

# Counterparty Credit Risk

## Summary

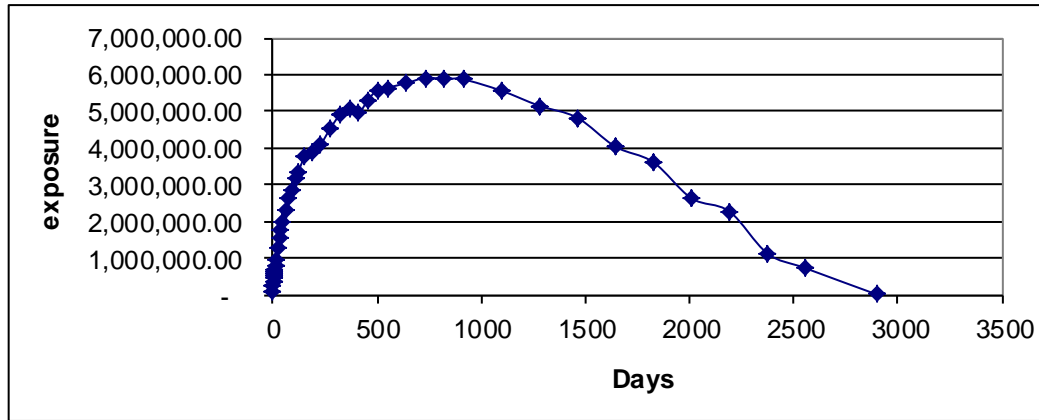
- ◆ Counterparty Credit Risk Definition
- ◆ Counterparty Credit Risk Measures
- ◆ Close Out
- ◆ Master Agreement
- ◆ CSA Agreement
- ◆ Final Credit Exposure

## Counterparty 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.

## Counterparty 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



## Counterparty 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) =  $\alpha$  \* EffectiveEPE, where  $\alpha = 1.4$ .

## 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

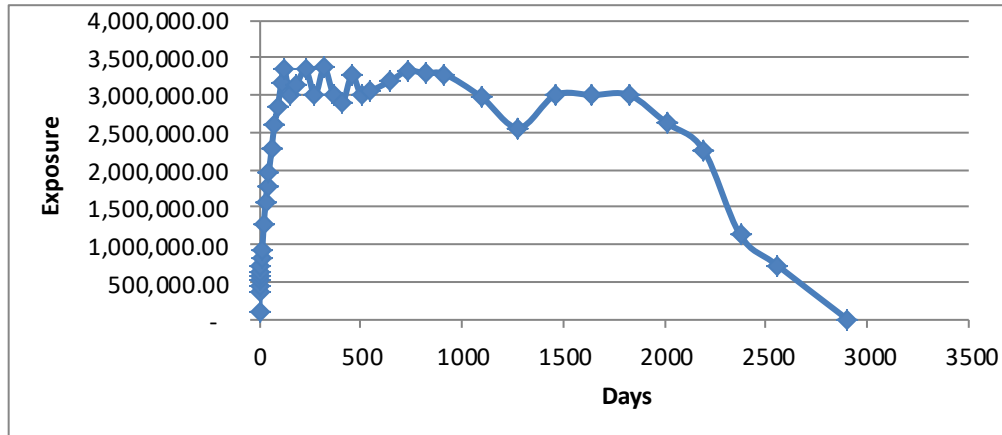
- ◆ Credit Support Annex (CSA) or Margin Agreement or Collateral Agreement is a legal document that regulates collateral posting.
- ◆ Trades under a CSA should be also under a netting agreement, but not vice versa.
- ◆ It defines a variety of terms related to collateral posting:
  - ◆ Threshold
  - ◆ Minimum transfer amount (MTA)
  - ◆ Independent amount (or initial margin or haircut)



CCR

## 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;

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

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



# Thanks!



You can find more details at  
<https://finpricing.com/lib/CdCreditSpreadCurve.html>

