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Trends and compensation

Derivatives traders, geologists, and insurance companies rely on mathematical models to forecast the likelihood of abruptly occurring events such as corporate bankruptcies, earthquakes and deaths.

We present a probabilistic framework in which to analyze event risk. Our setup accounts for the evolution of relevant information over time as well as the uncertainty surrounding that information. The need for event risk models that incorporate these features is highlighted by the recent accounting scandals at Enron, WorldCom, and Tyco. In each of these cases, management withheld and misrepresented the facts.

The mathematical underpinnings of the model are submartingales, which are stochastic processes that have an average upward trend. We explore the interesting relationship between the analytical attributes of the trend and the probabilistic nature of events. We then isolate the trend and use it to estimate event arrival probabilities and to value securities with event-contingent payoffs.

Many of the elements of our model are found in the work of Paul-Andre Meyer, Claude Dellacherie and Marc Yor from the 1970's.