DATA STATISTICS

ANALYSIS MATHEMATICS

AUSTRALIA INFORMATION

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NEWSLETTER

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Recent events in the financial and insurance worlds have generated much discussion of "risk management", often without defining what is meant, with seemingly contradictory expressions such as "planning for unexpected events". In this difficult area statisticians can provide a rigorous framework that gives practical solutions to these problems.

Dr John Henstridge
Managing Director

Modelling Uncertain Risks in a Risky Market

When will you retire? How much money will you have to live on after retirement? And what income and savings will you need to invest to achieve your financial goals?

Important decisions are made in an uncertain market environment, particularly for younger adults who have a longer working future ahead. To help people meet retirement goals, a large financial management firm turned to Data Analysis Australia to assist in building a forecasting model. The model was to incorporate something that the financial industry in Western Australia previously found difficult to present to customers – the variability of future markets and how that would really affect their customers' financial future.

Understanding variability and risk is a natural problem for statisticians. The challenge was to combine an understanding of risk with a correct model of a person's finances, not an easy task when superannuation and tax rules must be considered. Data Analysis Australia recognised simulation as being the most appropriate method since it allowed the exact application of tax and accounting rules at the same time as considering a range of possible scenarios for financial markets.

A key component was the modelling of future returns. Obviously the only data available was from past returns, measured by standard indices that are closely linked to investment classes. The precise choice of indices was the first step, involving a detailed understanding of the business model. The eventual selection included a mix of indices covering the International, Australian and Emerging Markets.

A detailed statistical analysis followed, examining features such as average returns, variability, correlations and the precise distributions. The last feature involved the development of some proprietary methods for efficiently simulating the heavy tailed distributions encountered in finance – it is no longer good enough to assume that returns follow a normal distribution since financial markets are subject to shocks that can distort returns.

Many other features of financial returns, such as the most appropriate way of handling inflation were also considered. Even this requires some care since inflation tends to be correlated with nominal investment returns.

Data Analysis Australia also identified the most appropriate software environment for the simulations – the program Visual DSS developed by Perth company, Trueblue Systems. This is a sophisticated financial modelling system that has many advantages over spreadsheets such as Excel – it has a succinct language for clearly specifying complex models and it has simulation or risk analysis facilities built in. This meant that there were no compromises between incorporating all the accounting rules and carrying out the risk analysis.

Data Analysis Australia also assisted in the design of the Web based front-end, ensuring that the displays followed good statistical practice and were as informative as possible. The presentation of inflation effects was critical here since the models typically cover several decades.

The resulting simulations can answer questions such as "what is the probability that the client will meet their financial goals?" This goes far beyond traditional modelling that only considered the "most likely" outcome without saying how likely it really was. Clients can then see the result of changing investment portfolios to empower them to choose the balance of return and risk that is right for them.

Staff Profile - Meredith Regan

Where do you go after you have completed degrees in Statistics and a Mechanical Engineering? For Meredith Regan the completion of this challenging combination of university courses led her to Data Analysis Australia early in 2001.

During the 3 years that Meredith has spent at Data Analysis Australia she has utilised both mathematical and engineering techniques to assist clients in a wide range of industries.

Meredith is the Account Manager for a range of projects for Western Power (for which she is ideally suited by her engineering background), which involves planning and co-ordinating the overall research in addition to managing a number of projects. Meredith has particular expertise in mathematical modelling, forecasting and time-series analysis. Meredith is also experienced in the design and management of surveys and using conjoint analysis to provide solutions to problems where trade-offs and preferences need to be quantified.

She will be part of the Data Analysis Australia delegation at the Australian Statistical Conference in Cairns later this year where she will be presenting a paper on modelling water consumption.

When she is not at work Meredith keeps busy by playing the Violin and Cello, juggling and learning languages and has recently taken up Tae Kwon Do to handle any troublesome clients!

Analytical Ideas

Data Analysis Australia has started a new series of short discussion papers titled Analytical Ideas. It is intended that a range of topics will be covered, discussing developments that are relevant to our clients and giving something of Data Analysis Australia's approach to solving problems. These are available on our website at www.daa.com.au/analyticalideas

The first in this series is **Surveys, the Internet and Data Entry**. It covers the impact of Internet technologies on traditional surveys, both as a means of carrying out surveys and as a way of improving the back room tasks of data entry. The technologies include the use of the Linux operating system and the Python language. The example of data entry is the Perth and Regions Travel Survey (PARTS) that is one of the most complex surveys currently being carried out in Australia at present.

The paper can be found at www.daa.com.au/analyticalideas/2004/dataentry.html

Company News

James Henstridge was an invited speaker at the Australian Linux Conference (linux.conf.au) recently held in Adelaide. James spoke on Remote Control and Scripting of Gnome Applications with Python, demonstrating how the accessibility framework of the Gnome desktop can be used to automate applications.

Over the Christmas vacation **Elspeth M^{ac}Kay** has been working at Data Analysis Australia as a vacation student. Ellie has been seeing how real statisticians work before resuming her studies at the University of Western Australia.

John Henstridge was recently invited to assist in a review by the World Health Organisation of a major clinical trial of a HIV immunisation vaccine in Thailand. John provided independent statistical advice on the design and most appropriate analysis. The trial itself was testing a vaccine that has the potential to delay or prevent the progression into full AIDS in a way that is affordable for third world countries.

Classic Quote

True, the average rate for the year as a whole, though on the high side, is not too bad, but that is like assuring the nonswimmer that he can safely walk across a river because its average depth is only 4 feet.

Martin Freidman
Newsweek

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