# CDOs RISK MANAGEMENT & ALL ABOUT CDOs

Presented by:

Dr. Malick Sy

iCo-op.net

Governance, Risk Management and Compliance

# AGENDA

- Collateralized Debt Obligations (CDOs) Risk Management
- Basic Characteristics
- Concept and Structures
- Why Investing in CDOs, Motivation of Investment Banks and Investors
- Types of CDOs
- Other Types of CDOs

# AGENDA - Continued

- Types of Collateral
- The Subprime Crisis:

  \- Detailed Explanation
- CDOs Risk Exposures and Implications
- Our CDOs Risk Management System
- CDOs Casualties and What is Next
- Discussions and Conclusion

# COLLATERALIZED DEBT OBLIGATIONS (CDOs) RISK MANAGEMENT

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# BASIC CHARACTERISTICS

- Collateralized Debt Obligations (CDOs) are a type of:
  - Asset-backed Security and
  - Structured Credit Product
- CDOs are constructed from a portfolio of fixed-income assets.

# BASIC CHARACTERISTICS - Continued

- These assets are divided into different tranches:
  - Senior tranches (rated AAA),
  - Mezzanine tranches (AA to BB) and
  - Equity tranches (unrated).

# *BASIC CHARACTERISTICS - Continued*

- According to the Securities Industry and Financial Markets Association
- Aggregate Global CDO issuance totalled:
  - USD 157 billion in 2004
  - USD 249 billion in 2005
  - USD 489 billion in 2006
  - The size of the CDO global market to close to $2 trillion by the end of 2006.

# CONCEPT

- A CDO is constructed as follows:
  - a CDO entity acquires an inventory of assets. Common assets held include mortgages, credit card debt and student loan.
  - the CDO entity sells rights to the cash flows from the inventory along with the associated risk.

# CONCEPT - Continued

- The sold rights are called tranches in accordance with the cash flow and risk assignment rules of the CDO: senior (rated AAA) tranches are paid first followed by mezzanine (AA to BB) tranches and, last of all, equity tranches (unrated).
- the CDO passes cash flows to the investors.

# CONCEPT - Continued

- The issuer of the CDO, typically an Investment Bank
- Earns a Commission at time of issue
- Earns Management Fees during the life of the CDO

# STRUCTURES

- Source of funds
  - – Cash Flow versus Market Value
    - *Cash flow CDOs* pay interest and principal to tranche holders using the cash flows produced by the CDO's assets. Cash flow CDOs focus primarily on managing the credit quality of the underlying portfolio
    - *Market value CDOs* attempt to enhance investor returns through the more frequent trading & profitable sale of collateral assets.

# WHY INVESTING IN CDOs

- Motivation
  - Arbitrage versus Balance Sheet
    - <u>*Arbitrage transactions*</u> (cash flow and market value) attempt to capture for equity investors the spread between the relatively high yielding assets and the lower yielding liabilities represented by the rated bonds. The majority, 86%, of CDOs are arbitrage-motivated.

# WHY INVESTING IN CDOs - Continued

- Motivation
  - Arbitrage versus Balance Sheet
    - *<u>Balance sheet transactions</u>*, by contrast, are primarily motivated by the issuing institutions’ desire to remove loans and other assets from their balance sheets, to reduce their regulatory capital requirements and improve their return on risk capital. A bank may wish to offload the credit risk in order to reduce its balance sheet's credit risk.

# WHY INVESTING IN CDOs - Continued

- Funding – Cash versus Synthetic
  - *Cash CDOs* involve a portfolio of cash assets, such as loans, corporate bonds, asset-backed securities or mortgage-backed securities. Assets are transferred to the legal entity (known as a special purpose vehicle) issuing the CDO's tranches. The risk of loss on the assets is divided among tranches in reverse order of seniority. Cash CDO issuance exceeded $400 billion in 2006.

# WHY INVESTING IN CDOs - Continued

- Funding – Cash versus Synthetic
  - *Synthetic CDOs* do not own cash assets like bonds or loans. Instead, synthetic CDOs gain credit exposure to a portfolio of fixed income assets without owning those assets through the use of credit default swaps, a derivatives instrument.

# WHY INVESTING IN CDOs - Continued

- Funding – Cash versus Synthetic
  - *Hybrid CDOs* are an intermediate instrument between cash CDOs and synthetic CDOs. The portfolio of a hybrid CDO includes both cash assets as well as swaps that give the CDO credit exposure to additional assets.

