



AMERICAN ACADEMY *of* ACTUARIES

March 6, 2000

Mr. Arnold L. Dutcher
Chairman, NAIC Securitization Working Group
NAIC
2301 McGee
Suite 800
Kansas City MO 64108-2604

Dear Mr. Dutcher,

At the October, 1999 NAIC meeting the NAIC Securitization Working Group received the American Academy of Actuaries (Academy) report *Evaluating the Effectiveness of Index-Based Insurance Derivatives in Hedging Property/Casualty Insurance Transactions*. In the paper the Task Force identified five statistics that could be considered to evaluate hedge effectiveness. They also indicated that additional research needed to be performed to determine which statistic or combination of statistics provided the best indication of hedge effectiveness. At that meeting the Securitization Working Group requested the Academy to continue with research to evaluate the appropriate statistical measures and specific criteria that regulators should consider in determining the effectiveness of index-based derivative transactions. This letter and the attached report are the result of the additional research the Working Group requested.

Throughout this process the Academy Task Force has been working with the Valuation, Finance and Investments Committee (VFIC) of the Casualty Actuarial Society. The attached report is the work product of VFIC under the guidance of the Academy Task Force. We have reviewed the results of their research and believe that proposed statistical framework and criteria for hedge effectiveness should be considered by the Working Group as the basis for evaluating hedge effectiveness for index-based transactions.

The results of the research indicated that had identified the appropriate statistics for consideration. It also indicated that a hybrid of the statistics provided the best indicator of hedge effectiveness.

The original statistics identified were:

- ◆ change in expected policyholder deficit (EPD);
- ◆ change in Value at Risk (VaR);
- ◆ change in standard deviation;
- ◆ coverage ratio; and
- ◆ correlation.

The revised statistics, which are further detailed in the attached report, which represent a

combination of the above, are:

- ◆ change in Tail Value at Risk (TVaR) – this is a melding of the EPD and VaR measures above.
- ◆ change in standard deviation (StD) – this is similar to the above measure except that it is modified to include the cost of the hedge and as a result measures the potential for investment gain.

The TVaR statistic is a one tailed test, while the StD is a two-tailed test.

These statistics are utilized to measure risk reduction of the transaction. The reduction of risk using these statistics are defined as:

$$\text{Reduction in TailVaR} = 1 - \frac{\text{Post-Hedge TailVaR}}{\text{Pre-Hedge TailVaR}} \quad \text{and}$$

$$\text{Reduction in StdDev} = 1 - \frac{\text{Post-Hedge StdDev}}{\text{Pre-Hedge StdDev}} .$$

Based on the research completed we believe that if it can be shown that both, the change in TVaR and StD (Post-Hedge – Pre-Hedge), are less than 0 then the transaction is effective. If one or both record positive values then transaction has a high potential of producing returns that exceed the hedged exposure and should be considered an investment.

We have also evaluated the remaining original statistics, change in coverage ratios and correlation. In the case of coverage ratios, the statistic is highly sensitive to the attachment point and treatment of the zero loss scenerios. With respect to correlation, the StD statistic is a variation of the correlation statistic. The correlation statistic does not take into account the price of the options and has properties similar to the standard deviation and is therefore eliminated.

These findings have been based on research using hurricane loss data, commonly used industry models and actual company exposure data. While we believe that these statistic and qualifying criteria apply to other risk exposures additional testing may be necessary to validate this assumption.

The Academy appreciates this opportunity to assist the NAIC Securitization Task Force and are available to answer any questions on this letter and attached report.

Sincerely,

Frederick O. Kist, Chairman
American Academy of Actuaries
Index Securitization Task Force

