FRM Part II

Credit Risk Measurement and Management

DERIVATIVES

Learning Objectives (1/2)

After completing this reading, you should be able to:

- ✓ Compare and contrast **exchange-traded derivatives** and **over-the-counter (OTC) derivatives**, and discuss the features of their markets.
- ✓ Describe the process of **clearing** a derivative transaction.
- ✓ Identify the **participants** and describe the use of **collateralization** in the derivatives market.
- ✓ Define the **International Swaps and Derivatives Association (ISDA) Master Agreement**, the risk-mitigating features it provides, and the default events it covers.
- ✓ Describe the **features** and use of credit derivatives and discuss potential risks they may create.
- ✓ Describe **central clearing** of OTC derivatives and discuss the roles, mandate, advantages, and disadvantages of the central counterparty (CCP).

Learning Objectives (2/2)

After completing this reading, you should be able to:

- ✓ Explain the **margin requirements** for both centrally-cleared and non-centrally-cleared derivatives.
- ✓ Define **special purpose vehicles** (SPVs), **derivatives product companies** (DPCs), **monolines**, and **credit derivatives** product companies (CDPCs) and describe the **limitations** of using them as risk mitigating methods.
- ✓ Describe the **approaches** used and the challenges faced in **modeling** derivatives risk.

What are Derivatives?

Define derivatives and explain how derivative transactions create counterparty credit risk.

- Financial contracts whose **value is linked** to the performance of **underlying assets**, **indices**, or **market conditions.**

Key Characteristics

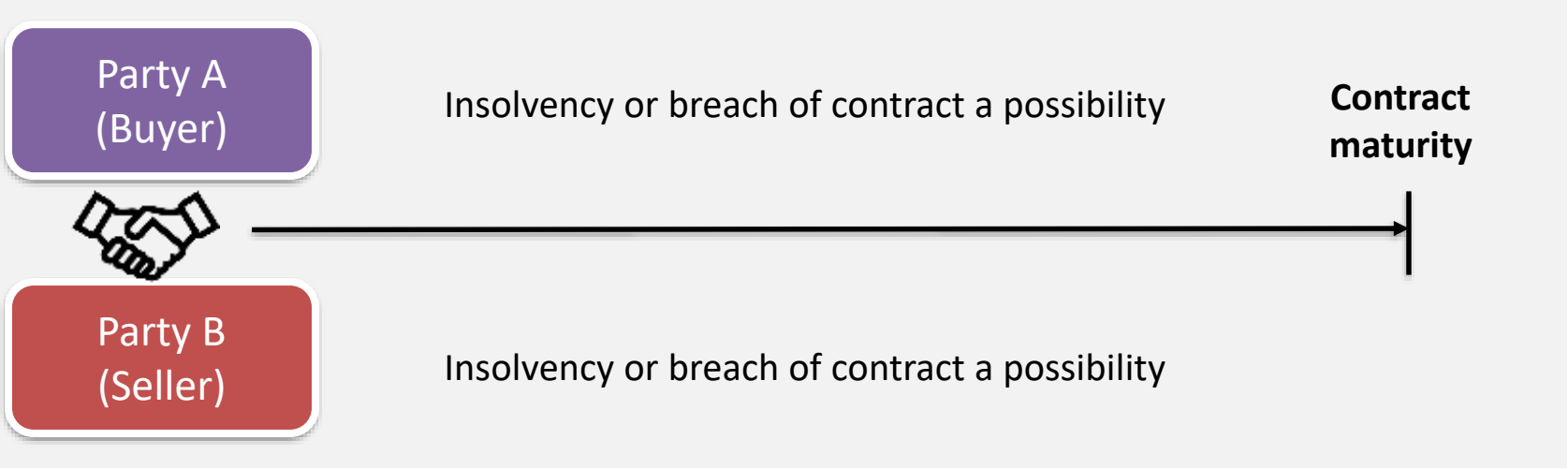
- **Hybrid risk**: Combine market and credit risk.
- **Uncertain exposure**: market conditions fluctuate all the time.
- **Dynamic risk management**: Counterparty risk managed over time via various tools.
- **Risk complexity**: Mitigating counterparty risk can introduce more risks, e.g., illiquidity.
- **Sensitivity to legal and jurisdictional issues:** Counterparty risk is sensitive to legal and jurisdictional issues.

Forwards | **Futures** | **Options** | **Swaps**

What are Derivatives?

How Derivatives Create Counterparty Risk

- Parties in a derivatives contract have **claims against each other**, evolving with underlying assets and market conditions.
- Counterparty credit risk arises from the risk of one party becoming **insolvent.**
- A party may also **breach the contract** while still solvent.



