CLO Waterfall Simulation: Base vs Stress Scenario

Objective

This project simulates the interest waterfall and compliance test mechanics of a simplified Collateralized Loan Obligation (CLO). The goal was to understand how cash flows are allocated across seniority tiers, and how Overcollateralization (OC) test results affect Mezzanine and Equity tranches.

Structure

- **Asset Pool**: Hypothetical loan portfolio generating £8M in annual interest income.
- **Tranches**:
  - Senior: £50M at 5% (highest priority)
  - Mezzanine: £30M at 7%
  - Equity: £20M residual (lowest priority)
- **Compliance Test**: Overcollateralization (OC)

Scenarios Simulated

Base Case – OC Test Passes

- **Collateral**: £100M
- **OC Ratio**: 2.00x (above 1.25x threshold)
- **Results**:
  - Senior Paid: £2.5M
  - Mezzanine Paid: £2.1M
  - Equity Paid: £3.4M (residual)

Stress Case – OC Test Fails

- **Collateral**: £55M
- **OC Ratio**: 1.10x (below 1.25x threshold)
- **Results**:

  - Senior Paid: £2.5M
  - Mezzanine Paid: £0
  - Equity Paid: £0
  - Unallocated Cash: £5.5M retained or redirected

Key Insights

- Overcollateralization (OC) tests play a critical role in protecting senior tranche investors. Even modest declines in collateral coverage can lead to complete cash flow cutoffs for junior tranches.
- The model captures the conditional structure of real-world CLOs, where compliance triggers override waterfall priority.
- Both Excel and Python implementations reinforce the importance of model transparency and reproducibility in structured finance analysis.
- Python's `pandas` and `matplotlib` libraries were used to automate calculations and visualize cash allocation outcomes across scenarios.

Conclusion

This simulation improved my understanding of structured credit mechanics and risk allocation. It demonstrated the practical use of compliance tests in portfolio-level cash flow control, and highlighted the power of programmatic finance modeling for investment analysis.