In Nature’s Casino
With the cost of natural disasters far beyond the insurance industry’s ability to pay, a new market has sprung up to spread the risk. But how do you calculate the odds of catastrophe?

By Michael Lewis

Photographs by Sasha Burzukov  Courting destruction in Palm Beach, Fla.
t was Aug. 24, 2005, and New Orleans was still charmed. Tropical Depression 12 was spinning from the Bahamas toward Florida, but the chances of an American city being destroyed by nature were remote, even for one on the low-lying coast. An entry industry of weather bookies — scientists who calculate the likelihood of various natural disasters — had in effect set the odds: a storm that destroys 85% of insured property should strike the United States only once every 200 years. New Orleanians had made an art form of ignoring such statistics. The Harrises were among the most hardy. Nothing so wild has happened to them since they arrived in the city as a young couple in the early 1970s. Their home, they thought, was built to withstand anything.

When Hurricane Katrina whipped up and destroyed New Orleans, it became abundantly clear how wrong was the widely held belief that it was possible to build a structure that would withstand a hurricane. The building industry was left wondering what it had gotten wrong to build homes that were not even capable of protecting those inside them.

The storm was so powerful that it destroyed 85% of insured property in some areas. The city was left in a state of chaos, with thousands of people homeless and the economy brought to a standstill.

John Seo, a Korean, came to the United States for his Ph.D. in math and became known as a hedge fund manager. He is now a professor at the University of California, Los Angeles, studying the financial crisis.

During the hurricane, Seo was in his home in Westport, Conn., speaking on the phone with his brother. He had just lost everything in the storm, including his home and his business. But Seo remained calm and collected, even as the water rose around him.

Seo had always been interested in mathematics, but he never thought he would end up as a hedge fund manager. He had always been interested in the idea of a financial model that could predict the future.

As the water continued to rise, Seo realized that he had been right. He had been able to predict the hurricane, and he had been able to make money from it.

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course they were; they had made pots of money the past 20 years investing against catastrophic storms. But — and this was her real point — there enabled her to estimate the losses: $13 billion, give or take. If builders in hired a few scientists and engineers, and she set to work acquiring more and start a business. Applied Insurance Research, she called it, or A.I.R. Clark soon found herself in a role for which she was, on the surface at least, ill suited: fanatic. “I became obsessed with it,” she says. One big player in the They had been lucky.

Hurricane Andrew made landfall at 5 on a Monday morning. By 9 she spoke with a single voice: four natural perils had outgrown the insurers’ prepared to lose $30 billion in a single event, once every 10 years. The models showed that a sole hurricane in Florida wouldn’t have to work too hard to hurricanes, and you generate not only dozens of massive hurricanes canes have made in the last 100 years. Generate a few hundred thousand for instance, that the odds of big hurricanes making landfall north of

Karen Clark’s model was, for Seo, the starting point. When he first stumbled upon it and the other companies’ models, he found them “guilty until proven innocent,” as he put it. “I could see the uncertainty in them,” he says, “just by looking at the different numbers they generated for the same storm.” When they run numbers to see what would happen if the 1926 Miami hurricane hit the city today, A.I.R. puts the losses at $10 billion, R.M.S. at $12 billion and Epic at $16 billion. They can’t all be right. But they didn’t have to be exactly right, just sort of right, and the more he probed inside them, the more he felt they were

Investors were occasionally slow to see the appeal of an investment whose first name was catastrophe. As one put it, “My boss won’t let me buy bonds that I have to watch the Weather Channel to follow.”

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they would need to feel there was some reason in the pricing of that risk. “The market,” as Seo puts it, “needs an acceptable mode of failure.”

In the spring of 2001, to the surprise of his colleagues, Seo left his big Wall Street firm and opened a hedge fund — which, he announced, wouldn’t charge its investors the standard 2 percent of assets and 20 percent of returns but a lower, flatter fee. “It was quixotic,” says Paul Paolo, a former executive at Lehman who worked with Seo. “He goes this high-paying job to basically open a business in a garage in a market that doesn’t exist.” Seo opened his new shop with his younger brother Nelson and then brought in their older brother, Michael. (His third brother, Scott, had studied astrophysics but decided that “there was no future in astrophysics” and eventually turned himself into an ophthalmologist.) Seo named his firm Firmat Capital Management, after one of his intellectual heroes. “I had once read the letters between Pierre de Fermat and Blaise Pascal,” he wrote in a recent e-mail message. “From my father I had learned that everything is math. You can get a feel for the world. And so on Aug. 24, 2005, John Seo was waiting, waiting for a storm. And here it came.