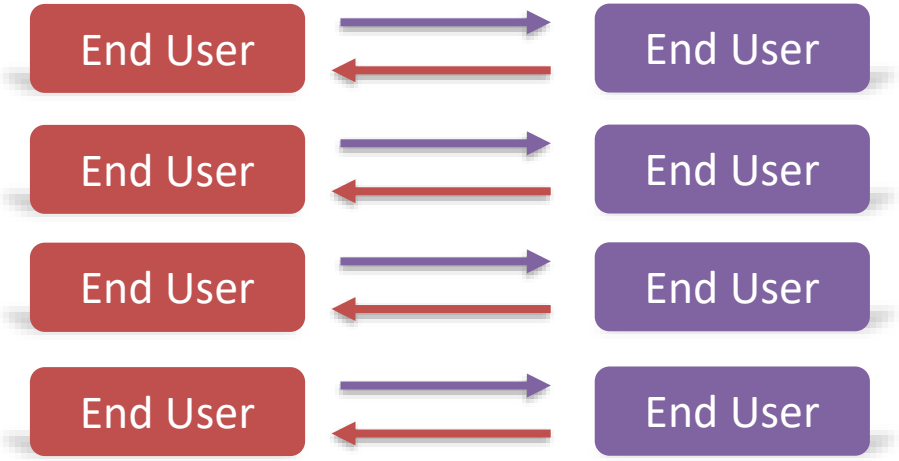
- Breach contract can manifest in several forms, from **unwillingness** to meet obligations to **delays** in executing certain requirements

Types of Derivatives

Compare and contrast exchange-traded derivatives and over-the-counter (OTC) derivatives, and discuss the features of their markets.

OTC Derivatives Markets

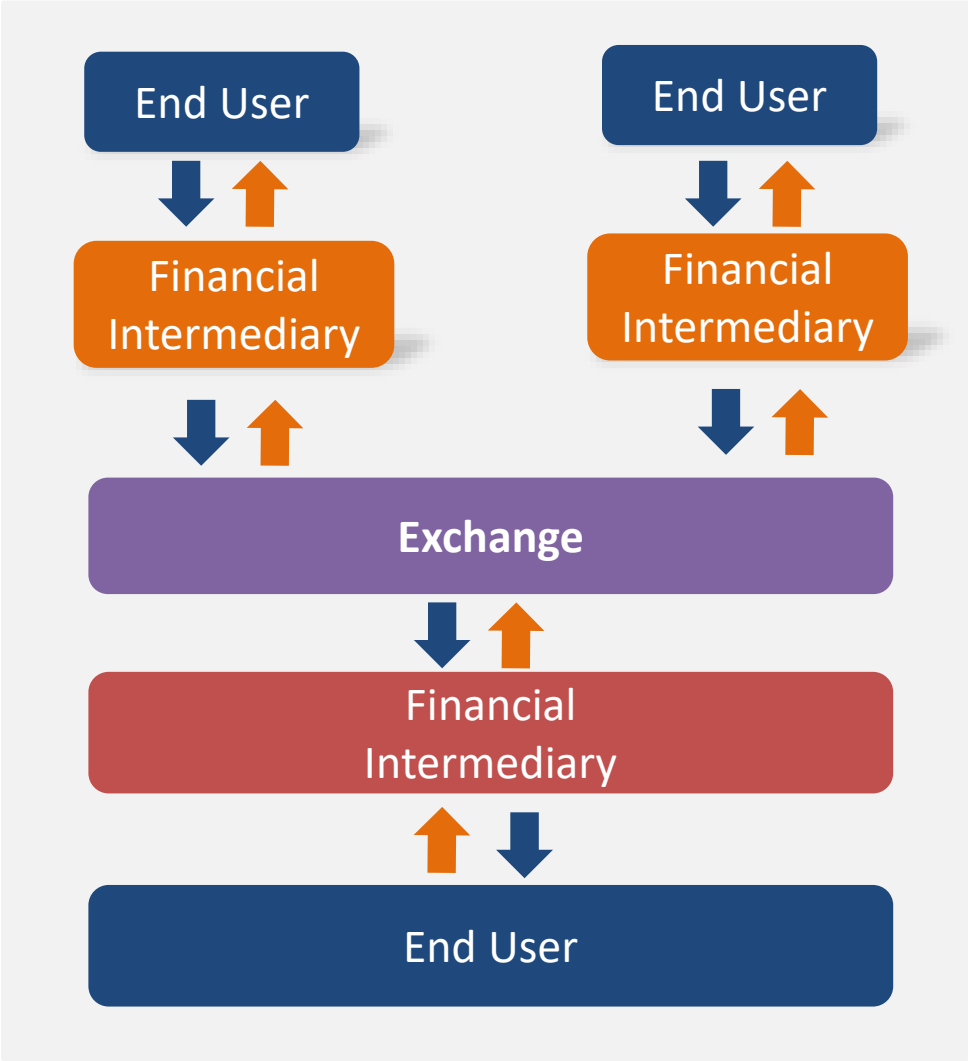
- **Non-standardized**, customized, and less **regulated markets**.
- **Derivatives end users** enter into contracts with fellow end users.
- Terms can be modified to **match a desired risk exposure profile**.
- Beneficial to **hedging**.



Types of Derivatives

Exchange-traded Markets

- **Standardized** and **highly regulated**.
- Promotes **liquidity** and **transparency**.
- **Terms and conditions** (size of each contract, type, quality and delivery of the underlying) are determined by the exchange.
- Standardization promotes efficiency in **clearing** and **settlement process.**



Types of Derivatives

Exchange-traded Product Example: Futures Contract

- Standardized variation on a forward contract.
  - Examples: S&P 500 E-mini (ES), 10 Year T-Notes (ZN), Crude Oil (CL), **Gold** (GC), etc.
- Public, standardized transaction that occurs on a **futures exchange.**
  - The exchange determines expiration dates, underlying assets, size of the contracts, etc.
  - In an oil futures contract, for instance, the contract buyer agrees to take delivery, from the seller, a specific quantity of crude oil (e.g., 1000 barrels) at a predetermined price on a future delivery date.
  - The **exchange is the counterparty** in futures transactions.
- **Marking-to-market** for all parties.
  - **Daily settlement** where profits and losses are charged and credited to the short and long positions each day.

