Credit and funding VAs

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Fair Valuation of derivatives

- *Fair value* is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants.

- The definition of Fair Value is based on an exit price notion, which embeds the evaluation of the risks that the incumbent would be transferring to a third party, on top of the risk-free value of the asset or the liability.

- Therefore the calculation of the Fair Value of a derivative contract between the Institution and a counterparty encompass (among others) the following adjustments to the risk-free value the derivative

  - CVA, covering the default risk of the counterparty

  - DVA, covering the default risk of the Institution

  - FundVA, covering the funding cost/benefit stemming from hedging the market risk of the derivative, if not perfectly collateralized.

Counterparty Credit and Funding Risk: CVA / DVA

- The Credit Value Adjustment is meant to reflect the counterparty/own default risk in the value of derivatives.

- The calculation is bilateral (i.e. includes DVA) and based on future expected exposures

  - market risk factors are simulated and used for **mark-to-future** of derivatives, until maturity

  - ITM and OTM derivatives can be netted, in case of close-out **netting agreements**

  - for counterparties under a collateral agreement, risk mitigation from **margin calls** is to be considered

$$\text{CVA}=\sum_{i} LGD_c * PD_C(t_{i-1},t_i) * SP_B(t_0,t_i) * \frac{1}{2}\left(D_{i-1} * EPE_{i-1} + D_i * EPE_i\right) * \Delta t + \sum_{i} LGD_b * PD_B(t_{i-1},t_i) * SP_C(t_0,t_i) * \frac{1}{2}\left(D_{i-1} * ENE_{i-1} + D_i * ENE_i\right) * \Delta t$$

Counterparty Credit and Funding Risk: FundVA

- Funding Value Adjustment (FundVA) accounts for expected future funding costs / benefits for derivatives that are not fully collateralized.

  - Most material contributors are in-the-money trades with uncollateralized counterparties.

  - It represents a spread over Libor and has the effect of "present valuing" long term funding costs into the value of derivatives today, rather than accruing the cost over the lifetime of the derivatives.

$$\text{FundVA} = \sum_{i} s_b * SP_C(t_0, t_i) * SP_B(t_0, t_i) * 1/2\,(D_{i-1} * EPE_{i-1} + D_i * EPE_i) * \Delta t + \sum_{i} s_l * SP_C(t_0, t_i) * SP_B(t_0, t_i) * 1/2\,(D_{i-1} * ENE_{i-1} + D_i * ENE_i) * \Delta t$$

  - If the future value of an uncollateralized derivative is simulated as positive (expected future positive P&L), the bank will need to fund such exposure (similarly to a classic loan) and FundVA materializes as a negative correction to current Mark-To-Market of the derivative

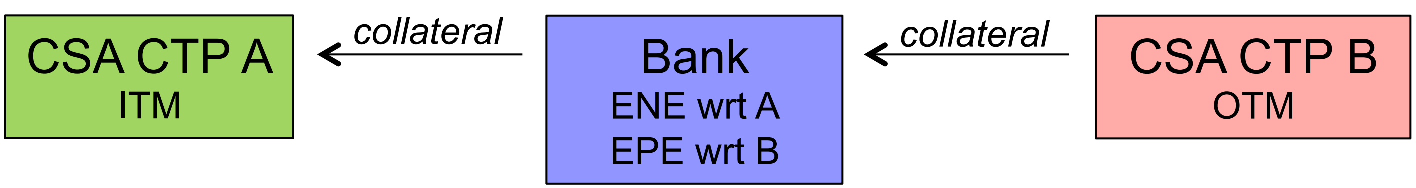
  - Actual funding is conditional on survival of both parties

Collateral flows (1)

- In terms of market risk, a derivative with a collateralized counterparty A can be fully hedged entering the same derivative, with opposite sign, with a collateralized counterparty B. At inception of the derivative (MtM = 0), such hedge has zero cost.