# TYPES OF CDOs

- The two main types of CDOs are:
  - Collateralized Loan Obligations (CLOs)

    - CDOs backed primarily by leveraged bank loans.
  - Structured Finance CDOs (SFCDOs)

    - CDOs backed primarily by asset-backed securities and mortgage-backed securities (In 2006, 54% of CDOs were backed by structured finance and 35% were backed by leverage loans.

# OTHER TYPES OF CDOs

- Other types of CDOs include:
  - Commercial Real Estate CDOs (CRE CDOs)

    - backed primarily by commercial real estate assets.
  - Collateralized Bond Obligations (CBOs)

    - CDOs backed primarily by corporate bonds.
  - Collateralized Insurance Obligations (CIOs)

    - backed by insurance or, more usually, reinsurance contracts.

# OTHER TYPES OF CDOs - Continued

- CDO-Squared

  - CDOs backed primarily by the tranches issued by other CDOs.
- CDO^n - Generic term for CDO^3 (CDO cubed) and higher,

  - where the CDO is backed by other CDOs/CDO^2/CDO^3. These are particularly difficult vehicles to model due to possible repetition of exposures in the underlying CDO.

# TYPES OF COLLATERAL

- The collateral for cash CDOs include:
  - Structured finance securities (mortgage-backed securities, home equity asset-backed securities, commercial mortgage-backed securities)
  - Leveraged loans
  - Corporate bonds
  - Real Estate Investment Trust (REIT) Debt

# TYPES OF COLLATERAL - Continued

- Commercial real estate mortgage debt (including whole loans, B notes, and Mezzanine debt)
- Emerging-market sovereign debt
- Project finance debt
- Trust Preferred securities

# THE SUBPRIME CRISIS:

DETAILED EXPLANATION

# SUBPRIME

- A term used mainly in the USA to describe a segment of the home lending market – customers who do not qualify for prime market rates because of blemished or inadequate credit record.
- Typically have a FICO credit score below 620 (scale 300-850).

# *SUBPRIME - Continued*

- Approx 25% of the US population fall into this category.
- The subprime mortgage market has evolved with encouragement to borrow with little or no deposit, interest only deals and "honeymoon" loan schedules.

# SUBPRIME - Continued

- Estimated that approx 15% of all outstanding mortgages in the US are subprime.
- Also estimated that approx 2 million US households will or are in danger of loosing their homes because of subprime lending.
- The closest in Australia is the “low docs” market.

# LOW DOCS LENDING

- Basically means self declared income.
- This segment of the mortgage market originated in the non-traditional lending market supported by the growth of mortgage broking.
- Now established in the banking sector.
- Typically banks require mortgage insurance for capital adequacy reasons.
- Estimated that the “at risk” (US subprime equivalent) component of the low docs market is about 1% of outstanding mortgages.

# ***SUBPRIME CRISIS & THE EFFECT ON INVESTMENT BANKS & INVESTORS***

CREDIT CRUNCH ORIGINATION

# DEAL STRUCTURE PROCESS

At the Mortgage Broker's ...

Origination

# Mortgage Brokers

1. Gee, I'd like to buy a house but I haven't saved any money for a down payment and I don't think I can afford the monthly payments.  Can you help me?

2. Sure! Since the value of your house will always go up, we don't need down payments anymore!

# Mortgage Brokers - Continued

1. And we can give you a really really low interest rate for a few years. We'll raise it later, okay?

2. Sure no problem. Umm, there's one other thing … my employer is a real prick and might not verify my employment. Would that be a problem?

3. Nope. We can get you a special "Liar's Loan" and you can verify your own employment and income!

# Mortgage Brokers - Continued

1. You guys are awesome! You are really willing to work with guys like me.

2. Well, we don't actually lend you the money – a bank will do that – so we don't really care if you repay the loan. We still get our commission.

3. Wow! Let's get started!

# DEAL STRUCTURE PROCESS

A Few Weeks Later, at the Bank ...

# First Bank of Bankland, Inc

I’d better get rid of these crappy mortgage loans. They are starting to stink up my office. Thankfully, the really smart guys in New York will buy them and perform their financial magic! I’ll call them right away!

Let’s See What the Smart Guys Are Doing …

# *Investment Bank Wall Street*

1. Phew!!!
We'd better get rid of these mortgages before they start attracting flies.

2. But who would buy this rubbish, Boss?

# Investment Bank Wall Street

1. I've got it! First We'll create a new security and use these crappy mortgages as collateral.  We'll call it a CDO (or maybe CMO). We can sell that CDO to investors and promise to pay them back as the mortgages are paid off.

