

Growth and Financial Markets

Lecture 3

Financial Innovation

In **lecture 1** we saw that:

- Expansion of credit is a systematic development due to efforts to reduce transaction costs and holding of liquidity and money balances
- History of money is a story of continuing innovations so that the existing supply of money can be used more efficiently and of developments of close substitutes for traditional money in order to circumvent formal requirements applied to money

We now look at:

- **Innovation in financial instruments (lecture 3)**
 - Derivatives
 - Structured credit
 - Credit Default Swaps
- **Innovation in the structure of the financial sector (lecture 4)**
 - The “regulated” banking system
 - The “unregulated” shadow banking system

History of Derivatives (I)

- **Financial derivatives are not new; they have been around for years.** A description of the first known options contract can be found in Aristotle's writings (Politics, Ch. 9). He tells the story of Thales, a poor philosopher from Miletus who developed a "financial device, which involves a principle of universal application." People reproved Thales, saying that his lack of wealth was proof that philosophy was a useless occupation and of no practical value. But Thales knew what he was doing and made plans to prove to others his wisdom and intellect.
- Thales had great skill in forecasting and predicted that the olive harvest would be exceptionally good the next autumn. Confident in his prediction, he made agreements with area olive-press owners to deposit what little money he had with them to guarantee him exclusive use of their olive presses when the harvest was ready. Thales successfully negotiated low prices because the harvest was in the future and no one knew whether the harvest would be plentiful or pathetic and because the olive-press owners were willing to hedge against the possibility of a poor yield.
- Aristotle's story about Thales ends as one might guess: "When the harvest-time came, and many [presses] were wanted all at once and of a sudden, he let them out at any rate which he pleased, and made a quantity of money. Thus he showed the world that philosophers can easily be rich if they like, but that their ambition is of another sort." So Thales exercised the first known options contracts some 2,500 years ago. He was not obliged to exercise the options. If the olive harvest had not been good, Thales could have let the option contracts expire unused and limited his loss to the original price paid for the options. As it turned out, a bumper crop came in, so Thales exercised the options and sold his claims on olive presses at a high profit.
- The first known instance of derivatives trading dates to 2000 B.C. when merchants, in what is now called Bahrain Island in the Arab Gulf, made consignment transactions for goods to be sold in India. Derivatives trading, dating back to the same era, also occurred in Mesopotamia. Forward and options contracts were traded on commodities, shipments and securities in Amsterdam after 1595. The Japanese traded futures-like contracts on warehouse receipts or rice in the 1700s.

History of Derivatives (II)

- **Derivatives markets were small until the 1970s**, when economic conditions, along with advances in the pricing of derivatives, led to spectacular growth. In that decade, the volatility of interest rates and currency-exchange rates increased sharply, making it imperative to find efficient ways to hedge related risks. Meanwhile, deregulation in a variety of industries, along with soaring international trade and capital flows, added to the demand for financial products to manage risk.
- Development of the Black-Scholes formula in the early 1970s (allowing to value options), along with the introduction of cheaper, faster computers to manage the computations, changed the trading of derivatives forever. Thereafter, financial engineers could invent new derivatives and easily find their value.
- Until the 1970s, derivatives mostly took the form of option, forward and futures contracts. Except for futures contracts on commodities, the trading of derivatives had been done “over the counter,” meaning without intermediation by an organized exchange.
- **In 1972, the Chicago Mercantile Exchange started trading futures contracts on currencies. The Chicago Board Options Exchange, where stock options are traded, was founded in 1973.**
- In the late 1970s and early 1980s, the swaps market took off. Exotic derivatives trading exploded a few years later.

Derivatives

- A **derivative** is a financial instrument whose value depends on – or is “derived” from - the value of an “underlying asset” (a financial instrument, and indicator or a commodity)
- The most common “underlying assets” include commodities, stocks, bonds, interest rates, currencies and market indices
- Plain vanilla derivatives include:
 - Contracts to buy or sell an underlying at a fixed price for future delivery (**forward or futures** contracts)
 - Contracts involving the right (but no obligation) to buy or sell an underlying at a fixed price in the future (**options**)
 - Contracts to exchange one cashflow for another (**swaps**)

Types of Derivatives (I)

- A **forward** is an OTC agreement – highly customized - between a buyer and a seller to exchange the underlying for a prespecified amount of cash (strike price) on a prearranged future date (settlement date)
- A **future** is a forward contract that has been standardized (notional amount, expiration date) and is negotiated on an organized exchange
- An **option** is an agreement between two parties:
 - The option buyer, who pays a premium and obtains a right (but no obligation) to exchange the underlying for a prespecified amount of cash (strike price) on settlement date
 - The option seller (or writer), who receives the premium but has the obligation to exchange the underlying for a prespecified amount of cash (strike price) on a settlement date

There are two basic types of options:

- **Call option:** gives the buyer the right to buy the underlying at settlement date
- **Put option:** gives the buyer the right to sell the underlying at settlement date

