Financial Crisis – Technical Look Back

A Primer on Credit Derivatives

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A Primer on Credit Derivatives

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Introduction, Basic Concepts and Terms

Credit derivatives are simply financial instruments that allows one to assume or cede credit risk exposure.

Credit derivatives can be based on corporate debt, government debt, residential or commercial real estate mortgages, or other types of consumer loans.

Credit risk is transferred (i.e., swapped) with a traded insurance-like contract between two parties <u>neither of which need be the issuer nor the holder of the actual bonds or loans at risk</u>.

Value of a Credit Derivative is "derived" from the credit default risk on the underlying bond, loan or other assets.

Introduction, Basic Concepts and Terms

Credit derivatives are used for various purpose, including:

- Hedging individual credit risk exposure
- Managing a portfolio's total credit risk
- Assuming credit risk exposure (long or short) without holding a physical position in the debt instrument
- Tailoring credit exposure to desired maturity/currency
- **Creating leveraged investments to enhance yield**
- Separating risk embedded in securities
- **Managing an institutions regulatory capital**

Introduction, Basic Concepts and Terms

Credit derivatives are bilateral contracts between a buyer and a seller, whereby the seller sells protection against the credit risk of the reference entity (i.e. corporate, sovereign or any other legal entity which incurs debt).

Parties will agree which credit events apply and these usually consist of one or more of the following:

- Bankruptcy
- Failure to pay
- Obligation default
- Repudiation/moratorium
- Restructuring

Introduction, Basic Concepts and Terms

Credit Derivatives allow the separation of the credit risk component from other risks elements (i.e., interest rate risk and funding risk).

<u>Unfunded</u> credit derivative is where protection is bought and sold between bilateral counterparties, without recourse to any other assets.

If the credit derivative is entered into by a financial institution or special purpose vehicle (SPV) and payments under the credit derivative are funded using securitization techniques, this is known as a <u>Funded</u> credit derivative.

Introduction, Basic Concepts and Terms

Unfunded credit derivative products include the following:

- **Credit default swap (CDS)**
- Total return swap
- Constant maturity credit default swap (CMCDS)
- First to Default credit default swap
- Portfolio Credit Default Swap
- Secured Loan Credit Default Swap
- Credit Default Swap on Asset Backed Securities
- Credit default swaption
- Recovery lock transaction
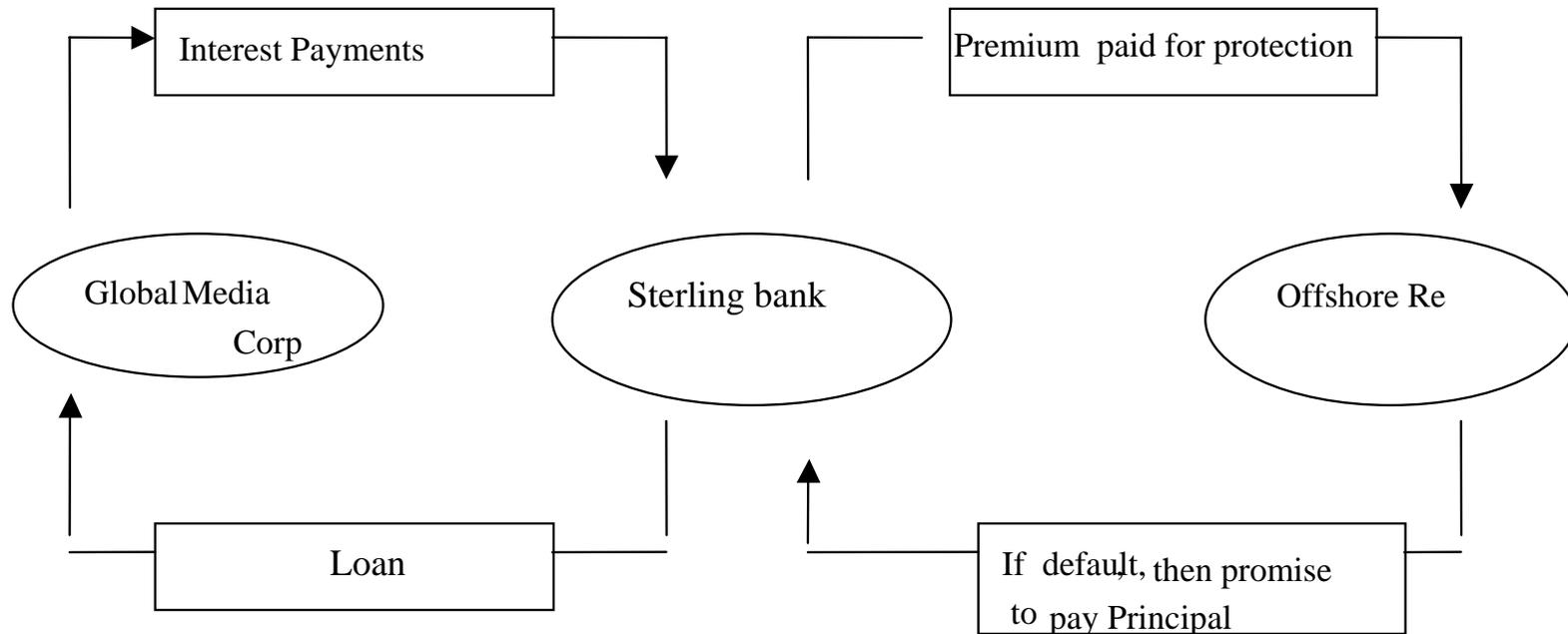- Credit Spread Option
- CDS index products

