RISK MANAGEMENT OF CREDIT ASSETS:
THE NEXT GREAT FINANCIAL
CHALLENGE IN THE NEW MILLENIUM

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NYU Stern School of Business
Managing Credit Risk: The Challenge in the New Millenium
Edward I. Altman
(Seminar Outline)

Subject Area

- Credit Risk: A Global Challenge in High and Low Risk Regions
- The New BIS Guidelines on Capital Allocation
- Credit Risk Management Issues - Credit Culture Importance
  - Caveats, Importance and Recommendations
- The Pricing of Credit Risk Assets
- Credit Scoring and Rating Systems
- Traditional and Non-Traditional Credit Scoring Systems
  - Approaches and Tests for Implementation
  - Predicting Financial Distress (Z and ZETA Models)
  - Models based on Stock Price - KMV, etc.
  - Neural Networks and Rating Replication Models
(Seminar Outline Continued)

- A Model for Emerging Market Credits
  - Country Risk Issues
- CreditMetrics® and Other Portfolio Frameworks
- Default Rates, Recoveries, Mortality Rates and Losses
  - Default Recovery Rates on Bonds and Bank Loans
  - Correlation Between Default and Recovery Rates
  - Mortality Rate Concept and Results
  - Valuation of Fixed Income Securities
  - Credit Rating Migration Analysis
- Collateralized Bond/Loan Obligations - Structured Finance
- Understanding and Using Credit Derivatives
- Corporate Bond and Commercial Loan Portfolio Analysis
CREDIT RISK MANAGEMENT ISSUES
Credit Risk: A Global Challenge

In Low Credit Risk Regions (1998 - No Longer in 2001)

- New Emphasis on Sophisticated Risk Management and the Changing Regulatory Environment for Banks
- Refinements of Credit Scoring Techniques
- Large Credible Databases - Defaults, Migration
- Loans as Securities
- Portfolio Strategies
- Offensive Credit Risk Products
  - Derivatives, Credit Insurance, Securitizations
Credit Risk: A Global Challenge
(Continued)

In High Credit Risk Regions
• Lack of Credit Culture (e.g., Asia, Latin America), U.S. in 1996 - 1998?
• Losses from Credit Assets Threaten Financial System
• Many Banks and Investment Firms Have Become Insolvent
• Austerity Programs Dampen Demand - Good?
• Banks Lose the Will to Lend to “Good Firms” - Economy Stagnates
### Changing Regulatory Environment

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>Regulators recognized need for risk-based Capital for Credit Risk (Basel Accord)</td>
</tr>
<tr>
<td>1995</td>
<td>Capital Regulations for Market Risk Published</td>
</tr>
<tr>
<td>1996-98</td>
<td>Capital Regulations for Credit Derivatives</td>
</tr>
<tr>
<td>1997</td>
<td>Discussion of using credit risk models for selected portfolios in the banking books</td>
</tr>
</tbody>
</table>
| 1999 | New Credit Risk Recommendations  
- Bucket Approach - External and Possibly Internal Ratings  
- Expected Final Recommendations by Fall 2001  
- Postpone Internal Models (Portfolio Approach) |
| 2001 | Revised Basel Guidelines  
- Revised Buckets - Still Same Problems  
- Foundation and Advanced Internal Models  
- Final Guidelines Expected in Fall 2001 - Implemented by 2004 |
THREE PILLARS OF BASEL II

- Outlines new rules and procedures to determine risk weightings of credit and operational risk
- The new Accord retains existing definitions of capital and minimum capital requirements

- Introduces a risk-based approach to banking supervision

- Fundamentally concerns disclosure levels
Although Basel II will be fully implemented no sooner than 2007, banks and the market may/should act now.

TIME LINE OF BASEL II

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>31 May 2001</td>
<td>End 2001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Banks**
- Have sophisticated risk controlling system in place in order to satisfy requirements on data history by 2004/07
- Take action in order to shift asset mix
- Take action in loan pricing
- Take action in the respect to long term funding

**Market**
- May already consider Basel II in same transactions given maturities (e.g., MBS)
- May push banks to comply with Basel II ("Quality Standard")

Source: BIS – The New Basel Accord
Basel II may prove to be an incentive to make the credit pipeline more established...