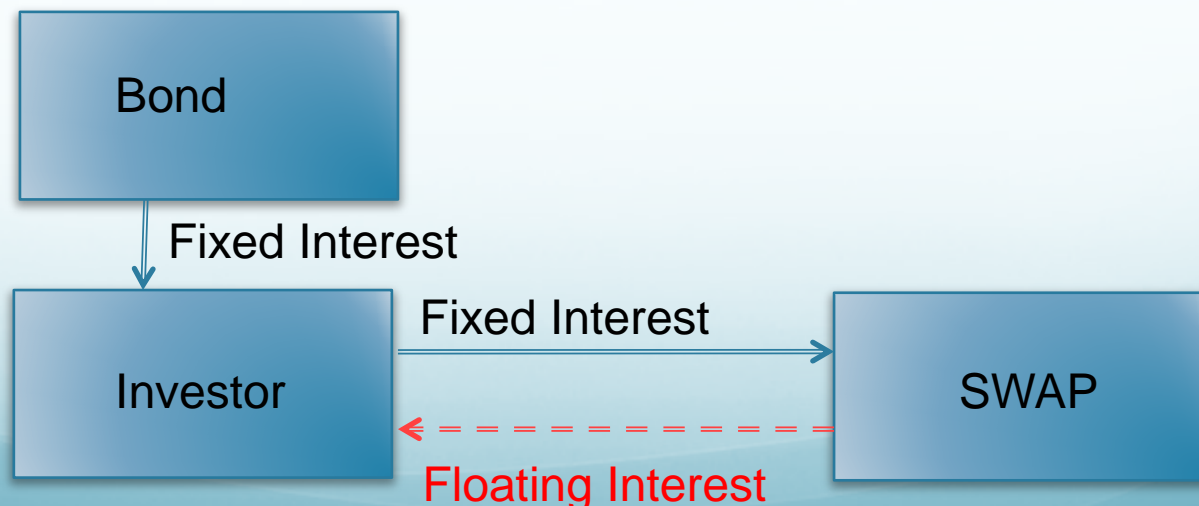
An American option can be exercised at any date up to the expiration date

A European option can be exercised only at expiration date

- **Option have asymmetric payouts**, therefore are particularly suited to **transfer risks**

Types of Derivatives (II)

- A **swap** involves an exchange of cash flows (related to interest payments, or receipts) on a notional amount of principal, that is never exchanged.
- The simplest asset swaps involves an investor buying a fixed coupon bond and at the same time entering into an interest rate swap that has a maturity equal to that of the bond. The investor uses the coupon received from the bond to pay fixed interest on the swap. The swap counterparty then pays a floating rate of interest to the investor. The fixed rate investment has been converted into a synthetic floating rate note, (FRN), see the diagram below:



Trading venues for Derivatives

- **Derivatives can be traded:**
 - “**other the counter**” (OTC), that is in private markets, directly between two parties, without standardization of contracts (swaps, forwards, caps & floors, and other exotic derivatives)
 - **through specialized exchanges** - “exchange-traded derivatives” (ETD) - in standardized contracts (futures and standardized options)
- OTC derivative involve a “**counterparty**” risk (often mitigated by requirements to post collateral), whereas the settlement of ETD is guaranteed by the “Clearing House” of the exchange where they are traded
- **In the OTC markets there is very little information provided by either the private market participants or collected by government regulators.** The prices and other trading information in these markets are not made freely available to the public like is the case with futures and options exchanges. Instead that information is hoarded by each of the market participants.
- As a result of this lack of information in the OTC market, it substantially reduces the ability of the government and other market participants to anticipate and possibly pre-empt major market failures, manipulation efforts or the building of serious market pressures or of systemic risks. .
- Over-the-counter dealing and lack of transparency will be less common as the Dodd-Frank Wall Street Reform and Consumer Protection Act in US and the European Market Infrastructure Regulations (EMIR) & new MIFID in Europe come into effect

Use of Derivatives

- **Financial derivatives enable parties to trade specific financial risks** (such as interest rate risk, currency, equity and commodity price risk, and credit risk, etc.) to other entities who are more willing, or better suited, to take or manage these risks [risk transfer] - typically, but not always, without trading in a primary asset or commodity
- Financial derivatives contracts are usually settled by net payments of cash. This often occurs before maturity for exchange traded contracts such as commodity futures. Cash settlement is a logical consequence of the use of financial derivatives to trade risk independently of ownership of an underlying item. However, some financial derivative contracts, particularly involving foreign currency, are associated with transactions in the underlying item
- **Financial derivatives are used for a number of purposes including risk management, hedging, arbitrage between markets, and speculation**

Risks of Derivatives

- The main danger posed by derivatives comes from the **leverage** they provide to both hedgers and speculators. **Derivatives transactions allow investors to take a large price position in the market while committing only a small amount of capital** – thus the use of their capital is leveraged.
- Leverage makes it cheaper for hedgers to hedge, but it also makes speculation cheaper: instead of buying \$1m of Treasury bonds or \$1m of stock, an investor can buy futures contracts on \$1m of the bonds or stocks with only a few thousand dollars of capital committed as margin. The returns from holding the stocks or bonds will be the same as holding the futures on the stocks or bonds. This allows an investor to earn a much higher rate of return on their capital by taking on a much larger amount of risk.
- **Sellers of options also run very high risks**: in exchange for a premium, they can face unlimited losses. Options writing (selling CDS protection) brought insurance giant AIG almost to default in September 2008 (it was saved by a massive capital and liquidity injection by the US government and the Fed)
- Taking on these greater risks raises the likelihood that investors make or lose large amounts of money. If they suffer large losses, then they are threatened with bankruptcy. If they go bankrupt, then those who invested in them or lent money to them will face possible losses and in turn face bankruptcy themselves. This spreading of the losses and failures is known as “**systemic risk**”, and it is an economy wide problem that can be made worse by leverage and leveraging instruments such as derivatives.

