Derivative Securities, Fall 2011

Lecture 1: History (Revised , Fall 2019)

Primary Sources:

-- A.J. Weber (2008): A short history of derivative securities

-- Don Chance: History of Derivatives (www.bankdersysrisk.blogspot .com)

-- Wikipedia Articles

-- Instructor's memory

-- The global derivatives market, an Introduction (Deutsche Borse Group)

Derivatives

- A *promise* between two parties in which one will deliver a payoff (in money, commodity or a good) to another in the future.

- The contract typically depends on

  -- the promisor's ability to perform

  -- the value of one or more underlying variables

Derivatives in the Antiquity

- First contracts (written on clay tablets) appeared in Mesopotamia around 2000 BC as contracts for future delivery of goods
- Played an important role in financing long-distance trade
- Example: Merchant receives six shekels of silver and, in exchange, will repay it in six months with sesame, at the going rate
- Forward agreements on commodities played a crucial role in developing long-distance trading in the Mesopotamia and the Egyptian and Roman empires

Very Old Contracts for Future Delivery

"Thirty wooden [planks?], ten of 3.5 meters each, twenty of 4 meters each, in the month Magrattum Akshak-shemi will give to Damqanum. Before six witnesses (their names are listed). The year that the golden throne of Sin of Warhum was made."

"Three kurru of barley, in the seah-measure of Shamash, the mesheque measure, in storage, Anum-pisha and Namran-sharur, the sons of Siniddianam, have received from the naditu-priestess Iltani, the King's daughter. At harvest time they will return the three gur of barley in the seah-measure of Shamash, the mesheque measure, to the storage container from which they took it. Before (two witnesses whose names are listed). Month Ulul, 19th day, year in which King Abieshuh completed the statue of Entemena as god."

Source: Weber, A.J., (2008), A Short History of Derivative Securities

Over-the-counter trading

- In the Antiquity, most contracts were private, between parties (e.g. financier/buyer and merchant/seller)
- Byzantine Roman emperors Theodosian and Justinian (~ 400 AD) developed laws which allowed contracts to be traded
- Derivatives trading began!
- Middle ages: derivatives-like contracts were used to finance the Crusades

Derivatives Markets in the Renaissance

- Shares and bills of exchange are first issued by Italian city-states and the practice expands through Europe
- Main centers: Bruges (XII-XV), Antwerp (XVI) and Amsterdam (XVII)
- Amsterdam: Emergence of cash-settled contracts. [Instead of delivering the commodity, settle the difference in cash.] These are known as contracts for difference.
- Amsterdam: first options on shares are traded (puts and calls)
- Short-selling is also introduced in Amsterdam in the XVII

The Tulipmania

- Tulips were traded in Amsterdam for future delivery using CFDs and options
- CFDs and options were not enforceable in courts. Instead they traded over-the-counter based on the reputation of counterparties
- The tulip market collapses in 1637, leading to the first crash officially recorded in history
- Since derivatives were private arrangements, this did not lead to an economic recession in the Netherlands. It just ruined the longs.

Great Britain in the XVII-XVIII

- British debt emerges to fund various wars
- 1690s: creation of English financial institutions

  -- Treasury (*Exequer*) issues bills i.e. government debt

  -- The *Royal Exchange* trades stocks, bills of exchange and Exequer bills

- Creation of the *Bank of England*
- *South Sea Company* created in 1711, as a state funded monopoly on trade with Africa and the Americas
- Stocks and options (puts and calls) trade on SSC.
- Market collapses in 1720 – known as the *South Sea Bubble*

Aftermath of South Sea Bubble & Derivatives

- 1734: Government issues the *Sir John Bernard's Act* which makes CFDs and options on stocks unenforceable in courts
- OTC trading in options on stocks continues based on reputation
- *Exchange Alley* and surrounding coffee-shops become the preferred trading venues for derivatives
- Short-selling, which was not allowed in the Royal Exchange, was carried out in Exchange Alley
- Commodity-based contracts for future delivery continue trading at the Royal Exchange and are enforceable according to British law

John Law & France in the XVIII Century

- *Compagnie du Missisipi* (French colonial interests in America)
- Creation of the *Banque Royale* to finance the lavish Louis XV court
- *Compagnie des Indes*, merges CM & BR, Founded by John Law (1671-1729)
- Shares in Compagnie des Indes rose 20-fold and then collapsed in 1720
- Trading became restricted to 20 dealers in the Paris Bourse
- Contracts for future delivery and short-sale were banned
- Derivatives trade privately in restaurants and cafes near the exchange

Derivatives in the IXX Century

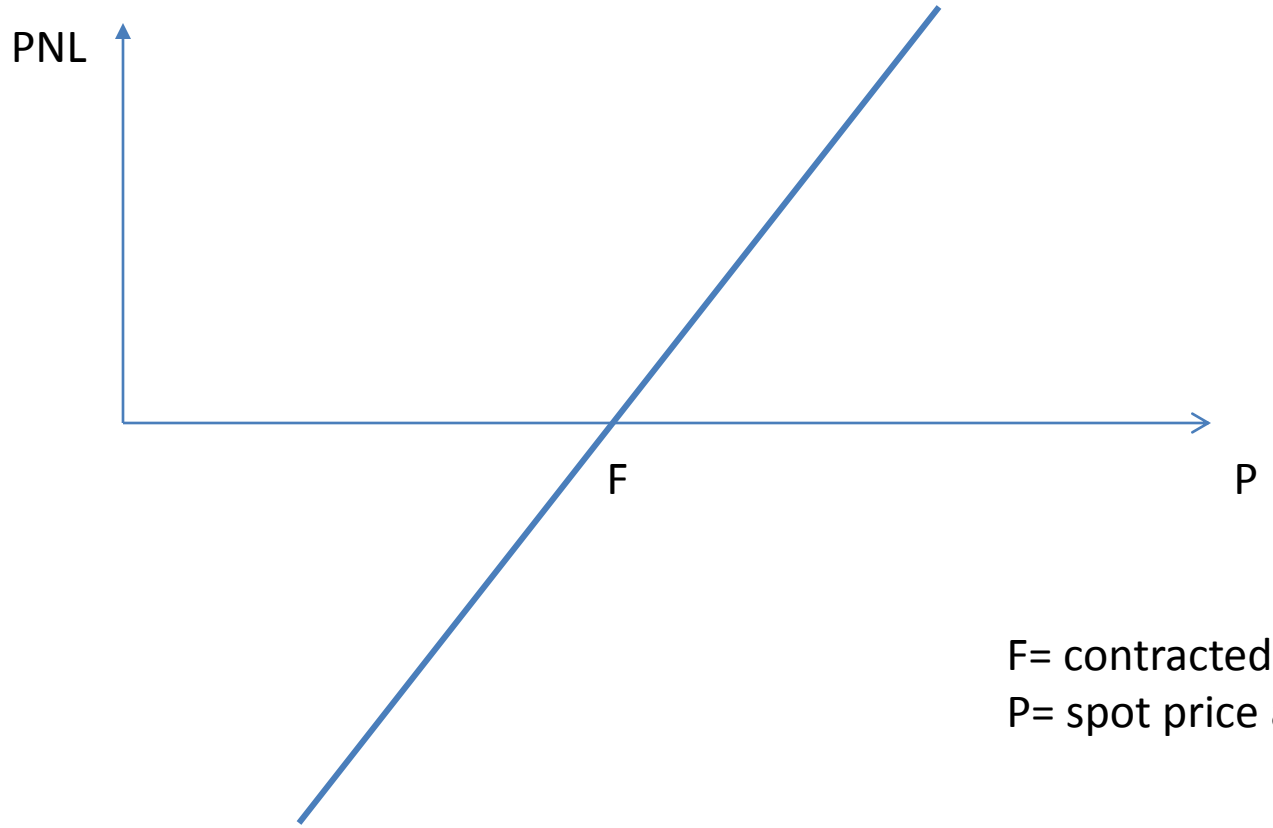
- 1820: Banque de France was established by Napoleon
- Trading of Government bonds and stocks was done at the Bourse by authorized dealers
- Trading of contracts for forward delivery of GBs and options was illegal, but done outside the exchange in restaurants and cafes, such as *Café Tortoni*
- 1853: Proudhon publishes the *Manuel du Speculateur a la Bourse*, the first book on options and forwards
- 1850s: Zurich opens its stock exchange, and derivatives trading extends to Central Europe
- Several books and manuals are published at the end of the 1800/early 1900 to popularize derivatives trading in the continent

