financial risks with over-the-counter (OTC) contracts are also subject to credit risk or the possibility that their counterparty to the hedge transaction—an interest rate swap, for example—may default. Further, corporate stakeholders have become increasingly aware of this risk in light of the financial crisis of 2008 and the collapse or potential collapse of several large financial institutions. Measurement of credit risk in derivatives is complicated by the fact that the future is uncertain—the derivative's value can move in the company's favor (a positive value) and out of the company's favor (a negative value) over time. The current market value of the derivative only represents the potential gain/loss today and does not account for future changes in value. It is no longer safe to assume that your hedges are secure, given the fact that you deal with only highly rated counterparties and are diversified among several of them.

In light of this risk, practitioners should be employing more sophisticated, analytical techniques to value both their current and future exposures to account for the possibility of default by their counterparties. Further, many corporate users of derivatives have been subjected to amendments to their ISDA (International Swaps and Derivatives Association, Inc.) agreements by their counterparties with respect to credit exposure, including the addition of cash or other collateral requirements based on thresholds for various credit rating levels or other credit events, should they occur.

Such credit exposure and suggested analyses notwithstanding, companies have also been impacted in their financial reporting and valuation of derivatives by changes to accounting principles, namely FAS157 (*Fair Value Measurements*), which have impacted how companies value their derivatives used in hedging.

The issue of fair valuation is an ongoing hot topic. Given that, this article focuses on the choice of the credit spread(s), with an overview of the mechanics used for adjusting the current fair value of hedge instruments for both the company's as well as the counterparty's credit per the requirements of FAS157. It also highlights some of the implications of these credit adjustments to FAS133 (*Accounting for Derivative Instruments and Hedge Activities*). Further, the reader is directed to more robust, analytical techniques to assist in modeling/managing their projected credit exposure versus simple credit spread adjustments—curve shifts, for example—that merely meet GAAP reporting requirements. It is simply an overview and is not intended to be a comprehensive "white paper." The reader may be referred to other sources for information on specific topics.

FAS133 (ASC815) Requirements

FAS133 has always required companies to consider the creditworthiness of their hedge counterparties in complying with hedge accounting principles. For example, Statement 133 Issue (DIG Issue) No.G10 (*Cash Flow Hedges: Need to Consider Possibility of Default by the Counterparty to the Hedging Derivative*) specifies that "the entity must be aware of the counterparty's creditworthiness (and changes therein) in determining the fair value of the derivative." Other issues, including No.G7 (*Cash Flow Hedges: Measuring the Ineffectiveness of a Cash Flow Hedge under Paragraph 30(b) When the Shortcut Method Is Not Applied*), as well as No.G9 (*Cash Flow Hedges: Assuming No Ineffectiveness When Critical Terms of the Hedging Instrument and the Hedged Transaction Match in a Cash Flow Hedge*) either specify or imply that "the likelihood of the obligor not defaulting is assessed as being probable." Prior to FAS157, however, such assessments of creditworthiness were more qualitative vs. quantitative.

FAS157 (ASC820) Requirements

FAS157 provides principles on how the valuation of currently fair valued assets / liabilities should be accomplished. According to the May 2008 FASB article "Some Facts about Fair Value," the statement "clarifies the fair value objective and establishes a framework for developing fair value estimates … It is intended to convey to investors that value of an asset or liability at the measurement date (current value), not the potential value of the asset or liability at some future date." Fair value (FV) is the price that would be received or paid to transfer an asset or liability in an orderly transaction (not in a "fire sale") between market participants at the measurement date. For an asset, this may be referred to as the "exit price," while for a liability, the FV may be referred to as the "transfer price." The FV is always from the perspective of the reporting entity.

FAS157 establishes hierarchies or "levels" of valuation calculations, with emphasis on maximizing the use of observable inputs, quoted prices, or readily available market data used in valuation models, for example. The statement specifies the category for the FV level based on the following criteria:

- Level 1 is the unadjusted quoted price in liquid markets, such as the NYSE quoted price of a stock or NYMEX futures price. A price for an OTC derivative provided by a third party such as your counterparty or other pricing service would not constitute a Level 1 value.
- Level 2 is a calculated value based on observable market inputs that are reasonably available in the absence of quoted market prices such as an interest rate swap based on the closing Libor rate curve. This level covers most OTC derivatives pricing/valuation.

FV Level	Priority
Level 1	Quoted Prices
Level 2	Observable Inputs
Level 3	Unobservable Inputs

- Level 3 is a calculated value based on internally derived assumptions / unobservable inputs such as volatility and/or other components, including derived forward price curves or a valuation based on a unique, internal model.

The point is that FAS157 provides only guidance on how the fair valuation of financial instruments that are currently being fair valued should take place. As such, it requires the reporting entity to include credit spreads or other adjustments for creditworthiness in the valuations. Classification of the FV is based on the lowest level that is "significant" to its fair value, which can be influenced by credit adjustments if such adjustments are significant as well as unobservable, i.e., internally derived. This statement has not only increased volatility in financial reporting (recall the impact to financial institutions' financial statements amid the financial crisis), but has also caused confusion. Moreover, while it provides principles or guidance to fair value calculations, it does not dictate how to arrive at such values. On the other hand, it has been noted that both auditors and the SEC may have their own rules in analyzing valuations.