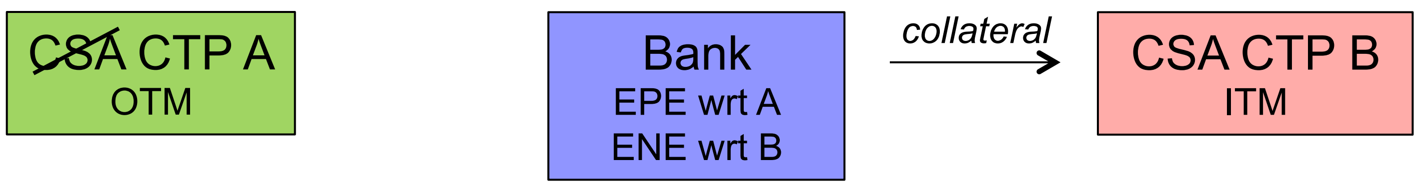
- Any collateral outflow towards counterparty A would be offset by a collateral inflow from counterparty B, and viceversa.

- As a result, in a risk neutral and fully collateralized world, the risk-free value of the derivative does not require a Fair Value adjustment for any credit nor funding risk:
  - **CVA ~ FundVA ~ 0**

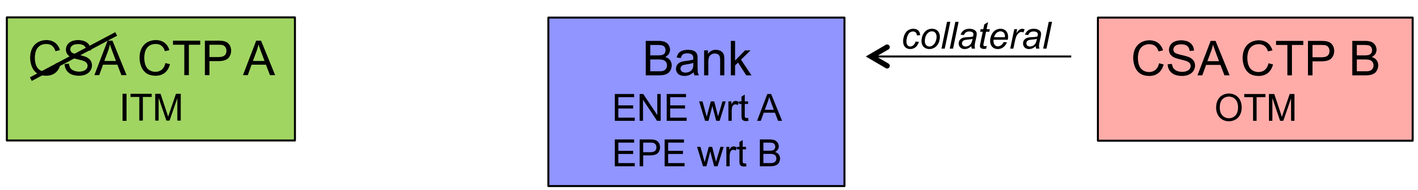


Collateral flows (2)

- In case counterparty A was uncollateralized and the MtM of the derivative was positive, the value of the hedge would be negative instead and would trigger a margin call from the collateralized counterparty B. The funding of such collateral to be posted by the Institution would represent a cost.
  - **CVA > 0, FundVA > 0**



- In the opposite situation (negative MtM of the derivative with counterparty A), the incoming collateral from counterparty B would represent a funding benefit for the Institution.
  - **CVA < 0 (i.e. DVA), FundVA < 0 (i.e. funding benefit)**



Accounting considerations

- When determining Fair Value, the Institution uses the assumptions that a representative market participant would use when pricing the asset or liability
    - FundVA must be representative of the funding cost/benefit prevailing in the market.
    - The assessment of the Institution-specific funding cost/benefit of a derivative is rather a matter of Fund Transfer Pricing than Fair Value under accounting principles.
- As CVA and DVA for the Institution are in principle equal to -DVA and -CVA for the counterparty, making up a zero sum game, a FundVA calculation based on the **market average funding spread** allows to achieve the same consistency across the balance sheets of market participants.

xVA hedging (1)

- Exposures contributing to xVAs can be hedged entering into derivatives with opposite sensitivities, with collateralised high rated counterparties

- Counterparty PD can be hedged via CDS
  - Need continuous re-balancing
  - Cross gamma effects with exposures, difficult to manage
  - Pure credit risk may instead just be subject to limits from risk appetite, together with non derivative exposures

- Can / should institution PD be hedged?
  - sell CDS protection on itself, offering an amount of collateral equal to own LGD (to cover wrong-way risk) → this would reduce funding benefit
  - DVA is capital neutral (Art 33 CRR)
  - A DVA loss from bank PD implies an improved credit quality

- Can funding be hedged / used to reduce CVA? …

xVA hedging (2)