

May 22, 2007

# **Introduction to Credit Derivatives: Applications to Energy Market Counterparty Risk**

**Presented by TD Securities**

# Today's Agenda

1. Mechanics of Credit Default Swaps
2. Contractual Differences between CDS & Counterparty Exposures
3. Economic Differences between CDS & Counterparty Exposures
4. New Products for Managing Energy Credit Risk

# Mechanics of Credit Default Swaps

# Introduction to Credit Default Swaps

Simplistically, a Credit Default Swap is a contract which provides pure credit insurance in exchange for a premium.



- The CDS contract names the “Reference Entity” whose default triggers the credit protection.
- CDS Buyer agrees to pay the premium, and receives compensation if the Reference Entity defaults.
- If the Reference Entity does not default, the Buyer receives nothing.
- Documented under ISDA based off 2003 ISDA Credit Derivative Definitions.
- CDS are invisible to the Reference Entity.

# Credit Default Swap Caveats

- CDS pricing is not related to credit ratings
  - Pricing is based off market perceptions - can move dramatically wider (or tighter) even before credit ratings are changed.
  - For example, GMAC traded as wide as 750bps while rated Baa2, and then as tight as 95bps while rated Ba1.
- CDS is not a short term protection instrument.
  - The most liquid term is 5 years. For most credits a short term trade would be 3y, with select names quoted in 1y.
  - CDS is generally traded to standardized quarterly rolls - Mar/Jun/Sep/Dec 20th.
- Can be very expensive in crisis situations
  - Both Continental Airlines & Delta Airlines CDS traded as expensive as 50% upfront in 2004. Delta filed for Chapter 11, but Continental survived and the CDS has tightened in below 500bps.

# CDS Market

Market estimates suggest it covers around 1500-2000 names globally.

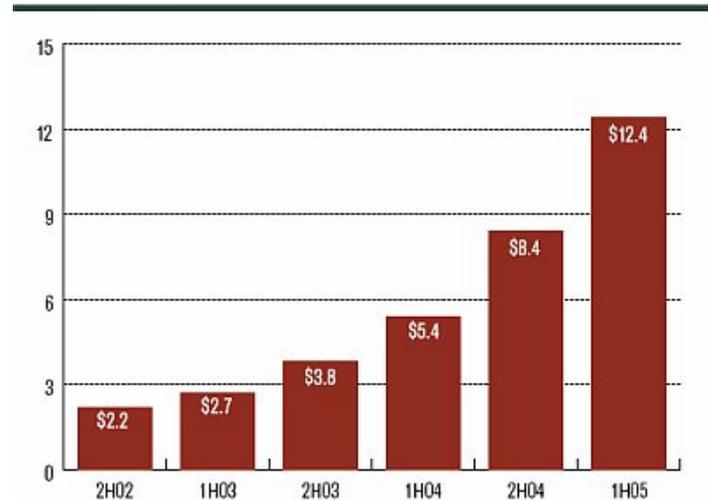
ISDA estimates that \$26Tln of CDS was outstanding in mid-2006. This was up from \$17.1Tln at the end of 2005.

Names that trade in the CDS market generally have publicly rated debt.

Typically, CDS would Reference either

- (1) Top level corporation in a corporate family
- (2) A special finance subsidiary.

**GROWTH IN CREDIT DEFAULT SWAPS OUTSTANDING**  
(\$ IN TRILLIONS)



Source: ISDA

# Reference Entity Complications

- Specification of the Reference Entity is the most important detail of the CDS contract.
- Having the wrong Reference Entity name can make credit protection worthless.
  - Verizon Wireless
  - May Department Stores Delaware vs May Dept Stores NY
- Can't rely on credit ratings or membership in a "corporate family".
  - Bell Teleglobe vs BCE Inc
- Can rely on SOME guarantees.
  - In North America, only downstream (majority owned) guarantees apply.
- Further complications are introduced by the rules on Successors.
  - Goal is to have CDS contracts follow debt when corporate mergers, acquisitions, spinoffs or other actions occur. This may not align with other obligations.
  - Can leave CDS contracts "stranded" – debt is repaid or refinanced through a different entity, but the CDS contracts continue to reference an entity with no debt.