2 The Challenges

This FV principle is not only a hot topic among corporate practitioners but also has received increased focus among the auditor community. Unfortunately however, there is no established consensus on the methodologies being employed among companies at this time; the consensus continues to evolve. See fasb.org for more information on FAS133, FAS157, and related issues as well as to confer with external auditors.

In light of the confusion, practitioners have endured a number of challenges in fair valuing their derivative hedge instruments specifically related to the credit adjustment component, such as:

- Which credit spread(s) to use—bond spreads, credit default swap (CDS) spreads, or others?
- How should the credit spread(s) be employed—flat spread or spread curve?
- What should the credit adjustment be applied to—net value, net cash flows, or all cash flows?
- What if the credit component is not observable?
- What is the impact of credit exposure mitigation terms in contracts—collateral posting or other margin requirements contained in a Credit Support Annex (CSA) to an ISDA agreement?

- What is the impact to hedge accounting, specifically effectiveness assessment and the measurement of ineffectiveness, if the derivative is now fair valued under a credit adjustment, but the exposure may not be?

Approaches to Credit Adjustments

Although confusion exists in a number of areas regarding FV, this article attempts to address only a few of the issues at this time, including a recommendation for which credit spread(s) to use and various, basic methods for employing the credit spread(s) in fair valuation. As mentioned, there is no single or right way of calculating the credit adjustment. As with any valuation technique, the methodology should be appropriate, logical, transparent, defensible, consistent, and reproducible by others. Further, the process and parameters should be well documented and disclosed in the notes to financial statements where required.

Credit Spreads

In general, practitioners have two basic, alternative credit spreads potentially available to them that should provide observable inputs for valuation based on credit adjustments, including: corporate bond yield spreads and credit default swap (CDS) spreads. Typically, this data is available by subscription to a service such as Bloomberg®, Reuters®, or other third-party data or risk management system provider.

A **bond yield spread** is the difference between the yield to maturity of a corporate bond and the "risk-free" rate, which is typically the yield on a U.S. Treasury Note of similar maturity. Note, if using this spread, then it should be calculated over Libor or other discount rate (adjusting for day count issues) that is employed in the base case valuation, as this is the rate the credit spread would be added back to for a credit adjustment. Further, if using bond spreads, it is advisable to use a basket of similar bonds if available to mitigate any other factors, including liquidity premiums, with specific issues. Alternatively, one can use **CDS spreads** (defined below) to measure the credit spread. If available, it is recommended that CDS rates be employed. Since credit risk is two sided—the credit risk of a derivative buyer and a derivative seller—then a relevant credit spread curve is needed for both the company as well as each counterparty. CDS rates are typically available for major financial institutions through data services, but not always for individual, non-financial companies, however.

What if credit spreads are not available or observable? One alternative is to use bond yields or CDS rates of similar companies with adjustments if necessary. Or, employ a model, which is discussed in Method 6: Probability of Default below that uses probabilities for default and expected recovery rates, or the loss given default, to calculate a credit adjustment. These parameters could be derived from CDS rates, but of course, that step wouldn't typically be needed if CDS rates existed, unless, a particular valuation model employed only these parameters as opposed to credit spreads, per se; this is not atypical. Further, there are third-party pricing services that use proprietary methods such as observable market benchmarks on similar securities (bonds or credit default swaps) to derive an appropriate credit spread. Many risk management systems may also use market-based spread curves based on industry type and ratings levels to deploy spread adjustments when the user is unable to provide their own data. Another alternative is to use historical default rates supplied by various rating agencies or other credit services, which may be available for a fee. Refer to chapter 20 of the book: *Options, Futures, and Other Derivatives*, John C. Hull, 6th edition, Prentice Hall, 2006, for more information on this topic. Note that internally derived credit adjustment parameters may have an impact on the "level" categorization (1, 2, or 3) of the valuation per FAS157.

Definition of a Credit Default Swap (CDS)

According to Hull, (chapter 21), a credit default swap is "a contract that provides insurance against the risk of default by a particular company [the reference entity]." An entity's credit default swap spread (the CDS rate) is the cost per annum for the protection against a default (a "credit event") by the entity, which can be a corporate or government entity. The annual (or other frequency) payment for the CDS is the CDS rate times the notional value, or face value, of the swap. For example, given an initial CDS rate of 124 basis points (1.24%), the cost of a $10MM CDS is $124,000 per year (0.0124 X $10MM) until the contract matures (termination date) or a credit event occurs. The credit event may be a failure to pay, a restructuring, or a bankruptcy, for example. The payoff to the swap buyer at the time of the event can be either a cash settlement, which may be determined by a calculation agent or auction mechanism, or physical delivery of the bond to the swap seller (counterparty), where the value of the payoff is the swap's notional value less the market value of the reference issue (the underlying bond) since it is typical for some value of the liability to be recovered even in a bankruptcy restructuring. The CDS terminates upon the contract's maturity or a credit event, whichever comes first. Note, however, that the buyer of a CDS does not have to own a reference entity's bond or other credit obligation to purchase the swap; this is referred to as a "naked CDS," which is purported to comprise the vast majority of CDS trading. Terms of the CDS, including calculation of the payoff and specified credit events, are governed by an ISDA Master Agreement similar to other over-the-counter derivative contracts.