**BASEL II AND THE CREDIT PIPELINE**

New capital framework
Closer alignment of regulatory and economic capital

**More sophisticated risk management systems**
Instruments and process for advanced credit risk management is necessary in any case

Better external communication
Improvements on disclosure levels

**Unbundling the Value Chain: The Credit Pipeline Concept**

Origination  Management  Placement
### Two new mechanisms are introduced to calculate credit risk

**APPROACHES TO CREDIT RISK CAPITAL CALCULATION**

<table>
<thead>
<tr>
<th>Standardized approach</th>
<th>Internal Ratings Based approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use of external credit ratings in assigning risk weightings</td>
<td>• The IRB approach provides a similar framework for measuring corporate, bank and sovereign exposures and a separate structure for retail, project finance* and equity exposures</td>
</tr>
</tbody>
</table>
| • All the major agencies are recommended for use in this approach | • IRB consists of two potential approaches
  - Foundation approach**: Bank's own assessment of the probability of default
  - Advanced Approach: Banks will also use their own Loss-Given Defaults (LGD). |
| • Where there are two ratings, the lowest should be taken | • The BIS intends all internationally active banks to use the IRB approach, but notes that it should be accessible to all institutions |
| • Possibly, will be used by those banks whose internal models do not satisfy the minimum criteria for the Internal Ratings Based (IRB) approach | |

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* Not defined yet

** For the first two years post implementation the BIS is proposing that capital requirements determined under the advanced IRB approach should be at least 90% of the foundation IRB approach
## Capital Adequacy Risk Weights from Various BIS Accords
*(Corporate Assets Only)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Ratings</td>
<td>100% of Minimum Capital (e.g. 8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rating/Weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAA to AA-</td>
<td>20%</td>
<td>A+ to B-</td>
<td>Below B-</td>
<td>BBB+ to BB-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100%</td>
<td>150%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Basic Architecture of an Internal Ratings-Based (IRB) Approach to Capital

• In order to become eligible for the IRB approach, a bank would first need to demonstrate that its internal rating system and processes are in accordance with the minimum standards and sound practice guidelines which will be set forward by the Basel Committee.

• The bank would furthermore need to provide to supervisors exposure amounts and estimates of some or all of the key loss statistics associated with these exposures, such as Probability of Default (PD), by internal rating grade (Foundation Approach).

• Based on the bank’s estimate of the probability of default, as well as the estimates of the loss given default (LGD) and maturity of loan, a bank’s exposures would be assigned to capital “buckets” (Advanced Approach). Each bucket would have an associated risk weight that incorporates the expected (up to 1.25%) and unexpected loss associated with estimates of PD and LGD, and possibly other risk characteristics.
Recent (2001) Basel Credit Risk Management Recommendations

- May establish two-tier system for banks for use of internal rating systems to set regulatory capital. Ones that can set loss given default estimates, [OR]
- Banks that can only calculate default probability may do so and have loss (recovery) probability estimates provided by regulators.
- Revised plan (January 2001) provides substantial guidance for banks and regulators on what Basel Committee considers as a strong, best practice risk rating system.
- Preliminary indications are that a large number of banks will attempt to have their internal rating system accepted.
- Basel Committee working to develop capital charge for operational risk. May not complete this work in time for revised capital rules.
- Next round of recommendations to take effect in 2004.
### Risk Weights for Sovereign and Banks
(Based on January 2001 BIS Proposal)

