Collateralized Debt Obligations

Prof. Ian Giddy
Stern School of Business
New York University
## Worldwide Securitization Volume

<table>
<thead>
<tr>
<th></th>
<th>1Q-04 Issuance (US$Mil.)</th>
<th>No. of Deals</th>
<th>Market Share (%)</th>
<th>1Q-03 Issuance (US$Mil.)</th>
<th>No. of Deals</th>
<th>Market Share (%)</th>
<th>'04-'03 Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Public ABS</td>
<td>$139,082.3</td>
<td>163</td>
<td>47.5</td>
<td>$105,440.3</td>
<td>139</td>
<td>41.6</td>
<td>31.9</td>
</tr>
<tr>
<td>U.S. Rule 144A ABS</td>
<td>10,830.9</td>
<td>67</td>
<td>3.7</td>
<td>12,096.9</td>
<td>63</td>
<td>4.8</td>
<td>-1.2</td>
</tr>
<tr>
<td>U.S. Public MBS</td>
<td>46,029.5</td>
<td>115</td>
<td>15.7</td>
<td>70,394.8</td>
<td>159</td>
<td>27.8</td>
<td>-23.1</td>
</tr>
<tr>
<td>U.S. Private ABS</td>
<td>700.0</td>
<td>1</td>
<td>0.2</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Non-U.S. ABS and MBS</td>
<td>52,790.5</td>
<td>82</td>
<td>18.0</td>
<td>34,411.3</td>
<td>68</td>
<td>13.6</td>
<td>17.4</td>
</tr>
<tr>
<td>U.S. Commercial MBS</td>
<td>18,975.9</td>
<td>19</td>
<td>6.5</td>
<td>14,920.3</td>
<td>19</td>
<td>5.9</td>
<td>3.8</td>
</tr>
<tr>
<td>Non-U.S. Commercial MBS</td>
<td>6,421.3</td>
<td>19</td>
<td>2.2</td>
<td>1,966.1</td>
<td>12</td>
<td>0.8</td>
<td>4.2</td>
</tr>
<tr>
<td>Worldwide CDOs</td>
<td>17,685.0</td>
<td>56</td>
<td>6.0</td>
<td>14,168.4</td>
<td>46</td>
<td>5.6</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Worldwide Total</strong></td>
<td><strong>292,515.4</strong></td>
<td><strong>522</strong></td>
<td><strong>100.0</strong></td>
<td><strong>253,398.0</strong></td>
<td><strong>506</strong></td>
<td><strong>100.0</strong></td>
<td><strong>37.1</strong></td>
</tr>
</tbody>
</table>

*Source: abalert.com, March 2004*
Asset-Backed Securities: The Typical Structure

FORD (SPONSOR)

SALE OR ASSIGNMENT

LOANS.

SPECIAL PURPOSE VEHICLE

ISSUES ASSET-BACKED CERTIFICATES

LOANS.

Servicing Agreement
The Alternative: Synthetic ABS

DB (Originator)

REFERENCE
POOL OF LOANS
(Stay on balance sheet)

CREDIT SWAP AGREEMENT

SPECIAL PURPOSE VEHICLE

TOP QUALITY INVESTMENTS

ISSUES ASSET-BACKED CERTIFICATES
Collateralized Debt Obligations

- Collateralized loan obligations (CLOs)
- Collateralized bond obligations (CBOs)
Collateralized Debt Obligations

- Cash flow backed CLOs and CBOs
- Market value backed CBOs
- Synthetic CLOs
Cash Flow Backed CLOs

Motivations:
- Free up capital
- Lower cost of funding
- Distressed loan arbitrage (3rd party sponsors)

BANK (SELLER)

SALE OR ASSIGNMENT

LOANS

SPECIAL PURPOSE VEHICLE

LOANS

 ISSUES ASSET-BACKED CERTIFICATES
CLO Transaction Structure

CLO – Collateralized loan obligation. ABS – Asset-backed securities.
CLO Rating Criteria

- Initial Review
  - Originator’s credit evaluation system
  - Pool composition & stress testing
- On-Site Due Diligence
- Legal Integrity
  - Bankruptcy-remoteness of SPV
  - Validity of asset transfer to SPV
  - Perfection of security interests in underlying collateral
- Determining Credit Enhancement
Sample Information Request

General/Organization
- Functional Areas and Staffing Levels
- Key Officers and Responsibilities
- Team Biographies
- Related Experience and Performance
- Credit Approval Process

