# Counterparty Credit Risk

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Counterperty Credit Risk (CCR) Definition

- Counterparty credit risk refers to the risk that a counterparty to a bilateral financial derivative contract may fail to fulfill its contractual obligation causing financial loss to the non-defaulting party.

- Only over-the-counter (OTC) derivatives and financial security transactions (FSTs) (e.g., repos) are subject to counterparty risk.

- If one party of a contract defaults, the non-defaulting party will find a similar contract with another counterparty in the market to replace the default one. That is why counterparty credit risk sometimes is referred to as replacement risk.

- The replacement cost is the MTM value of a counterparty portfolio at the time of the counterparty default.

Counterperty Credit Risk Measures

◆ Credit exposure (CE) is the cost of replacing or hedging a contract at the time of default. The CE of a typical interest rate swap is shown below
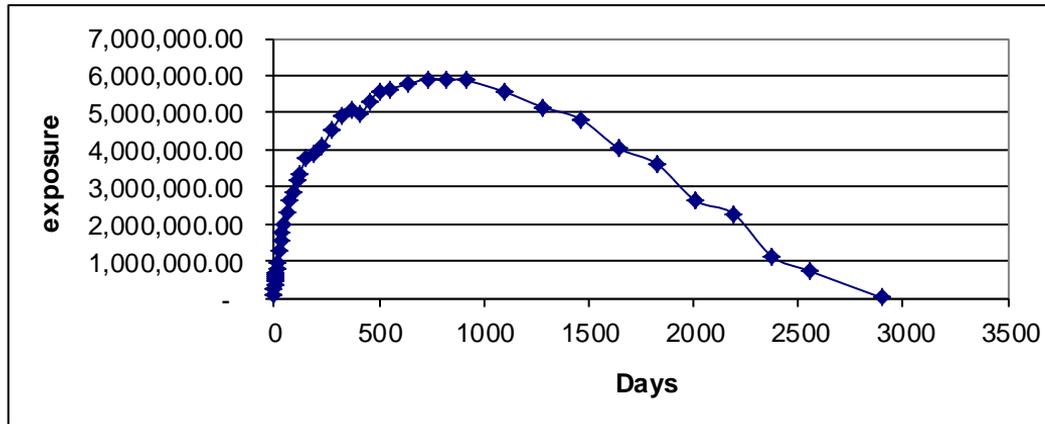
Counterperty Credit Risk Measures (Cont't)

◆ Potential future exposure (PFE) is the credit exposure at a specified quantile on a future date.

◆ Expected exposure (EE) is the average (expected) credit exposure on a future target date.

◆ Expected positive exposure EPE) is the weighted average of EE.

◆ Effective EE is equal to the maximum of EE before time t.

◆ Effective EPE is the weighted average of Effective EE.

◆ Exposure at default (EAD) = α * EffectiveEPE, where α = 1.4.

Close Out

◆ If a contract value > 0 to a bank at the time of default, the bank
- ◆ closes out the position and receives nothing from the defaulting counterparty;
- ◆ then enters a similar contract with another party and pays the contract value.
- ◆ The exposure is the replacement cost, i.e., the contract value

◆ If the contract value < 0 to the bank at the time of default, the bank
- ◆ closes out the position and pays contract value to the defaulting counterparty
- ◆ then enters a similar contract with another party and receives the contract value.
- ◆ The net loss is zero.

◆ Thus the credit exposure can be expressed as

$$E(t) = \max(V(t), 0)$$

Master Agreement

◆ Master agreement is a document agreed between two parties, which applies to all transactions between them.

◆ Close out and netting agreement is part of the Master Agreement.

◆ If two trades can be netted, the credit exposure is
$$E(t) = max(V_1(t) + V_2(t), 0)$$

◆ If two trade cannot be netted (called non-netting), the credit exposure is
$$E(t) = max(V_1(t), 0) + max(V_2(t), 0)$$

CSA Agreement

◆ Credit Support Annex (CSA) or Margin Agreement or Collateral Agreement is a legal document that regulates collateral posting.

◆ Trades under a CSA should be also under a netting agreement, but not vice verse.

◆ It defines a variety of terms related to collateral posting:

  ◆ Threshold
  ◆ Minimum transfer amount (MTA)
  ◆ Independent amount (or initial margin or haircut)

CSA Agreement (Cont'd)

◆ The credit exposure of the interest rate swap after taking CSA into account can be illustrated as
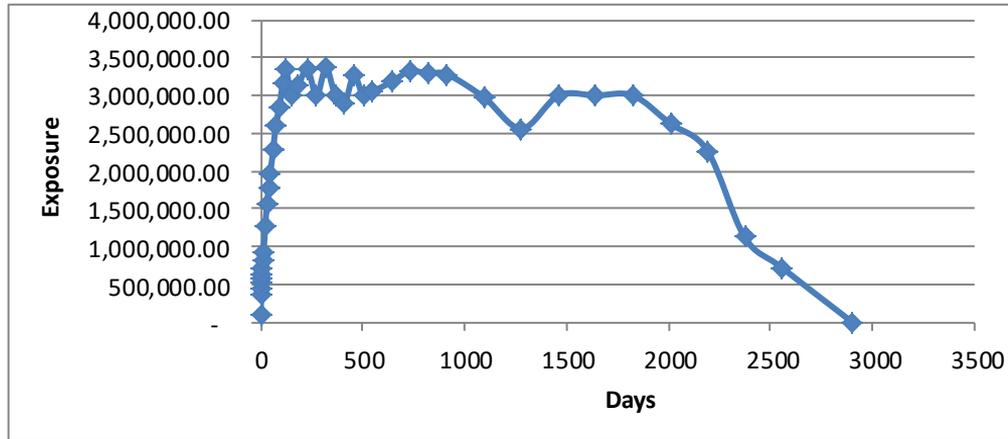
Final Credit Exposure

