



SciFinance Case Study



CommonwealthBank

RAPID MODEL DEVELOPMENT

for Valuation of Exotic Option Instruments with SciFinance and Integration into a 3rd Party Vendor System

QUICK FACTS

Industry:

Banking

Headquarters:

Sydney, Australia

Web Site:

www.commbank.com.au

The Commonwealth Bank (CBA) is Australia's leading provider of integrated financial services including retail banking, premium banking, business banking, institutional banking, funds management, superannuation, insurance, investment and sharebroking products and services.

Key challenges:

- Need for an economical approach for developing robust exotic derivatives pricing models.
- Rapidly prototype and assess alternative pricing model approaches.
- Efficient implementation of robust, stable and performant risk calculations.
- Easy and economical integration of derivatives pricing models with a third party risk application.

Alternative approaches:

Two alternatives were considered (i) complete internal design and implementation of the pricing model by the quantitative development team or (ii) pricing model design by the quantitative development team and model implementation through the code synthesis technology provided by SciFinance.®

1. Complete In-House Design and Implementation of Pricing Models

Developing pricing model source code with the objective of having it operate in a production environment requires that the code be both highly computationally efficient and robust. These critically important criteria require that in-house developers possess a high degree of specialization in sophisticated numerical techniques in order to write such highly optimized and efficient code. Furthermore, developing such pricing code is a time consuming effort requiring weeks and/or months to complete.

These considerations prompted a review of pricing model development technologies that identified SciFinance® as a model development tool for code generation.

After completing a successful proof of concept CBA decided to license SciFinance for developing exotic derivatives pricing models.



www.scicomp.com

2. In-House Design of Pricing Model and Implementation through SciFinance

SciFinance is ground-breaking software for building derivative pricing models. Using an intuitive, very high-level programming language (VHLL) for describing financial contracts and numerical methods, SciFinance provides a friendly, versatile environment in which to make and implement modelling decisions. Specify the choices that are important, then let SciFinance handle the rest using its extensive knowledge base.

SciFinance eliminates programming by automatically translating model specifications for any financial derivative that can be priced using any series of partial differential equations (PDEs) or stochastic differential equations (SDEs) into fully documented C-family/CUDA source code in minutes. SciFinance generates wrapper code (in Java, Python, .xll, COM, or .NET) to automate integration without imposing proprietary data models.

Why SciFinance

SciFinance was the preferred technology approach for the following key reasons:

- Cost-effective and highly-efficient technology for quickly developing pricing and risk models for exotic option instruments.
- High degree of customization that is possible with using SciFinance combined with the ease of implementing complex numerical schemes.
- Resulting code is robust, thread-safe and highly optimized which is an essential requirement for building third party libraries for incorporation into existing production systems.
- Automatic generation of CUDA-enabled source code for any Monte Carlo simulation pricing and risk model. Clients need not become experts in CUDA or parallel computing in order to greatly accelerate pricing performance.
- The ability to rapidly prototype and extend pricing to use multi-factor volatility models.

SciFinance Effectively Addressing the Challenges

1. Economical approach for developing robust exotic derivatives pricing models


By reducing model development time, SciFinance effectively frees up scarce quant resources so they are able to support both existing day-to-day activities and develop complex exotic pricing models. In contrast, an in-house model development solution would require dedicated resources that would be unable to assist with ongoing trade desk support issues.

2. Rapidly prototype and assess alternative pricing model approaches

A key advantage SciFinance has over manual code development is the speed in which the pricing model code for new schemes can be generated and tested. Rather than taking days or weeks to complete, SciFinance reduces the code generation process to a matter of minutes. SciFinance automatically generates Excel spreadsheets and add-ins as well as code wrappers (e.g., JAVA, COM, .Net, Python) so the new code can be immediately tested and assessed.

Trading and sales desks operate globally and at times compete simultaneously with end-of-day operations, so processing speed is an important consideration. The need for developing pricing model source code that is computationally efficient while not necessitating a sacrifice in numerical accuracy is crucial.

SciFinance automatically generates C-family pricing model source code from concise, high-level model specifications written in a flexible and extensible language. SciFinance's flexible modelling architecture provides support for all asset classes and allows for any variety of payoffs. The synthesized code is globally optimized and well documented. SciFinance ships with a detailed reference manual and hundreds of model specifications. The synthesized code is globally optimised and well documented. SciFinance ships with a detailed reference manual and hundreds of model



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specifications. All pricing model specifications are customizable and composable.

3. Efficient implementation of robust, stable and performant risk calculations

More than just providing a means for being able to easily specify payoffs, SciFinance exposes many sophisticated numerical techniques that are indispensable for generating pricing code that is fast as well as being numerically stable, a crucial requirement for incorporating external created pricing models into any production system.

4. Easy and economical integration of derivatives pricing models with a third party risk application.

CBA has successfully integrated its exotic options analytics into a third party risk management application via the application's API. Two essential requirements for the SciFinance generated code is that it be tuned to run in a highly efficient manner and be thread-safe so that function calls can be safely distributed over a computing grid. The SciFinance generated code is easily incorporated into an existing function library and is readily adaptable for being integrated into external third party platforms.

Conclusion

SciFinance provides CBA with a cost-effective and robust derivatives pricing model development technology that allows for the rapid development of exotic pricing models that can easily and efficiently be integrated into a third-party vendor system.

Through the use of SciFinance, CBA:

- Has reduced model development time, effectively freeing up scarce quant resources.
- Can efficiently access many sophisticated numerical techniques that are indispensable for generating pricing model code that is fast as well as being numerically stable.
- Can quickly develop and test pricing model codes for new schemes.



For Further Information

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