# Credit Events

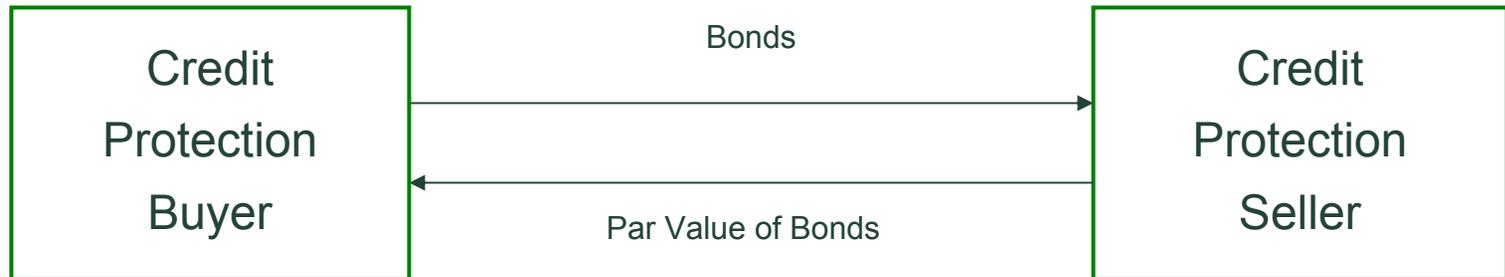
- **Bankruptcy**
  - Corporate level action involving legal proceedings (easily verifiable).
- **Failure to Pay**
  - Failure to make payments on “Obligations” before expiry of any Grace Period, where the missed payment is more than the Threshold Amount.
  - Typically “Obligations” are restricted to Borrowed Money.
- **Obligation Default / Repudiation / Moratorium / Obligation Acceleration**
  - No longer used for corporate transactions in North America or Europe. Some still found in Emerging Market transactions.
- **Restructuring**
  - So complex it gets a separate slide.

# Restructuring Clause

- “Restructuring” has been one of the most controversial elements of the Credit Derivative Definitions.
- Restructuring is defined as a situation where borrowers have consented to any of:
  - Reduction in Principal or Interest payable, or change in currency paid.
  - Postponement/deferral of principal repayment.
  - Change in priority ranking of Payments
- In Sept 2000, Conesco restructured some short term loans - extending the maturity by 3 months, increasing the coupon and adding additional covenants. The company was in some distress but was still rated BB-.
- Protection Buyers seized on this “technical” restructuring and declared a Credit Event - even though rating agencies did not view it as a distressed exchange or default. Many buyers delivered 6yr bonds into CDS contracts which had prices in the 60s.
- In the 2003 Definitions, ISDA introduced the concepts of “Modified Restructuring” and “Modified Modified Restructuring”.
  - These concepts were intended to restrict the definition of Restructuring Events, and limit the bonds that would be deliverable .

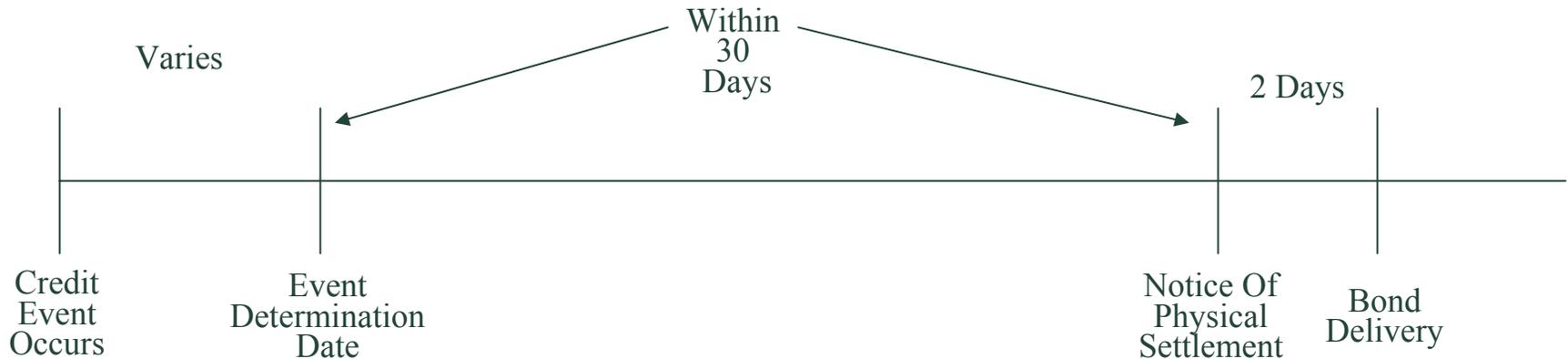
# “Credit Protection”

What is the exact mechanism by which the Seller provides protection against a default by the Reference Entity?



