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Theory under 'Derivatives Academy', Practice under 'Derivatives Pricer'

## Swaption Approach

### Formula:

$$CVA = LGD \sum_{t=1}^T PD(t-1, t) Swaption_t$$

The swaption approach models EPE as a series of swaptions and is only applicable where the derivative is an IR swap.

Simplistically, the exposure is modelled as:

- an option on a reversed swap in case the counterparty defaults before the first CF date +
- + an option on the reversed swap excluding the first CF in case the counterparty defaults between the first and second CF dates
- etc...

The number of swaptions is determined by the remaining term of the contract and the payment frequency.

### Terms:

Swaption<sub>t</sub> = fair value of an option with expiry t on a swap opposite to the derivative, with maturity T - t.

PD(t-1, t) = probability of default between time t - 1 and t.

The CVA calculation utilises counterparty PDs, while for DVA own PDs are used.

### Advantages:

- methodology takes both current and potential future exposure into account
- considers bilateral nature of derivatives
- can be applied on transactional level
- terms of swaptions are easy to determine
- intuitive appeal as the CVA is based on the cost of replacing the asset

### Disadvantages:

- applies to IR swap exposures only
- difficulty to apply on counterparty level, especially when exposure to counterparty includes derivatives other than IR swap.

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