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Climate Risks: Lessons from the Financial Crisis

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- A black swan is an event that is highly improbable but whose consequences are huge, possibly incalculable.
- Financial models that ignored black swans contributed to the deregulation of the financial industry over the past three decades.
- Climate change models that ignore black swans conclude that nothing should be done to avoid climate change because the costs of reducing emissions today are unjustifiably high.
- Yet as the global financial crisis shows, black swans exist. Therefore, an appropriate assessment of risk recommends taking precautionary measures to avoid climate change.

Among the many talking points that Wall Street emphasized in its successful efforts to de-regulate the financial industry over the past three decades was that it was more sophisticated now than it was back in the 1920s – it knew how to manage risk. The mantra that financial firms were doing a better job managing risk was no doubt a comforting thought for politicians from both major political parties who voted repeatedly to dismantle old regulations and permit new, unregulated financial firms to grow and dominate the industry.

Unfortunately for the rest of us, events have proved otherwise. The financial industry was not quite as sophisticated as it thought.

At the same time that the financial industry was building its risk management models, economists were constructing their own, ever more complicated models to assess the risks of climate change. Despite the emerging consensus from scientists that climate change posed significant and potentially catastrophic risks, these economic models purportedly demonstrated that the costs of emissions reduction in the present could not be justified by the future benefits of avoided damages from climate change. That these models were able to reach conclusions so at odds with climate science is surprising, but ultimately can be explained by the fact that these models ignored certain risks.

[1] Economics for Equity and the Environment Network (E3) is a nationwide network of economists developing arguments for environmental protection with a social equity focus. For more information, please contact Kristen Sheeran, Director, at ksheeran@e3network.org. E3 is a program of Ecotrust.

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Analyzing risk in the financial industry and the risks of climate change comes down to the following: How should we take into account events whose likelihood of occurring is extremely small? The standard answer is that we can ignore events with minimal probability of occurrence. This is reasonable, as long as the consequences associated with such highly improbable events are comparable in magnitude to the consequences of much more probable outcomes.

But what if the consequences of a highly improbable event are exceedingly large – bordering on the incalculable? Combine "incalculable" with "highly improbable" and you have two good reasons for analysts to avoid what is now popularly referred to as a *black swan* – an event that is highly improbable but whose consequences are so disastrous that they dwarf the consequences of more probable outcomes. Black swans are to finance and climate change what hanging chads were to Florida election officials – the nightmare everyone would like to ignore. But we ignore black swans at our peril – which is unfortunately what financial deregulation and failure to take precautionary measures to avoid climate change amount to.

The danger of black swans is becoming increasingly well recognized. Nassim Taleb popularized the notion of "black-swans" in his best-selling book of the same name. The book criticizes the Black-Sholes and Capital Assets models that revolutionized Wall Street for ignoring these types of risks. Hedge funds place bets that almost always generate small gains and only risk large losses once in a blue moon. By leveraging their bets heavily, hedge funds magnify the small gains into much larger percentage gains for their clients, which predictably roll in year after year. The hedge fund then pockets a 2% management fee and 20% of client profits over some minimum rate of return each year. Year after year, the hedge funds pay their clients handsomely, while paying themselves royally. This creates the illusion that blue moons don't rise over their hedge fund.

But sooner or later a blue moon will rise over every hedge fund placing bets. By leveraging bets, hedge funds not only magnify gains on all the normal nights, they also multiply the magnitude of a loss when the blue moon does appear. Consequently, when the blue moon finally rises clients are wiped out, but the fees and profit shares of the hedge fund usually are not. Only when hedge fund managers are foolish enough to invest their gains alongside their clients' investments do the managers go down with the ship. That is, only when managers forget that they are exploiting the predictable tendency of clients, who they have carefully conditioned with an uninterrupted string of white swan sightings to discount the likelihood that black swans can exist, do they also fall victim to their own scheme.

The global financial crisis has unleashed a large flock of black swans over many hedge funds simultaneously, shattering the illusion that none could exist. We may be witnessing the end of an era defined by this particular financial scam. But protecting wealthy investors from hedge fund scams is the least of our concerns. The shockwaves those swans have sent throughout the global financial system threaten all of us, because banks that were too big to fail were allowed to play Russian roulette with our funds by investing heavily in hedge funds. If we have learned one thing from the crisis it should be this: the interests of those who make short term profits with other people's money in the financial carrying trade do not coincide with the long-run interests of the public at large.

But have we also learned to better manage risks? Climate scientists have warned that if we can't get on a trajectory to stabilize atmospheric carbon dioxide levels within the next ten years, there is a very high probability we'll experience moderate global warming and a smaller, but still real, possibility of passing critical thresholds that will result in cataclysmic climate changes. In light of this evidence, what is the appropriate response?

Economic models that claim that the costs of preventing climate change are not worth the benefits of avoided damages are ignoring the possibilities of black swans and maximizing the expected value of climate policy. If an action almost always produces small negative payoffs and only yields a large positive payoff once in a blue moon, maximizing expected value leads us to reject this course of action. Yet, if people behaved this way in the real world, no one would buy insurance. Profits in the insurance industry hinge on the willingness of buyers to pay more in annual premiums than the expected payout in the event of a blue moon. Insurance is profitable because almost all of us, fearful of incurring a black swan we cannot afford, buy insurance policies with a negative expected value. Yet most of us do not think it is foolish to purchase fire insurance for our homes. Why then, would we think it is foolish to insure the planet against catastrophic climate risks whose costs are literally incalculable?

Ironically, there is every reason to believe the benefits of avoiding even mild climate change would outweigh the costs of avoidance. A few unwarranted assumptions buried in mountains of technical details – such as ignoring whole categories of damages from even mild climate change and undervaluing benefits of avoidance by choosing a high rate of time discount – are responsible for giving the opposite impression. But *even if* avoiding mild climate change were not cost effective, and *even if* cataclysmic climate change was less probable than scientists warn, the appropriate risk model would still recommend the precautionary policy of paying the necessary costs to avoid climate change.

The likelihood of cataclysmic climate change under business as usual emissions scenarios is far greater than the likelihood of a once in a hundred years financial crisis – to borrow the words of

a chastened Alan Greenspan. Even Greenspan now admits that this small probability warrants precautionary regulations on the financial industry given the magnitude of the damages that such an event unleashes. Since both the probability of a climatic black swan and the magnitude of the damages are far greater, the rational choice is to pay our precautionary premiums to insure ourselves against climate change. Arguments that the expected value of our insurance policy may be negative are beside the point. There are simply some risks that are too great to ignore. Haven't we learned out lesson yet?