

# Quaternion™ approach to Structured Bond Valuation

The **accurate valuation of structured assets** remains an issue that financial institutions and asset investors face. Collateralized Loan Obligations (CLOs) as well as cash flow Collateralized Debt Obligations (CDOs) have waterfall structures that determine the priority in which tranche holders are paid interest, principal repayments and default priority. This feature makes them more complex to value than a synthetic CDO.

The means to ensure that the more senior tranches receive the cash flows first are, generally, interest coverage and overcollateralization ratios.

Pricing these transactions requires the ability to run multiple scenarios simulating defaults of the underlying assets run through Monte Carlo models with outputs on each simulation path stressing the resulting cashflows, driving capital and liquidity requirements.

This involves complex calculations, and involves a vast amount of computation – it was thus long believed that such products could not be priced analytically, unlike synthetic CDOs. Quaternion Risk Management has implemented a fast solution, built on Open Source Risk, that uses an approximation of the joint distribution of interest and notional payments, which is complementary to the much slower computation of the actual distribution by Monte Carlo simulation.

Using the Quaternion CLO pricing tool allows our clients to:

- **Reduce the time** required to value a structured bond;
- **Compute sensitivities** or other risk numbers for a portfolio of structured securities much more frequently than a full Monte Carlo simulation would allow;
- Thus **improve the risk management** for their CLO portfolios.



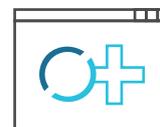
## CLIENT MODEL

A client's internal model has been developed by the risk or technical units based on the existing frameworks of the organisation itself



## ORE

Open Source Risk provides an Open Source engine under an open BSD license providing a fully transparent, cutting edge platform for the Quaternion product suite



## ORE+

Quaternion has developed a series of libraries integrating with Open Source Risk to deliver superior results in terms of speed and breadth

## Features

- Comprehensive approach to DIM
- 'What ifs' allowing for testing
- Supported by independent model
- Built on open source

## Benefits

- Transparency of the core model
- Independent model validation
- Regulatory compliance
- Support by Quaternion experts