2. Individually, these are pretty bad loans, but if we pool them together only some of them will go bad – certainly not all of them. And since housing prices always go up, we really have very little to worry about.

# *Investment Bank Wall Street*

The new CDO will work like this: It will be made up of three pieces (or "tranches") and we'll call them "The Good" - AAA, "The Not-so-Good" - AA to BB and "The Ugly" - unrated

# *Investment Bank Wall Street*

If some of the mortgages fail, as surely some might, we will promise to pay investors holding the "Good" tranche first.  We'll pay the "Not-so-Good" investors second, and the "Ugly" investors last.

# *Investment Bank Wall Street*

I'm starting to get it. And because the "Good" investors have the least risk, we'll pay them a lower interest rate than the other guys, right? The "Not-so-Good" will get a better interest rate and the "Ugly" guys will get a nice fat interest rate.

# *Investment Bank Wall Street*

Exactly. But Wait, it gets better. We'll buy bond insurance for the "Good" piece. If we do that, the Rating agencies will give it a really great rating, in the AAA to A range. They will likely give the "Not-so-Good" piece a BBB to B rating, still pretty good.  We won't even bother asking them to rate the "Ugly" piece.

# *Investment Bank Wall Street*

Yes, I know.

So you have managed to create AAA and BBB securities out a pile of stinky, risky mortgage loans.  Boss, you are a genius.

# *Investment Bank Wall Street*

1. Okay, now who are we going to sell the three pieces to?

2. The SEC won't let us sell this stuff to widows and orphans, so we'll sell it to our sophisticated institutional clients.

3. Like who?

# *Investment Bank Wall Street*

1. Like insurance companies, banks, small towns in Norway, school boards in Australia – to anyone who is looking for a high-quality safe investment.

2. But, surely nobody would buy the "Ugly" piece, would they?

# *Investment Bank Wall Street*

1. Of course not – nobody is that stupid. We will keep that piece and pay ourselves a handsome interest rate.

2. This is all great, but since we are only using the smelly mortgages as collateral on an entirely new security, we haven't really gotten rid of them. Don't we have to show them on our balance sheet?

# Investment Bank Wall Street

No, of course not. The guys who write the accounting rules allow us to set up a shell company in the Caymen Islands to take ownership of the mortgages. The rubbish goes on their balance sheet, not ours. The fancy name for it is "Special Purpose Vehicle" Or SPV.

# Investment Bank Wall Street

2. Sure, but we have convinced them that it is vitally important to the health of the U.S. financial system that investors not know about these complex transactions and what is behind them.

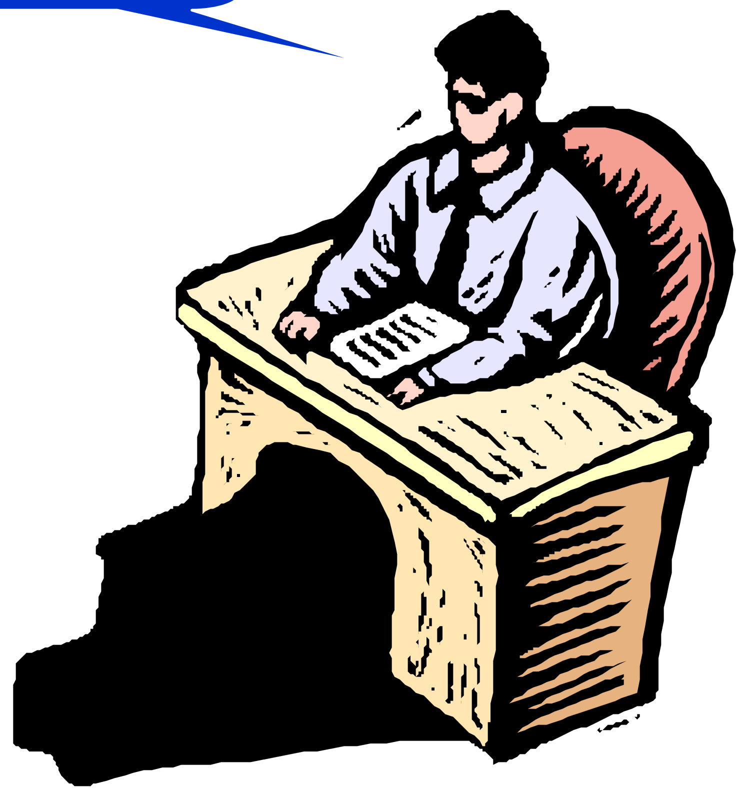
1. That's great, but why would they let us do that, aren't we just moving our own things around?