Main Characteristics of Derivatives: forward transactions and optionality

- **Forward:** Contracts specify that cash-flows / deliveries/ payments should take place on one or several future dates.

- **Optionality:** Some contracts may specify that cash-flows / deliveries/ payments may or may not take place, depending on future events (price level/ default of entity/index value)

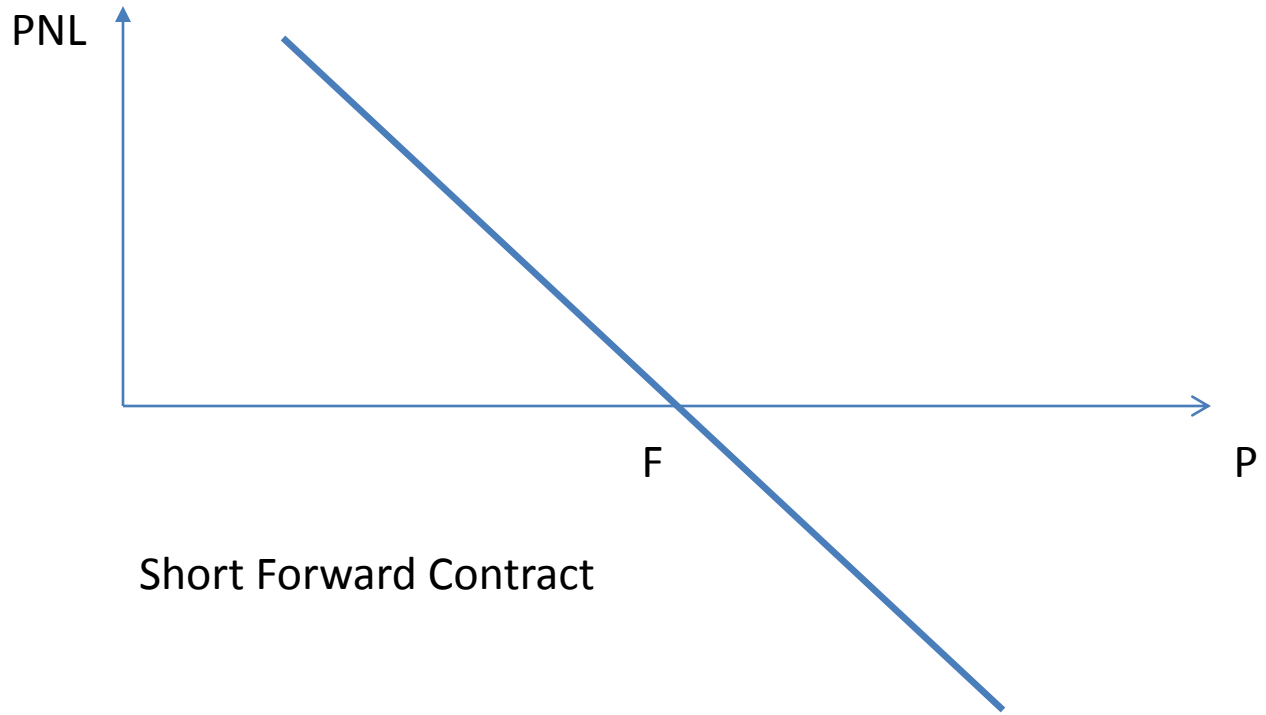
Profit Diagrams



F= contracted forward px
P= spot price at expiration

Long Forward Contract

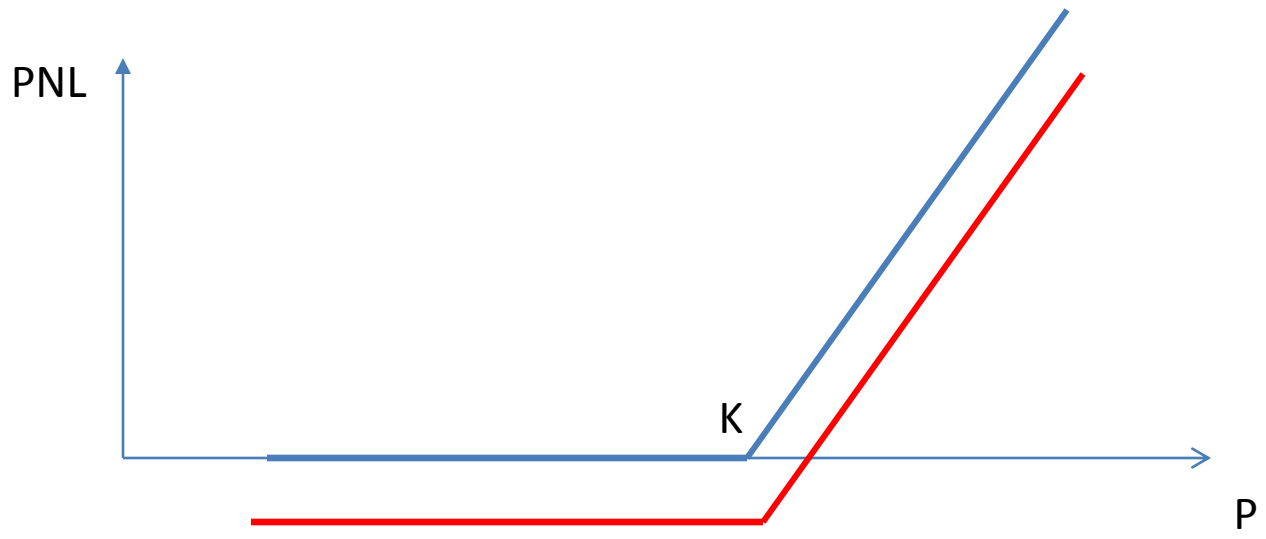
Profit Diagrams



Short Forward Contract

The diagram shows that short-selling is
equivalent to a short cash-settled forward on a stock (almost)