Structured Credit

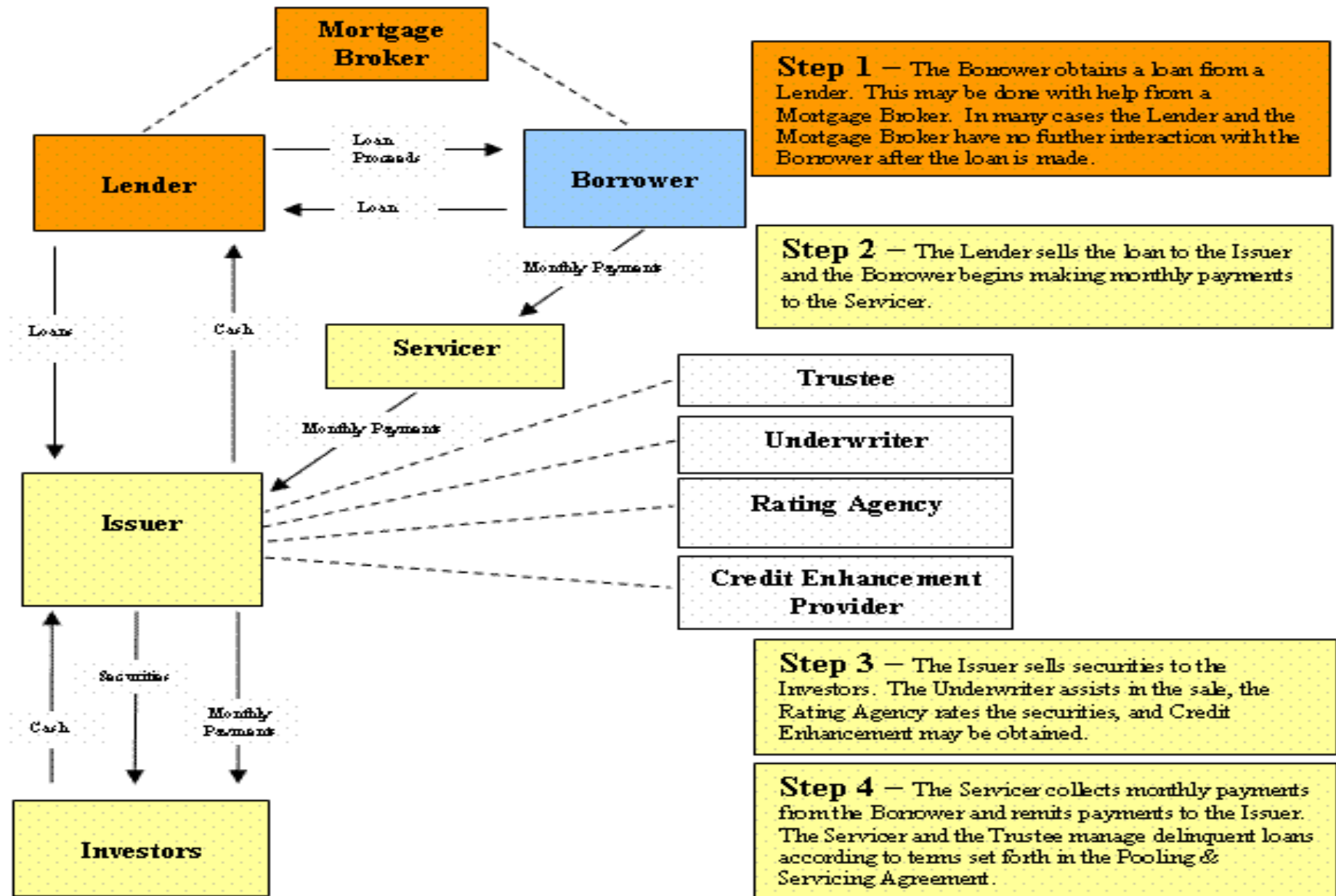
from: “originate to hold” to: “originate to distribute”

- Historically banks made loans and kept them on their books (“**originate do hold**”): the borrower would apply for a loan and, if approved, the bank would lend him money and then collect payments on interest and principal over a number of years
- Loans “consume” capital, which remains “tied up” for the whole duration of the transaction
- In 1970s Ginnie Mae put together the first **mortgage-backed securities (MBS)**, by pooling mortgages it had originated and issuing bonds on the basis of that pool
- The issuer of the MBS does not have to wait several years to recoup the proceeds on the mortgage, but receives a lump sum upfront from the purchaser of these bonds [**originate to distribute**]
- The “**securitized**” **loans** are taken off the books of the lender, freeing up capital to make new loans (this is not the case for “covered bonds” – widely used in some European countries - where the bank keeps the loans on its books and remains liable in case of default of its loans)
- **Securitization turns illiquid assets**, like mortgages and other loans, **into more liquid assets**, tradable on open markets, creating new opportunities for borrowers, for financial intermediaries and for investors alike

Creating an Asset Backed Security (ABS)

- An investment bank sets up a “**Special Purpose Vehicle**” (SPV) that **purchases a pool of mortgages from the originator** (a bank, a nonbank lender or a GSE) and issues bonds (called MBS) that would pay out the revenue stream received from the thousands of homeowners paying off their mortgages
- **Holding a diversified portfolios of loans reduces the riskiness of an ABS** (provided loan default probabilities are not perfectly correlated, i.e. that not all homeowners default at the same time)
- “**Securitization**” spread from housing to commercial real estate mortgages (CRE) and to many other kinds of consumer loans: credit card, student and car loans. Corporate loans, such as leveraged loans and industrial and commercial loans, where securitized as well (LLO, CLO)
- The bonds resulting from “securitization” are generally called “**Asset Backed Securities**” (ABS)
- It seems as though anything can be securitized: airplane leases, revenues from forest and mines, delinquent tax liens, radio tower revenues, boat loans, state and local government revenues, and even royalties of rock and pop stars
- Most collateral requires the performance of **ongoing servicing activities** (like sending monthly bills to credit card holders or collecting payments). They will be carried out by a servicing agent (sometimes the originator itself) for a service fee

Creating an Asset Backed Security (MBS)



The risks of ABS: Interest Rate Risk

Holding a plain vanilla ABS necessarily implies taking on a certain amount of risk.

The borrowers might:

- prepay, if interest rates fall (interest rate risk, duration risk)
- default, if they cannot repay interest or principal (credit risk)
- As with any bond, ABS are subject to **interest rate risk**:
 - if interest rates rise the price of the bond falls [the NPV of all future cash flows of the bond (coupon stream + principal repayment) is inversely correlated to interest rate]
 - $P = \sum_{t=1}^n [C_t/(1+i_t)^t + 100/(1+i)^t]$
 - The longer the **duration** of a bond, the higher the sensitivity of changes in prices to changes in interest rates (given a change interest rates, the price of a bond with a very long duration will fluctuate more than the price of a short duration bond)

The risks of ABS: Duration Risk (convexity)

For many ABS (especially MBS) the cash flows of the underlying loans change because of changes in interest rates (prepayment or convexity risk)

- Many loans (in particular mortgages) permit prepayment:
 - If interest rates drop, underlying mortgage holders decide to prepay and refinance their mortgages, reducing the duration of the ABS
 - If interest rates rise, underlying mortgage holders try to extend as much as possible their loans at the lower rate, increasing the duration of the ABS

Since duration is inversely correlated to the size of price changes, the volatility of the prices of a ABS will be higher than the volatility of the prices of a “straight” bond with the same duration.