Types of Derivatives

OTC Product Example: Swap

- Two parties agree to **exchange a series of cash flows**.
- One party **pays a variable series** that will be determined by an underlying asset or rate and the other party pays either (1) a variable series determined by a different underlying asset or rate or (2) **a fixed series**.
  - Examples: Interest rate swaps, currency swaps.

Types of Derivatives

Summary: Similarities between OTC and ETD

Both are financial instruments used for **hedging** and **speculative** purposes

Utilize **underlying assets** like interest rates, currencies, or commodities for valuation

Involve **two parties** agreeing on terms of the contract

Carry risks such as market, credit, and operational risks

Can be used to **manage financial exposures** related to specific assets or market conditions

Types of Derivatives

Summary: Differences between OTC and ETD

	Exchange-Traded Derivatives	OTC Derivatives
Standardization	Highly standardized contracts.	Less standardized, more flexible.
Trading Mechanism	Through centralized exchanges.	Bilaterally between two parties.
Market Efficiency	Enhances market efficiency and liquidity.	Not actively traded in secondary markets.
Price Transparency	Transparent and accessible pricing.	Pricing often private and less transparent.
Contract Closure	Easy to buy and sell equivalent contracts.	Custom terms may complicate closure.
Maturity	Standard maturities; at most a few months.	Negotiable; often many years.

Clearing

Describe the process of clearing a derivative transaction.
Identify the participants and describe the use of collateralization in the derivatives market.

- Refers to the process where **payment obligations** between firms are **compute**d, often **netted**, and **managed** until the final settlement.
- Acts as a crucial **intermediary phase** between execution and settlement of a transaction.
- Top goal is to **manage counterparty risk** via transactions such as **margining** and **cash flow payments**.

Execution	Clearing	Settlement
Buyer and seller enter into a **legal obligation** to buy/sell securities or another underlying.	Transaction is managed prior to settlement (**margining**, **cashflow payments**, etc.)	Transaction is settled via exchange of securities and/or cash and legal obligations are therefore **fulfilled**.

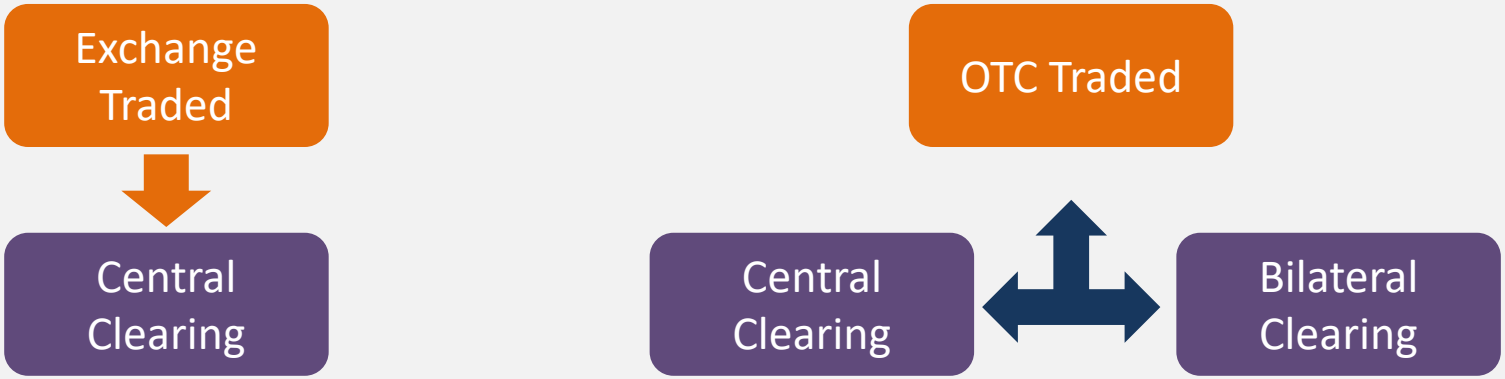
Clearing

Clearing Time Horizons

- **Exchange-traded derivatives**: Settlement usually occurs within **a few days** to **months**.
- **OTC derivatives**: Clearing process can extend **over years** or even **decades.**

Types of Clearing

- **Bilateral clearing**: Both parties involved in the trade are responsible for managing the clearing process and its associated risks.
- **Central clearing**: Everything handled by a **Central Counterparty (CCP).**



Participants in the Derivatives Market

Large Players

- **Global banks**, commonly known as **dealers**.
- Engage in a **wide range** of derivatives trades across **all asset classes**.
- Are **members** of most exchanges and **Central Counterparties (CCPs)**.
- **Hold** a significant portion of the **total notional value** in the OTC derivatives market.

Medium-Sized Players

- Typically **smaller banks** or **financial institutions**.
- Have significant activities in **OTC derivatives**, with a scope less diverse than large players.
- May focus on **specific markets** or regions.

Participants in the Derivatives Market

End Users

- Include **large corporations, sovereign entities**, or **smaller financial institutions.**
- Use derivatives primarily for **hedging needs** or **investments.**
- Engage in a **limited number** of OTC derivatives transactions, often in a **single asset class.**
- Maintain a **directional position** based on their specific needs, like foreign exchange, commodities, or interest rates.