# DEAL STRUCTURE PROCESS

Let’s Drop in to see the Accountants ...

# Office of Czar of Accounting

ZZzzz…



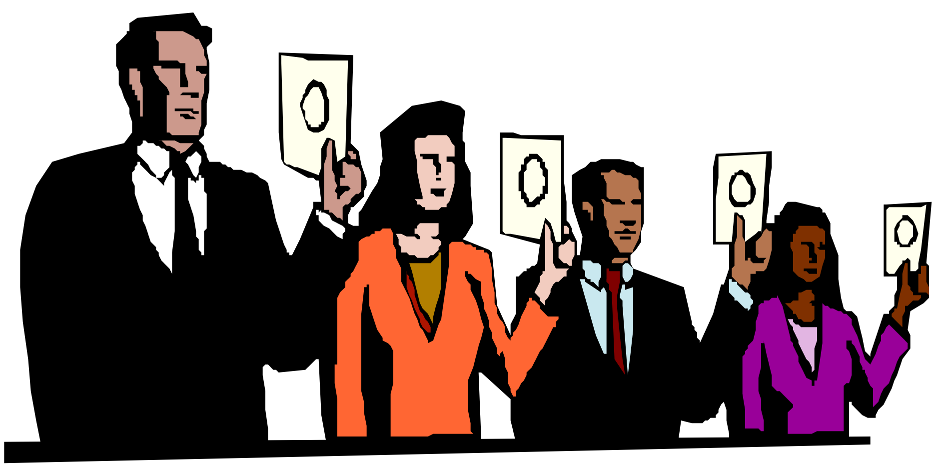
1. Sir, as an investor and a concerned citizen. I demand that you force our financial institutions to show greater transparency and openness in their financial reporting!

# DEAL STRUCTURE PROCESS

Gee, We never saw it Coming ...

France Village Pension Fund

1. Hey man, what is going on? We're not receiving our monthly payments?

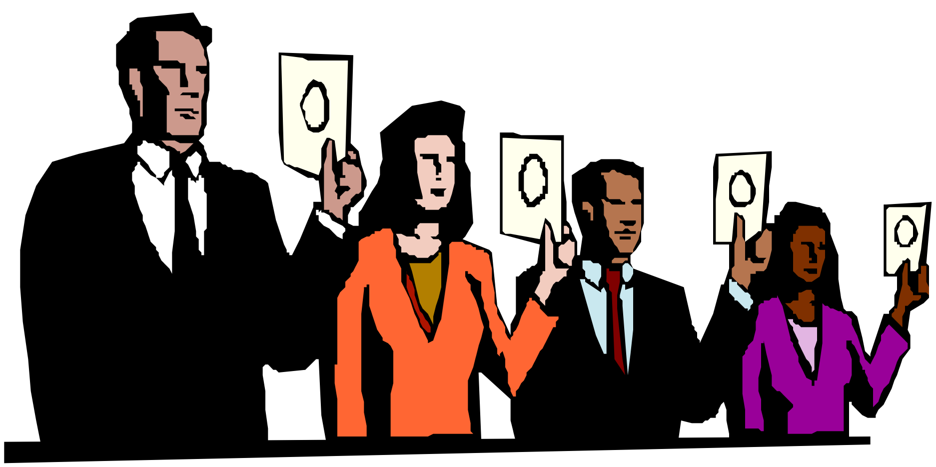


Investment Bank Wall Street

2. Yeah, I meant to call you but it's been really crazy around here. It seems that the companies who took out the mortgages backing your CDO aren't able to pay them off.

## France Village Pension Fund

1. Wait a minute! We bought the AAA "Good" piece of the CDO. You know? The safe one. We're supposed to be getting paid first.