A CDS is analogous to a basic put option on a bond, where the holder of the put option has the right to put the security back to the option writer at the option's strike price, similar to the notional value in the case of a credit default swap. The gain on the put option is the strike price less the market price of the underlying bond. Note that this analogy is for illustration purposes only as the valuation of put options and credit default swaps may be very different. Moreover, the buyer of a CDS pays a periodic premium (the CDS rate) over the life of the contract, whereas a put option buyer pays a single, upfront premium.

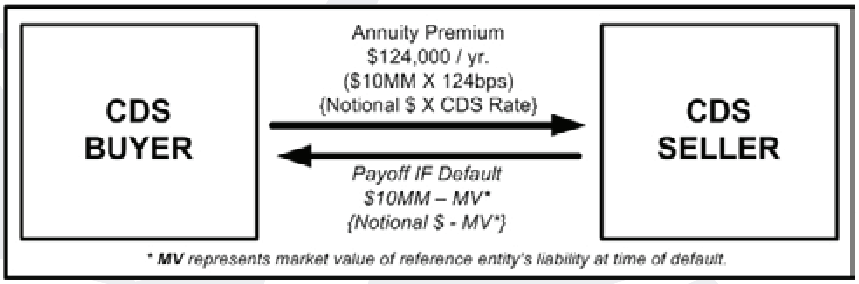

Exhibit 1: Credit Default Swap Flows

CDS Example

To illustrate the basics of a CDS, suppose that in January 2005 two parties (swap buyer and swap seller) enter into a CDS with a maturity of January 2010 (5-yr. term). At inception (Jan '05), the 5-year CDS offered rate for reference entity 'X' (the underlying company on which the CDS rate is quoted) is 124 basis points per annum. Therefore, if the buyer purchases a $10 million (notional value) CDS, the buyer must pay the CDS seller $124,000 (in arrears in this example) each year the CDS is outstanding ('05 – '10), or a total of $620,000 (5 X $124k/yr) unless there is a credit event as defined by the ISDA agreement. If a default by the reference entity occurs between '05 and '10, then the CDS seller must take delivery of the underlying bond (if this contract dictates a physical settlement) and pay the CDS buyer the par value (100% of face value) of the bond. Or, in the case of cash settlement, the CDS seller would pay the CDS buyer a cash value. The value of the cash settlement, which would be determined by a calculation agent or other specified means, would equal the notional amount of the CDS ($10MM) less the determined market value of the underlying reference obligation, which may be greater than zero. For example, if it was determined that the underlying obligation was worth 35% of par value, or $3.5MM in this case, then the payoff to the swap buyer would be $6.5MM ($10MM less $3.5MM), less any accrued premium due from the CDS buyer, and the CDS would terminate.

Credit default swaps may be employed in a variety of strategies, including: 1) speculation on an entity's perceived credit standing, 2) hedging of a credit exposure to the reference entity, or 3) arbitrage of the values among related securities. According to Hull, the effect of buying a CDS to hedge an exposure to an entity's bond, i.e. a long position in the bond, would net a yield to the holder of the bond and CDS equal to the risk-free rate (bond yield less CDS rate ≈ risk-free rate). Credit default swaps may also be traded on credit indices and/or a number of reference entities ("basket credit default swap").

CDS Rates vs. Bond Yield Spreads

CDS rates, rather than bond yield spreads, should be employed for the credit component of valuation. According to Hull, CDS rates anticipate a change in credit status or a ratings announcement for the reference entity. Moreover, others have shown that the CDS market lead changes in the bond market (Blanco, et al. Journal of Finance; vol. 60, no. 5. October '05:pp. 2255-81). And finally, bond yields may also include a liquidity premium in them, (Longstaff, et al, Journal of Finance; vol. 60, no. 5. October '05: pp. 2213–53), which means that use of bond spreads in adjusting a hedge's value for credit quality may result in over compensation for the credit component, per se. Moreover, the CDS market is highly liquid. It is roughly the same size in notional value outstanding as the entire U.S. bond market—for all types of bonds ($31.2 trillion and $34.5 trillion, respectively as of mid-2009)—and roughly 4.5 times the size of the market for corporate debt, excluding commercial paper (Securities Industry and Financial Markets Association).