<table>
<thead>
<tr>
<th>Credit Assessment of Sovereign</th>
<th>AAA to AA-</th>
<th>A+ to A-</th>
<th>BBB+ to BBB-</th>
<th>BB+ to B-</th>
<th>Below B-</th>
<th>Unrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign risk weights</td>
<td>0%</td>
<td>20%</td>
<td>50%</td>
<td>100%</td>
<td>150%</td>
<td>100%</td>
</tr>
<tr>
<td>Risk weights of banks</td>
<td>20%</td>
<td>50%</td>
<td>100%</td>
<td>100%</td>
<td>150%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Suggestions (Altman):
* Add a BB+ to BB- Category = 75%
* Eliminate Unrated Category and Use Internal Ratings
## Risk Weights for Sovereign and Banks
*(Based on January 2001 BIS Proposal) (continued)*

### Banks

<table>
<thead>
<tr>
<th>Credit Assessment of Banks</th>
<th>AAA to AA-</th>
<th>A+ to A-</th>
<th>BBB+ to BBB-</th>
<th>BB+ to B-</th>
<th>Below B-</th>
<th>Unrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk weights</td>
<td>20%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
<td>150%</td>
<td>50%</td>
</tr>
<tr>
<td>Risk weights for short-term claims</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>50%</td>
<td>150%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Minimum BIS Conditions for Collateral Transactions to be Eligible for Credit Mitigation

- Legal Certainty
- Low Correlation with Exposure
- Robust Risk Management Process
- Focus on Underlying Credit
- Continuous and Conservative Valuation of Tranches
- Policies and Procedures
- Systems for Maintenance of Criteria
- Concentration Risk Consideration
- Roll-off Risks
- External Factors
- Disclosure
Methodologies for Proposed Treatments of Collateralized Transactions

- **Comprehensive** - Focuses on the Cash Value of the Collateral taking into consideration its price volatility. Conservative valuation and partial collateralization haircuts possible based on volatility of exposure [OR]

- **Simple** - Maintains the substitution approach of the present Accord -- Collateral issuer’s risk weight is substituted for the underlying obligor.

Note: Banks will be permitted to use either the comprehensive or simple alternatives provided they use the chosen one consistently and for the entire portfolio.
Opportunities and Responsibilities for Regulators of Credit Risk

- Assumes Acceptance of Revised BIS Guidelines
  - Bucket Approach
  - 2004 Application

- Sanctioning of Internal Rating Systems of Banks
  - Comprehensiveness of Data
  - Integrity of Data
  - Statistical Validity of Scoring Systems
  - Linkage of Scoring System to Ratings (Mapping)
Opportunities and Responsibilities for Regulators of Credit Risk (continued)

- Linkage of Rating System to Probability of Default (PD) Estimation
  - Mapping of Internal Ratings with Local Companies’ External Ratings
  - Mapping of External Ratings of Local Company with International Experience (e.g. S&P)

- Loss Given Default (LGD) Estimation
  - Need for a Centralized Data Base on Recoveries by Asset Type and Collateral and Capital Structure
  - Crucial Role of Central Banks as Coordinator and Sanctioner
  - Similar Roles in Other Countries, i.e. Italy, U.S., Brazil, by Various Organizations, e.g. Bank Consortium, Trade Association or Central Banks.
The Importance of Credit Ratings

- For Risk Management in General
- Greater Understanding Between Borrowers and Lenders
- Linkage Between Internal Credit Scoring Models and Bond Ratings
- Databases - Defaults and Migration
  - Statistics Based on Original (Altman-Mortality) and Cumulative (Static-Pool - S&P), Cohorts (Moody’s) Ratings
- BIS Standards on Capital Adequacy
  - 8% Rule Now Regardless of Risk - Until 2004
  - Bucket Approach Based on External (Possibly Internal) Ratings
  - Model Approach - Linked to Ratings and Portfolio Risk (Postponed)
- Credit Derivatives
  - Price Linked to Current Rating, Default and Recovery Rates
- Bond Insurance Companies’
  - Rating (AAA) of these Firms
  - Rating of Pools that are Enhanced and Asset-Backed Securities (ABS)
Rating Systems