◆ After taking master agreement and collateral posting into account, the final counterparty credit exposure equals

$$E_{cpty}(t) = \sum_i E_{NCi} + \sum_j E_{Nj} + \sum_k E_{NNk}$$

where

E_{NCi} – the exposure for a trade with both CSA and netting agreement;

E_{NCi} – the exposure for a trade with netting agreement but without CSA;

E_{NNk} – the exposure for a non-netting trade.
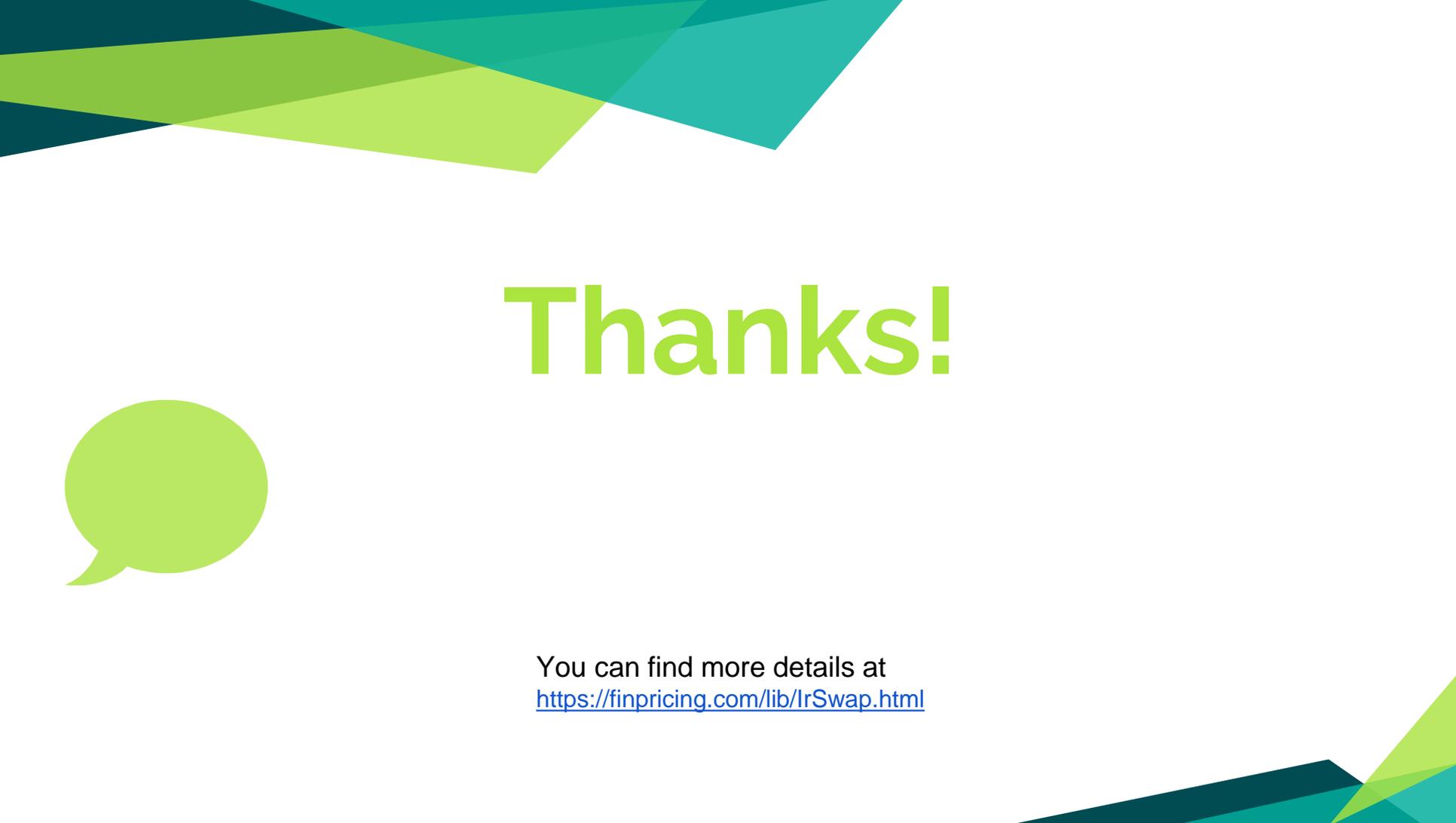
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