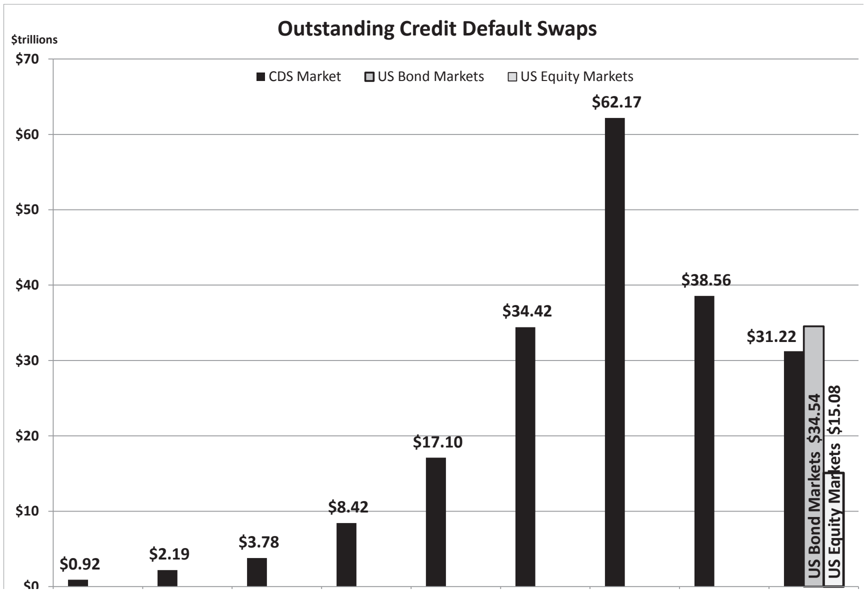

Exhibit 2: Outstanding Credit Default Swaps*

Basic Valuation of a CDS

A basic CDS spread on an individual entity can be calculated from estimates of default probabilities (probability of the entity defaulting during a year, conditional on no earlier default) and a recovery rate (expected proceeds as a percent of face value that would be recovered upon default). Under this method, the CDS rate is calculated using discounted cash flows where the expected cash flows are derived by the default rate and recovery rate assumptions and the discounted by the risk-free rate. By equating the present value of expected payments on the credit default swap to the present value of expected cash flows of the bond (principal and interest), one can derive the credit default swap rate. See chapter 21 of the Hull book for more details.

Use of Credit Spreads in Fair Valuation

The issue now is how to employ the spread. There are several alternative methods from simple to more complex that are either being recommended or employed in fair valuation for the credit adjustment by practitioners through either internally developed models or third-party risk management systems. The methods outlined below begin with the base or unadjusted value which is shown in Method 1: Base Value below and progress to more detailed or analytically rigorous methods.

*Sources:
1) CDS Market: International Swaps and Derivatives Association (ISDA)
2) U.S. Bond Market: Securities Industry and Financial Markets Assoc (SIFMA)
3) U.S. Equity Markets: NYSE and NASDAQ market capitalization (The World Federation of Exchanges)
Notional amounts outstanding in U.S. dollars ($-trillions).

Methods 2 – 5 (Simple Adjustment through Separate Curves Adjustment) are basic calculations to derive a credit adjustment to the derivative's current value by shifting the base-case discounting curve by a credit spread(s), which may be a point-in-time, flat spread or a relevant term structure of spreads corresponding to each cash flow date (refer to Exhibit 4: Discounting Curves on page 15). Beginning with the derivative's base value, the expected cash flows are subsequently rediscounted to present value using parameters for a credit adjustment, which results in the credit adjustment to the instrument's current fair value. The amount of the credit value adjustment (CVA) is then the difference between the base value and the credit adjusted value (CVA = credit adjusted value less base value).

Methods 6 & 7 (Probability of Default and Projected Future Exposure) summarize more analytically rigorous methods to derive a credit adjustment based on historical probabilities for default and expected loss given default. Further, these methods may also be employed in projections of future exposure (the gain or loss expected under various future scenarios or paths) and credit adjusting such exposures. These approaches are more useful than the basic credit spread adjustments in providing both a projected value given credit adjustments as well as insight into a worst case or maximum expected exposure, given a defined confidence level.

The examples below focus on the valuation and credit adjustment of an individual, basic interest rate swap without any credit enhancements such as collateral or cash margin deposits. These methods can also be applied to other derivatives as well. The swap buyer in this example is the fixed-rate payer, while the swap seller is the floating rate payer. In general, if the market value of a derivative is in a net gain position to the derivative buyer, then it is recorded as an asset, and the credit adjustment should correspond to the counterparty's credit spread(s). If it is in a net-loss position, then the liability is adjusted based on the derivative buyer's credit spread.

Credit Adjustment Methods

1. **Base Fair Value**—the unadjusted market value derived from observable market inputs, i.e., the Libor curve unadjusted for specific credit spreads. The base value should closely correspond to the marked-to-market value provided by the derivative counterparty given similar inputs.