## Investment Bank Wall Street

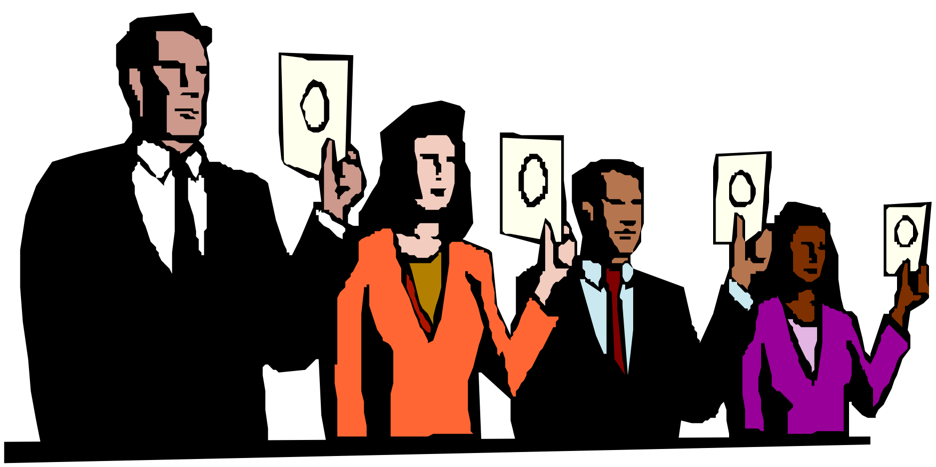
2. Well, unfortunately the loans were quite a bit bad than we originally thought and there is very little cash coming in. Frankly, I assure you that we are as disappointed as you are.

## France Village Pension Fund

1. But you told us that housing prices always go up and that your borrowers could always refinance their mortgages!

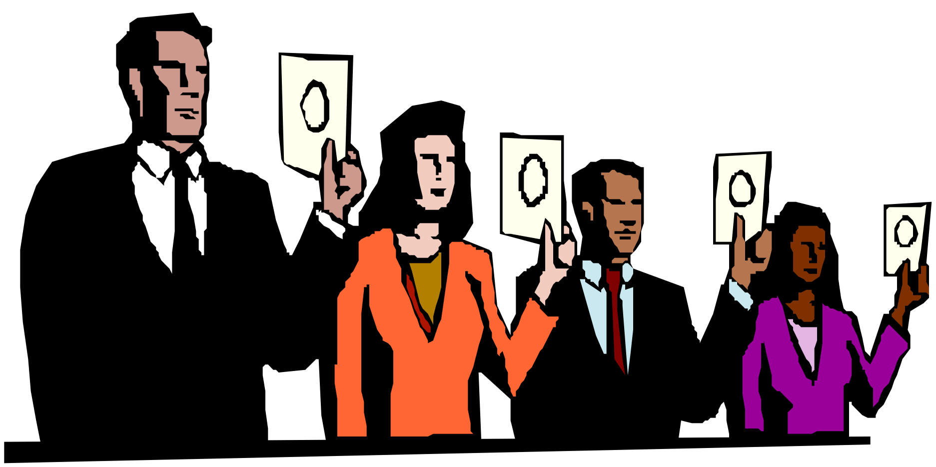
## Investment Bank Wall Street

2. Yeah, that was a bad assumption. We messed it up. Sorry!



## France Village Pension Fund

1. Bad assumption …
What about the AAA rating from the agencies?



## Investment Bank Wall Street

2. They messed it up too!

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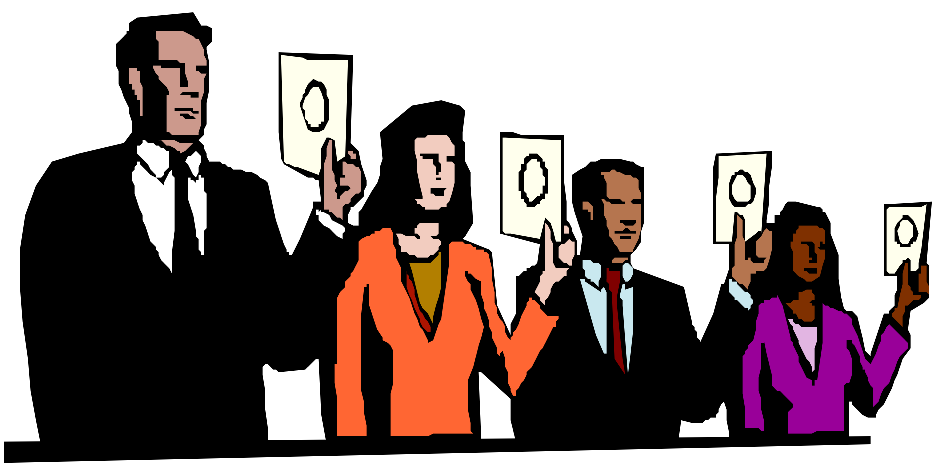
## France Village Pension Fund

But this security was insured! What about the insurers?