Profit Diagram: Long Call Option

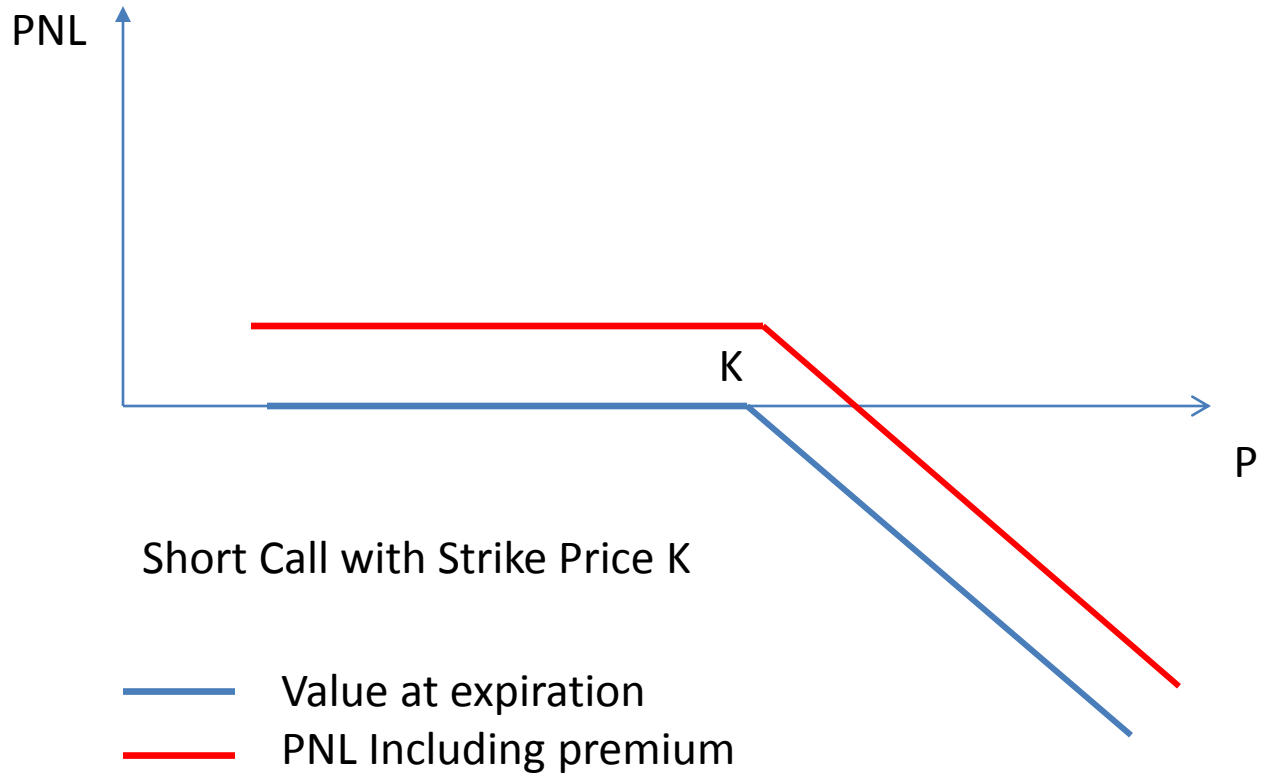


K= Strike price

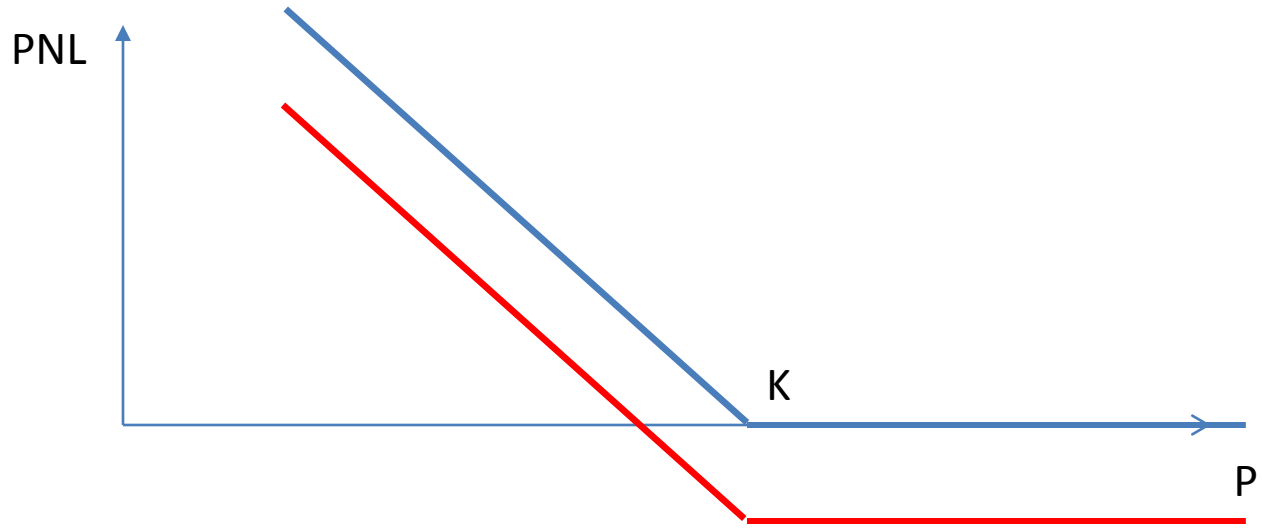
Value at expiration

PNL Including premium

Short Call Option



Long Put Option

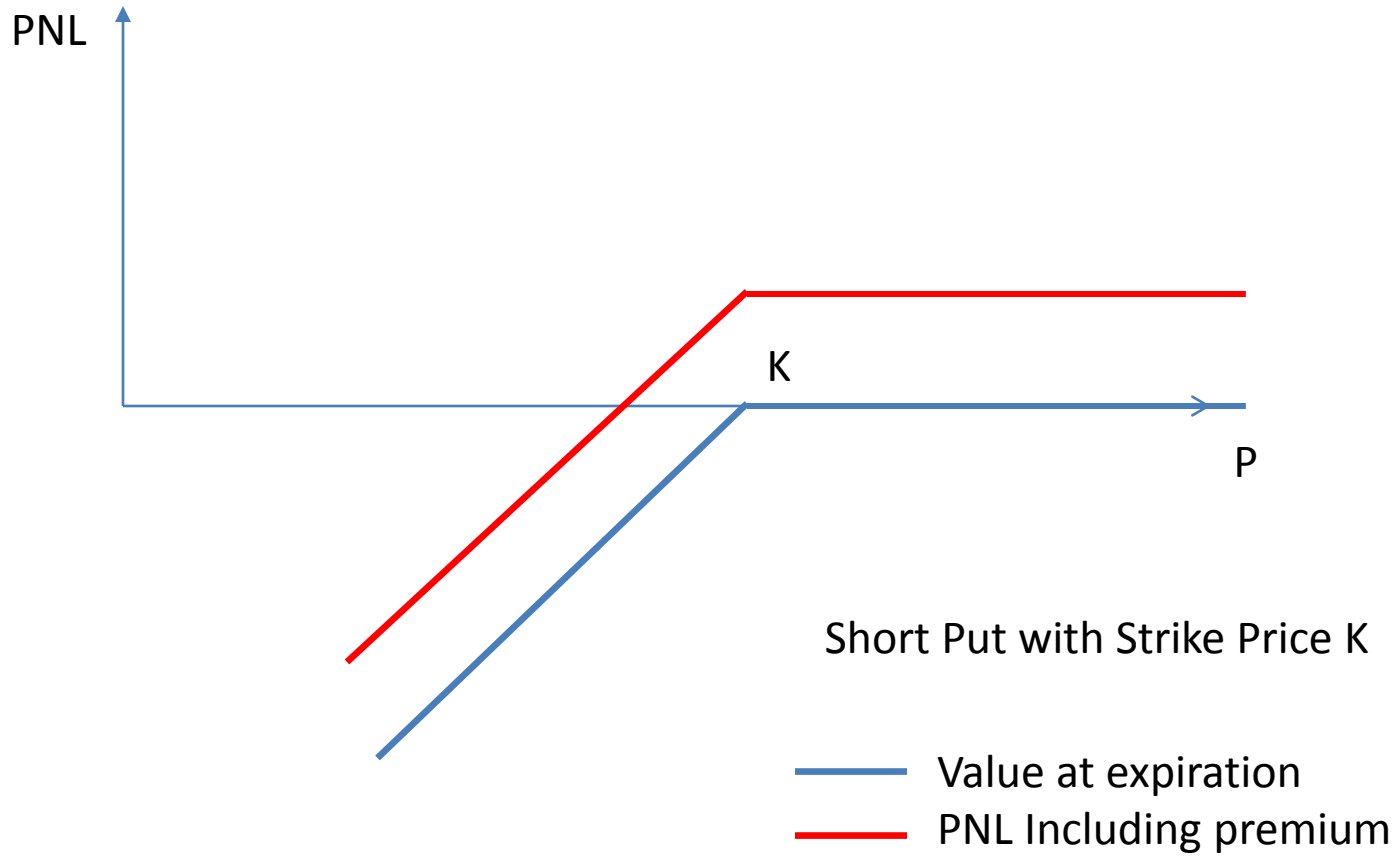


Long Put with Strike Price K

Value at expiration

PNL Including premium

Short Put Option



Early history of derivative markets in the US

- 1848: Creation of the Chicago Board of Trade. Creation of the ``To-Arrive'' contract for grains
- 1865: Standardization of forward contracts
- 1874: Creation of the Chicago Produce Exchange
- 1919: CPE becomes the Chicago Mercantile Exchange
- 1925: First futures clearinghouse is formed
- 1922: Grains Futures Act
- 1936: Options on futures are banned
- 1955: Corn Products Refining Company decision by the Supreme Court

Modern brief history of derivatives in the US

- 1972: Creation of the International Monetary Market (IMM) for trading Currency futures
- 1975: CBOT creates first interest rate futures contract
- 1975:CBOT Treasury bill futures contract (& options)
- 1977: CBOT T-Bond futures contract (& Options)
- 1982: Index Futures on S&P 500 launched by the CME
- 1973: Chicago Board of Options Exchange (CBOE) is created for trading equity options and equity index options
- 1980s: Development of interest rate swaps as OTC trading between dealers and with corporates

Mortgage Derivatives

- 1934: National Housing Act. Creation of the FHA.
  -- Creation of the fixed-rate mortgage
- 1938: FNMA created to buy FHA mortgages and promote housing
- 1968: Creation of GNMA to buy FHA mortgages
- 1970: FHLMC (Freddie Mac)
- 1968: GNMA guarantees first mortgage pass-through (MBS)
- 1977: First private-label mortgages issued by Bank of America
- 1983: Freddie Mac issues first Collateralized Mortgage Obligation
- 1984: Secondary Mortgage Enhancement Act

Interest rate derivatives in the 1990's and Beyond

- Development of LIBOR IR swaps and swap derivatives
- Caps and Floors (series of options on short-term rates)
- Swaptions (options on swaps)
- Swaptions are natural instruments for hedging MBS and CMOs