- Bond Rating Agency Systems
  - US (3) - Moody’s, S&P (20+ Notches), Fitch/IBCA
- Bank Rating Systems
  - 1→9, A→F, Ratings since 1995 (Moody’s and S&P)
- Office of Controller of Currency System
  - Pass (0%), Substandard (20%), Doubtful (50%), Loss (100%)
- NAIC (Insurance Agency)
  - 1→6
- Local Rating Systems
  - Three (Japan)
  - SERASA (Brazil)
  - RAM (Malaysia)
  - New Zealand (NEW)
  - etc.
# Debt Ratings

<table>
<thead>
<tr>
<th>Moody's</th>
<th>S&amp;P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>AAA</td>
</tr>
<tr>
<td>Aa1</td>
<td>AA+</td>
</tr>
<tr>
<td>Aa2</td>
<td>AA</td>
</tr>
<tr>
<td>Aa3</td>
<td>AA-</td>
</tr>
<tr>
<td>A1</td>
<td>A+</td>
</tr>
<tr>
<td>A2</td>
<td>A</td>
</tr>
<tr>
<td>A3</td>
<td>A-</td>
</tr>
<tr>
<td>Baa1</td>
<td>BBB+</td>
</tr>
<tr>
<td>Baa2 Investment</td>
<td>BBB</td>
</tr>
<tr>
<td>Baa3 Grade</td>
<td>BBB-</td>
</tr>
<tr>
<td>Ba1 High Yield</td>
<td>BB+</td>
</tr>
<tr>
<td>Ba2</td>
<td>BB</td>
</tr>
<tr>
<td>Ba3</td>
<td>BB-</td>
</tr>
<tr>
<td>B1</td>
<td>B+</td>
</tr>
<tr>
<td>B2</td>
<td>B</td>
</tr>
<tr>
<td>B3</td>
<td>B-</td>
</tr>
<tr>
<td>Caa1</td>
<td>CCC+</td>
</tr>
<tr>
<td>Caa</td>
<td>CCC</td>
</tr>
<tr>
<td>Caa3</td>
<td>CCC-</td>
</tr>
<tr>
<td>Ca</td>
<td>CC</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>
Scoring Systems

• Qualitative (Subjective)

• Univariate (Accounting/Market Measures)

• Multivariate (Accounting/Market Measures)
  – Discriminant, Logit, Probit Models (Linear, Quadratic)
  – Non-Linear Models (e.g., RPA, NN)

• Discriminant and Logit Models in Use
  – Consumer Models - Fair Isaacs
  – Z-Score (5) - Manufacturing
  – ZETA Score (7) - Industrials
  – Private Firm Models (eg. Risk Calc (Moody’s), Z” Score)
  – EM Score (4) - Emerging Markets, Industrial
  – Other - Bank Specialized Systems
Scoring Systems
(continued)

• Artificial Intelligence Systems
  – Expert Systems
  – Neural Networks (eg. Credit Model (S&P), CBI (Italy))

• Option/Contingent Models
  – Risk of Ruin
  – KMV Credit Monitor Model
Number of Non-Impaired Grades

Number of Impaired Grades

### Rating System: An Example

**PRIORITY: Map Internal Ratings to Public Rating Agencies**

<table>
<thead>
<tr>
<th>Internal Credit Ratings</th>
<th>Code</th>
<th>Meaning</th>
<th>Corresponding Moody's</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Exceptional</td>
<td>Aaa</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Excellent</td>
<td>Aa1</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Strong</td>
<td>Aa2/Aa3</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>Good</td>
<td>A1/A2/A3</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>Satisfactory</td>
<td>Baa1/Baa2/Baa3</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>Adequate</td>
<td>Ba1</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>Watch List</td>
<td>Ba2/Ba3</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>Weak</td>
<td>B1</td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>Substandard</td>
<td>B2/B3</td>
</tr>
<tr>
<td>10</td>
<td>L</td>
<td>Doubtful</td>
<td>Caa - O</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>In Elimination</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>In Consolidation</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td>Pending Classification</td>
<td></td>
</tr>
</tbody>
</table>
Rating Coverage

Rating Usage

Calculation of Internal Capital Estimates

Price (Interest Rate) = Cost of Funds + Credit Charge + Loan Overhead & Operating Risk
Proposed Credit Risk Pricing Model

