

# Making the Model Smarter

A Towers Watson senior consultant gets excited about Replicated Stratified Sampling, which combines speed and simplicity.

For Towers Watson senior consultant and University of Connecticut Professor Jeyaraj (Jay) Vadiveloo, 2012 has been a breakout year.

This has been the year the U.S. Patent and Trademark Office issued Towers Watson two patents related to Replicated Stratified Sampling, a new "smart modeling" statistical sampling technique discovered by Vadiveloo and designed to speed up run times for complex insurance calculations.

For Vadiveloo, who had been working on his Replicated Stratified Sampling technique with the help of his students for the past three years,

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it's been worth the wait. "It took a lot of trial and error, and it took some time, a lot of time," Vadiveloo said.

So audibly excited was Vadiveloo upon the discovery of the sampling technique that his Towers Watson colleague, Steve Bochanski, had to slip away from a cubicle into an office and shut the door so as to not disturb a client.

"I'm sitting in a cubicle and you could hear him screaming through the phone and I had to get up and go to an office for quiet," said Bochanski, a senior consultant with Towers Watson familiar with Vadiveloo's work. "He's very excited about it. He's got a touch of the 'nutty professor' in him."

Life insurance companies, who need to run models on millions of policies with 30 year tails or longer, are giving the statistical model a serious look, he said. But what does his discovery mean for risk managers in the property/casualty segment?

Replicated Stratified Sampling is a tool for analyzing long-tail risks. Long-term care policies and workers' comp policies where frequency and severity affect payouts that could extend many years into the future are obvious candidates for his new sampling technique, Vadiveloo said.

The technique has been "empirically tested" as a tool to analyze complex actuarial applications such as Solvency II modeling, stress testing, setting reserves for variable

annuities, profitability analysis and economic capital modeling.

"Anytime you have a lot of information that can be impacted by several variables," Vadiveloo said, "that is the potential for RSS."

Actuarial departments are filled with other off-the-shelf and custom sampling techniques. Monte Carlo simulations and a technique known as "model compression" come to mind, as does RSS' cousin, scenario sampling.

These statistical techniques are not always reliable, said Vadiveloo, who also serves as director of the Goldenson Actuarial Research Center

at the University of Connecticut, and other reliable techniques don't always work well with a company's computer systems.

If that's the case, what is it about the Towers Watson method that makes it worth a second look?

Speed and simplicity, Vadiveloo said. RSS, which is licensed by Towers Watson, is robust enough to work with existing modeling software. Run times

are much quicker under RSS because the technique remains accurate even by running smaller data samples, according to Towers Watson.

Vadiveloo said the fact that his sampling model was a success didn't come as a surprise. "But the speed and accuracy of this model surprised me."

If Vadiveloo and Towers Watson can license the statistical modeling technique to the financial services industry, the discovery may turn out to be one of Vadiveloo's most cherished — and lucrative — moments, certainly since he emigrated to the United States from Malaysia at the tender age of 22, before going on to earn a Ph.D. in theoretical statistics.

Looking back at Vadiveloo's career, there were plenty of signs that he would one day apply his prodigious mental talents to a new statistical technique thoroughly grounded in the analysis of the everyday life.

After earning his doctorate at the University of California, Berkeley, Vadiveloo went on to teach statistics at Syracuse University and then at the University of Oldham.

But it wasn't long before he yearned for a practical outlet for his statistical research, which led him to pursue the actuarial science profession and work for insurance



JEYARAJ (JAY) VADIVELOO, SENIOR CONSULTANT, TOWERS WATSON, AND UNIVERSITY OF CONNECTICUT PROFESSOR

and consulting giants Connecticut Mutual, Mass Mutual, Aetna Financial Services, ING, Deloitte Consulting and finally Towers Watson.

Vadiveloo, with his thick mane of salt-and-pepper hair flowing down over his shirt collar, looks every bit the professor over the corporate actuary. But he bridges the world of academia and practical actuarial solutions in a way that not many others trained like him do.

That is why his skills are such a valuable commodity in the risk management and insurance marketplace.

"It's tough to find that combination of academic and problem-solving skills," Bochanski said.

Vadiveloo has not only invented a new statistics-based financial modeling technique, but he's doing his best to make sure it's being put to good use.

— By Cyril Tuohy



MAKING THE world of the computerized model gleam with greater clarity is the goal of Towers Watson's Jeyaraj (Jay) Vadiveloo.