- OTC market, in which dealers trade with dealers and with ``end users'' (banks, mortgage originators)
- Mid 1990's: credit derivatives begin trading OTC
- Credit-default swaps: synthetic bond insurance (mostly for corporates)
- Late 1990's Collateralized Debt Obligations (JPM first large issuer)

The 2000's

- Explosive growth of markets on credit derivatives fueled by low interest rates

- 2007: Subprime Crisis
  -- non-performance of mortgages, esp. on the sub-prime sector
  -- failure of several CDOs and Special Purpose Vehicles
  -- bankruptcy of mortgage originators
  -- collapse of private label market (subprime market and Alt-A)
  -- investors withdraw completely from securitized paper

- March 2008: Bear Stearns collapse & ``purchase'' by JPM for $1/share

- September 2008: Lehman Brothers' collapse & liquidation

- September – December 2008: Credit Crunch.
  -- Collapse of the money-market and interbank lending
  -- AIG Bailout (USD 150 billion). AIG FP: major seller of CDS
  -- Nationalization of FNMA and Freddie Mac

- October 3, 2008 : Creation of Troubled Assets Relief Program (TARP) by the Bush administration to support the banking system (~ 1 trillion dollars)

Dodd-Frank Act of 2010

Mandatory central clearing of standardized OTC derivatives (swaps)

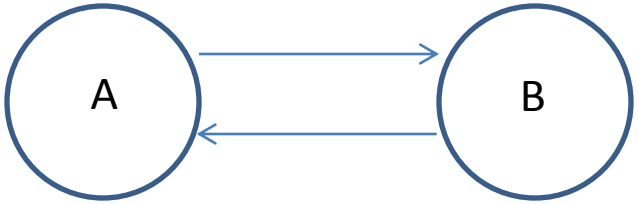
The term clearing, in relation to OTC derivatives, has sometimes been loosely used to refer to post-trade processing such as warehousing (whereby information about derivatives contracts is held centrally and certain processes such as payment instructions are automated).
In central clearing, each counterparty to a trade is substituted for a Central Clearing Counterparty (CCP). (``Novation'')

To take a simple example of how this operates in practice:

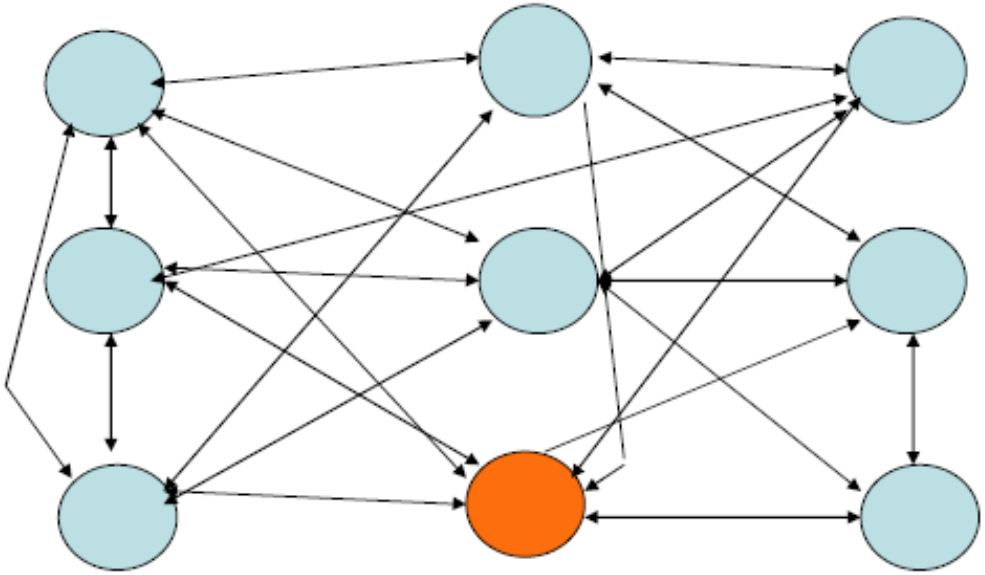
- An original `buyer' and original `seller' execute a contract.
- They agree that the contract will clear through a certain clearing system.
- When the contract is accepted for clearing by the clearing system, they are no longer counterparties to each other. Instead, the CCP becomes the buyer to the seller and the seller to the buyer

