



The Nonlife Reserving Platform for the Solvency II Era



DEVELOPED BY

ADVANCED RISK & CAPITAL SOLUTIONS (ARCS)

A Matrix Group Company

IN COLLABORATION WITH



Cass Business School

CITY UNIVERSITY LONDON

SYSTEMS AND PROCESSES: SOME FUNDAMENTAL QUESTIONS

- Are you sure your reserving practice follows a proper actuarial modeling process?
- Can you eliminate analysis done on error-prone spreadsheets and fragmented processes?
- Would you like to spend less time on collecting data and constructing actuarial datasets and more on actually performing the analysis?
- Are there an increasing number of actuarial users within your organization that require access to the reserving projects but have to be properly managed?
- Are your datasets and models reliable? Do you have the necessary security, audit and control capabilities?
- Have you examined the benefits from having a reserving platform fully integrated with your Solvency II model?

RESERVING THEORY AND PRACTICE: AN ESSENTIAL CHECKLIST

- Would like to be able to perform analysis using the full spectrum of the deterministic methods in less than a minute?
- Are you able to incorporate actuarial judgment through proper parameterization while being able to trace every step?
- Do your current tools allow you to go beyond traditional deterministic point estimates? Are you able to produce a distribution of possible outcomes?
- Is the theory behind your methods transparent to the actuarial user and based on recognized actuarial bibliography?
- Is your stochastic model based on a properly defined statistical model backed by recent scientific research?
- Do you have the diagnostic tools to check the suitability of a method?
- Does your model calculate all Solvency II inputs directly from the data?

Res-timator® has been designed to enable you to answer **YES** to all these questions.

CUTTING-EDGE RESEARCH

STATE-OF-THE-ART IMPLEMENTATION

TRUE STOCHASTIC FRAMEWORK

SECURITY, AUDIT AND CONTROL

STREAMLINED PROCESSES

SOLVENCY II ENABLED PLATFORM

CUTTING-EDGE RESEARCH

The software has been developed in collaboration with the Actuarial Faculty of the Cass Business School, which has been ranked 2nd globally in actuarial research by the North American Actuarial Journal.

The leader of the research team is Cass Prof. Jens Perch Nielsen, a renowned expert in the field who is best known for his groundbreaking work on the Double Chain Ladder stochastic modeling framework.

The stochastic module of the Res-timator® is the first implementation in a commercial application of the actuarial research carried out at Cass Business School on the Double Chain Ladder. All academic papers used in the application have been peer-reviewed and published in prominent statistical and actuarial science academic journals.

The research team comprises of another world class academic in the field of mathematical statistics, a Phd fellow at Cass, and a full time ARCS employed researcher. The team is currently working on several academic papers which are expanding current knowledge while tackling practical problems faced by practicing actuaries. The outcome of this research will be part of future releases of the Res-timator®.

A TRUE STOCHASTIC FRAMEWORK

Stochastic models can produce a full distribution of possible outcomes and a formal process for estimating the variance, percentiles as well as other useful statistics.

The Double Chain Ladder (DCL) framework is not only a true statistical model defined at the micro-level but it also provides explicit parameterization that has an intuitive appeal to the actuary and it is useful for applying or explaining actuarial judgment.

By using accident inflation and delay probability instead of the non-interpretable forward factors as the parameters, the incorporation of prior or expert knowledge becomes a systematic and explainable process.

Both IBNR and RBNS cash flows are calculated separately on a full distribution basis. The volatility of the cash flows for a single line of business is also measured, as well as the correlations across various lines. Especially useful under Solvency II, the DCL module enables a truly stochastic view of the outstanding liabilities one, two, or “n” years from now, along with discounting and risk margins.

The parametric bootstrapping approach employed is the result of extensive research so as to avoid the pitfalls of the early bootstrapping methods. There are two simulation options, with and without parameter uncertainty.

The stochastic module also includes a validation procedure for the models chosen, which estimates point error, calendar and accident year error as well as relative error.