- ABS are said to have “**negative convexity**” [convexity is the sensitivity of the duration of a bond to changes in interest rates, the second derivative of the price of the bond with respect to interest rates (duration is the first derivative)]
- The higher the convexity the more sensitive is the bond price to changes in interest rates]: therefore ABS must offer higher yields than comparable “straight” bonds (they have “**embedded optionality**”)

The risks of ABS: Credit Risk

As with any corporate bond, ABS are subject to **credit risk**

- Credit risk refers to the risk that the borrowers will default on their debt by failing to make payments of principal or interest
- In assessing credit risk from a single counterparty, three issues must be considered:
 - **Default Probability:** the likelihood that the counterparty will default on its obligation either over the life of the loan/bond or over some specified time horizon (for a one year time horizon it is called “expected default frequency”)
 - **Credit Exposure:** how large is the outstanding obligation when the default occurs
 - **Recovery Rate:** what fraction of the exposure may be recovered through bankruptcy proceedings or some other form of settlement
- **In ABS credit risk is mitigated by the diversification of the borrower pool:** therefore it is important that the default probabilities of each borrower in the pool has as low correlation as possible with the default probabilities of other borrowers in the pool
- Credit risk can also be mitigated by **credit enhancements** such as over-collateralization or third party guarantee, or by selling Credit Default Swaps
- To model the credit risk of portfolios with exposure to multiple obligors, standard default models, used to assess the likelihood of default by a single obligor, are integrated with correlation models (and also need to assess dynamically the recovery rate: during a crisis, when everybody is selling, the recovery rate will be lower than historical)

Securitization of Risks of ABS

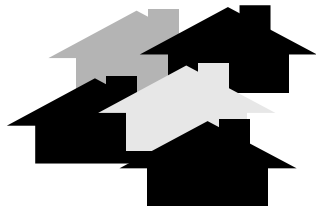
- Can some or all of these risk be “sliced and diced” in order to redistribute them among those better equipped to analyse, understand and shoulder the outcomes (i.e. to professional investors)?

Suppose we have two mortgages each with face value \$ 1m and a 10% chance of total default. If we package them together and then issue two securities against the package:

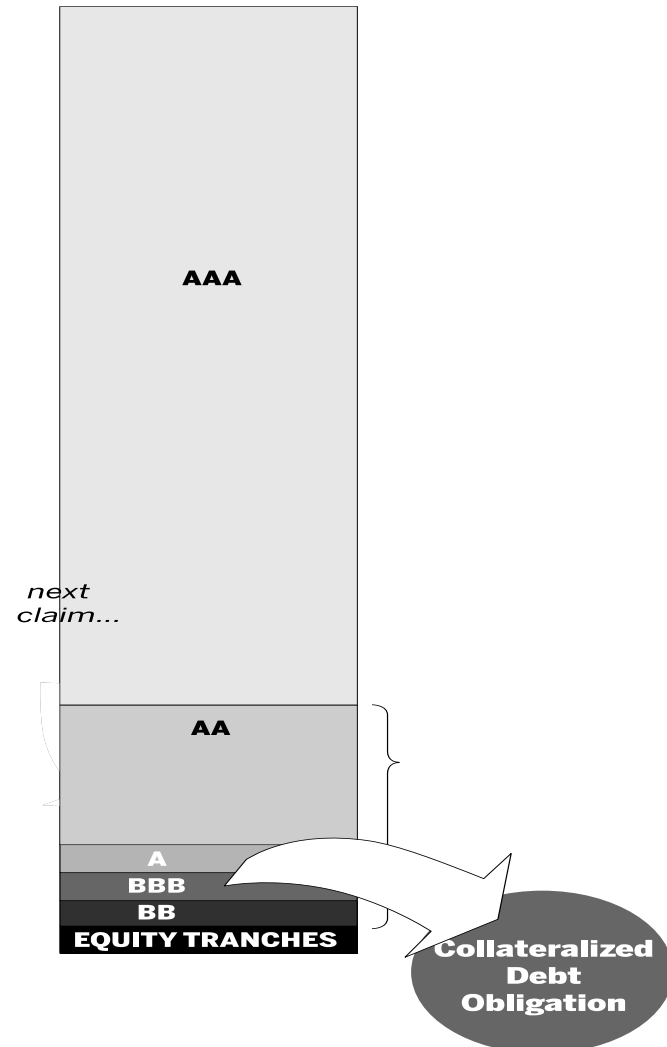
- (i) a junior security, face value \$ 1m that bears the brunt of losses until they exceed \$ 1m
- (ii) a senior security, face value \$ 1m that bears losses after the first \$ 1m

Therefore the senior security suffers only if both mortgages default

- If mortgage defaults occur independently (that is, if they are uncorrelated) the senior tranche defaults only 1% of the time, and therefore can be rated AAA
- If correlation was 1, the senior security would default as often as the junior, that is 10% of the time (no benefit from diversification)



pool them.