2. **Simple Credit Adjustment**—a single spread applied to the base value, or net present value. This is otherwise known as "the back of the envelope method," and it simply adjusts the base fair value of the derivative (NPVt) at the measurement date (t) by a fixed credit spread (r) of a similar maturity (n): NPVt / (1 + rn)n. For example, given an unadjusted NPV of $145K (a net gain) for the IR swap with 3.75 years remaining to maturity and a simple credit spread for the counterparty for the same maturity of 95bps, the credit adjusted value would equal $140K (a negative 3.5% adjustment vs. base value): $145K/(1+.0095)3.75 = $139.9K.

3. **Parallel Shift Adjustment**—a single spread applied across the discounting curve for each net cash flow of the hedge instrument—the fixed leg less floating leg of the interest rate swap, for example. This method employs the same, point-in-time credit spread of 95bps for the counterparty as in Method 2: Simple Adjustment. But, instead of a single adjustment to the final NPV, the entire underlying Libor discounting curve is shifted by a single spread; hence, a "parallel shift"—effectively adjusting all discounting rates by the same credit spread of 95bps and applying the new, credit adjusted curve to each expected net cash flow per period. The resulting credit adjusted fair value of the interest rate swap would equal $132.9K (a negative 8.3% adjustment vs. base value).

4. **Single Curve Adjustment**—a term structure of varying spreads applied across the discounting curve for each expected net cash flow. Similar to interest rates, credit spreads are not necessarily flat or static across different maturities; they can be either upward or downward sloping—see Exhibit 3: Credit Default Swap Spreads below for two actual bank credit default swap spread curves (CDS rates from 3-mo to 4-yr terms). In light of this fact, it is more appropriate to adjust the base discounting rates at each expected cash flow's payment date by the relevant credit spread for that same term. As opposed to shifting the entire Libor curve, for example, by a single rate of 95bps as in the parallel shift Method 3: Parallel Shift, shift the discounting curve by a term structure of rates that more closely match the term of each net cash flow. The credit adjusted value, based on the counterparty curve (swap seller) shown below, would equal $133.4K (a negative 8% adjustment vs. base value). In this case, the credit adjustment is slightly lower than in Method 2: Simple Adjustment,

since the weighted average spread across the term structure equated to about 75bps as opposed to the 95bps flat spread, which is a 4-year rate.

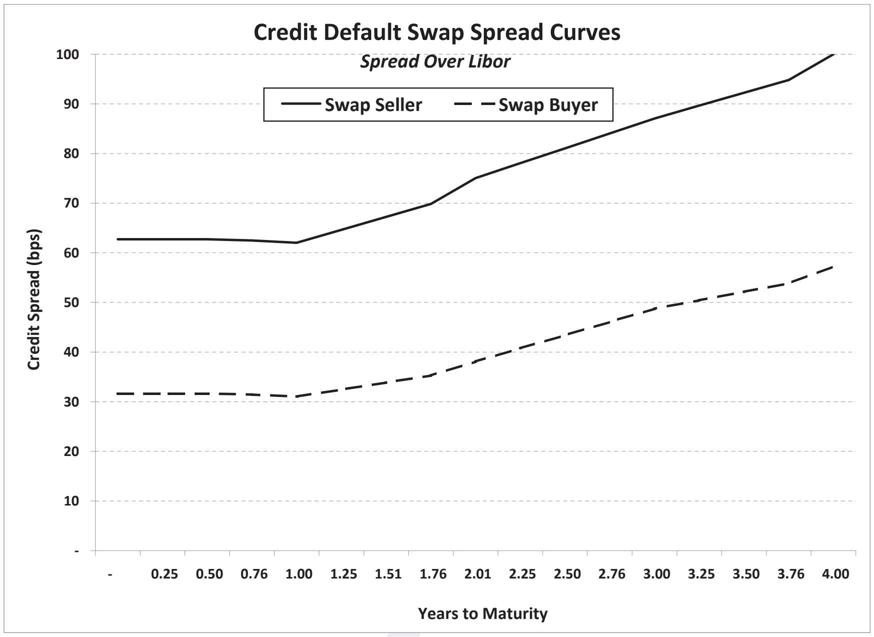

Exhibit 3: Credit Default Swap Spreads

5. **Separate Curves Adjustment**—a different term structure of separate credit spreads (swap buyer and swap seller applied across the discounting curve for each leg of the derivative instrument to the expected gross cash flows at each cash flow date. If interest rate swaps had only one cash flow stream as opposed to two (fixed and floating legs) then the single curve Method 4: Single Curve Adjustment would suffice for simple credit adjustments, but that is not the case. There is a fixed payer with one set of credit spreads and a floating payer with another set of credit spreads. The two cash flows (fixed minus floating) are netted only for settlement purposes and interest accruals. This does not cause any problem for the base valuation since both cash flow streams are discounted using the same Libor curve. However, since each expected net cash flow of an interest rate swap can be either positive (in the swap buyer's favor) or negative (in the counterparty's favor), then the appropriate spread (swap buyer or swap seller) must be applied. Rather than applying a different spread, depending on the sign (+/-) of the net cash flow, it is simpler to apply the swap buyer's credit curve to the fixed payments (for a pay-fixed swap) and

the swap seller's curve to the floating payments. For example, using the curves in the above illustration for swap buyer and swap seller, the credit adjusted net value would equal $122.8K (a negative 15.3% adjustment vs. base value). Why such a big decline vs. base value? The fixed payments the swap buyer pays are discounted by a lower spread curve (40bps on average in this case), while the expected floating payments which the counterparty pays are discounted by a higher spread curve (75bps on average). Netting the two newly discounted streams results in a substantially lower NPV vs. all other methods. This difference should shed light on the impact of using a single spread or spread curve to adjust only the expected net cash flows of the interest rate swap in this case.