Participants in the Derivatives Market

Others

High Credit Entities

- **Favorable collateral terms**: Receive but **do not post** collateral.
- **Examples**: Sovereigns, supranational entities, and multilateral banks historically enjoy preferential collateral arrangements.
- **Rating-triggered obligations**: Required to post collateral **if downgraded**, reflecting a risk-sensitive approach.
- **Increased costs**: Recent shifts in funding and capital requirements have heightened the financial burden of these arrangements.

Participants in the Derivatives Market

Others

Third-Party Service Providers

- **Operational support services**: Offer crucial services such as settlement, margining, collateral management, trade compression, and clearing.
- **Risk management enhancement**: Contribute to reducing counterparty risk and associated legal risks, improving overall market operational efficiency.

Derivatives Groupings

Exchange Traded

- Settled daily with **cash payments** known as variation margin.
- Generally considered **safer**, though recent events have challenged this view.

OTC Centrally Cleared

- Involves **complex, illiquid, and non-standard** derivatives.
- Subject to regulations mandating **central clearing** and daily **cash collateralization**.

OTC Collateralized

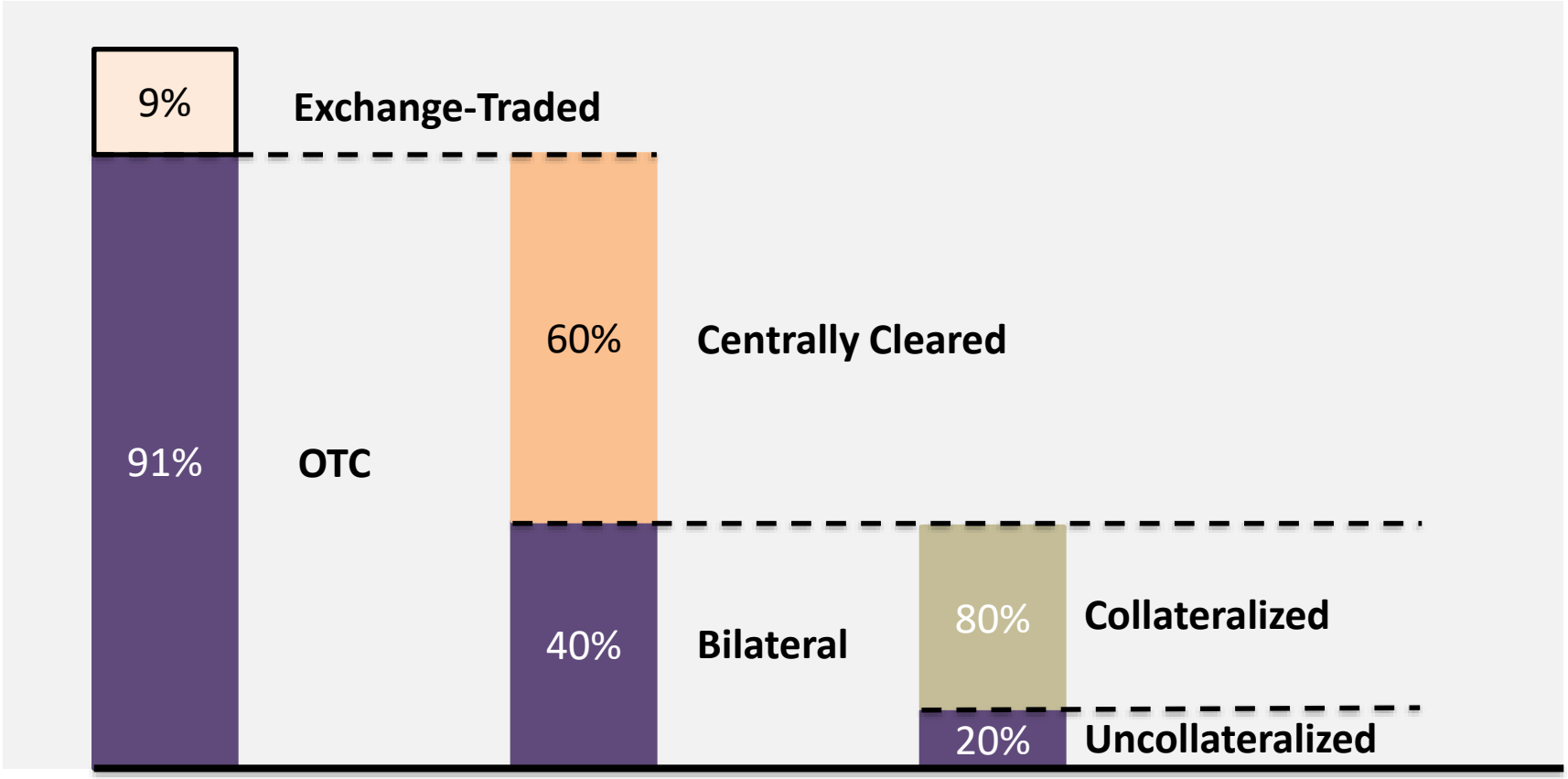
- Comprised of **bilateral** OTC derivatives not **centrally cleared**.
- Parties post **cash or securities** to mitigate counterparty risk.

OTC Uncollateralized

- Parties **do not post**, or post less and/or lower quality, collateral.
- Attracts significant attention due to heightened **counterparty risk** without collateral mitigation.