Bilateral arrangements versus Central Clearing

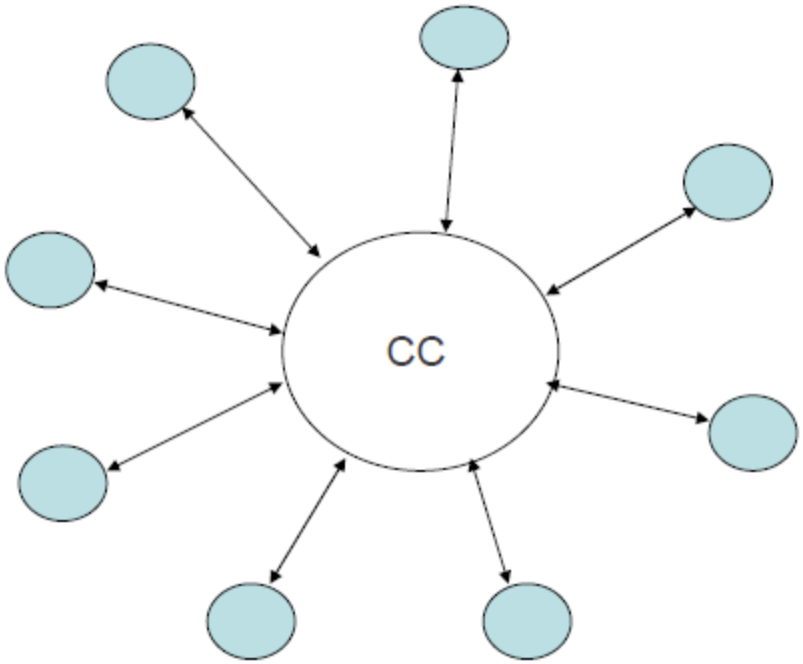
Diagram of a bilateral derivative contract



Network of derivatives exposures

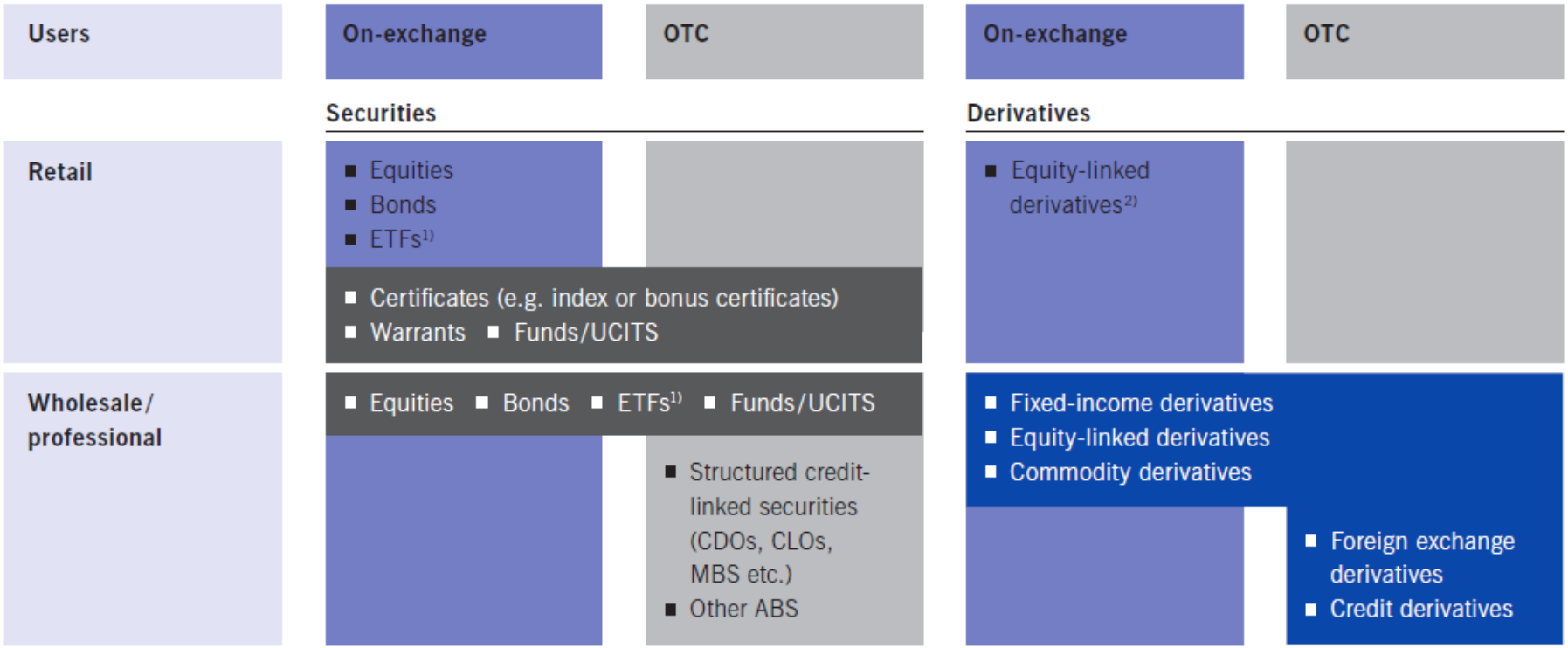


Clearinghouse acts as a counterparty to each derivatives transaction



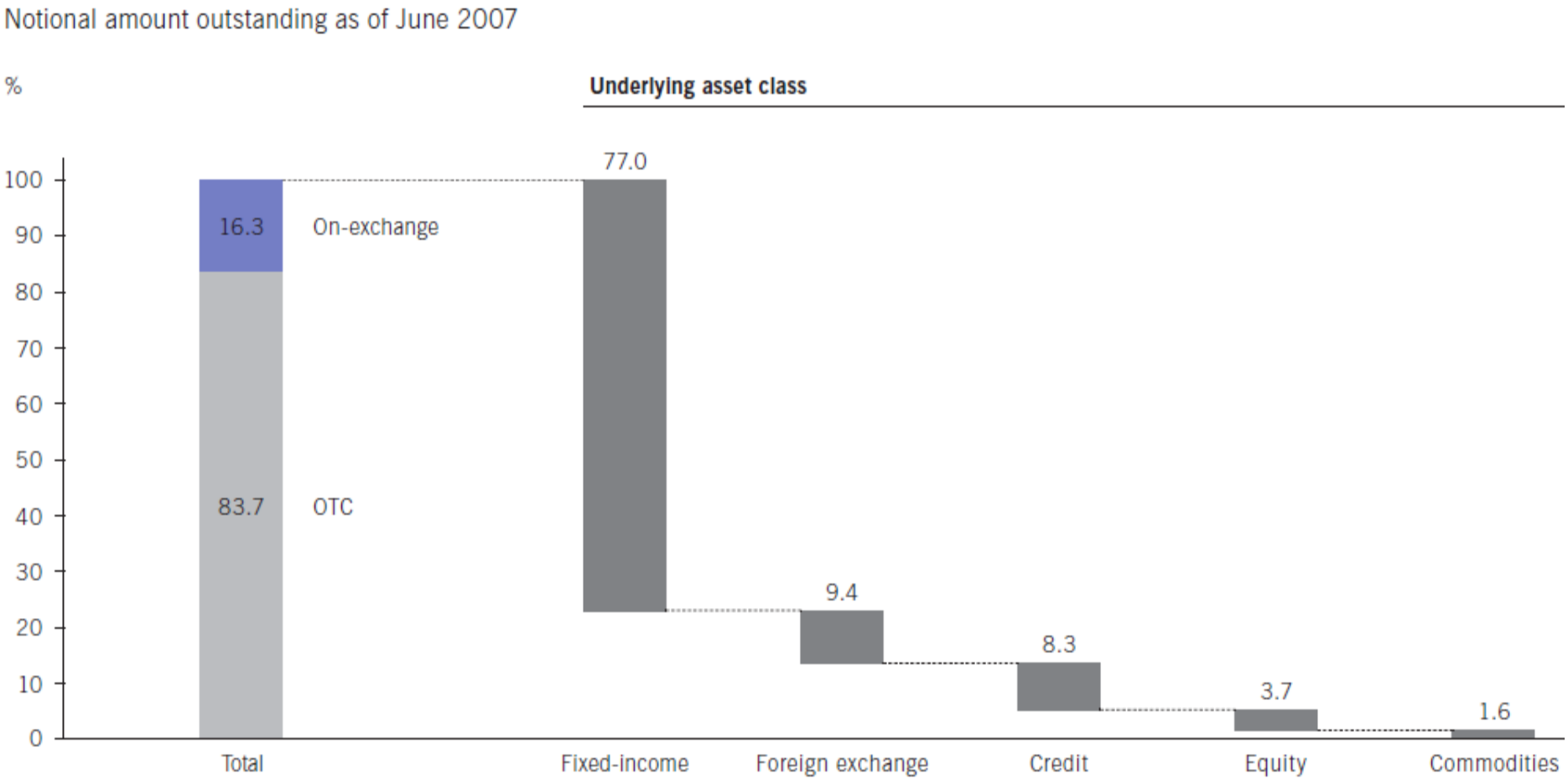
Risk is mitigated by the fact that participants must post margin with the CC