## Investment Bank Wall Street

(Sigh!) …

# CDOs RISK EXPOSURE & IMPLICATIONS

- Operational Risk
- Credit Risk
- Asset Price Risk (CDO Valuation)
- Liquidity Risk

# OUR CDOs RISK MANAGEMENT SYSTEM (FEATURES)

- The System will provide:
  - Modelling the structure of each new deal on behalf of the Managers and setting up the Compliance Tests so that they can be monitored through the Life of the Deal.
  - Cash Flows Projection.
  - Generating Front and Back Office Reporting.
  - Cash Management and Trustee Notification and Reconciliation.

# OUR CDOs RISK MANAGEMENT SYSTEM - Continued

- Independent Evaluation of Both the Market Value and Loss Distribution of Credit Portfolios and Tranches of Portfolios, especially those of Synthetic Collateralized Debt Obligations.

# OUR CDOs RISK MANAGEMENT SYSTEM - Continued

- The System takes a Multiple Models Approach:
  - Credit Models
  - Merton Default Probability
  - Hybrid Default Probability
  - Different Portfolio Simulation Techniques

# OUR CDOs RISK MANAGEMENT SYSTEM - Continued

- Different Portfolio Simulation Techniques
  - Copula / Merton Style Simulation
  - Historical Default Probability Simulation
  - Macro-Factor Driven Simulation
  - Base Case Assuming no Correlation
- Users can select any number of modeling periods from a 1 single period to N periods.

# CDOs CASUALTIES

| **Businesses filing for bankruptcy** | | |
|---|---|---|
| **Business** | **Type** | **Date** |
| New Century Financial | subprime lender | April 2, 2007 |
| American Home Mortgage | mortgage lender | August 6, 2007 |
| Sentinel Management Group | investment fund | August 17, 2007 |
| Ameriquest | Subprime lender | August 31, 2007 |
| NetBank | on-line bank | September 30, 2007 |
| Terra Securities | securities | November 28, 2007 |
| American Freedom Mortgage, Inc. | subprime lender | January 30, 2007 |

# CDOs CASUALTIES - Continued

| Write-downs on the value of loans, MBS and CDOs | | |
|---|---|---|
| **Company** | **Business Type** | **Loss (Billion $)** |
| Citigroup | investment bank | $24.1 bln |
| Merrill Lynch | investment bank | $22.5 bln |
| UBS AG | investment bank | $18.7 bln |
| Morgan Stanley | investment bank | $10.3 bln |
| Crédit Agricole | bank | $4.8 bln |
| HSBC | bank | $3.4 bln |
| Bank of America | bank | $5.28 bln |
| CIBC | bank | $3.2 bln |
| Deutsche Bank | investment bank | $3.1 bln |
| Barclays Capital | investment bank | $2.7 bln |
| Bear Stearns | investment bank | $2.6 bln |
| RBS | bank | $2.6 bln |
| Washington Mutual | savings and loan | $2.4 bln |
| Swiss Re | re-insurance | $1.07 bln |
| Lehman Brothers | investment bank | $2.1 bln |
| LBBW | bank | $1.1 bln |
| JP Morgan Chase | investment bank | $2.9 bln |

# CDOs CASUALTIES - Continued

| **Write-downs on the value of loans, MBS and CDOs** | | |
|---|---|---|
| **Company** | **Business Type** | **Loss (Billion $)** |
| Goldman Sachs | investment bank | $1.5 bln |
| Freddie Mac | mortgage GSE | $3.6 bln |
| Credit Suisse | bank | $3.08 bln |
| Wells Fargo | bank | $1.4 bln |
| Wachovia | bank | $3.0 bln |
| RBC | bank | $0.360 bln |
| Fannie Mae | mortgage GSE | $0.896 bln |
| MBIA | bond insurance | $3.3 bln |
| Hypo Real Estate | bank | $0.580 bln |
| Ambac Financial Group | bond insurance | $3.5 bln |
| Commerzbank | bank | $1.1 bln |
| Société Générale | investment bank | $3.0 bln |
| BNP Paribas | bank | $0.870 bln |
| WestLB | bank | $1.37 bln |
| American International Group | insurance | $4.8 bln |
| BayernLB | bank | $2.8 bln |
| Natixis | bank | $1.75 bln |

# *Thank You*

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