Collateralized Debt Obligations (CDO)

The magic of combining diversification and “tranching” of the liabilities:

The **Collateralized Debt Obligation** (commonly known as CDO)

- **The CDO** (other acronyms include CMO – collateralized mortgage obligations -, CLO – collateralized loan obligation and CBO – collateralized bond obligation) **divides the ABS in tranches (or slices), and creates securities of different seniority and rating, with different maturity and credit risk characteristics**
- Put a sufficient number of subprime mortgages (or other risky loans) together from different parts of the country and from different originators (in the hope of achieving low correlations), issue different tranches of securities against them, and it is indeed possible to transform a substantial amount of risky loans in AAA securities (provided correlation between loan defaults is assumed low enough)
- The simplest CDO has three tranches: subordinated/equity, mezzanine and senior
 - The holders of the equity tranche get the highest return but also take on the greatest risk: if any borrower defaults, the holder of the equity tranche sees losses before anyone else
 - The holders of the mezzanine tranche carry less risk (and consequently got less return), but its purchasers would still suffer if a large percentage of loans in the underlying pool defaulted
 - The holders of the senior tranche are the most secure (and receive the lowest rate of return), since they get paid first and sustain losses last. These tranches have the highest credit rating
- **Each tranche receives its own credit rating, reflecting both the credit quality of the underlying collateral as well as how much protection a given tranche is afforded by tranches that are subordinate to it**

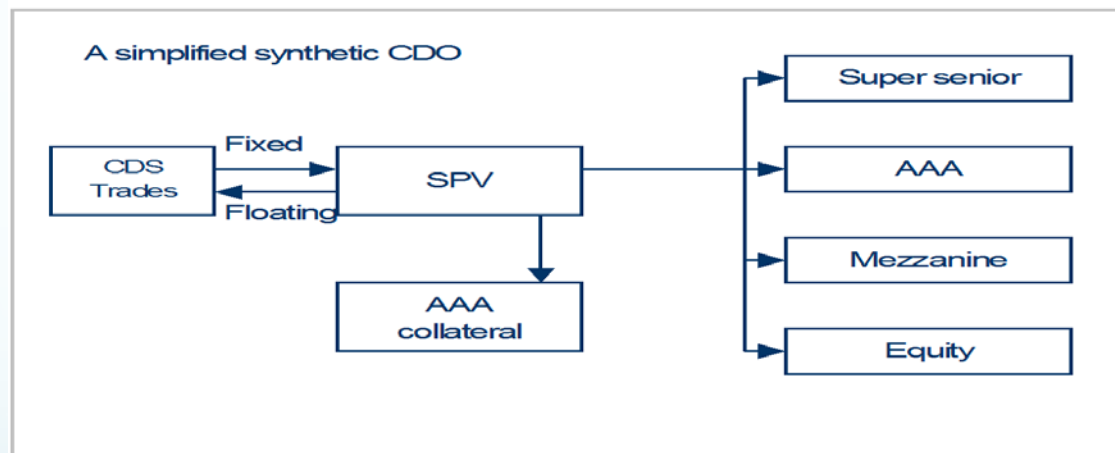
Creating a Collateralized Debt Obligation (CDO)

- A **sponsoring organization** (banks, investment banks, asset managers) **sets up a “Special Purpose Vehicle” (SPV) to hold collateral and issue securities** [expenses associated with running the SPV are subtracted from the cash flow to investors]
- A CDO can be static or managed:
 - In a static CDO collateral is fixed throughout the life of the CDO, therefore investors can assess the various tranches of the CDO with full knowledge of the underlyings
 - In a managed CDO a portfolio manager (IM) is appointed to actively manage the collateral of the CDO. This adds IM risk (the risk of poor decisions by the IM) as well as moral hazard risk. It also increases the costs of the CDO, because of IM's fees
- A CDO can be structured as a cash-flow or as a market-value deal:
 - In a cash-flow CDO cash flow from collateral are used to pay principal and interest to investors, according to seniority of the tranches
 - In a market-value deal, principal and interest payments to investors come from both collateral cash-flow as well as sales of collateral. Payments are not contingent on the adequacy of the collateral cash-flow but rather the adequacy of its market value
- The issuance of a CDO can be motivated by balance-sheet reasons or by arbitrage reasons:
 - In a balance sheet CDO the sponsoring organization wants to remove loans or debt from its balance sheet
 - An arbitrage CDO is motivated by the opportunity to make a profit by repackaging collateral into tranches that sell for a higher price than the underlying. Because a tranche's credit rating largely determines its price, this leads to “credit rating shopping”

From CDO to CDO³ and Synthetic CDO

The level of complexity achievable through securitization is apparently unlimited:

- Pooling the equity tranches of a number of CDOs we could build a **CDO²**, turning a sizable amount of highly risky investments in AAA rated paper
- Even the equity tranches of CDO² were sometimes pooled to build **CDO³**!
- When the underlying assets were in short supply, investment banks pooled CDS (credit default swaps) on those loans/bonds/ABS/CDO to mimic the underlyings of CDO and called these products “**Synthetic CDO**” [a synthetic CDO holds high quality or cash collateral, with little or no default risk, and gets credit risk exposure through CDS]



- Banks claim that synthetic CDOs provide a form of securitization that might make a bank want to retain ownership of the underlying debt while achieving capital relief through CDS. In retrospect, the motivation for some investment banks appears to have been to sell short CDOs. A bank that structured a synthetic arbitrage CDO and sold it to clients held no offsetting collateral. The bank was essentially betting against the very instrument it was assembling and promoting to its clients

Evaluating a CDO

A BBB ABS, constructed by bundling together a bunch of high risk loans (Alt-A or “sub-prime” mortgages or “high yield”/below investment grade loans/bonds) can be sliced into several tranches with different “seniority” (i.e credit protection) and the senior tranche, often accounting for approximately 80% of the underlying assets, would receive a AAA rating

- “Structuring” transforms “toxic waste” in gold-plated, AAA securities purchased by the most conservative investors around the world
- In 2007, roughly 60% of all ABS-backed securities were rated AAA, vs typically less than 1% of all corporate bonds

The soundness of a CDO depends on the assumptions about likelihood of defaults on the loans pooled in the ABS and especially about the correlations of such defaults

- It is very hard for a final investor (even a professional investor) to properly value a CDO, especially a “complex” CDO
 - For a “simple” CMO the investor would have to analyse each and every individual mortgage in the MBS, evaluate the risk of default and estimate the correlation across all mortgages
 - To increase diversification, often CMO pool together a number of MBS, which makes this computation even more difficult
 - “Complex” CDO, like CDO² or CDO³ or Synthetic CDO are so fiendishly complicated and unique that it is difficult, if not impossible, to find appropriate markets prices. Financial firms resorted to mathematical models to value them, but too often these models were flawed, since they relied on optimistic assumptions that minimized risk