Which Credit Adjustment Method?

As seen from Exhibit 5: I.R. Swap NPVs below, credit adjustment Method 2 through Method 5 may provide significantly different end values. So, which method should practitioners use to satisfy GAAP reporting requirements per FAS157? Given the newness of the requirement to quantify the credit risk in hedging instruments and the uncertainty regarding exactly how to do this, there is not an established consensus on methods at this time; they are still evolving based on auditors' changing requirements as well as on the advancement in risk management models/systems. Methods across companies can vary widely in practice. The choice of which method is best for a specific situation depends on: 1) the objective—to quickly obtain a value for financial reporting purposes or measure as best as possible the credit exposure impact to the hedge portfolio, and 2) what the company's auditors require. Based on the methods outlined above, Method 5: Separate Curves should be employed where possible to adjust an instrument's current value. Or, Method 4: Single Curve should suffice, if the financial instrument has only one cash flow stream or expected payment. Of course, practitioners may need to acquire the appropriate tools or valuation models, including relevant data, to accomplish this task, which is a topic for another day. In any case, Method 2: Simple Adjustment, or the "back of the envelope method", is not sufficient.

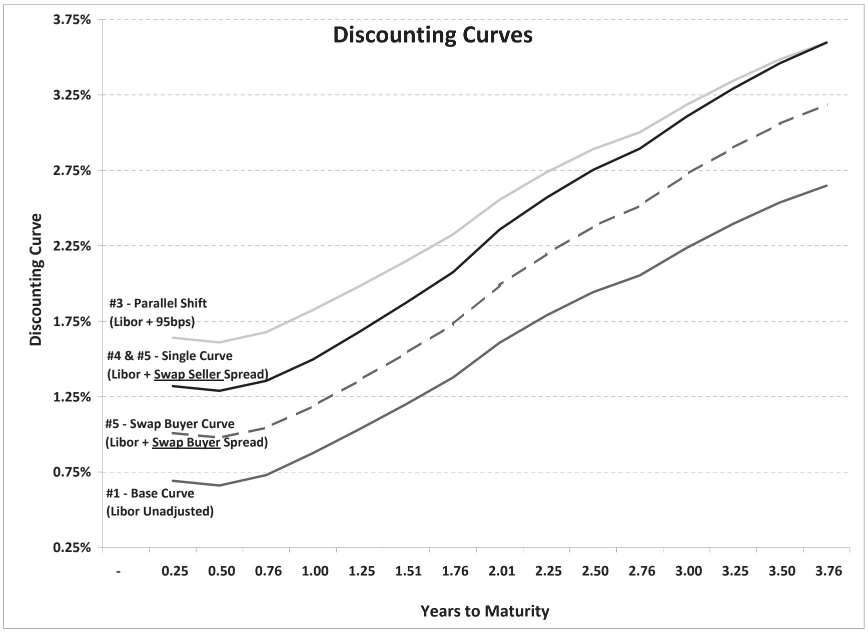

Exhibit 4: Discounting Curves

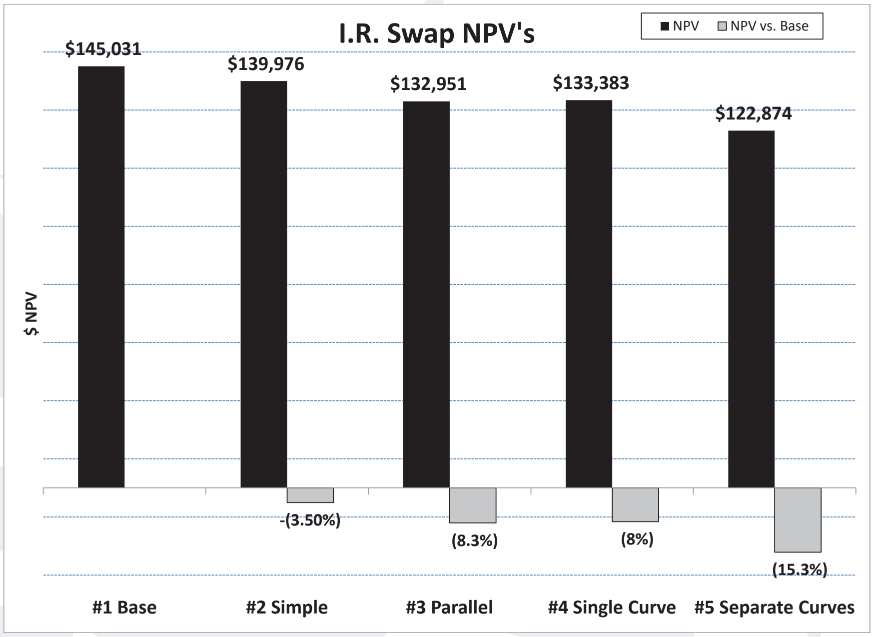

Exhibit 5: I.R. Swap NPV's

The recommendation above notwithstanding, practitioners should also consider other, more analytically rigorous methods to either quantify their current credit adjusted cash flows or a projected credit exposure. These methods, which are briefly described below, are typically more forward looking as in the case of Method 7: Projected Future Exposure, for example. Further, they may be applicable where there are not observable credit spreads available for either the company or the counterparty as these methods attempt to model a probability for default and expected recovery rate among other variables. Again, the choice of which method(s) to use depends on the objectives. If the goal is to gauge the expected credit risk, a company may endure with its counterparty over the term of the contract, which is the true credit exposure; then, the expected future value needs to be considered. The following approaches attempt to accomplish this while Methods 2 – 5, which are simple discount rate adjustment techniques, do not.

6. Probability of Default / Expected Recovery—Instead of adjusting the discount rate as in Methods 2 – 5 by a credit spread(s), this method employs a model which utilizes the parameters for a probability for default and an expected recovery rate. That is, a different default probability (DP) as well as an expected recovery rate given default (R) is applied to each expected cash flow per period, and the adjusted cash flows are subsequently discounted to derive a credit adjusted value in a static environment. Either internally derived assumptions from bond or CDS spreads, or historical data provided by rating agencies or other third-parties may be employed to estimate these parameters. Note, however, that this model only works if there is no uncertainty regarding the expected cash flows. That is, it adjusts the base case cash flows only similar to discount rate adjustment methods. To utilize this type of model to derive an expected future credit exposure, the parameters would need to be employed under various scenarios and account for volatility. Method 7 below may be more applicable in this case.
