MATLOGICA

Case Study

How a major European Bank revolutionised their front-office risk management using MatLogica AADC

Client

Tier 2 European Bank

Challenge

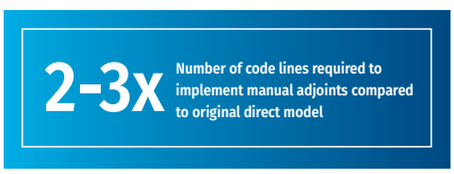
The bank's front-office risk management infrastructure was struggling to provide timely and accurate risk reports, crucial for trading and management decisions.

Solution

AADC enabled them to supercharge their analytics by introducing Automatic Adjoint Differentiation (AAD) to compute risk and accelerate pricing and scenario analysis.

Result

MatLogica-enhanced analytics unlocked revenue streams, lowered infrastructure costs, and improved risk management. 15-20x speedups have been achieved compared to their previous manual adjoint differentiation combined with Bump&Revalue. The shorter but sharper codebase increased the quant team's efficiency, allowing them to keep up with regulatory requirements and create additional business opportunities.



Client's problem statement

The client's proprietary quant system used a combination of Bump&Revalue and manual adjoint differentiation to compute risk. Despite significant investment, the risk system struggled and occasionally could not produce risk reports on time for the next trading day.

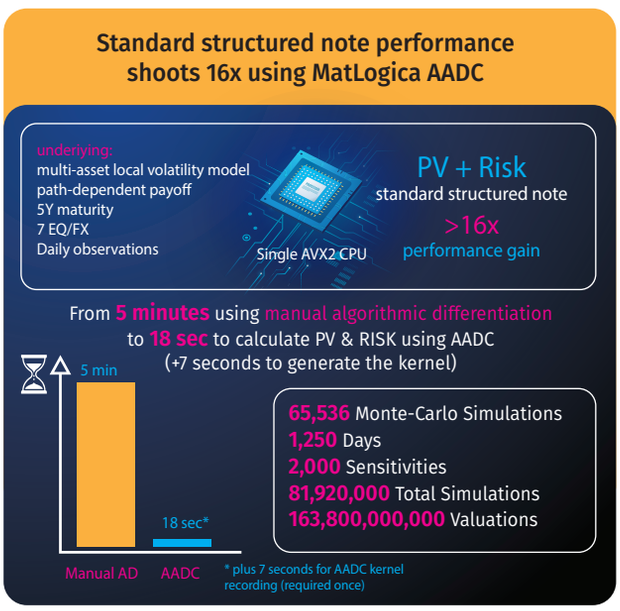
The client stressed the following key problems:

1. Inability to calculate portfolio risk overnight
2. 30+ minute delay for intraday risk calculation
3. Long time to market for bug fixes and new models
4. Difficulty keeping pricing functions and manual adjoint in sync
5. Poor ability to explain P&L due to difficulty to identify and calculate all the important first and second-order sensitivities using manual adjoint differentiation.

The traders needed faster portfolio risk sensitivities for intraday market moves while the technology infrastructure team was unable to keep up with the computing demand for overnight risk reports. The Quant team was overwhelmed with maintaining manual adjoint differentiation whilst keeping up with the new business requirements.

Integration of Matlogica's AADC library

Superior performance and swifter integration of MatLogica's AADC, when compared with alternatives, convinced the client to select our product. They were able to integrate using their own resources, with MatLogica's support offsite.



The first results were achieved within 3 months and showed a 10-20x speed-up compared with manual adjoint differentiation, using a single AVX-2 core. This improvement came from a more efficient utilisation of CPU cache and memory layout as well as automatic vectorisation, and MatLogica's proprietary JIT optimisations.

Nine months into the project, after rigorous user acceptance tests and back-testing, the following models were transitioned to AADC in production:

1) Dupire local vol for Equity and FX
2) Chayette models for Commodity and Interest Rates
3) A Hybrid model combining the above

By eliminating manual adjoint implementation, the modelling code was reduced by about 70%. In addition, the client stated:

"One notable feature of AADC is that complex model calibration procedures do not require any special attention as is often the case with other AAD approaches. For example, we "AADC-record" simple Dupire volatility calculations, regression based continuation value calibration and even Monte-Carlo based Cheyette model calibrations, with no special care needed to back-propagate adjoints. This has allowed us to eliminate a large amount of complex and hard to maintain code."

Conclusion

The turnaround for overnight portfolio risk calculation decreased from 8+ hours to ~2 hours, while intraday risk calculation decreased to just a few minutes from 30+ minutes. By eliminating hard to maintain portions the modelling quant team velocity increased ~3x, enabling faster time-to-market for new features. Key benefits to the business include:

- new revenue streams and increased customer satisfaction: faster pricing of the complex derivative instruments has allowed the bank to offer new products via a one-click online portal for corporate clients adding
- Quant development 3-4x faster due to code simplification combined with AADC
- Traders can better structure risk and compute more what-if scenarios
- Previously noisy "P&L explain" has become a reliable risk management tool
- Reduction in grid capacity has led to costs savings of around 50% and current 2-hour batch completion leaves significant capacity for future business growth