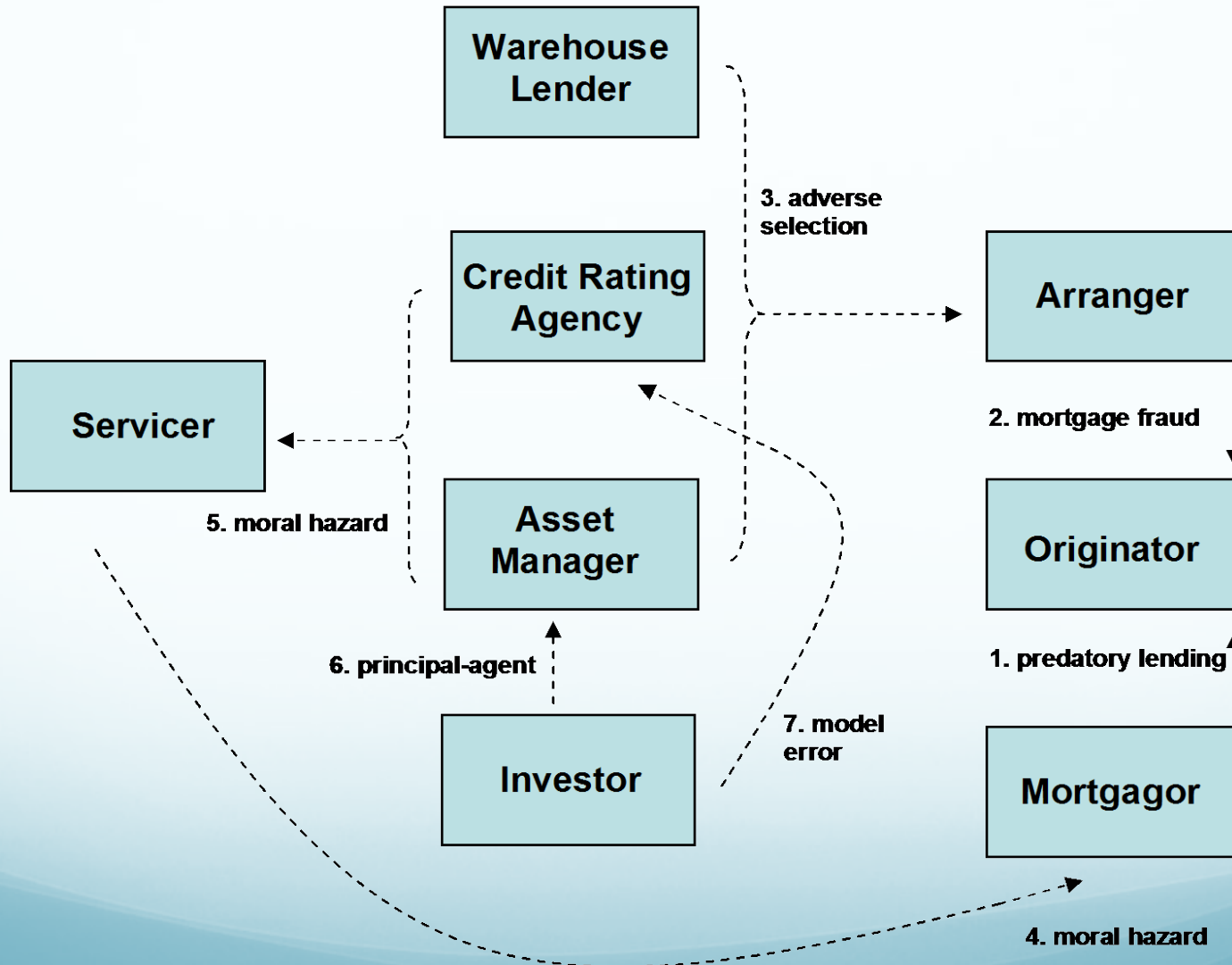
The role of the Rating Agencies

- **Investors outsourced the analysis and valuation of these complex instrument to the rating agencies**, who were ridden by **conflicts of interest** (intrinsic in their business models, since they are paid by the issuers of the securities) but also had a difficult time in properly valuing these securities, due to lack of historical data
- Since ABS structures represent claims on cash flows from a *portfolio* of underlying assets, **the rating of a structured credit product must take into account systematic risk**. It is correlated losses which matter especially for the more senior (higher rated) tranches, and loss correlation arises through dependence on shared or common (or systematic) risk factors. For ABS deals which have a large number of underlying assets, for instance MBS, the portfolio is large enough such that all idiosyncratic risk is diversified away leaving only systematic exposure to the risk factors particular to that product class (here, mortgages).
- Therefore, unlike corporate credit ratings, ABS ratings should rely heavily on a forecast of economic conditions and require a long history of data, often not available to rating agencies and investors alike
- Credit ratings have a long history of playing a role in the regulatory process going back to the 1930s: in the U.S. Asset managers such as pension funds and insurers often have strict asset allocation guidelines which are ratings driven, such as, for instance, a ceiling on the amount that can be invested in speculative grade debt
- Notwithstanding all their drawbacks, **with the introduction of the Basel II standards, credit ratings have entered bank capital regulation**

The conflicts of interest in Securitization

- The soundness of a securitized product depends on the behaviour of several participants in the securitization value chain:
 - The borrower, interested to get the loan
 - The mortgage broker, interested to earn a fee
 - The appraiser, interested to earn a fee
 - The mortgage lender, interested to securitize the loan, offload it from its balance sheet and earn a fee
 - The investment bank, interested to earn a fee
 - The rating agencies, interested to earn a fee
 - The institutional investors (mutual funds, pension funds, sovereign wealth funds), looking for “extra yield” (called “alpha”) to keep their clients and keep earning a fee
 - The final investor, who trusted all the participants in the securitization chain to do a proper due diligence and invest on based on the “prudent man principle”
- This is a **multiple principal-agent problem**, fraught with **moral hazard and adverse selection** issues, where **incentives at each stage where not aligned with the interests of the final investor**

Key Players and Frictions in Subprime Mortgage Credit Securitization



The funding of securitized assets

If banks used securitization to “originate to distribute” loans, why before the crisis were they holding (directly on their books or indirectly through conduits) so much of this securitized debt?