- **Most CDS are Physically Settled - the Buyer delivers (defaulted) bonds to the Seller, and receives the par value of the bonds in exchange.**
- **Some CDS are Cash Settled - but they calculate the default payment using market bond prices. This is economically equivalent to physical settlement.**
- **Deliverable Obligations are typically Bonds and Loans, which trade in the public market, which are transferable etc. etc. etc.**
- **If the CDS Buyer does not own bonds, they must acquire them in the secondary market (cheaply) and then deliver into the CDS to monetize the credit protection.**

# Sample Timeline



- **Either party can send a Credit Event Notice and a Notice of Publicly Available Information which marks an Event Determination Date.**
- **These notices can be sent anytime between the occurrence of a Credit Event and 14 days after the Scheduled Termination Event.**
- **The Buyer then has 30 days to deliver a Notice of Physical Settlement which describes bonds to be delivered to Protection Seller.**
- **Actual Delivery of Bonds would take place as per normal market conventions.**
- **Note that the entire process should be concluded within 35 days of the Credit Event. This will be much shorter than a normal Bankruptcy process.**

# Mechanics of Credit Default Swaps

**“Anything can be customized – for a price”**

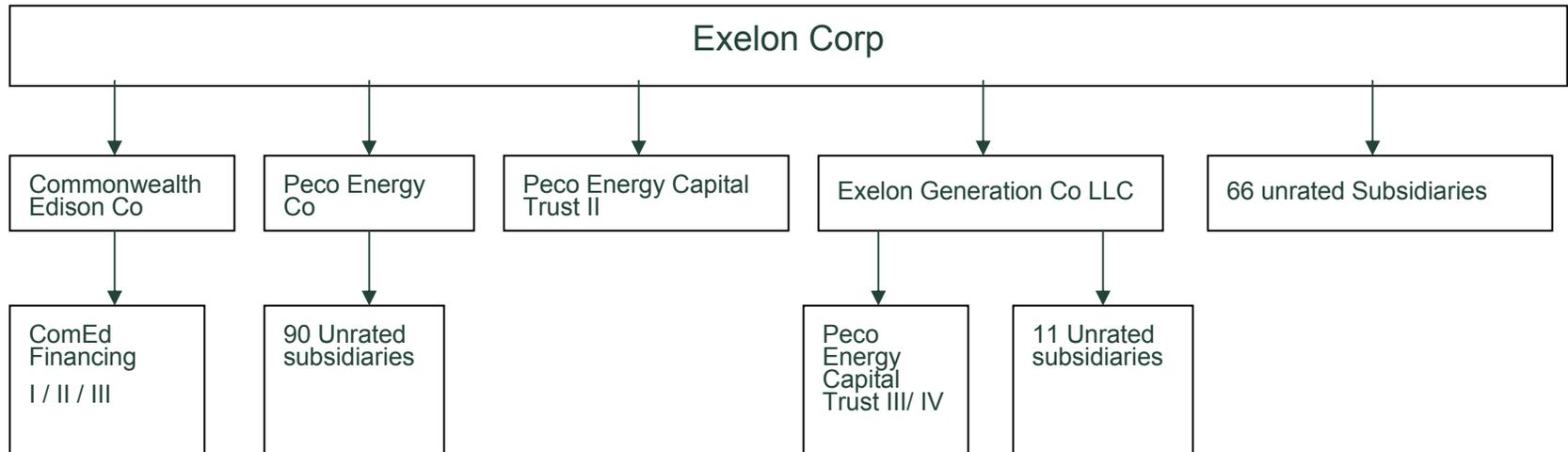
**Any feature of a CDS contract can be customized – can change credit events, settlement provisions, can have CDS on Reference Entities that don't have public debt.**

**But**

**All of these customizations come at a price –understanding market practice will allow credit managers to make the most efficient use of Credit Derivatives.**

# Contractual Differences between CDS & Counterparty Exposures

# Name Mismatches



- The entities in this corporate family which have a CDS market are Exelon Corp and Exelon Generating Co LLC.
- Note that Exelon lists 167 subsidiaries in its annual report. The company tree above shows the rated entities.
- If you have exposure to Commonwealth Edison Co, buying protection on Exelon Corp may or may not be a good hedge - requires a credit judgement.
- Any relationships that currently exist can change due to corporate actions.

# Documentation Risk

- Even if the CDS specifies the correct Reference Entity, trade receivables or other contractual exposures are not deliverable into CDS.
- Any attempt at hedging with CDS could lead to a basis risk due to the Obligations covered by the CDS being different to contract being hedged.
- Credit Exposure under a contract could be better, worse or just different than CDS hedge.
  - Seniority Level (Subordinated vs. Unsecured)
  - Security (Secured vs. Unsecured exposure)
    - Some entities have both secured and unsecured CDS.
  - Guarantees
    - Obligations may be guaranteed by another entity.
- Many of these relationships can change !
  - Many LBO targets put on a large layer of secured debt to the detriment of unsecured creditors.