Market Risk Management
- Hedging Strategy
- Interest Rate Risk Limits
- Counterparty Approval

Portfolio Risk Management
- Investment Strategy
- Risk Management Philosophy
- Pricing Systems
- Portfolio Monitoring

Portfolio Level
- Distributions by:
  - Country
  - Industry
  - Credit Rating
  - Asset Class
  - Loan Size
  - Maturity
  - Payment Frequency
  - Margin
  - Loan Type
  - Base Rate — LIBOR, Prime, and Federal Funds, Among Others
  - Currency
  - Collateral
  - Position of Loan in Borrower’s Capital Structure
  - Drawn and Undrawn Amounts
  - Swap Rate
  - Swap Counterparty
  - Facility Rating
  - Amortization Schedule

Credit Risk Management
- Performance Benchmarks
- Use of External Ratings
- Internal Credit Evaluation System
  - Basis of Credit-Scoring System
  - Adjustments for Industry
  - Influence of Collateral
  - Treatment of Guarantees
  - Relationships/Parent Companies/Subsidiaries
  - Default Levels (by Internal Credit Score and Year)
  - Recovery Levels (by Internal Credit Score and Year)
  - Loan Provisions

Actual Loss History
- Specific Credit Information by Borrower
  - Name
  - Guarantor
  - Parent Company
  - Country
  - Industry

Operations
- Risk Management Tracking and Reporting
- Procedures to Assure Consistent Use of Credit Scoring (Previous Changes to the Credit-Scoring System)
- Monitoring of Upgrades and Downgrades
- System Contingency Plans

Transaction
- Cash Flow Model

Legal Opinions*
- First Perfected Security Interest Opinion
- FIRREA Opinion
- True Sale Opinion
- Nonconsolidation Opinion

*U.S. issuers. Requirements for other jurisdictions will vary.


Source: Fitch, "Bank CLOs: an Overview"
Cash flow Backed CLOs

- Senior-Sub with priorities of cash flows
- Cash reserve accounts
- Letters of credit
- Guarantees
**Senior-Sub CLO Structure**

---

**Sample CLO Balance Sheet**

($ Mil.)

<table>
<thead>
<tr>
<th>Assets (Loans)</th>
<th>Liabilities (Notes)</th>
<th>Rating</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,000</td>
<td>4,650</td>
<td>‘AAA/AA’</td>
<td>93</td>
</tr>
<tr>
<td>—</td>
<td>100</td>
<td>‘A’</td>
<td>2</td>
</tr>
<tr>
<td>—</td>
<td>100</td>
<td>‘BBB’</td>
<td>2</td>
</tr>
<tr>
<td>—</td>
<td>150*</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>5,000</td>
<td>5,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Equity, not rated. CLO – Collateralized loan obligation.*
Cash Flow Backed CBOs

Motivation:
- Cash flow arbitrage (bonds have good returns relative to risk, but may be illiquid)
Cash Flow Backed CBOs

MANAGER

Selects portfolio

Collateral cash flows meet ABS interest & principal needs

BONDS

Cash flows

SPV

Investors

ABS flows
Market Value Backed CBOs

Motivation:
- *Price arbitrage (bonds are underpriced, and tradeable)*

Diagram:
- SALE
- BONDS
- MANAGER
- SPECIAL PURPOSE VEHICLE
- BOND PORTFOLIO
- ISSUES ASSET-BACKED CERTIFICATES
Market Value Backed CBOs

Trades bonds to meet interest & principal needs

BONDS

Cash flows

SPV

ABS flows

Investors
Rating Agencies Analyze Price Volatility to Determine CE Requirements

Volatility Analysis — Distressed Debt

Source: Altman Distressed Bond Index,
Advance rates determine how much rated debt can be issued against the market value of an asset.