7. Projected Future Exposure—may be accomplished with a simulation-based technique such as *Monte Carlo simulation* to derive a "Credit VaR", which is similar to value-at-risk (VaR) or cash-flow-at-risk (CFaR). See *Treasury Update* Vol.3, Issue 2, Winter 2009, page 3, for a discussion of VaR, which is available at www.strategictreasurer.com/resources/newsletter, or see chapter 20, page 499 of the Hull book for a more complete description of Credit VaR. This type of model considers both the current as well as the expected derivative value (projected gain/loss) over time under a number of simulated scenarios that include probability-weighted, projected interest rate environments, probabilities for default

and recovery rates, and a specified confidence level in deriving a projected or future credit-adjusted exposure. Practitioners would need to employ a system or model capable of generating future scenarios or random paths. Financial institutions typically employ a proprietary model such as this to value and manage their credit exposure to various counterparties.

For a short demonstration and example of a model that employs some of the factors noted in Method 7: Projected Future Exposure, see http://www.fincad.com/trial-downloads/demos/credit-exposure-cva-workbook.aspx. Or, for a short discussion paper on this topic including points on why Methods 2 – 6 do not adequately capture the expected credit risk, see www.fincad.com/cva.

Credit Adjustment Method	Description
1. Base Value	Unadjusted market value.
2. Simple Adjustment	Single credit spread applied to base value.
3. Parallel Shift	Flat spread applied across discounting curve for net cash flows.
4. Single Curve	Term structure of credit spreads applied across discounting curve for net cash flows.
5. Separate Curves	Separate term structure of credit spreads (buyer & seller) applied across discounting curve for respective fixed and floating cash flows legs.
6. Probability of Default	Derive credit adjusted cash flows (NPV) using expected probabilities for default/recovery.
7. Projected Exposure	Probability adjusted NPV of projected exposure, which is expected gain/loss under simulated future paths.

Summary of Credit Adjustment Methods

Although FAS157 does not require the calculation of "the potential value of the asset or liability at some future date" to satisfy GAAP reporting requirements, practitioners may want to employ a model that does however. The objective should be to project the future exposure, to both manage credit exposure (it changes over time) as well as any future margin or collateral calls for the company or the counterparty, if applicable.

Impact on Effectiveness Assessments per FAS133

FAS133 requires that the hedge relationship's "effectiveness," or the degree to which the hedging instrument (the derivative) offsets the changes in fair value (for a fair value hedge) or cash flows (for a cash flow hedge) of the hedged item (the exposure), be assessed both at inception and on an ongoing basis. This assessment must be performed on both a prospective as well as a retrospective basis. As mentioned earlier, one of the challenges related to the credit adjustment to fair value of the derivative is whether the same adjustment can be applied to the exposure. If the same adjustment is not applicable to the exposure, then assessment of effectiveness would likely be impacted, which could potentially disallow favorable hedge accounting treatment or result in greater ineffectiveness (the actual dollar mismatch of the derivative and the exposure) being carried through to the income statement, causing volatility to the reported profit/loss for the entity.