# Credit Events

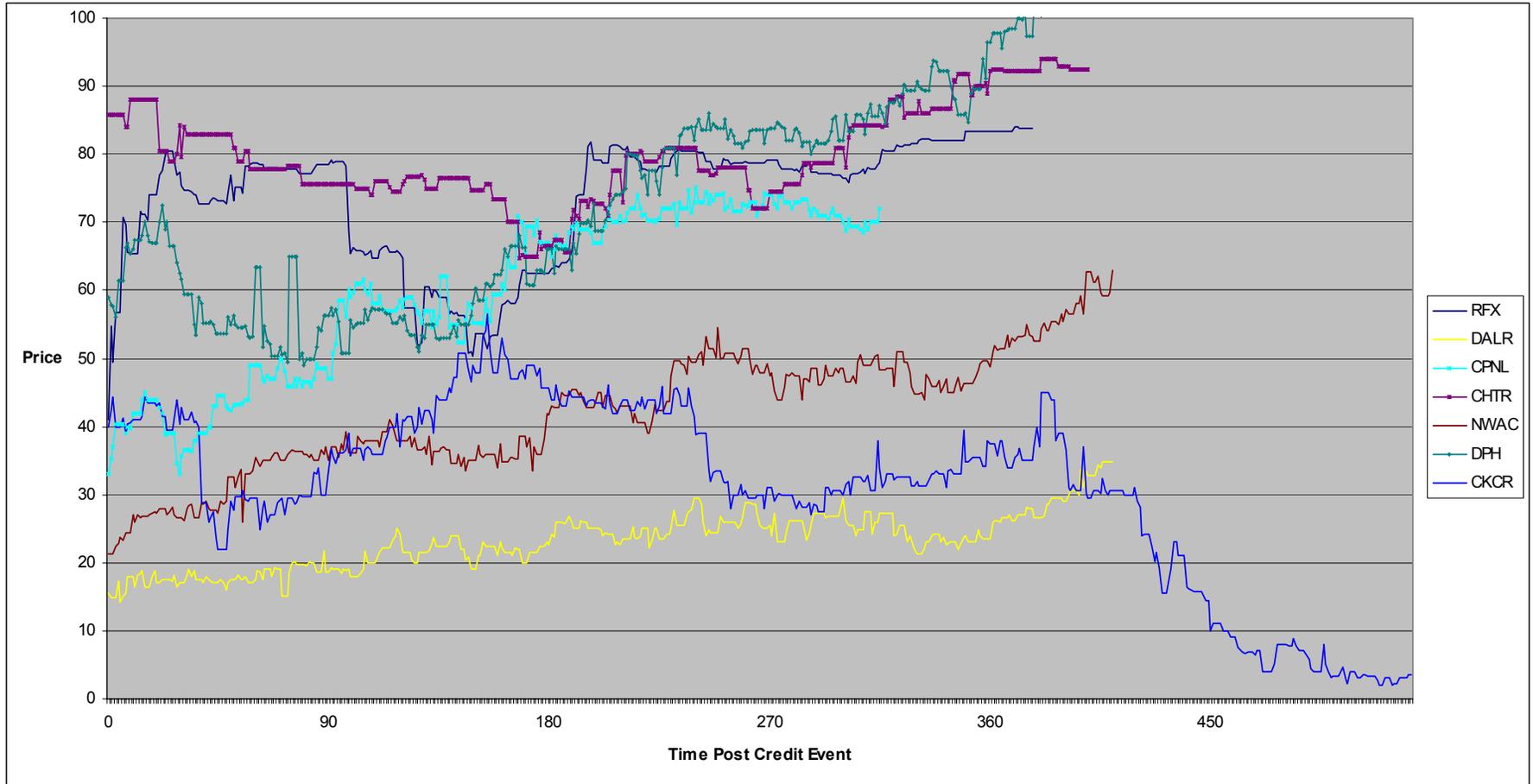
- The definition of Event of Default, and the remedies available when the Event occurs, are other potential mismatches between a contractual exposure and a CDS hedge.
- Question: If the counterparty does not make good on a payment due under the contract, how would that lead to a Credit Event under the CDS?
  - May need to sue the counterparty to make payment, and then force them into bankruptcy if they fail to make the payment when ordered by the court.
- Question: If a Credit Event occurred under the CDS, would that lead to an Event of Default under the contract?
  - Is the contract cross-defaulted to public debt? This is very easy for Bankruptcy, quite easy for Failure To Pay, and difficult for Restructuring events.
  - Collecting on the CDS protection while still have the contract in place is a potential windfall, but it does increase the level of risk since the remaining exposure is unhedged post Credit Event.