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>'B'</th>
<th>'BB'</th>
<th>'BBB'</th>
<th>'A'</th>
<th>'AA'</th>
<th>'AAA'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and Equivalents</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Certificate of Deposit, Commercial Paper</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Senior Secured Bank Loans</td>
<td>96</td>
<td>95</td>
<td>93</td>
<td>91</td>
<td>89</td>
<td>87</td>
</tr>
<tr>
<td>'AAA' Corporate Bonds</td>
<td>96</td>
<td>95</td>
<td>93</td>
<td>91</td>
<td>89</td>
<td>87</td>
</tr>
<tr>
<td>'AA' Corporate Bonds</td>
<td>96</td>
<td>95</td>
<td>93</td>
<td>91</td>
<td>89</td>
<td>87</td>
</tr>
<tr>
<td>'A' Corporate Bonds</td>
<td>96</td>
<td>94</td>
<td>92</td>
<td>89</td>
<td>87</td>
<td>84</td>
</tr>
<tr>
<td>'BBB' Corporate Bonds</td>
<td>96</td>
<td>94</td>
<td>91</td>
<td>88</td>
<td>86</td>
<td>82</td>
</tr>
<tr>
<td>'BB-' High-Yield Debt</td>
<td>94</td>
<td>92</td>
<td>90</td>
<td>86</td>
<td>82</td>
<td>77</td>
</tr>
<tr>
<td>&lt; 'BB-' High-Yield Debt</td>
<td>93</td>
<td>89</td>
<td>85</td>
<td>80</td>
<td>73</td>
<td>66</td>
</tr>
<tr>
<td>Investment-Grade Convertibles</td>
<td>90</td>
<td>85</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>High-Yield Convertibles, PIK, Zero, Step-Up</td>
<td>88</td>
<td>81</td>
<td>76</td>
<td>63</td>
<td>52</td>
<td>40</td>
</tr>
<tr>
<td>Mezzanine, Distressed Debt</td>
<td>85</td>
<td>80</td>
<td>73</td>
<td>60</td>
<td>55</td>
<td>27</td>
</tr>
<tr>
<td>Emerging Market</td>
<td>85</td>
<td>78</td>
<td>71</td>
<td>50</td>
<td>40</td>
<td>27</td>
</tr>
<tr>
<td>Equity, Illiquid Debt</td>
<td>85</td>
<td>78</td>
<td>71</td>
<td>50</td>
<td>40</td>
<td>27</td>
</tr>
</tbody>
</table>

Note: Advance rates may vary for more or less diversified pools.
Creating a CBO

Assets

Liabilities
Example of Market Value CBO Asset Mix and Financing

<table>
<thead>
<tr>
<th>Portfolio Assets</th>
<th>Market Value ($ Mil.)</th>
<th>Advance Rate (%)</th>
<th>'A' Discounted Collateral Value ($ Mil.)</th>
<th>Capitalization</th>
<th>Rating</th>
<th>Required OC ($ Mil.)</th>
<th>Additional OC ($ Mil.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Loans</td>
<td>300</td>
<td>91</td>
<td>273</td>
<td>Revolving Notes*</td>
<td>'AA'</td>
<td>266</td>
<td>85</td>
</tr>
<tr>
<td>'BB' High-Yield Bonds</td>
<td>250</td>
<td>86</td>
<td>215</td>
<td>Senior Notes*</td>
<td>'AA'</td>
<td>268</td>
<td>85</td>
</tr>
<tr>
<td>'B' High-Yield Bonds</td>
<td>250</td>
<td>80</td>
<td>200</td>
<td>Senior-Subordinate Notes</td>
<td>'A'</td>
<td>212</td>
<td>73</td>
</tr>
<tr>
<td>Emerging Market Debt</td>
<td>50</td>
<td>50</td>
<td>25</td>
<td>Subordinate Notes</td>
<td>'BBB'</td>
<td>142</td>
<td>79</td>
</tr>
<tr>
<td>Private Equities</td>
<td>150</td>
<td>50</td>
<td>75</td>
<td>Junior Subordinate Notes</td>
<td>'BB'</td>
<td>107</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,000</td>
<td>79</td>
<td>Participating Notes</td>
<td>'B'</td>
<td>75</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>788</td>
<td>Equity</td>
<td>160</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Overcollateralization (OC) calculated for aggregate 'AA' rated debt. NR = Not rated.
Synthetic ABS

DB (Originator)

REFERENCE POOL OF LOANS
(Stay on balance sheet)

CREDIT SWAP AGREEMENT

SPECIAL PURPOSE VEHICLE

TOP QUALITY INVESTMENTS

ISSUES ASSET-BACKED CERTIFICATES
Synthetic ABS
or Collateralized Loan Notes

- CLNs are SPV debt backed by the credit of the selling bank (or better)
- No loans are sold to the SPV
- But performance is based on the performance of a reference pool of loans
  - If the reference credits perform, full debt service is made on the CLN
  - If the reference credits default, the CLN is deemed “defaulted” and payment is halted.
Synthetic ABS