Derivatives Groupings

Market Share: Breakdown by Total Notional



Observed Market Tendencies

End Users

- Engage in **directional hedging** to specifically target and offset **economic risks.**
  - Leads to portfolios primarily designed to counteract certain market movements, causing noticeable **MtM volatility.**
- **Significant MTM volatility** affects derivative values and collateral needs.
  - Value of derivatives and the associated **collateral flows** can fluctuate substantially, affecting **liquidity**.
- **Substantial collateral** requirements often deter entering into collateral agreements.
  - Need for large collateral amounts on short notice can be **financially taxing** and **logistically challenging**.
- **One-to-one hedging** limits the benefits of **netting.**
  - Hedging specific items individually may lead to less favorable terms and reduced netting advantages in risk mitigation.

Observed Market Tendencies

End Users

Instrument Mismatch

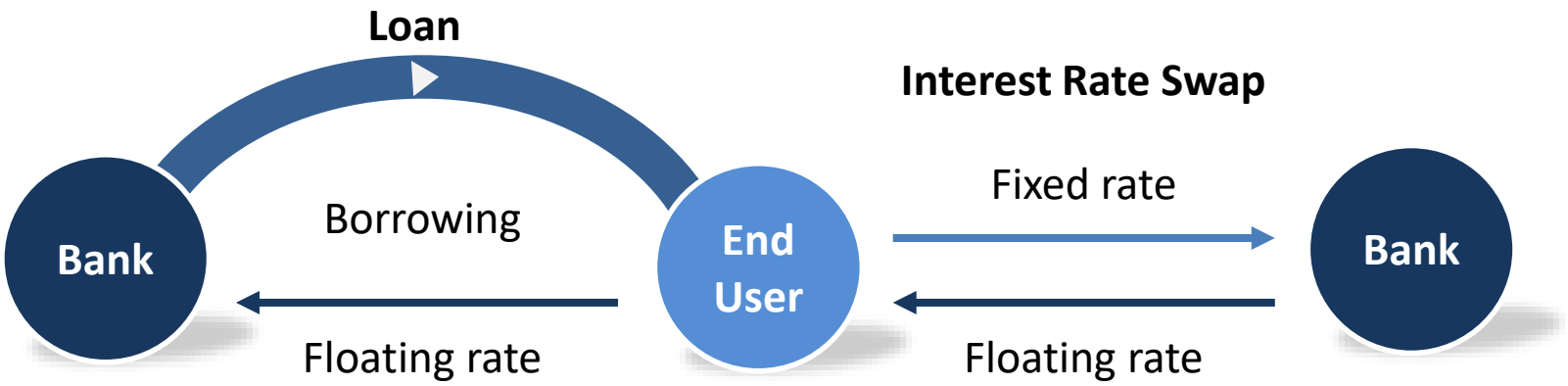
- Hedging with interest rate swaps can create **mismatches** due to differing bank practices.
  - **Example**:
    An end user takes a **floating-rate loan** and transacts an **interest rate swap** (with a bank) to convert it to a **fixed-rate obligation**.
  - The two institutions might have **divergent** accounting and collateral requirements for loans and swaps that can create problems.
    This is true even if the end user does both bits of business with the **same**

Observed Market Tendencies

End Users

Instrument Mismatch

- This is true even if the end user does both bits of business with the **same bank**.
- For banks, loans belong in the **banking book**, but swaps belong in the **trading book**.
- Separate capital treatments may impact the borrower's **cash flow and liquidity**.
- Varied collateral requirements for loans and swaps may **strain user's resources**.



Observed Market Tendencies

Banks

- Aim to maintain a **flat book** to manage **market risk.**
  - Banks hedge client transactions comprehensively, seeking to neutralize their positions and minimize **MtM Volatility.**
- **Series of hedges** executed in the **interbank market** or directly offsetting transactions.
  - This strategy helps in balancing the portfolio and reducing exposure to market fluctuations.
- **Minimal MtM volatility** but significant **counterparty risk.**
  - Banks face substantial risk if aany party in the hedged transactions defaults, exposing them to potential losses.
- **Asymmetry in collateral flows** due to uncollateralized client transactions vs. collateralized hedges.
  - Discrepancy between uncollateralized client transactions and collateralized hedges can lead to **liquidity challenges**.

ISDA Master Agreement

Define the International Swaps and Derivatives Association (ISDA) Master Agreement, the risk-mitigating features it provides, and the default events it covers.

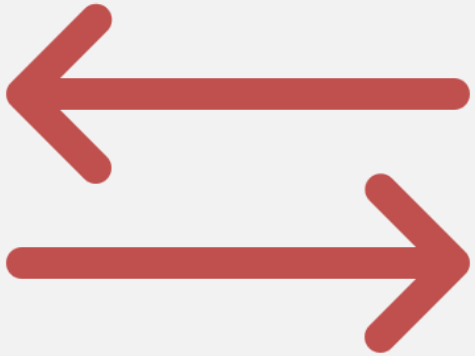
Definition

- **Bilateral** framework for OTC derivatives.
- **Governs** transactions, reducing **legal uncertainties** and **counterparty risk**.
- Covers **multiple transactions** under a single legal contract.
- Includes core section and adjustable terms for **netting, collateral, and default**.
- **Trade confirmations** specify commercial terms, referencing the Master Agreement.