# Deliverability and Recovery Rate Risk (I)

- Even if the correct Reference Entity and Seniority is specified in the CDS contract, there is still residual risk.
  - The contract being hedged is generally not deliverable into the CDS.
- Recovery Rate Risk is the risk that the CDS will not provide a perfect hedge to the desired exposure.
  - If a bond has a market value of \$100, it can be perfectly hedged with CDS (upon default, the bond can be sold for \$100)
  - However, if the market value of the bond is \$105 (due to interest rates falling), the CDS does not compensate for loss of the premium – the hedge is not perfect.
- Major recovery rate risk involved in hedging a contract with CDS is a timing mismatch.
- CDS does not provide any hedging between the time of physical settlement (post-default trading price) and then end of the workout process (ultimate recovery). This is known as workout risk.
- Long term academic studies have shown that the ultimate recovery is substantially higher (on average ) than post-default trade prices. However, there is substantial variance among outcomes and the results are quite cyclical.

# Recovery Rate Risk (II)

This graph shows the prices of defaulted bonds at various times after default.



# Collateral and Other Credit Mitigation Tools

- Collateral is another means of reducing credit risk to a counterparty, especially in combination with downgrade triggers.
- Break Clauses may allow termination of a contract at certain times or upon the occurrence of adverse events at the counterparty.
- These (and other) credit mitigation arrangements are beyond the scope of today's discussion.
- However, these kinds of measures often kick in when the counterparty is undergoing some financial stress (and is therefore less likely to be able to perform under the new conditions).
- There is still some residual risk with any Credit Mitigation strategy.
- CDS is generally not useful for managing this residual risk.

# Contractual Differences

**“No hedge can prevent you from taking losses due to bad documentation.”**

- More specifically, a credit manager who wishes to use (or be able to use) CDS for the purpose of hedging Counterparty Risk must:
  - Compare hedgeable name and Counterparty name prior to entering into a contract. (Ideally, the counterparty should be the Reference Entity).
  - Compare contract documentation with CDS obligations in terms of seniority, security, cross-default language and Events of Default.
  - Devise and document a strategy/policy for dealing with workout risk.

# Economic Differences between CDS & Counterparty Exposures

# Types of Contracts

Two major types of energy contracts which produce credit risk:

## 1) Physical Delivery of Product (Receivables)

Typical payment cycles in the energy industry are 55 days (receive payment on the 20<sup>th</sup> for deliveries made during the prior month).

This means that a seller have credit risk during the period where product has been delivered but payment has not yet been received.

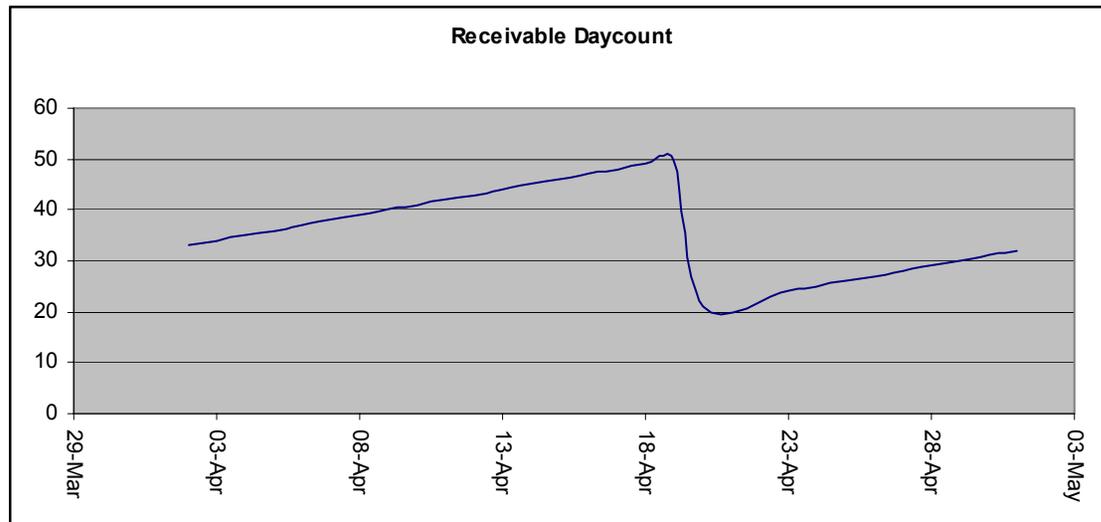
## 2) Long-Term Fixed Price Contracts

These contracts generate credit risk because market movements could lead to the contract having either a positive or negative mark-to-market.

Both Physical & Financial contracts have similar mark-to-market risk.