GERMAN BANK (Originator)

REFERENCE POOL OF LOANS
(Stay on Balance Sheet)

CREDIT SWAP AGREEMENT

TOP QUALITY INVESTMENTS

SPECIAL PURPOSE VEHICLE

ISSUES ASSET-BACKED CERTIFICATES
Synthetic ABS

GERMAN BANK (Originator)

REFERENCE POOL OF LOANS
(Stay on Balance Sheet)

EURIBOR plus “PREMIUM”

PROTECTION against POOL DEFAULTS

TOP QUALITY INVESTMENTS

SPECIAL PURPOSE VEHICLE

ISSUES ASSET-BACKED CERTIFICATES
Credit Swaps in Synthetics: Doubts

- Problems with the collateral
  - Debates about “events of default”
  - Workouts and other pre-default losses
- Problems with the sponsor bank
  - Obtaining title to the collateral
  - Those “high quality investments”
- And all those swaps
Typical Credit Default Swap Arrangement

The guarantee:
- Pledge of a deposit in the sponsor bank
- Part or all of that deposit will be forfeited if there are pool losses
- “Losses in the transaction are defined as amounts written off in compliance with the bank’s usual procedures”
Leveraged CDO (Super Senior Tranche)
# Promises, Promises

## Promise-A-2000-1: Deal Info

(Dec. 2000)

<table>
<thead>
<tr>
<th><strong>Issuer</strong></th>
<th>Promise-A-2000-1 plc, Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Originators</strong></td>
<td>HypoVereinsbank &amp; Vereins- und Westbank</td>
</tr>
<tr>
<td><strong>Servicer</strong></td>
<td>HypoVereinsbank</td>
</tr>
<tr>
<td><strong>Issue Type</strong></td>
<td>Synthetic CLO:</td>
</tr>
<tr>
<td></td>
<td>85.3% Super Senior Tranche plus funded AAA-Notes</td>
</tr>
<tr>
<td><strong>Coupon</strong></td>
<td>3-Months Euribor + Spread, first coupon May 2001, act/360, payable February, May, August, November, rolldates 28</td>
</tr>
<tr>
<td><strong>Expected Maturity</strong></td>
<td>28th February 2009, soft bullet</td>
</tr>
<tr>
<td><strong>Final Legal Maturity</strong></td>
<td>28th February 2011</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>The issue can be redeemed on any Interest Payment Date on or after year 5</td>
</tr>
<tr>
<td><strong>Listing</strong></td>
<td>Luxembourg</td>
</tr>
<tr>
<td><strong>Denomination</strong></td>
<td>100,000 EUR</td>
</tr>
<tr>
<td><strong>Lead Manager</strong></td>
<td>HypoVereinsbank</td>
</tr>
</tbody>
</table>

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Super-Senior

Promise-A-2000-1: Structure

HVB

KFW

Super Senior Credit Default Swap

OECD Bank

Promise-A-2000-1 plc (Ireland)

KFW-MTNs Aaa/AAA (Collateral)

Mittelstand loans HVB and VUW

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CDOs 32
# Bank Capital Savings

## Credit Enhancement Calculation

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Securities Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Portfolio</td>
<td></td>
<td>From A From BB+ From B</td>
</tr>
<tr>
<td>A 50</td>
<td>AAA</td>
<td>47.5 52.5 32.8</td>
</tr>
<tr>
<td>BB+ 100</td>
<td>AA</td>
<td></td>
</tr>
<tr>
<td>B 100</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital: 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital: 9.376</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt 7%</td>
<td></td>
</tr>
<tr>
<td>Equity 15%</td>
<td></td>
</tr>
<tr>
<td>Total 7.64%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS 5%</td>
<td></td>
</tr>
<tr>
<td>Debt 8%</td>
<td></td>
</tr>
<tr>
<td>Equity 16%</td>
<td></td>
</tr>
<tr>
<td>Total 6.71%</td>
<td></td>
</tr>
</tbody>
</table>
Case Study: Global High Yield Bond Trust

- What is the legal structure of this deal?
- What are the assets?
- What are the different classes of securities, and their terms?
- How do the synthetic CLOs work? (Draw a diagram)
- Should investors buy the subordinated tranche?
Global High Yield Bond Trust

### Profile

**Expected closing date:**
April 18, 2000.

**Collateral:**
Pool of high-yield bonds and synthetic securities referencing high-yield bonds, all satisfying certain eligibility criteria.

