



Risk Prediction and Dynamic  
Risk Management - Friend or foe?

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## RISK PREDICTION AND DYNAMIC RISK MANAGEMENT - FRIEND OR FOE? WILLIAM I. RIKER

Hurricane forecasters and prognosticators had their heyday during the first seven months of 2006, as the increased hurricane activity of 2004 and 2005 greatly raised the public's awareness of hurricane risk. Predictions of an imminent and dire hurricane season abounded, and fear persisted all along the Atlantic coast of the United States.

Yet, the 2006 season ended up being an average year for hurricane activity, and a below average year for hurricanes making landfall in the U.S. How can we understand these missed predictions and how will they impact predictions in the future?

### Dynamic Risk Management and Seasonal Hurricane Forecasting

2006 can be considered the first year in which insurance and reinsurance companies practiced a version of dynamic risk management in conjunction with seasonal hurricane predictors of risk. The result of this first unknowing experiment was that those companies that chose not to heed the forecasts ended up better off than those who took the warnings as binary predictions, or given outcomes. Moreover, reinsurance companies that reacted to the warnings and avoided the risk may have, in some cases, been perceived as unresponsive to their clients' needs. Obviously, this outcome would not entice companies to embrace short term forecasts in the future.

In order to navigate our way through this new world of forecasting, it is helpful to review the history of seasonal hurricane predictions.

Just as the basic science of catastrophe modeling did not emerge until the mid-1980's, seasonal predictions of hurricane activity did not really start until then as well. Dr. William Gray of Colorado State University, a pioneer in hurricane forecasting, publicly released his first seasonal forecast in 1983. In the mid-90's, after a number of catastrophe based reinsurance companies were established in Bermuda, the Risk Prediction Initiative (RPI) was launched. It was sponsored by several of these new companies and managed through the Bermuda Biological Station for Research. RenaissanceRe was one of the original founders of the RPI.

The RPI provided funding to many of today's leading forecasters, such as Chris Landsea, Jim Elsner and Bill Gray. The RPI performed a series of studies in the area of forecasting, and those companies that participated became much better calibrated as to the true state of the art in hurricane risk forecasting. Some of the conclusions were:

- 1) Seasonal forecasting (2 - 9 months) is very complex and difficult, with most forecasts being statistical in nature. The direct link between the statistical factors and the physical process taking place within the atmosphere are often not completely understood.
- 2) There seems to be some skill in the ability to forecast basin wide trends (i.e. Atlantic basin), but most often the actual risks are tightly geographical in nature, which makes the damage correlation difficult to assess.
- 3) Some of the stronger correlations between factors, such as the North Atlantic Oscillation ("NAO"), which refers to a pattern of atmospheric variability over the North Atlantic, and the El Nino-Southern Oscillation ("ENSO"), do not themselves lend very well to credible seasonal forecasting. Consequently, forecasts for hurricane activity cannot be any better than their components.

In the end, we believe that although there is useful information in the seasonal forecasts, they did not have the geographic credibility that would cause us to significantly change our risk measures and ultimately impact the products we provide to our clients.

After the hyperactive 2005 season, there emerged many different groups conducting seasonal hurricane forecasts. Our analysis indicated that most were using some derivative of the statistical forecasts originally devised by Bill Gray. Significant additional work had been done in many instances, but the basic science was similar. Though interesting, we did not see a credible basis for raising our rates due to short term forecasts. The storms of 2004 and 2005 did convince us that we are clearly in a decadal period of increased hurricane frequency, which is reflected in our risk models, but we are still a long way from incorporating into our client pricing models predictions regarding a specific number of storms that might make landfall in any given season.

### What We See for the Future

So, practically speaking, what does this mean for the future of hurricane risk prediction?

- 1) We can expect that risk prediction will improve as numerical models, which attempt to simulate the complex physics of the atmosphere, grow increasingly robust.
- 2) We believe that over time, companies will evolve to manage risk more dynamically, as products and services become more influenced by predictions.
- 3) Analytics will be improved, both for those who assume risk and for those who transfer risk to others.
- 4) Conflicts will arise in the public policy arena, as near term projections can cause instability in markets. The current situation in Florida is a good example of this effect. The insurance markets increased their perception of risk, and as a result the state government has been drawn in to deal with the resulting consumer unrest due to the increase in pricing.
- 5) The issue of global warming adds an additional dimension to this complex situation. We will have to ask ourselves how well the past can be used to predict the future when climate change could make historical data less useful.

In the future, the skills required by all market participants will need to change and be upgraded from the current static view of risk. At RenaissanceRe, one of our highest corporate goals is to innovate in response to our changing understanding of risk and how we can better manage it.