Two main factors behind banks' demand for securitized products:

- **Securitized debt was used as collateral to attract repo funding, and through this to boost banks' leverage and returns.** Banks already retained most of the equity tranche of securitizations (either directly or by providing protection to vehicles holding assets), as cash pool investors did not want to assume that risk. But in addition, banks also accumulated, on their balance sheets or in affiliated investment vehicles, a significant share of the long-term AAA claims produced by securitization. Banks used these claims in part as collateral for repo funding. By pledging high-quality securitized debt, banks could raise wholesale funds (and increase leverage) more cheaply and in larger volumes than if they relied on traditional liabilities, such as deposits and unsecured funding
- **Another reason some banks held on to the safer securitization tranches was regulatory arbitrage.** Regulations require banks to maintain capital against loans on their balance sheets. Securitization as practiced offered two ways to reduce such capital charges:
 1. hold securitized debt through affiliated investment vehicles (e.g., SIVs) that were funded in short-term money markets and relied on both *implicit* (thus not requiring capital charges) and explicit credit and liquidity support from banks.
 2. Given how ratings came about, banks could sometimes reduce capital charges simply by holding on their own balance sheet securitized but higher-rated claims instead of the same non-securitized debt.

The crisis of Securitization

The factors that led to the crisis of securitized products are:

- **Deteriorating loan underwriting standards** that undermined underlying asset quality (sometimes linked to fraudulent behaviour)
- **Lack of incentives to conduct the oversight and due diligence** necessary to confirm that the underlying loans would be paid off
- **Complexity of products, lack of transparency and standardization, embedded leverage** (often misunderstood by investors)
- **Overreliance on rating agencies** (sometimes imposed by regulators), which did not properly represent risk to investors
- **Misjudgement of liquidity risk and maturity mismatch**, especially since a relevant share of these securitized products were held by leveraged investors and funded at short term maturity [SIV (Special Investment Vehicles issuing short term debt) or through ABCP (Asset-Backed Commercial Paper)]

When the crisis came

- Investors could not penetrate the portfolios far enough to value the securities and, because of **asymmetric information** (at each step of the chain one side knew significantly more than the other about the underlying structure of the securities involved), it became a typical “**market for ‘lemons’**” case:
 - prices of all securitized debt collapsed with no relationship to underlying values or expected cash flows and the market for securitizations simply disappeared
- Some of the assets underlying a “plain, vanilla” ABS (for instance, the mortgages underlying an MBS) defaulted:
 - junior and mezzanine tranches of the ABS suffered, but normally the cashflows of the most senior tranches were not affected
 - in many cases even the most senior tranches of the CDOs (AAA rated) became worthless, because they were constructed “slicing and dicing” the junior and mezzanine tranches that all simultaneously defaulted
 - AAA-rated tranches of CDO are generally structured to withstand idiosyncratic risk, but by their nature are vulnerable to systematic risk and particularly tail risk. Consequently, the performance of highly-rated structured securities exhibits higher correlation in an extreme environment than one would predict from observed behaviour in a more benign environment

For this reason **ca. US\$ 600 billion of mortgage defaults triggered several trillions of losses on securitized credit**: an inverted pyramid of securities had been built on the “same” underlying asset!

The importance of Securitization

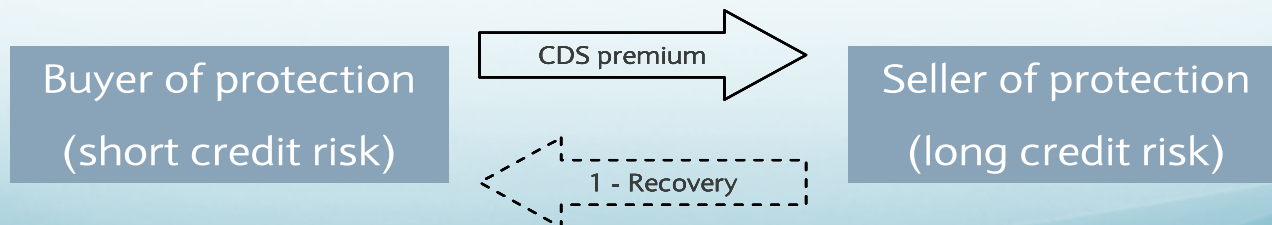
- The securitization and structured credit markets are anyway critically important to the global capital markets and thereby also to the growth of world economies
- **Securitization has offered significant benefits to consumers, borrowers, investors and the economy, lowering the cost of credit and increasing its availability, by freeing bank capital that could be lent back into the economies to the benefit of consumer and businesses alike**
- To return the securitization market to a normal level of functionality the industry needs to:
 - Enhance transparency with regard to underwriting and origination practices
 - Improve disclosure of information on underlying assets
 - Improve confidence in valuations, methodologies and assumptions, adopting standardized methods as much as possible
 - Restore credibility of rating agencies and return final responsibility of evaluation to investors by redesigning relevant accounting and capital treatment rules

Finally it is key to ensure that:

- There will be alignment of incentives along the securitization and structured credit value chain (“skin in the game” by each player)
- Overly complex products are banned (or restricted to non-levered investors)