STATE-OF-THE-ART IMPLEMENTATION

The Actuarial Team at ARCS have carried extensive research to make sure that we have included almost all the traditional methods practicing actuaries have been using the last twenty five years.

With great attention to detail and with the clear intention to permit the actuarial user to incorporate actuarial judgment through a structured and controlled manner, we have enabled parameterization in almost all of the methods. When available, generalized forms of the methods were chosen but with the automatic ability to reduce to the standard.

In addition to the known development methods we have included methods like Frequency/Severity, Munich Chain Ladder, Ghezzi's Hindsight, Brosius Least Squares, as well as the Berquist-Sherman techniques on a separate module which enables creation of the adjusted triangles.

Tail modeling is also available on paid triangles, with 3 different methods, while *a priori* Loss Ratios can also be calculated using a Weighted Least Squares algorithm.

Diagnostic tools are available to help the user decide which method is most appropriate (or which combination). The Diagnostics can be applied to any method and include a list of residuals, residual graphs, normality plot and test, whisker graphs for outlier detection and distribution chart.

The Actuarial Modeling Process Embedded in Res-timator®



SOLVENCY II ENABLED PLATFORM

Through its standard features, for example, Reserve and Premium Provisions or Undertaking-specific parameters, but also through company-specific customizations, Res-timator® will provide all necessary inputs for the standard Solvency II model and will integrate with the standard model where needed to facilitate the calculation of the Risk Margin.

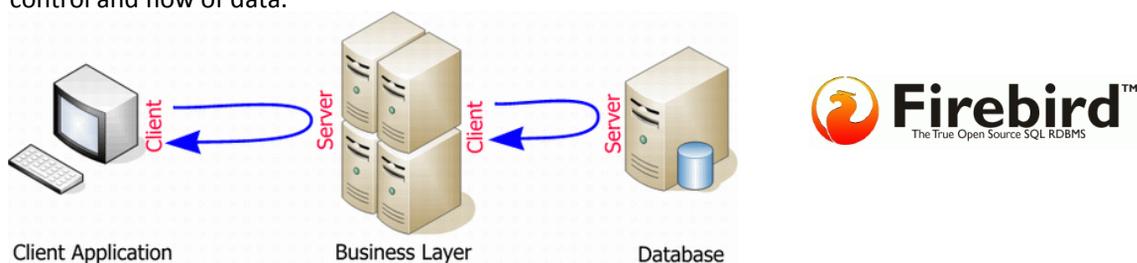
Our objective is to assist companies who want to use USP's for their SCR calculation to get regulatory approval. Res-timator® can help to:

- Provide evidence that the data used to support the calculation of USPs is complete, accurate and appropriate.
- Justify that each standardized method to calculate the USP parameter for each segment provides the most accurate result of the calculation of the SCR.
- Justify that the USPs better reflect the underwriting risk profile of the company than the standard parameters.