The universe of financial instruments



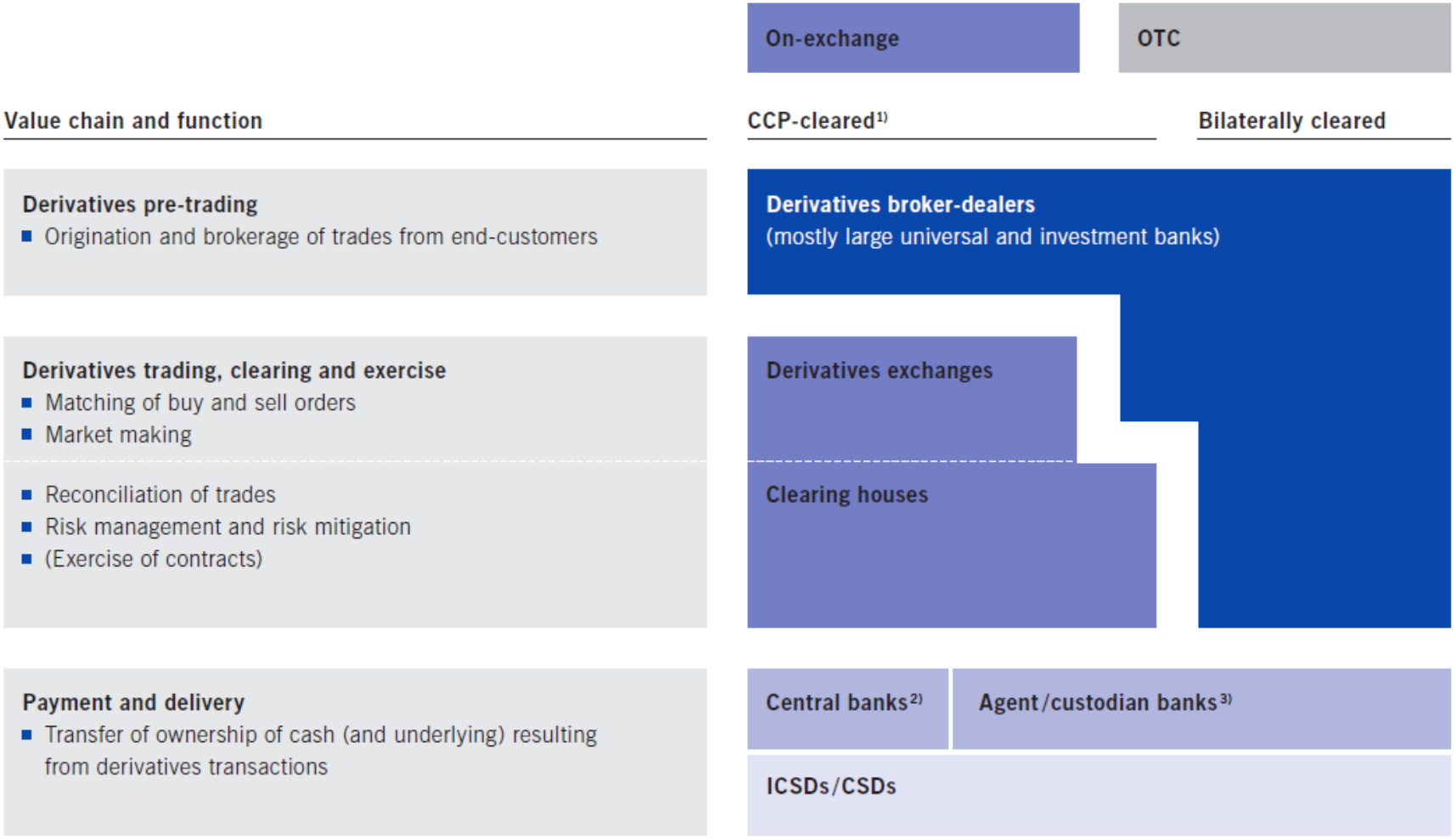
Source: The Global Derivatives Market- An introduction (Deutsche Borse Group)