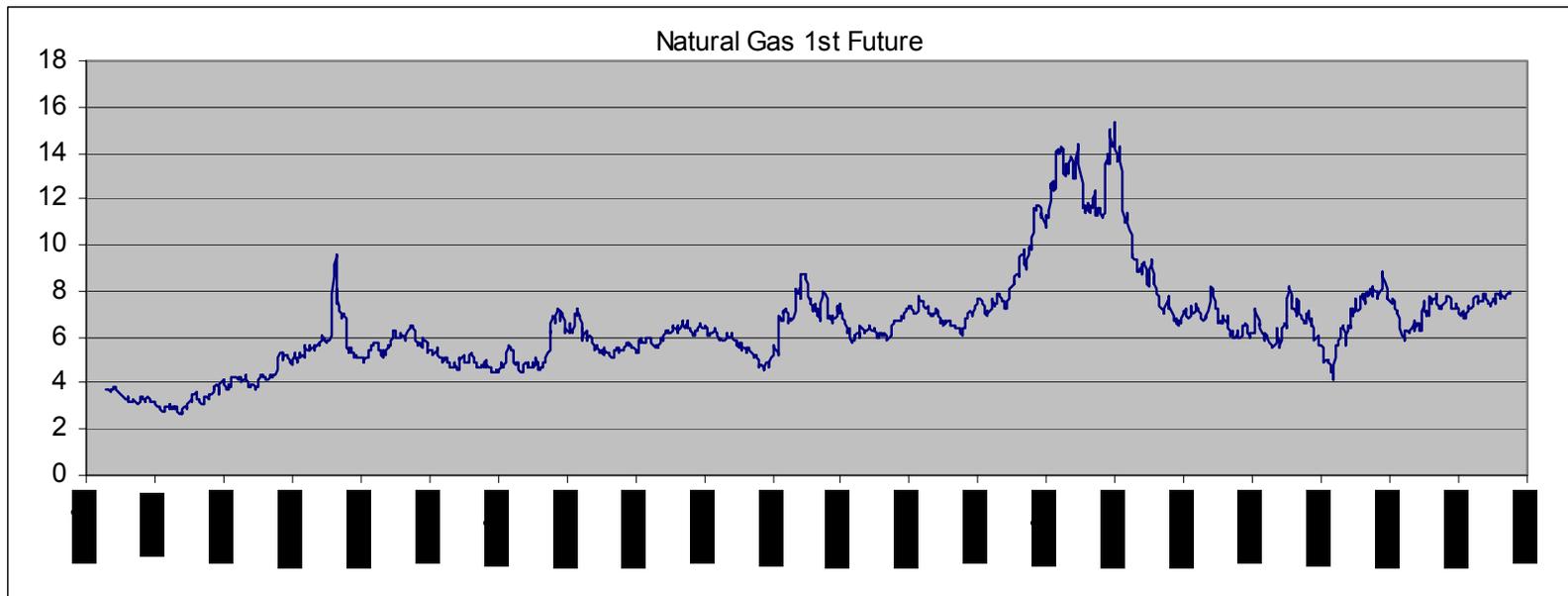
# Receivables

- One solution would be to buy credit protection as the receivable amount changes. This is impractical because the receivable amount (and hence protection required) changes daily when deliveries are made.
- Buying short dated credit protection (such as 30 day CDS to the next pay date) is next to impossible. Even if protection is available today, it may not be during a time of financial distress for the Counterparty.
- A more sensible solution is to buy term protection. However, it is difficult to know how much to buy since the amount of exposure varies widely over the course of the month.



# Receivables (II)

- Supply contracts usually specify a quantity of some commodity to be delivered, so the amount of receivables varies with energy prices.
- Given that CDS contracts are defined in terms of a fixed notional, how much protection should be purchased to hedge a receivables exposure?