There are various opinions on how the principles of hedge accounting (FAS133) and fair valuation (FAS157) interact. Each interpretation depends on which effectiveness assessment method(s) is employed, including for example: 1) DIG Issue No.G7, which specifies alternative "long-haul" methods such as the "change in variable cash flows method," "hypothetical derivative method," and "change in fair value method," and 2) Issue No.G9—"critical terms match." FAS133 is either explicit or implicit as to how the assessment or measurement of the credit component of the counterparty should be accounted for under each method. Depending on which assessment method is employed and how the credit adjustment of the exposure is quantified, the potential for P&L volatility could be severe as credit spreads can be highly volatile (see Exhibit 6: 5-Year CDS Spreads for historical CDS spreads below).

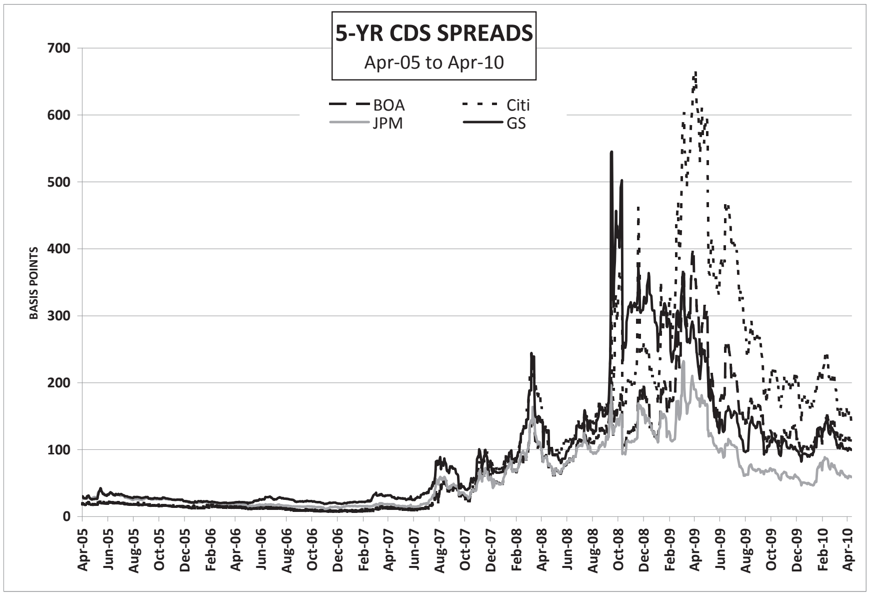

Exhibit 6: 5-Year CDS Spreads

3 Conclusion

Again, there is no consensus on the issue of credit adjustments and how they may impact hedge effectiveness; it is evolving in practice. It is not uncommon, however, under the various long-haul methods of FAS133 for the credit adjustment to be applied to both the derivative and the exposure, or the hypothetical derivative in the case of Issue No. G7. A complete discussion of this topic is beyond the scope of this article, but there are other resources the reader should pursue that provide a more thorough overview of the issues such as: 1) FAS157: Bad Credit, Ineffective Hedges? K. Iyengar (Reval), August 07, and 2) Interaction of FAS157 with FAS133: The Second Wave. P. Seward (Reval), June 09; both articles are available at reval.com. Further, check with the company's auditors for their opinion as well as for other publications.

GAAP reporting requirements such as FAS157 notwithstanding, it is clear that risk managers cannot take for granted the creditworthiness of their counterparties in light of the events of past two years; a hedge is only as good as the party on the other side of the trade. At this time (May 2010), there are legislative proposals being discussed that could mitigate some of the credit risk in OTC derivatives including a central clearing house, for example. Nevertheless, more due diligence is required on the part of the risk manager to adequately value the change in credit exposure over time. Assessing the credit impact as of the measurement date for financial reporting purposes per

FAS157 is only a minimum requirement. To further project credit exposure over time, managers must employ more robust modeling techniques including simulation and/or stress test models.

The objective of this article was to provide an overview of credit spreads (bond/CDS) and suggest a spread(s) and method (flat spread and/or curves) to employ in quantifying the impact to the derivative's fair value as of the measurement date per FAS157. This issue should remain a hot topic for some time to come as practitioners as well as the auditor and regulatory communities work to establish precedents and develop a more cohesive consensus.

To conclude, the reader should consider the following key points:

- Understand the key principles related to both FAS133 and FAS157, including relevant disclosure requirements.
- Set clear objectives in analyzing credit exposure, including:
    - o Meeting financial reporting requirements, or
    - o Projecting credit / cash flow at risk in the future.
- Establish methods/models, including data sources.
- Procure tool(s) to provide assistance in valuation and hedge accounting if needed.
- Use financially strong counterparties and diversify among them.
- Manage ISDA agreements with counterparties to address credit risk on a bilateral basis.
- Document the processes and methodologies.
- Seek the company auditor's opinion on the process.
- Continue to pursue other sources for information and common practices.