Breakdown: Exchange vs. OTC

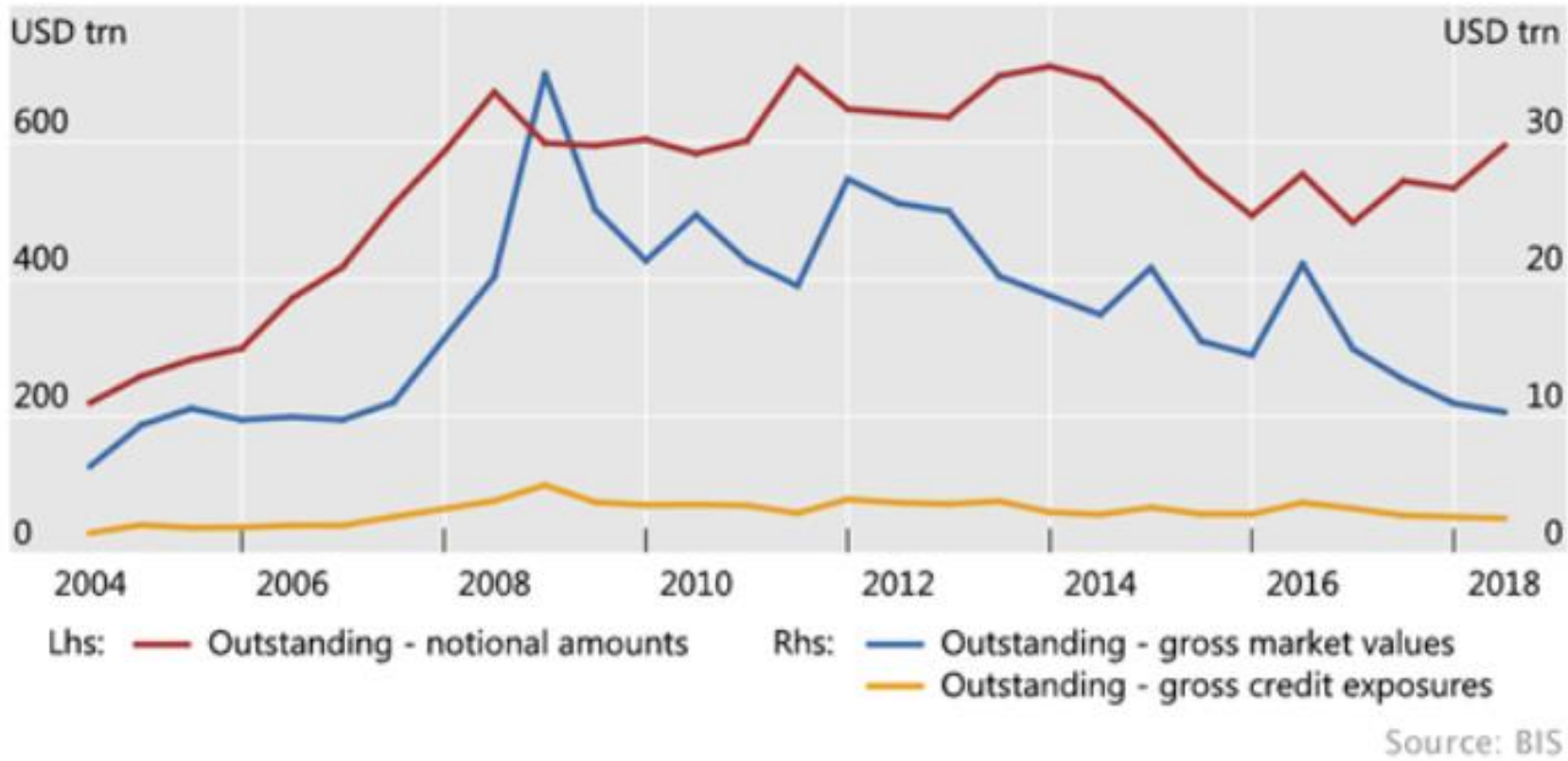


1) Exotic underlyings (e.g. weather, freight rates, economic indicators) account for less than 0.1 percent.
Source: BIS, WFE, FIA

The modern derivatives value chain



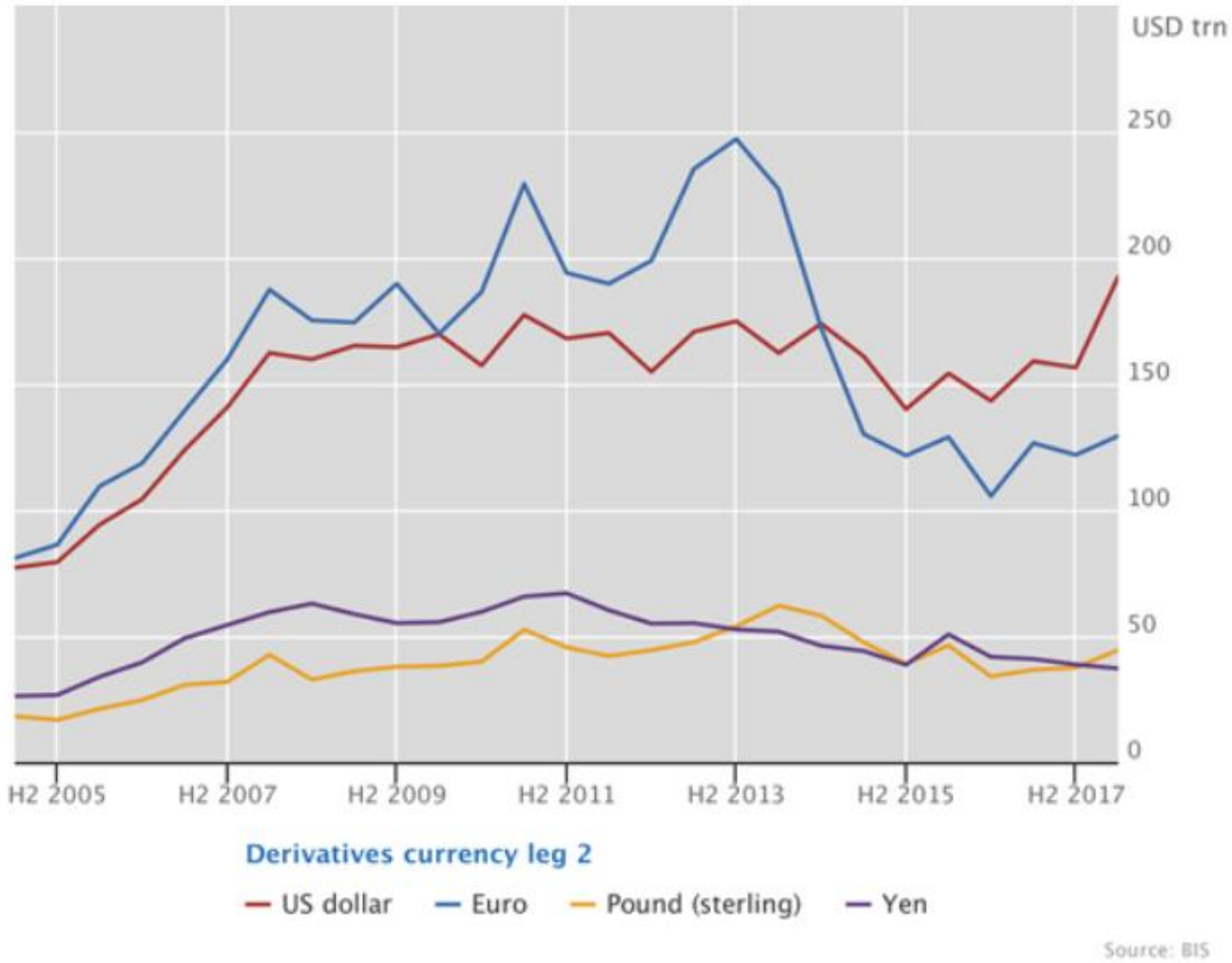
Gross market values declined despite an increase in notional amounts



Graph 1: Outstanding OTC derivatives, USD trillions (interactive graph).

Source: BIS OTC derivatives statistics (Table D5.1).

