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Conventional risk analysis is not well equipped to analyze actions with unknown probabilities and potentially disastrous consequences, and uncertainty in these situations is especially dangerous. The precautionary principle provides some guidance about these problems, but lacks specificity. We urgently need new ways of thinking about these issues.

Luckily, some new techniques have emerged for appraising potential catastrophic outcomes. These techniques can be applied to a wide range of contemporary policy areas including climate change, nanotechnology, nuclear waste disposal and financial markets. Applying fresh tools to these pressing policy areas provides insight into precisely how much caution is needed in approaching each issue, and how much confidence we can hope to have in our predictions about these complex hazards and new technologies. Here's a [research paper](#) exploring those issues in depth.

More specifically, economic modeling and policy analysis are often based on the assumption that extreme harms are highly unlikely, in the technical sense that the "tail" of the probability distributions is "thin" - in other words, that it approaches rapidly to zero. Thin tails allow extreme risks to be given relatively little weight. A growing body of research, however, focuses on the possibility of [fat tails](#), which are common in systems with feedback between different components. As it turns out, fat tails and uncertainty often go together. Economic theories of "ambiguity" deal at a more general level with situations where multiple plausible models of reality confront a decision maker. Ambiguity theories are useful in considering systems with fat tails and in other situations where the probabilities are simply difficult to quantify.