Introduction, Basic Concepts and Terms

Funded credit derivative products include the following:

- **Synthetic Collateralized Debt Obligation (CDO)**
- Credit linked note (CLN)
- Constant Proportion Debt Obligation (CPDO)
- Synthetic Constant Proportion Portfolio Insurance (SCPPI)

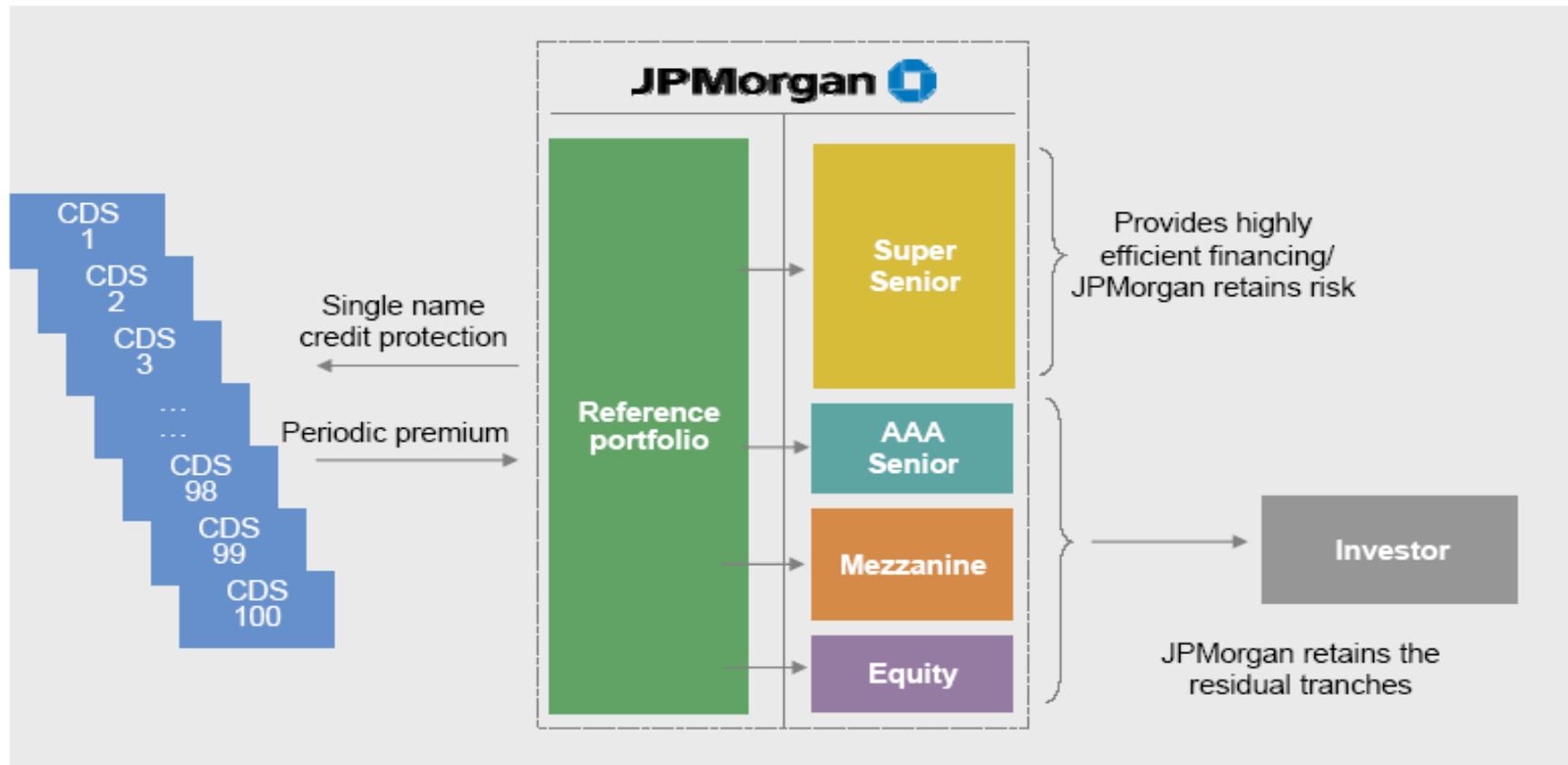# EXAMPLE of a CDS MARKET TRANSACTION

Credit Default Swap on a Single Corporate, Between a Bank and Reinsurer