# Fixed Price Contracts

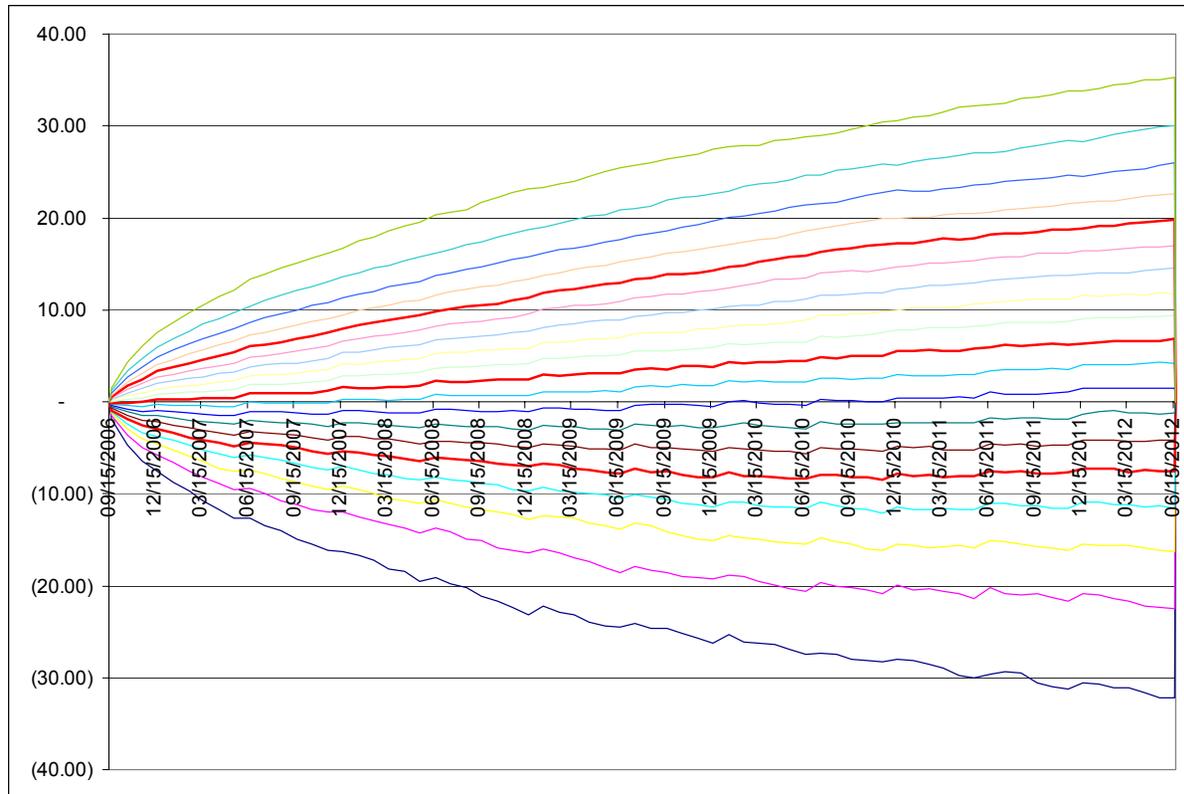
- **Similar to receivables contracts, the mark-to-market of a fixed price contract is variable and depends on the price of the underlying commodity. Unlike a receivable amount, the mark can be either positive or negative – and moves much more quickly on a percentage basis.**
- **For derivatives documented under ISDA, a counterparty default can only cost money. In the event that you owe a counterparty at the time of default, you are required to pay to close out the contract. [Other contracts and Master Agreements may differ]**
- **Settlement mechanics are important (e.g. ISDA 6(e)) - need to make sure that economic loss is properly captured by claim in bankruptcy.**
- **This may sound obvious but consider the bond market. By convention, the claim in bankruptcy for a bond holder is always par, even if the prevailing interest environment would suggest the bond should trade at a substantial premium or discount (fixed price bonds are rarely “worth” par).**

# Counterparty Credit Risk

- Counterparty Credit Risk is a different type of credit risk than lending.
  - Both receivables contracts and Fixed Price contracts fall into this category.
- In lending, the amount of exposure is known upfront so the questions revolve around ability to pay, risk appetite, documentation, etc.
- For Counterparty Credit Risk, there is an additional unknown because the amount of risk is not static.
- The amount of credit risk varies based on a market price (e.g. interest rates, currencies, commodity prices), so a pure credit judgement is not sufficient. Credit analysis must also incorporate an opinion about the underlying market.
- Because the amount of exposure varies, credit managers need to be very careful when using CDS for hedging purposes.

# Distribution of Exposures

The best way of understanding the exposure under a contract is to graph the distribution of possible values through time. This graph shows the 5<sup>th</sup> through 95<sup>th</sup> percentiles of the distribution (and is known around our office as the jellyfish).



# Setting Limits for Counterparty Credit Risk

- It is difficult to set limits for CCR since the exposure is a distribution of possible outcomes, not a specific value.
- Typically, limits and pricing charges are set based off summary statistics:
  - Current Mark
    - This is a bad measure because M2M can change quickly.
  - EPE (Expected Positive Exposure)
    - This is the average amount of exposure through time.
  - PFE (Peak Future Exposure)
    - This is a “high” percentile exposure at some point in the future.
- Once a limit policy has been chosen, how can CDS purchases be integrated into the framework?

# Directional Risk of Counterparty Credit

- Suppose that we enter into a financial swap contract where a risky client buys oil from us on a fixed price basis for the next 2 years. At time zero, we have a small positive PV – the cost we've charged the client to take on their **POTENTIAL** credit risk.
- Suppose we offset the market risk of this trade with a risk-free counterparty.
- If the price of oil goes down, the client will start to owe us money. The **POTENTIAL** credit risk becomes **ACTUAL** credit risk.
- If the price of oil goes up, we do not have **ACTUAL** credit risk. In fact, the amount of **POTENTIAL** exposure goes down.
- This means that we would prefer the price of oil to go up, even though we have hedged out the market risk of the transaction.
- The **Credit Risk of the Transaction** gives us a directional sensitivity to the underlying market.