Wall Street is a machine for turning information nobody cares about into information people can get rich from. Back when banks lent people money to buy homes and then sat around waiting for interest payments, no one thought to explore how quickly homeowners would refinance their mortgages if interest rates fell. But then Wall Street created a market in mortgage-backed securities and then sought new markets for them. Astute marketeers found a team of oceanographers in Rhode Island called Accurate Environmental Sciences, a company that charted where storms would strike, in marginally better weathermen. For instance, before the 2005 hurricane season, a Bermuda cat-bond hedge fund called Nephila formed a team of oceanographers in Rhode Island called Accurate Environmental Forecasting, whose forecasts of hurricane seasons had been surprisingly good. Nephila rented the company’s services and traded bonds based on the back of its reports. “They kind of chuckle at what we do,” says a trader at Nephila. (“The Weather Channel is the habit of buying in a storm. "The word had gotten out that buy 5 billion dollars in insured losses from U.S. tornados and related weather events in 2006. billion dollars in insured losses from a single 1973 tornado in Georgia

Raising the Roof The aftermath of a tornado near Moore, Okla.

The aftermath of a tornado near Moore, Okla.

When the storm jogged east and struck not New Orleans directly but the less populated, and less wealthy, coastline between Louisiana and Mississippi, they all had the same reaction — relief — but Hemant Shah felt a special relief. Shah is one of the founders of R.M.S., and he was at that moment driving to catch a flight from San Francisco to New York, where he hoped to speak at a conference devoted to predicting terrorism. When he saw Katrina miss New Orleans, he said to himself, O.K., it’s big, but it’s not catastrophic, and he boarded his plane.

As he flew across the country, R.M.S. and its competitors replicated Katrina’s three investments in a storm. All three investors would inevitably become jittery and sell their cat bonds at big discounts, what with the Weather Channel all hysteria all the time. “The worst place to go if you’re taking risks,” says one cat-bond investor, “is the Weather Channel. They’re just screaming all the time.” But entering the 2005 hurricane season, the Seo brothers had reconsidered their habit of buying in a storm. “The word had gotten out that buying in the storm was the smart thing to do,” Seo says. “And we were afraid our past successes would give us an irrational interest in buying. Everything’s all fuzzy in these events. And when things are fuzzy, your brain gives you an excuse to push the envelope. So we adopted a policy, before the season, of staying out of the market.”

A few hours later, Hemant Shah’s plane landed in New York. Shah turned on his BlackBerry and discovered that the New Orleans levees had broken: “My first reaction,” Shah says, “was, Uh-oh, we have a problem.” In the imaginary 100,000-year history of hurricanes that R.M.S. had in its comput-

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Photograph by Sasha Bezzubov

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ers, no hypothetical storm that struck so far from New Orleans had ever caused the levees to fail. The models, like the intuition they replaced, had a blind spot.

The Kamp Re bonds collapsed, the price dropping from the mid-90s to the low 20s. A few weeks later, an announcement from Zuricher American made it clear that the investors in Kamp Re wouldn’t be getting any money back, and Kamp Re’s price fell from $20 to 10 cents. But then the real trouble started: R.M.S., the modeling company, declared that it was rethinking the whole subject of hurricane risk. Since 1995, scientists had noted a distinct uptick in hurricane activity in the North Atlantic Basin. The uptick had been ignorable because the storms had not been making landfall. But between July 2004 and the end of 2005, seven of history’s most expensive hurricanes had struck the American coast, leaving behind 5.5 million insurance claims and $81 billion in insured losses. The rise in hurricane size and frequency was no longer ignorable. R.M.S. convened a panel of scientists. The scientists agreed that unusually warm sea-surface temperatures were causing unusually ferocious and frequent storms. The root cause might be global warming or merely the routine ups and downs of temperatures in the North Atlantic Basin. On cause they failed to agree. On consequence they were united. At the beginning of August 2005, R.M.S. had judged a Katrina-size catastrophe to be a once-in-40-years event. Seven months later, the company pegged it as a once-in-20-years event. The risk had doubled.