SECURITY, AUDIT AND CONTROL

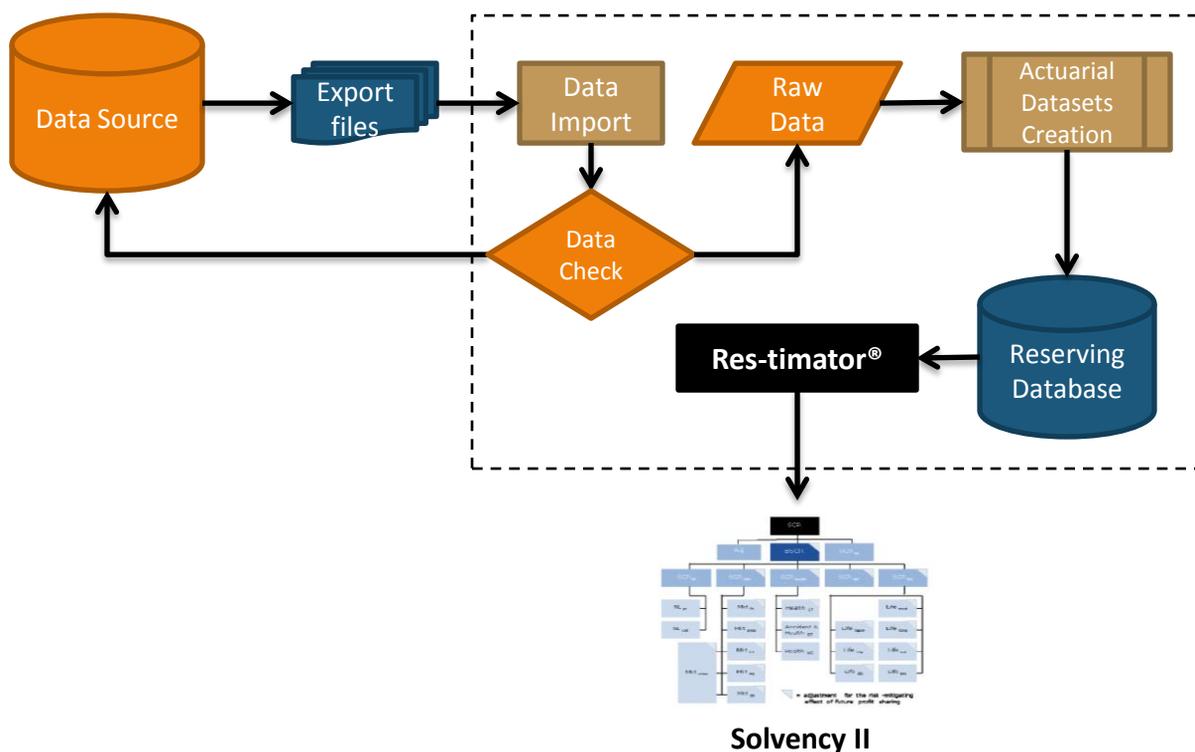
Insurance companies face increased business and regulatory pressures that require integrated data systems and effective processes. Res-timator® can adapt to your particular business needs while providing data access in a secure and controlled way. Satisfying regulatory requirements was also one of our top priorities.

Built on a 3-tier architecture design (client - application server - database) while relying on the Firebird database, the most advanced enterprise level open source database system available, Res-timator® incorporates full audit and security features to ensure a robust environment for storage, retrieval, control and flow of data.



For ease of access, back-up and control, data will be kept in 3 distinct databases: one for user security, one for the actuarial data and audit, and one for the raw data where original data files will be imported after the necessary validation process.

STREAMLINED PROCESSES



With Res-timator[®], as with all our solutions, we strive to be relevant and effective to your needs. We can provide a full enterprise reserving solution that can streamline your reserving processes and integrate seamlessly with your Solvency II model.

We provide the customization, training and knowledge transfer that you require to achieve your goals.

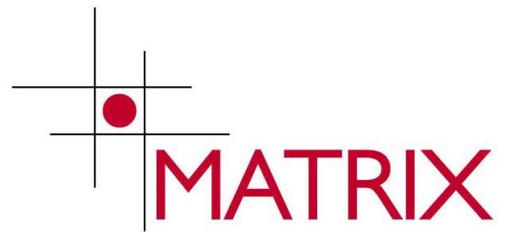
Contact us to see how we can help you reengineer your reserving function.

+357 22516751

+357 99519467

arcs@matrix-brokers.com

www.matrix-brokers.com



MATRIX is a leading independent reinsurance broker in providing innovative and structured products and services that create economic value for insurance companies. A registered Broker at Lloyd's since September 2012, **MATRIX**, with offices in 3 continents, builds worldwide reinsurer relationships, while maintaining small business service and values.

During 2014 **MATRIX** won the award of Best Broker (with GWP < \$1bn) for Client Service in Europe and took the second place at the Global Awards. In the same year **MATRIX** was awarded the national innovation award from the Athens Chamber of Commerce.