**Underwriter:**
Warburg Dillon Read.

**Collateral Manager:**
Morley Fund Management Ltd.

**Insurer:**
Financial Security Assurance Inc.

**Custodian:**
Chase Manhattan Bank.

**Trustee:**

---

### Preliminary Ratings as of April 7, 2000

<table>
<thead>
<tr>
<th>Class</th>
<th>Preliminary rating*</th>
<th>Preliminary amount (Eur000s)</th>
<th>Recommended credit support (%)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>A***</td>
<td>AAA</td>
<td>225,000</td>
<td>32</td>
</tr>
<tr>
<td>B</td>
<td>BBB</td>
<td>29,800</td>
<td>23</td>
</tr>
<tr>
<td>C</td>
<td>BB+</td>
<td>19,900</td>
<td>17</td>
</tr>
<tr>
<td>D</td>
<td>BB</td>
<td>10,000</td>
<td>14</td>
</tr>
</tbody>
</table>

* The rating of each class of securities is preliminary and subject to change at any time.
** Illustrated credit supports do not account for expenses or excess spread.
*** The class A notes have a preliminary rating of AA without giving effect to the note policy from FSA.

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### Rationale

The preliminary ratings assigned to the euro (Eur)284.7 million floating-rate notes issued by The Global High Yield Bond Trust Ltd. reflect the ‘AAA’ insurer financial strength rating of Financial Security Assurance Inc. (FSA) and an initial credit enhancement of...
Appendix:
Types of Credit Derivatives

- Total Return Swaps
- Credit Default Swaps
- Credit Spread Options
- Credit Linked Notes
Total Return Swap

One view

TR Payer ---- Total Return of asset ---- TR Receiver

LIBOR + Y bp p.a

And another

Bank ---- Total positive returns on a security ---- Investor

LIBOR + margin + losses on security
Credit Default Swaps

The key distinction between a Credit Swap and a TR Swap is that the former results in a contingent or floating payment only following a Credit Event, while the latter results in payments reflecting changes in the market valuation of a specified asset in the normal course of business.
Credit Spread Options

Payoff

0

Bond Spread

150BP

Bond Price

Put Writer

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Credit-Linked Notes

REFERENCE POOL OF LOANS

BANK

Credit Default Swap

Credit Guarantee

Fee (like spread on bond)

SPV

Credit-Linked Notes (ABS)

Deposits

T-bonds
**Purposes of Credit Derivatives**

- Diversification of risk away from institution’s own portfolio
- More credit to one borrower than bank can hold directly
- Bank capital relief
- Leveraged investments in credit-sensitive assets (eg hedge funds)
Chase Secured Loan Trust Notes

- Chase Secured Loan Trust (CSLT) notes offer investors access to the high-yield bank loan market. One of the attractive aspects of this market to investors is that, while offering double-digit returns in many cases, the senior-secured status of bank loans has given them a very stable, and favorable, default percentage over the years. This is a market that has been widely untapped by institutional investors with only 20 - 25 percent of the $250 billion in syndicated leveraged loans outstanding held by this sector. The Chase structure uses credit derivatives to offer these investors access to this asset class.

- Take, for example, an investor who is prohibited from investing in anything lower than investment grade securities. In the Chase structure, the underlying credit derivative is a Total Return Swap between Chase and a trust. Chase pays the trust the total return on a loan portfolio of $100 million for example, which yields LIBOR plus 250 basis points. In exchange, Chase receives LIBOR plus 100 basis points from the trust. An investor who purchases a tranche of the CSLT in the form of a note receives the same return on the loan portfolio that is received by the trust from Chase on the TRS. For this return, the investor does not put up the total $100 million as would be required to participate in actual loan syndication. Rather, the investor pays $20 million for the tranche, which is used by the trust to purchase treasuries to post as collateral against the trust's payment on the TRS. When all the cash flows are broken down on the transaction, including the five times leverage of the $20 million for access to the $100 million loan portfolio plus the yield on the treasuries of 6 percent, the investor generates a total yield in this example of 13.5 percent.

- Draw a diagram to show how this is achieved
Valuation

- Evaluation of credit factors
- Discriminant analysis and credit-scoring models like Altman’s z-score
- Option pricing models