ISDA Master Agreement

Risk-Mitigating Features

- **Collateral terms**: Ensure financial security against defaults.
- **Netting**: Combines multiple transactions into a single net obligation.
- **Events of default and termination**: Clearly defined to manage risks.
- **Close-out process**: Defined mechanics streamline the termination and settlement.



ISDA Master Agreement: Example

(Multicurrency — Cross Border)

ISDA®

International Swap Dealers Association, Inc.

MASTER AGREEMENT

dated as of 24 May 2019

SANTANDER UK PLC and HOLMES FUNDING LIMITED
and THE BANK OF NEW YORK MELLON, LONDON BRANCH

have entered and/or anticipate entering into one or more transactions (each a "Transaction") that are or will be governed by this Master Agreement, which includes the schedule (the "Schedule"), and the documents and other confirming evidence (each a "Confirmation") exchanged between the parties confirming those Transactions.

Accordingly, the parties agree as follows: —

1. Interpretation

(a) ***Definitions***. The terms defined in Section 14 and in the Schedule will have the meanings therein specified for the purpose of this Master Agreement.

(b) ***Inconsistency***. In the event of any inconsistency between the provisions of the Schedule and the other provisions of this Master Agreement, the Schedule will prevail. In the event of any inconsistency between the provisions of any Confirmation and this Master Agreement (including the Schedule), such Confirmation will prevail for the purpose of the relevant Transaction.

(c) ***Single Agreement***. All Transactions are entered into in reliance on the fact that this Master Agreement and all Confirmations form a single agreement between the parties (collectively referred to as this "Agreement"), and the parties would not otherwise enter into any Transactions.

2. Obligations

(a) ***General Conditions***.

ISDA Master Agreement

Default Events Covered

Failure to pay or deliver: Addresses non-fulfillment of financial obligations.

Breach of agreement: Covers violations of contract terms.

Credit support default: Focuses on collateral terms and conditions.

Misrepresentation: Includes false or misleading information.

Specified transaction default: Specific to the transaction's terms.

Cross-default: Triggers when default occurs on another obligation.

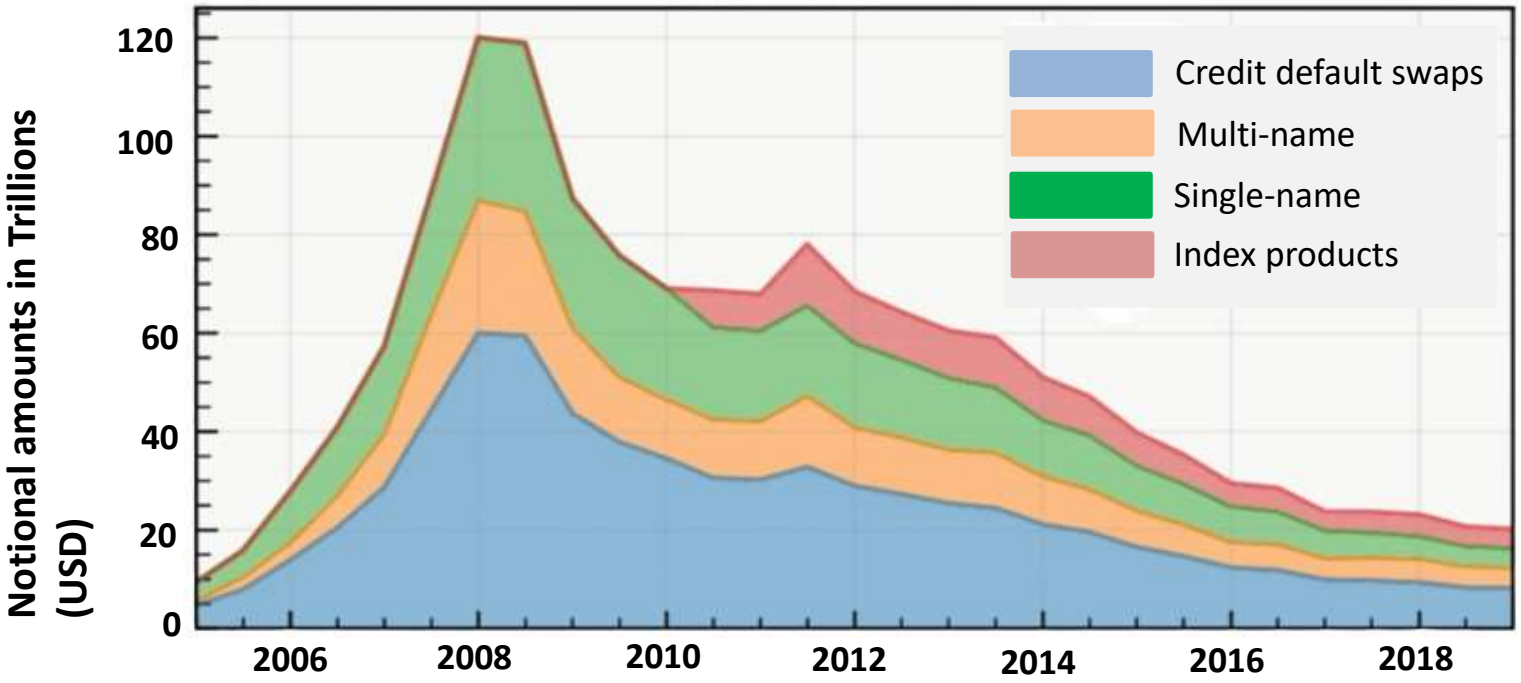
Bankruptcy: Addresses the insolvency of a party.

