3 Clearing House Pricing

3.1 Introduction of central counterparties

As a reaction to counterparty credit risk attached to uncollateralized derivatives and the non-transparency of the OTC derivatives markets, regulators decided to force banks to use central clearing with Central Counterparties (CCP) for derivatives trading (Dodd-Frank Act in the US, EMIR and CRR/CRD IV in Europe\(^1\)) by introducing a penalizing CVA capital charge for non-cleared derivatives, see Section 24.7.

Aside from their contribution to increased transparency in the derivatives market, CCPs are supposed to reduce counterparty credit risk. However, they turn it into liquidity risk via their margin requirements.

A CCP has a number of direct members. These are the counterparties that deal with the CCP directly. The members contribute to the CCP’s guarantee fund or default fund which is part of the defence against member or CCP default. In addition to that, the direct members usually agree to further funding if required. The maximum additional amount depends on the CCP. The guarantee fund contribution accrues interest at a sub-OIS rate.

Each direct member in turn can have an arbitrary number of clients who want to clear with the CCP through them. Any margin requirements are satisfied by the direct members who then in turn acquire the margin amounts from their clients.

Upon default of one of the members, the CCP will call the surviving members to recapitalize the guarantee fund. As a result, the members have a credit exposure against each other member which is not correlated with their trade exposure to them, and over which they have no control. In addition, members have a credit exposure against the CCP. These two residual sources of credit risk are recognized by the regulator and have to be capitalized, see Section 24.6.

3.2 Margin requirements

The CCP has two sources of risk for each member:

\(^1\) At the time of writing, central clearing is still not mandatory for eligible derivatives. The current estimate for the enforcement of central clearing to start is the second quarter of 2016 or later.
The exposure due to the current value of the portfolio with that member;
• The exposure due to potential adverse moves of the portfolio after the member defaults.

The current exposure is mitigated by the Variation Margin (VM). This is rebalanced at least once a day but more frequently up to three times a day. Rebalancing works similarly to collateralization for OTC derivatives, only faster, and there are no disputes.

Potential value losses after a member’s default are mitigated by the Initial Margin (IM). This is calculated as either a Value-at-Risk (VaR) number or as Expected Shortfall (ES), based on a historical simulation. The time horizon of this risk number depends on the type of portfolio. The initial margin is updated on a regular basis so as to capture times of recent market stress.

Margins received usually accrue interest at the overnight rate, sometimes less a small spread. Margin reductions are posted back on the day they occur.

3.3 Building the OIS curve

The first curve that we have to construct is the discount curve, based on the risk-free rates. Where available, this is the Overnight-Indexed Swap (OIS) curve:

• EUR Euro Overnight Index Average = EONIA
• GBP Sterling Overnight Index Average = SONIA
• USD FedFunds
• JPY Mutan (sometimes Tokyo Overnight Average Rate TONAR)
• CHF Swiss Average Rate Overnight = SARON
• DKK DKKOIS
• AUD AONIA
• CAD CORRA
• HKD HONIX
• NZD NZIONA

In an OIS, two parties exchange a fixed coupon (paid annually for longer-dated swaps and as a single payment at maturity otherwise) against the daily fixed and compounded overnight rate. Daily compounding means that the rate paid at the end of period \( i = 1, \ldots, n \) is given by

\[
R_i = \frac{1}{\delta_i} \left[ \prod_{k=1}^{n_i} \left( 1 + F^{ON}(t_{i,k-1}, t_{i,k}) \delta_{i,k} \right) - 1 \right],
\]