Interest Payments		Premium paid for protection

Global Media Corp	Sterling bank	Offshore Re

Loan		If default, then promise to pay Principal

Example of a CDO
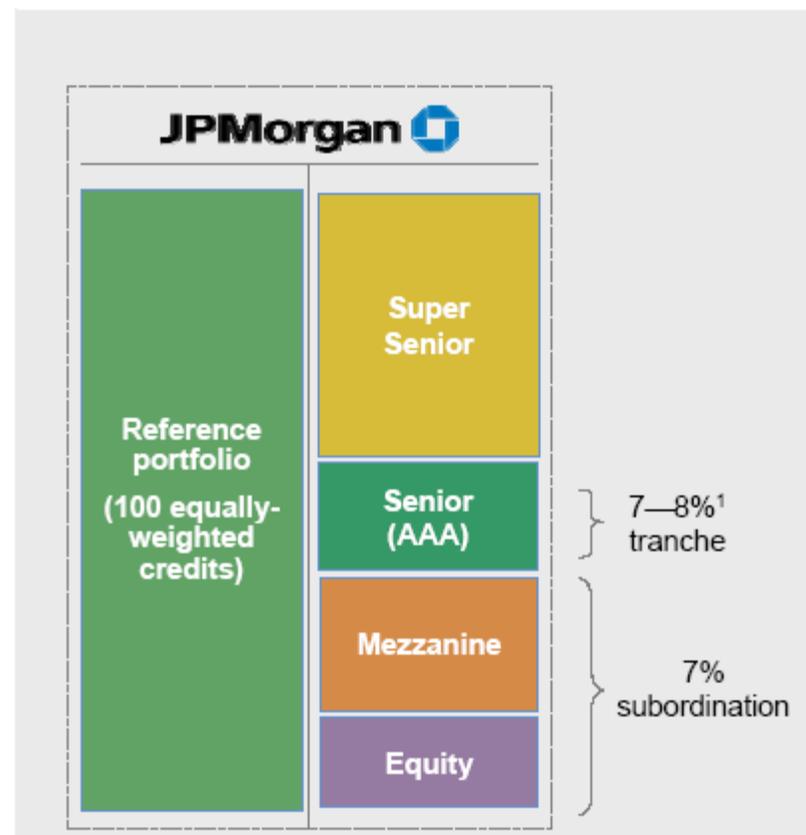
Source: " Structured Credit workshop",JP Morgan

Synthetic CDO tranche mechanics

- Synthetic CDO typically apply a linear write down methodology to determine loss