Credit Charge = Risk Charge + Overheads

Expected Loss Charge

- Default Rate
- 1-Recovery Rate

Capital at Risk

- Hurdle Rate
- Capital at Risk
An Alternative Structure For Estimating Expected Loss

\[ \text{EL($)} = P_{D,R}\% \times [(\text{Exp($)} - \text{CRV($)})) \times (1-\text{UNREC}(%))] \]

where:
\( P_{D,R} \) = Probability of Default in Credit Rating Class R
\( \text{EXP} \) = Exposure of Loan Facility
\( \text{CRV} \) = Collateral Recovery Value on Loan Facility
\( \text{UNREC} \) = Expected Recovery Rate on Unsecured Facilities
Risk Based Pricing: An Example

Given: 5-Year Senior Unsecured Loan
Risk Rating = BBB
Expected Default Rate = 0.3% per year (30 b.p.)
Expected Recovery Rate = 70%
Unexpected Loss (σ) 50 b.p. per year
BIS capital Allocation = 8%
Cost of Equity Capital = 15%
Overhead + Operations Risk Charge = 40 b.p. per year
Cost of Funds = 6%

Loan
Price\(_{(1)}\) = 6.0% + (0.3% x [1-.7]) + (6 [0.5%] x 15%) + 0.4% = 6.94%

Or

Loan
Price\(_{(2)}\) = 6.0% + (0.3% x [1-.7]) + (8.0% x 15%) + 0.4% = 7.69%

(1) Internal Model for Capital Allocation
(2) BIS Capital Allocation method
Bank Loans Vs. Bonds*

Although many corporations issue both bank loans and bonds, there are several distinguishing features which could make bank loans attractive to investors.

<table>
<thead>
<tr>
<th></th>
<th>Bank Loans</th>
<th>Bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claim on Assets</td>
<td>Senior</td>
<td>Subordinated</td>
</tr>
<tr>
<td>Collateral</td>
<td>Secured</td>
<td>Mostly Unsecured</td>
</tr>
<tr>
<td>Rate</td>
<td>Floating</td>
<td>Fixed</td>
</tr>
<tr>
<td>Principal Repayment</td>
<td>Amortizing</td>
<td>At Call or Maturity</td>
</tr>
<tr>
<td>Covenant Package</td>
<td>Restrictive</td>
<td>Less Restrictive</td>
</tr>
<tr>
<td>Mandatory Prepayments</td>
<td>In Most Cases</td>
<td>Some Cases</td>
</tr>
</tbody>
</table>

* Typical Structures
New-Issue Leveraged Loan Volume in US Dollars*

U.S. Senior Secured Bank Loans
New Issues*

Source: Merrill Lynch, Loan Pricing Corporation

*Commercial loans with spreads of LIBOR + 150 bps or more
Exponential Growth of Market

The increasing number of new issues provides portfolio managers with greater selection options. The volume of trading in the secondary market offers portfolio managers greater liquidity to trade in and out of positions.

Source: Merrill Lynch, Loan Pricing Corporation

*Commercial loans with spreads of LIBOR + 150 bps or more
Secondary Loan Trading Volume - Par Vs. Distressed

Source: Loan Pricing Corp.
High Return for Level of Risk (July 1992 - June 2000)

Attractive returns and lower volatility suggest superior risk-adjusted returns compared to traditional asset classes, as measures by a higher Sharpe Ratio.