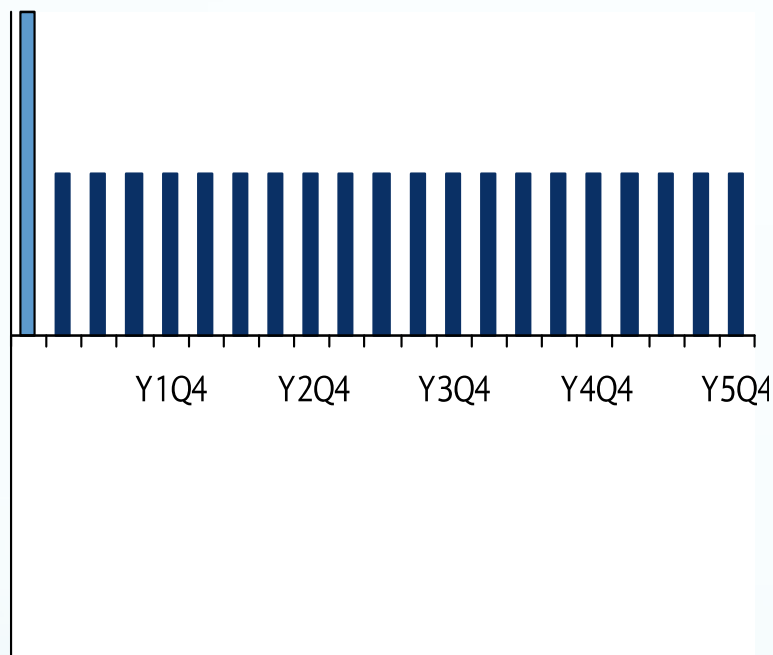
Credit Default Swap (CDS)

- A CDS is a credit derivative in which two counterparties agree to exchange a regular, fixed coupon for a one-off payment contingent on the occurrence of a credit event of a specified reference entity or obligation
- A CDS can be viewed akin to **an insurance contract** where the buyer of protection pays a premium to the seller of protection in order to receive protection against a credit event, as illustrated in the figure below. As such, the trade comprises a premium leg (the fixed-coupon stream) and a protection leg (the one-off, contingent payment).



CDS Cash Flows

No credit event occurs within 5 years



A credit event occurs in the 2nd year

ayment by
protection buyer
■ Coupon payments by
protection buyer

Fig 2

- Fig 1
- Figure 1 depicts example cash flows in the cases where a credit event does not occur
- Figure 2 depicts the cash flows in the cases where a credit event does occur before the contract maturity.

The termination of a CDS

- The contract terminates on a predetermined, fixed maturity date, unless it is triggered prior to that date by one of the counterparties.
- Typically, either party may trigger the contract upon the occurrence of a **Credit Event** (CE)
- What is a **CE must be clearly defined**. This is why ISDA (International Securities Dealers' Association) produces standard documentation for these transactions. It helps avoid confusion: when the counterparties enter the trade they must decide what credit events they wish to include
- CE that are frequently used are bankruptcy, failure to pay and restructuring (all of these have specific definitions). It is also normal to have reference to publicly available information in order to demonstrate that a CE has occurred
- In the occurrence of a CE:
 - the premium payments terminate and the buyer of protection makes an accrued interest payment to the seller to pay for the protection received since the previous coupon date;and
 - the protection buyer may sell any valid deliverable obligation to the protection seller for a price of par and for the notional of the contract. Valid deliverable obligations depend upon the type of and timing of the credit event.

The value of the delivered security at the time of delivery is known as the Recovery Value or Recovery Rate

The economic transfer is therefore Par minus Recovery

Key issues with CDS

- A CDS resembles insurance: it allows a buyer to purchase protection in the event that a debtor defaults on his obligations
- Unlike the purchaser of an insurance contract, **the buyer of a CDS does not have to own the “underlying” asset**, i.e. the asset subject to the bet
- **Therefore the buyer of a “naked” CDS has all the interest to make the default happen** [it is like buying homeowners' insurance on your neighbour's house and then trying to set fire to it]
- **CDS are traded OTC**, which brings
 - lack of transparency
 - counterparty risks
 - ◆ the two main causes of loss of investor confidence during the recent crisis
 - ◆ raising the risks of an institution becoming “too interconnected to fail” (see AIG)

New Regulations for OTC Derivatives

- Following the financial crisis, the leaders of G20 nations agreed to a series of measures to **increase the transparency of the over-the-counter (OTC) derivatives market and to reduce systemic risk**. These reforms bring sweeping changes for all financial institutions.
- They fundamentally alter the structure of the OTC derivatives markets, significantly impacting the business models, profitability, legal entity structures, operations, data and technology of financial institutions' derivatives businesses.
- Global regulatory reform initiatives are underway to implement these measures – e.g., the US Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank), the Markets in Financial Instruments Directive/Regulation (MiFID II/ MiFIR) and the European Market Infrastructure Regulation (EMIR)
- Ideally, all derivatives should be listed on “**Central Exchanges**”, so as to make trading, clearing and settlement straightforward and transparent. Since in this case the counterparty to all trades would be the central clearing counterparty (CCP), counterparty risk could be greatly reduced through adequate collateralization (posting adequate initial and maintenance margins)
- Unfortunately not all derivatives can be standardized and traded on such a “Central Exchange”: to mitigate the inherent opacity of OTC derivatives it remains essential that real-time reporting of data and pricing information is guaranteed by an entity (called **Trade Repository** or **Swap Data Repository**) that centrally collects and maintains the records of all OTC derivatives transactions
- In the US, under the Dodd-Frank Act, swaps that are accepted for clearing by at least one central counterparty (CCP) will become required to clear. This means instead of an OTC agreement between two parties, the CCP will step in and buy the swap from the seller and then sell it to the buyer. In doing so, the CCP will take on the responsibility for guaranteeing the contract. Because the CCP will be required to hold large amounts of capital and will be closely monitored, this can reduce the risk that one counterparty default will trigger a chain of defaults in swaps markets. These cleared swaps also will be required to be traded on an exchange or a swap execution facility (SEF) if they are made available for trading.

Suggested Readings

- NY Fed, Staff Reports: Understanding the Securitization of Subprime Mortgage Credit, 2008,
www.newyorkfed.org/research/staff_reports/sr318.pdf