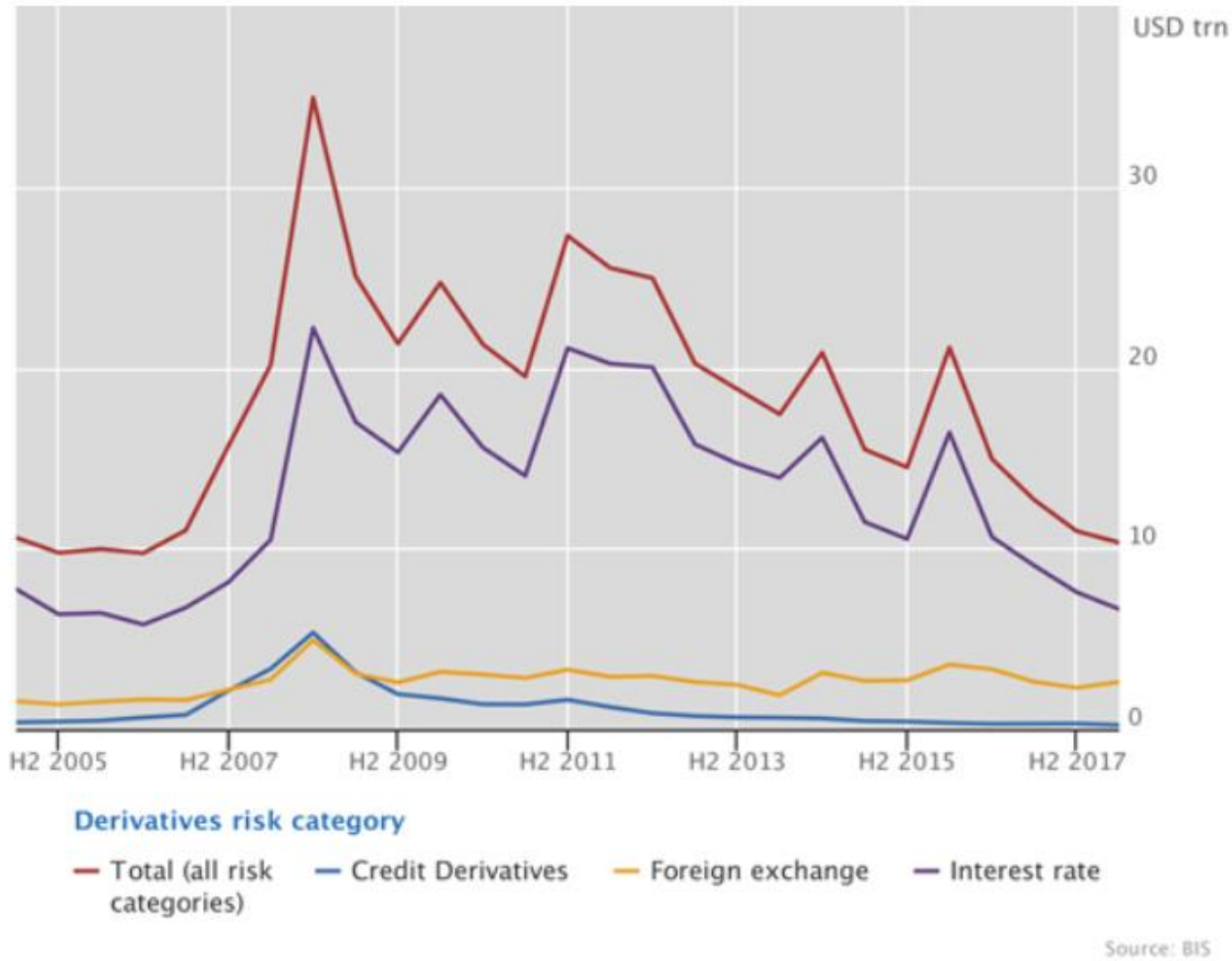
US dollar contracts drove the increase in notionals



Graph 2: Outstanding notional amounts of OTC interest rate derivatives, USD trillions (interactive graph).

Source: BIS OTC derivatives statistics (Table D7)

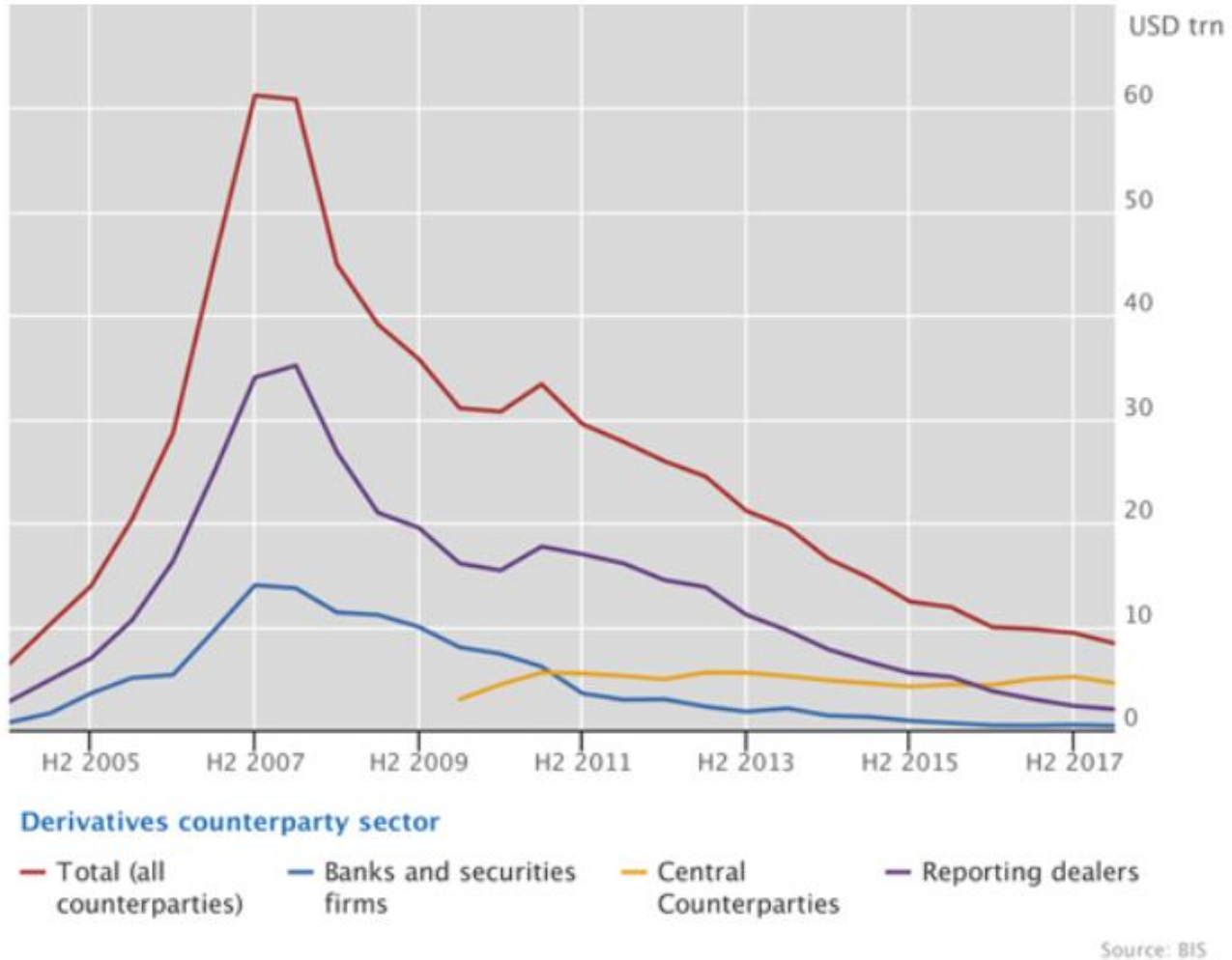
Market value of interest rate and credit derivatives declined further



Graph 3: Outstanding gross market values, trillions USD (interactive graph).

Source: BIS OTC derivatives statistics (Table D5.1).

Clearing in credit default swap markets was steady at 54%



Graph 4: Outstanding notional amounts of CDS, USD trillions (interactive graph).

Source: BIS OTC derivatives statistics (Table D10.1).