- Assuming a 1% tranche, with 7% subordination, the investor can withstand x defaults (at a 40% recovery rate) without losing principal

- Default calculation:

$$\text{Number of defaults investor able to withstand} = \frac{\text{Subordination}}{1\% * (1 - \text{Recovery}\%)}$$

$$= \frac{7\%}{1\% * (1 - 40\%)}$$

$$= 11.67$$

Default math example

JPMorgan

Reference portfolio (100 equally-weighted credits)

Super Senior

Senior (AAA) — 7—8%[1] tranche

Mezzanine

Equity

7% subordination

CDS Contract Standards

CDS contracts conform to the 2003 International Swap and Derivatives Association (ISDA) Credit Derivative Definitions. Transactions follow the ISDA Master Agreement which covers the following key elements:

- Which credit instruments could trigger the CDS
- What obligations are covered under the contract
- The notional value of protection provided
- Which defined "credit events" may trigger coverage
- What settlement procedures would apply

ISDA Credit Events and Settlement Process

Based on the 2003 ISDA conventions, there is a three step
procedure for physical settlement:

1. Notification of credit event
2. Notice of physical settlement
3. Delivery of bonds

Insurance Company Practices
& Risk Exposures

- Companies have acted as both large net sellers and large net buyers of credit risk protection
  - Underwriting
  - Investments
  - Recoverable Hedging
- Mark-to-Market (MTM) accounting effects
- Correlation of credit defaults with insurance U/W cycle

CDS and the Financial Credit Crisis

Harvard thesis by Anna K. Barnett-Hart, March, 2009 provides an excellent analytic study of the root causes.

Summary of Key Findings

CDO's have been responsible for over $540 billion in write-downs at financial institutions primarily due to:

1. The inclusion of low quality collateral originated in 2006 and 2007 with exposure to US residential housing.

2. CDO underwriters played a material role in CDO performance.

3. Failure of the debt rating agencies (S&P/Moody's/Fitch) derived from an over reliance on models that were not well understood and the extent to which losses may derive from parameter risk.

CDS and the Financial Credit Crisis

The Gaussian Copula Function (…that killed your 401(k)).

$$\Pr[T_A < 1, T_B < 1] = \Phi_2\left(\Phi^{-1}(F_A(1)), \Phi^{-1}(F_B(1)), \gamma\right)$$

- Probability
- Survival times
- Equality
- Copula
- Distribution functions
- Gamma

Investors exploited this approach as a quick and easy way to assess risk … but it has some fatal flaws that we will review.

Other Market Issues Related to the Financial Credit Crisis

- Financial Transparency Crisis
- Shadow Banking System
- REPO 105 Accounting for Illiquid Assets
- Money Market Regulatory Reforms in the wake of the Reserve Primary Fund "breaking-the-buck"

Recent Market Developments

In December 2009, the Chicago Mercantile Exchange (CME) began clearing credit default swaps (CDS) through CME Clearing. This provides market participants with an open-access clearing solution for over-the-counter CDS.

The CME has developed a "multi-factor" portfolio model to determine the margin requirements for CDS instruments.

The methodology incorporates seven risk-based factors to represent the different risk inherent to CDS.

Recent Market Developments

- 4 factors have insurance risk commonalities
  - M_s (Systemic) *e.g.,* => P/C underwriting cycle effects
  - M_c (Curve) *e.g.,* => LDF pattern bias
  - M_x (Convergence/Divergence), e.g., => Freq./Sev. bias
  - M_z (Sector) *e.g.,* => Risk class subsidy/surcharge bias

Recent Market Developments

- 3 factors invoke pure capital market risk exposure
  - M_i (Idiosyncratic), is a f(x) of jump shift credit defaults
  - M_l (Liquidity), is a f(x) of contagion
  - M_b (Basis), is a f(x) of information asymmetry

Summary

1. Manage for risk, not for regulation.

2. Fully understand all the material risks that the organization is assuming

3. Link incentives to risk.

4. Distinguish insurance risk from pure capital market risk

5. Financial risk correlations generally derive from non-stationary, non-linear distributions.

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Key References & Recommended Reading

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