It had been just 13 years since Karen Clark’s model swept the industry, but the entire catastrophe risk-taking industry now lived at the mercy of these modelers. The scientists were, in effect, the new odds-makers. It was as if the casino owner had walked up to his roulette table, seen a pile of chips on 00 and announced that 00 would no longer pay 36:1 but would henceforth pay only 18:1. The agencies that rated the insurance companies — S&P, Moodys, etc. — relied on the scientists to evaluate their exposure. When the scientists increased the likelihood of catastrophic storms, S&P and Moodys demanded that the insurance companies raise more capital to cover their suddenly more probable losses. And so in addition to the more than $40 billion they had lost in Katrina, the insurance companies, by edict of the ratings agencies, needed to raise $82 billion from their shareholders just to keep their investment-grade rating. And suddenly they weren’t so eager to expose themselves to losses from hurricanes.

John Seo felt differently. Katrina had cost him millions. But at the same time, in a funny way, it had vindicated his ideas about catastrophe. He had lost only what he had expected to lose. He had found an acceptable mode of failure.

As a boy, John Seo learned everything he could about the Titanic. “It was considered unsinkable because it had a hull of 16 chambers,” he says. The
chambers were stacked back to front. If the ship hit the iceberg head on, the cost of the catastrophe might be far front chamber, but it would likely have to puncture at least three more to sink the ship. “They probably said, ‘What are the odds of four chambers going?’” he says. “There might have been a one-in-a-thousand chance of puncturing a single chamber, but just the odds of puncturing four chambers, they probably thought of it as one in a million. The Republicans, they thought of them as independent chambers. And the chambers might have been independent if the ship didn’t happen to sink.” Lehmans was a big insurance and swerved. By swerving, the iceberg went down the line of a painting,” Seo says. “But if this is so, why are the taste for risk is as arbitrary as the value

“Could Lehman Brothers have been insured against drastic inter

The logic is what Seo stumbled upon back in

The price of insurance is only as clear as the

The insurance companies, John Seo says, are charging customers too

When Katrina struck and his insurance company stood to lose $4 billion, he didn’t know the truth about the catastrophe. He didn’t know anything about the insurance. It was an extraordinary event. His company was not prepared for it. They had

The storm has put a fine point on

Louisiana’s politicians are usu-

John Seo says that, except that it wasn’t. He said that risk itself was

on Wall Street, but there was no hard logic under

The insurance companies are basically

Seo thinks it over. The earthquakes that the

The insurance market is one of the

The tradeoff between price and risk is

The insurance companies are basi-

But their idea of a fair premium for insurance

This is a different lesson for the

And that was that, except it

And swerved. By swerving, the iceberg went down

And that was that, except it

The Titanic offered another lesson for the

Seo thought it over. The earthquakes that the

The insurance cost $2 million

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unwisely or in what his community of investors would consider a professionally unacceptable manner. Investors will endure losses as long as they come in the context of a game they perceive as basically fair, which is why they don’t abandon the stock market after a crash. “That’s all I need to know,” Seo says. “That’s all my clients need to know.” Actually, he goes even further: “I would be embarrassed if we had a big event and our loss wasn’t commensurate with it. It would mean that we didn’t serve society. We failed society.”

Seo’s returns in 2005 were only slightly positive, compared with the roughly 10 to 12 percent he had been delivering, but the demand for his services boomed. He now controls $2 billion, or more than twice what he had before the most costly natural disaster in history. Big investors weren’t scared off by Katrina. Just the reverse. It has led many of them to turn to Seo and others like him to make money from catastrophe. And they probably will. But what interests Seo more is what might happen in the bargain, that the financial consequences of catastrophe will be turned into something they have never been: boringly normal.

**Answers to Puzzles of August 19, 2007**

**Buried Treasure**

S O F A R S P A G H E T T I D I M E S
M A R I E P A T R O L M A N E N E M Y
U T U R N I N T E L L E C T C P L U S
I V E B E E N A M I N E R F O R A
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E G G S H E A R S S N A G S T E E N

*(Charles)* Dickens, American Notes —
What words shall describe the Mississippi, … an enormous ditch, sometimes … three miles wide, running liquid mud, … its frothy current choked everywhere by huge logs and whole forest trees … rolling past like monstrous bodies.

A. Delirium  K. Raleigh
B. Impossible  L. Insightful
C. Cheer up  M. Cherries
D. Klyber Pass  N. All right
E. E.L. Doctorow  O. Nonsmokers
F. Necessities  P. Northwest
G. Sheena  Q. “Oliver Twist”
H. Astros  R. Thumbs down
I. Mighty Mouse  S. Edwin Drood
J. Elmer Fudd  T. Squint-eyed