<table>
<thead>
<tr>
<th></th>
<th>High Yield Loans</th>
<th>High Yield Bonds</th>
<th>Corporate Bonds</th>
<th>U.S. Treasuries</th>
<th>3-month T-Bills</th>
<th>Large U.S. Stocks</th>
<th>Small U.S. Stocks</th>
<th>World Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compound Annualized Return</strong></td>
<td>8.37%</td>
<td>8.50%</td>
<td>7.02%</td>
<td>6.79%</td>
<td>4.86%</td>
<td>19.74%</td>
<td>15.08%</td>
<td>15.84%</td>
</tr>
<tr>
<td><strong>Annualized Standard Deviation</strong></td>
<td>1.97%</td>
<td>4.25%</td>
<td>4.94%</td>
<td>4.20%</td>
<td>0.30%</td>
<td>12.96%</td>
<td>17.13%</td>
<td>12.44%</td>
</tr>
<tr>
<td><strong>Sharpe Ratio</strong></td>
<td>1.78</td>
<td>0.86</td>
<td>0.44</td>
<td>0.46</td>
<td>N/A</td>
<td>1.15</td>
<td>0.6</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Sources: Various Securities Firms’ Indexes, LPC, PMD
New-Issue Loan Volume by Deal Purpose*

*As of June 30, 2000
CreditMetrics™ Framework

Exposures
- User Portfolio
  - Market Volatilities
    - Exposure Distributions

Value At Risk Due To Credit
- Credit Rating
  - Rating Migration Likelihood
- Seniority
  - Recovery Rate in Default
- Credit Spreads
  - Present Value Bond Revaluation

Correlations
- Ratings Series, Equity Series
  - Model (e.g., Correlations)
- Joint Credit Ratings

Portfolio Value at Risk Due to Credit

Source: J.P. Morgan, 1997
Credit Risk Measurement Tools

- JP Morgan’s CreditMetrics™
- CSFP’s CreditRisk+™
- KMV’s Credit Monitor™
- McKinsey’s CreditPortfolio View™
- Others: Algorithmics, Kamakura, Consulting Companies
Sample CLO Transaction Structure

Trustee
(Protects investor’s security interest in the collateral, maintains cash reserve accounts, and performs other duties)

Issuer (Trust)
(Special Purpose Vehicle
(Purchases loans and issues ABS, using loans as collateral)

Swap Counterparty
(Provides swap to hedge against currency and/or interest-related risk)

Bank

Seller/Servicer/Asset Manager
(Assigns portfolio of loans to the issuer of rated securities, monitors portfolio performance, and performs credit evaluation, loan surveillance, and collections)

Bank Loan Portfolio

$ Proceeds of ABS

ABS

$ Proceeds of ABS

$ Proceeds of ABS

Investors
(Buy Rated ABS)

Interest and Principal on ABS

CLO - Collateralized Loan Obligation
ABS - Asset-backed Securities
# Credit Derivative Products

## Structures

- Total Return Swap
- Default Contingent Forward
- Credit Swap
- Credit Linked Note
- Spread Forward
- Spread Option

## Underlying Assets

- Corporate Loans
- Corporate Bonds
- Sovereign Bonds/Loans
- Specified Loans or Bonds
- Portfolio of Loans or Bonds
Credit Risk Derivative Contract Time Line

Contract Date

Corporate Borrower (Third Party)

Credit Risk Seller (Protection Buyer)

Credit Risk Buyer (Protection Seller)

Default Date

I = Interest (fixed or floating rate) on underlying asset, e.g. bond
P = Premium on credit derivative contract
DR = Default recovery - either sale proceeds or delivery of underlying asset
FV = Face value at maturity of underlying asset
Recommendations for Credit Risk Management

A. Making Risks Visible, Measurable, and Manageable

- Meaningful Credit Culture Throughout
- Consistent and Comprehensive Scoring System
- From Scoring to Ratings
- Expected Risk (Migration, Loss) and Returns - Market and/or Bank Data Bases
- Individual Asset and Concentration Risk Measurements
- Reflect Risks in Pricing - NPV, Portfolio, RAROC Approaches
- Marking to Market
- Measure Credit Risk Off-Balance Sheet - Netting
  - Futures, Options, Swaps
Recommendations for Credit Risk Management
(continued)

B. Organizational Strategic Issues

- Centralized vs. Decentralized
- Specialized Credit and Underwriting Skills vs. Local Knowledge
- Establishing an Independent Workout Function
- Managing Good vs. Bad Loans
- To Loan Sale or Not
- Credit Derivatives
- Credit Risk of Derivatives