Merger without assumption: Pertains to corporate actions affecting obligations.

Features and Uses of Credit Derivatives

LO: Describe the features and use of credit derivatives and discuss potential risks they may create

- Swiftly grew pre-GFC for efficient **credit risk transfer**.
- Core instrument, **CDS**, revolutionized **credit risk trading**.
- CDSs used for **hedging counterparty risk** in various products.
- Credit derivatives provide **efficiency** in credit risk transfer.
- **Market growth** has slowed post-GFC.



Features and Uses of Credit Derivatives

Potential Risks

- **CDSs highly toxic** when misapplied, leading to magnified losses instead of risk mitigation.
- **Inherent counterparty risk** in CDS contracts implies potential default by the counterparty, jeopardizing the hedge.
- Increased **market awareness** post-GFC highlights the systemic risks associated with CDSs.
- Misuse of credit derivatives can lead to **market inefficiency** and exacerbate systemic financial toxicity.
- **Stagnation in market growth** post-GFC as institutions and regulators recognize and respond to the embedded risks in credit derivatives.

Derivatives: A Double-Edged Sword

On the one hand…

- Recognized as **key instruments** in global economic growth and risk management.
- Major corporations, governments, and financial institutions **globally** engage in derivative transactions.
- **Leverage** serves as a pivotal feature, enabling significant market exposure with minimal initial investment.
- Most of the world's **500 largest companies** use derivatives to
- manage risk.

On the one other…

- **Counterparty risk**: Derivative value depends on the creditworthiness of the counterparty, introducing a layer of risk.
- **Valuation discrepancies**: Potential for overstated derivative valuations, termed 'mark-to-myth'.
- **Downgrade triggers and liquidity crises**: Downgrade triggers can initiate cash demand spirals and further downgrades.
- **Daisy-chain risk**: Large receivables from interconnected counterparties hinder prudent diversification and amplify systemic risk.

In 2002, Warren Buffett famously described derivatives as "financial weapons of mass destruction."

Central Clearing

Describe central clearing of OTC derivatives and discuss the roles, mandate, advantages, and disadvantages of the central counterparty (CCP).

Central Clearing:

A process where a Central Counterparty (CCP) becomes the intermediary between buyers and sellers in OTC derivatives markets.

Objective:

Enhance transparency, mitigate counterparty credit risk, and improve market stability.

Mechanism:

CCPs stand between counterparties, guaranteeing the terms of the trade even if one party defaults.

Global Adoption:

Increasingly mandated by regulations worldwide post-2008 financial crisis.

Central Clearing

Advantages

Counterparty risk Reduction: CCPs mitigate the risk of a counterparty default impacting other market participants.

Market stability: Central clearing acts as a buffer during market volatility, preventing systemic crises.

Operational efficiency: Streamlines the settlement process, reducing the complexity and cost of bilateral clearing.

Improved transparency: Offers a clearer view of market exposures and potential risks.

Disadvantages

Concentration of risk: Central clearing concentrates risk within CCPs, requiring robust risk management.

Systemic importance: Failure of a CCP could have widespread implications, necessitating stringent regulatory oversight.

Limited scope: Not all OTC derivatives are suitable for central clearing, leaving some market segments exposed.

Operational complexity: Managing, operating, and complying with CCP requirements can be resource-intensive.

Margin Requirements: Centrally-Cleared Derivatives

Explain the margin requirements for both centrally-cleared and non-centrally-cleared derivatives.

- **Cash variation margin**: Ensures close tracking of market movements.
- **Initial margin**: Covers worst-case liquidation or close-out costs beyond variation margin.
- **Default fund**: Mutualizes losses in severe default scenarios.

Measures Taken for Extreme Situations

- **Additional calls to the default fund**: Increase financial buffer in times of crisis.
- **Variation margin haircutting**: Reduce the value of open positions to manage potential losses.
- **Selective tear-up of positions**: Cancel certain contracts to reduce exposure and stabilize the system.

Margin Requirements: Non-Centrally-Cleared Derivatives

Pre-GFC, there were **no obvious margin requirements** for non-centrally-cleared derivatives Post-GFC, **G20 leaders** mandated BCBS and IOSCO to develop margin standards for non-centrally cleared OTC derivatives.

Soon after, the **Working Group on Margin Requirements** (WGMR) was formed.

WGMR established **comprehensive guidelines** on acceptable collateral, margin calculation methods, collateral treatment, and margining operations.

Objective is to **mimic central clearing margin requirements**, incentivize central clearing of OTC derivatives, and reduce systemic risk.

Phased implementation strategy: Started in September 2016, targeting different market participant groups over several years.

Margin types defined by WGMR: Initial Margin (IM) for potential future exposure and Variation Margin (VM) for current exposure due to market value changes.

The rules have been rolled out in a phased manner, focusing on entities with different thresholds of **Aggregate Average Notional Amount** (AANA) of non-cleared derivatives.

- Entities with AANA **> $3 trillion** were targeted in Phase 1 (2016), with the AANA reducing to **$8 billion** in Phase 6 (2022).
- Implementation is **ongoing**; although there have been delays, e.g., COVID-19.