# Correlation in Counterparty Risk

	<u>No Default</u>	<u>Default</u>
<b>Positive M2M</b> (We are owed)	Flat	<b>LOSS</b>
<b>Negative M2M</b> (We Owe)	Flat	Flat

- When we take on counterparty credit exposure, we are worried about the simultaneous occurrence of two events – a Positive Mark-to-Market on the contract, and a Counterparty Default. This is a correlation risk.
- We need two hedges – one which pays out upon a counterparty default (CDS) and one which pays out when the contract M2M is positive (swap or option).
- The exposure is not completely hedgeable by any combination of underlying products and credit products. Modeling the dependence requires more sophisticated models than valuing the underlying contracts.
- Upon the occurrence of a default, our exposure turns into a short option position.

# Difficulties in hedging with CDS

- CDS is not a static hedge for Counterparty Credit Risk because the exposure changes continuously.
- One strategy is to buy “enough” protection that a wide range of outcomes are covered. This is likely to be expensive and lead to systematic over-protection.
- Another strategy is to dynamically rebalance the CDS hedge as the exposure changes.
  - Because of the dynamic hedging, the cost of the hedge is not known at inception. The hedging cost is determined by the underlying market price.
  - Continuous rebalancing produces an exposure to realized correlation. If the CDS spread goes higher when exposure goes higher, this will lead to a higher degree of hedging costs.
- Overall, trying to hedge Counterparty exposures with CDS is a very challenging modeling problem.

## “Counterparty Credit Risk is fundamentally different than lending risk.”

- Counterparty risk is credit risk that varies based off market movements.
- Both Receivables and Fixed Price contracts are examples of Counterparty Risk.
- Because risk varies systematically with market, credit exposure induces market risk.
- CDS is not well suited to hedging Counterparty Risk because:
  - The Sign and Amount of exposure is unknown.
  - CDS hedges have to be rebalanced dynamically.
  - This introduces correlation risk to a hedging program.

# New Products for Managing Energy Credit Risk

# Receivables Purchase Agreement

- A Receivables Purchase Agreement (RPA) is a product for hedging of receivables.
- An RPA is essentially a CDS with two modifications:
  - Credit Event triggers based off public debt and a receivables contract (generally both classes must be affected).
  - The Actual receivable is deliverable.
  - Dollar amount of protection is usually fixed (not related to commodity prices).
- Requires protection buyer to make reps and warranties about receivables documentation.
  - Does not reduce documentation risk.
- An RPA eliminates deliverability and recovery rate concerns.
- Some clients have reported fewer difficulties obtaining hedge accounting treatment with an RPA than a CDS since the RPA is explicitly linked to the receivable (a non mark-to-market asset).
  - I am not qualified to give professional advice - I'm not a CA.

# Contingent Credit Default Swap

- **A Contingent Credit Default Swap (CCDS) is a product for hedging of Counterparty Credit Risk.**
- **A CCDS is contractually very similar to a CDS, except that the amount of protection is not fixed. The amount of protection is indexed in some fashion.**
- **Usually, the amount of protection is based on the PV (if positive) of a Reference Transaction. This is equivalent to the credit exposure if the Reference Transaction was held on the books.**
- **The CCDS eliminates risk due to variations in the Counterparty Credit Exposure (economic risk).**
- **Typically, a CCDS is based off standard ISDA CDS terms, so it does not eliminate contractual (deliverability / recovery rate) risk.**
- **An Inter-dealer market is starting to develop with Interest Rate, Currency and Commodity derivatives as Reference Transactions.**

# Sample CCDS

- **Sample CCDS Terms:**
  - **Reference Credit: General Electric Capital Corp (GECC)**
  - **Term: 5Y**
  - **Reference Swap: 5Y Swap struck at 4.5% (15 Jun 2007- 15 Jun 2012) [The Reference Swap is generally chosen to have zero NPV at the time of dealing]**
  - **Premium Payment: Upfront Amount**
  - **Settlement Mechanics:**
    - **If GECC defaults during the life of the trade, the Protection Buyer and Seller agree on a PV for the Reference Swap from the point of view of the swap Payer.**
    - **If the Swap PV is negative (the swap payer owes money to the swap receiver), no settlement occurs and the contract terminates.**
    - **If the Swap PV is positive, the Protection Buyer can deliver that amount of GECC bonds to the Protection Seller and receive par.**
- **If TD had a swap with GECC where TD paid GECC on the Reference Transaction, a CCDS contract would perfectly match off our exposure, transferring the Counterparty Credit Risk onto the Protection Seller.**

**The market is introducing new products that make things easier for hedgers.**

Receivables Purchase Agreement (RPA)

Contingent Credit Default Swap (CCDS)

# Conclusions

- **Anything can be customized – for a price.**
- **No hedge can prevent you from taking losses due to bad documentation.**
- **Counterparty Credit Risk is fundamentally different from lending risk.**
- **The market is introducing new products that make things easier for hedgers.**

Questions?

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