Special Purpose Vehicles (SPVs)

Define special purpose vehicles (SPVs), derivatives product companies (DPCs), monolines, and credit derivatives product companies (CDPCs) and describe the limitations of using them as risk mitigating methods.

SPVs are **legal entities** like companies or partnerships, structured to **isolate financial risk**.

Utilized in **OTC derivatives** to manage assets or projects, safeguarding the firm from **counterparty risk**.

SPVs modify **bankruptcy rules**, ensuring clients secure their investment even if a counterparty is insolvent.

Special Purpose Vehicles (SPVs)

Limitations

- **Risk redistribution**: While SPVs favor certain parties in insolvency, they may impose **unfavorable conditions** on others, leading to risk redistribution.
- **Enforceability concerns**: Disputes like in the Lehman case reveal the precarious nature of **legal enforceability** and **jurisdiction-specific rulings**.
- **Legal evolution**: SPVs' legal structures are **dynamic**, evolving through judicial decisions and **market experiences**.

Derivatives Product Companies (DPCs)

Bankruptcy-remote subsidiaries set up by banks, often with **triple-A ratings**, to mitigate counterparty risk.

Separately capitalized, maintaining a **neutral market risk** position and supported by the parent, ensuring a buffer against the parent's failure.

Employ **quantitative models** for credit risk assessment and have **restrictions** on capital, margin, and activities to sustain their high credit rating.

Delineate an **orderly workout process** for their own failure, adopting a **pre-packaged bankruptcy** approach for simpler resolution compared to traditional counterparties.

Derivatives Product Companies (DPCs)

Limitations

- Fate is **tightly linked** with their parent's financial health, as seen with the **Bear Stearns DPCs** and **Lehman Brothers DPCs.**
- **Transform** counterparty risk into **market, legal, and operational risks**, which may not effectively minimize the overall risk exposure.
- **Efficacy** is contingent on the **parent company's stability**, implying that a DPC's rating is only as reliable as that of its parent.

Monolines

Essentially financial guarantee companies

Established for **high-quality counterparties** in **OTC derivatives**, especially **credit derivatives**.

Provided **credit wraps** to enhance products' **credit ratings**, venturing into **CDS** and **structured finance**.

Capital tied to potential **losses of wrapped structures**, usually **no collateral** due to strong ratings.

Monolines

Limitations

- Business model heavily reliant on maintaining **high credit ratings**; downgrades triggered **collateral clauses**.
- Faced **MTM valuation losses** on insurance, questioning their **capital adequacy** and **ratings**.
- **Efficacy** is contingent on the **parent company's stability**, implying that a DPC's rating is only as reliable as that of its parent.
- Forced to post unaffordable collateral post-downgrade, leading to **rapid defaults** (e.g., AMBAC, MBIA).

Credit Derivatives Product Companies (CDPCs)

Emerged to address the critical need for **high-credit-quality counterparties** in the **credit derivatives market**.

Extend the **DPC model**, providing **credit wraps** to enhance the credit rating of financial products, especially in **CDS** and **structured finance**.

Maintain **high ratings** (e.g., triple-A) through capital reserves aligned with the potential losses on the **structures they protect**.

Aim to be **'default remote entities'**, avoiding the posting of collateral due to their strong ratings, which mitigates **market value decline** risks.

Credit Derivatives Product Companies (CDPCs)

Limitations

- Business models are highly sensitive to **market fluctuations** and **credit rating downgrades**.
- Faced severe challenges during the GFC due to **MTM-based valuation losses** on the credit insurance they provided.
- Clauses requiring collateral posting upon rating downgrade led to **rapid declines and defaults**, as institutions struggled to meet these demands.

Approaches in Modeling Derivatives Risk

LO: Describe the approaches used and the challenges faced in modeling derivatives risk.

Value at Risk (VaR)

- **Models market risks** by providing a **quantile for potential losses** over a set time, within a specific confidence level.
- Used extensively across financial sectors to **summarize risks succinctly**.
- Offers flexibility by not relying on **distributional assumptions** but doesn't indicate potential loss beyond the confidence threshold.

Expected Shortfall (ES)

- Addresses **VaR limitations** by focusing on **tail risks**, averaging losses exceeding the VaR threshold.
- Provides a **broader risk perspective** by accounting for the magnitude of losses in the distribution's tail.
- Preferred in **regulatory frameworks** due to its comprehensive nature in capturing risk.

Approaches in Modeling Derivatives Risk

Historical Simulation and Backtesting

- Predicts **current portfolio outcomes** using historical market data, offering a range of potential scenarios.
- Primarily applied to **short-horizon measures** like VaR and ES, with the ability to scale using the square root of time rule.
- Serves as a critical **validation tool** for risk models by comparing model predictions with actual outcomes

Counterparty Risk Metrics

- Focuses on **managing credit risks** over the longer term by assessing **potential future exposure**.
- Adds **complexity** due to the long-term nature of predictions and the instability of financial correlations.
- Requires **robust methods** for reliably predicting and assessing risks over extended time horizons.

Challenges in Modeling Derivatives Risk

Complexity in Counterparty Risk

- Unlike VAR, which looks at a short horizon, counterparty risk involves forecasting years ahead, adding layers of **complexity**.

Correlation Volatility

- Historically-estimated correlations **may not accurately represent future behavior**.

Beyond Correlation

- Dependency in financial markets is **multi-faceted**.
- Measures other than correlation, especially in dealing with **wrong-way risk**, are crucial.

FRM Part II

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