Managing Weather Risk

Will Derivatives Use Rise?

By Joanne Morrison

Imagine that you run a ski resort in New England and disaster strikes. You get rained out during the all-important week between Christmas and New Year's Eve. There goes your chance for a profitable winter season—unless you happen to be one of the small number of companies that hedge such risks with a weather derivative.

As businesses come up against one of the worst recessions in decades, weather risk is probably not at the top of their list of concerns. But financial crisis or not, a surprisingly broad range of U.S. companies are vulnerable to unexpected fluctuations in weather that can hit the bottom line.

More than a third of total U.S. economic growth is linked to weather conditions, according to Commerce Department figures. A warmer-than-expected winter, for example, will directly impact how much fuel will be burned to heat homes, how fast crops will grow and how much consumers will spend.

Global warming could well increase weather risk by raising temperatures and increasing the unpredictability of weather patterns. The latest data from the U.S. National Oceanic and Atmospheric Administration showed lower precipitation and higher temperatures on average across the U.S. Regional patterns were even more abnormal. The West saw its fourth warmest November on record, while precipitation across most of the Midwest was at levels 50% to 75% of normal levels.

Yet only a small minority of businesses hedge these risks with weather derivatives — futures and options contracts traded on the Chicago Mercantile Exchange and more customized bi-lateral off-exchange transactions - even though these products have been around for a decade. A recent report from CME and the Storm Exchange showed only 10% of several hundred businesses theysurveyed have turned to derivatives to manage their weather risk exposures, even though a majority of firms cite weather conditions as a factor in earnings performance.

"Seldom have executives been so like-minded in recognizing a threat to their business, yet seemingly uncertain about addressing it," CME and Storm Exchange wrote in their study.

Slowly Gaining Traction

CME Group has carved out an important niche in the weather derivatives market, but it has taken a long time for that opportunity to emerge. In 1999, the exchange launched a series of exchange-traded futures and options based on temperature indices for various U.S. cities, but volume did not reach meaningful levels until 2003. Healthy growth came only when the exchange began offering clearing services for these transactions, which currently account for 91% of volume.

Today, the exchange offers contracts on temperature and precipitation indices in 24 cities in the U.S, six in Canada, 10 in Europe, and two in Asia-Pacific. Volume has grown from 798,000 contracts in 2006 to nearly a million in 2007, with notional value in 2007 equaling about $18 billion.

This year volume has been depressed by the turmoil in the financial markets and the general economic contraction, but not as much as other sectors of the futures industry. Total volume for January through November was 737,506 contracts, down by 16% from the prior year. Open interest was 168,542 contracts, down 35% from the prior year. But some industry observers think that the weather risk market will be boosted by the Obama administration's emphasis on wind power and other renewable energy solutions, which are highly dependent on the weather. And the use of a clearinghouse to reduce counterparty risk will make these investments more attractive.

"Now suddenly in a constrained credit environment, products that can de-risk a balance sheet are going to come to the forefront," predicts Martin Malinow, chief executive officer of Galileo Weather Risk Management Advisors, a firm that sells weather protection. He adds that as more and more companies look toward developing alternative renewable energy solutions, weather risk is becoming increasingly more important.

"Now more and more because of renewable energy, you have to grow your energy from the weather every day. We're selling more supply side solutions," said Malinow.

Where does the demand for these contracts come from? The practice is the most common in the energy sector, which accounts for more than half of the total weather derivatives business. That sector is followed by the construction industry and agriculture, according to the Weather Risk Management Association. And while the use of weather derivatives in the energy sector is more common than in any other sector, still just 35% of energy companies manage their exposure to weather through the use of either

A Sample Weather Hedge

Agribusinesses that operate grain elevators are ideal candidates for weather hedges, since grain volume revenues are highly correlated with temperatures during the growing season. Here's how ABC Grain Company, a theoretical integrated agriculture company, might use a customized weather option to protect against an unseasonably hot summer that decreases crop yields, and in turn, gross throughput revenue.

As daily maximum temperatures increase beyond an optimum growing value, the expected crop yield and ABC's elevator revenues will decrease. Let's say that ABC typically generates $15 million in revenues through the growing and harvesting seasons, when average temperatures produce a cumulative 60 cooling (15.56 c) degree days in its grain county area.

The company defines a cooling degree day, or CDD, as the greater of the maximum daily temperature less 88° (31.11 c) Fahrenheit, or zero. For example, a hot summer day with a maximum temperature of 98° Fahrenheit (36.67 c) would produce 10 CDDs. A day with a maximum temperature of 80° Fahrenheit (26.67 c) would produce zero CDDs.

ABC calculates that each CDD above the normal 60 decreases its grain volume revenue by $33,540. Before deciding how much of its exposure to hedge, however, the company looks back over the past 50 years and sees that while the average CDDs generated for the growing season is 60, the standard deviation from that average is 50 CDDs. Buying protection against CDDs within one standard deviation of the norm, it finds, would be prohibitively expensive.

Instead, it purchases a temperature hedge that begins to pay out only when CDDs for the season exceed the norm plus one standard deviation. In this case, the contract would pay $33,540 for every CDD above 110 CCDs, based on an index of government temperature data compiled at the municipal airport nearest to ABC's grain elevator.

Source: What Every CFO Needs to Know about Weather Risk Management, *a white paper published by the Storm Exchange and CME Group in May 2008*

off-exchange or exchange-traded weather derivatives, according to the CME/Storm Exchange study.

"Weather can trump the economy in periods where there is a huge demand drive," says David Riker, chief executive officer of Storm Exchange, a provider of weather-related financial risk and information services.

A utility, for example, may turn to traditional futures contracts to hedge against fluctuations in the price of the fuel that it burns. By using weather futures, it can also manage volumetric risk, i.e, lower-than-expected or higher-than-expected demand for power.

Most trading in U.S. and European weather markets centers on temperature hedging using either heating degree days (HDD) and cooling degree days (CDD). In the case of HDD, the futures contract is based on a baseline temperature of 65 degrees (18 c) minus the average temperature. For example, if the average temperature is 55 degrees (12.78 c) on a particular day, there are 10 HDDs for that day. Each contract is based on an index representing the accumulation of "degree days" over a calendar month.

The same applies for CDD, which again is based on the average temperature minus 65. So if the average temperature is 75 degrees (23.89 c), there are 10 CDDs for that day.

Another set of contracts is based on precipitation indices, which measure rainfall within a certain region over the course of a month. These contracts are useful for many sectors such as construction, where rain delays cost money in terms of not only labor and inventory costs but also potential penalties for delays.

Electric utilities are naturally exposed to cool summers because their sales revenue is based on the volume of electricity that is consumed during the summer season when consumers are running their air conditioners.

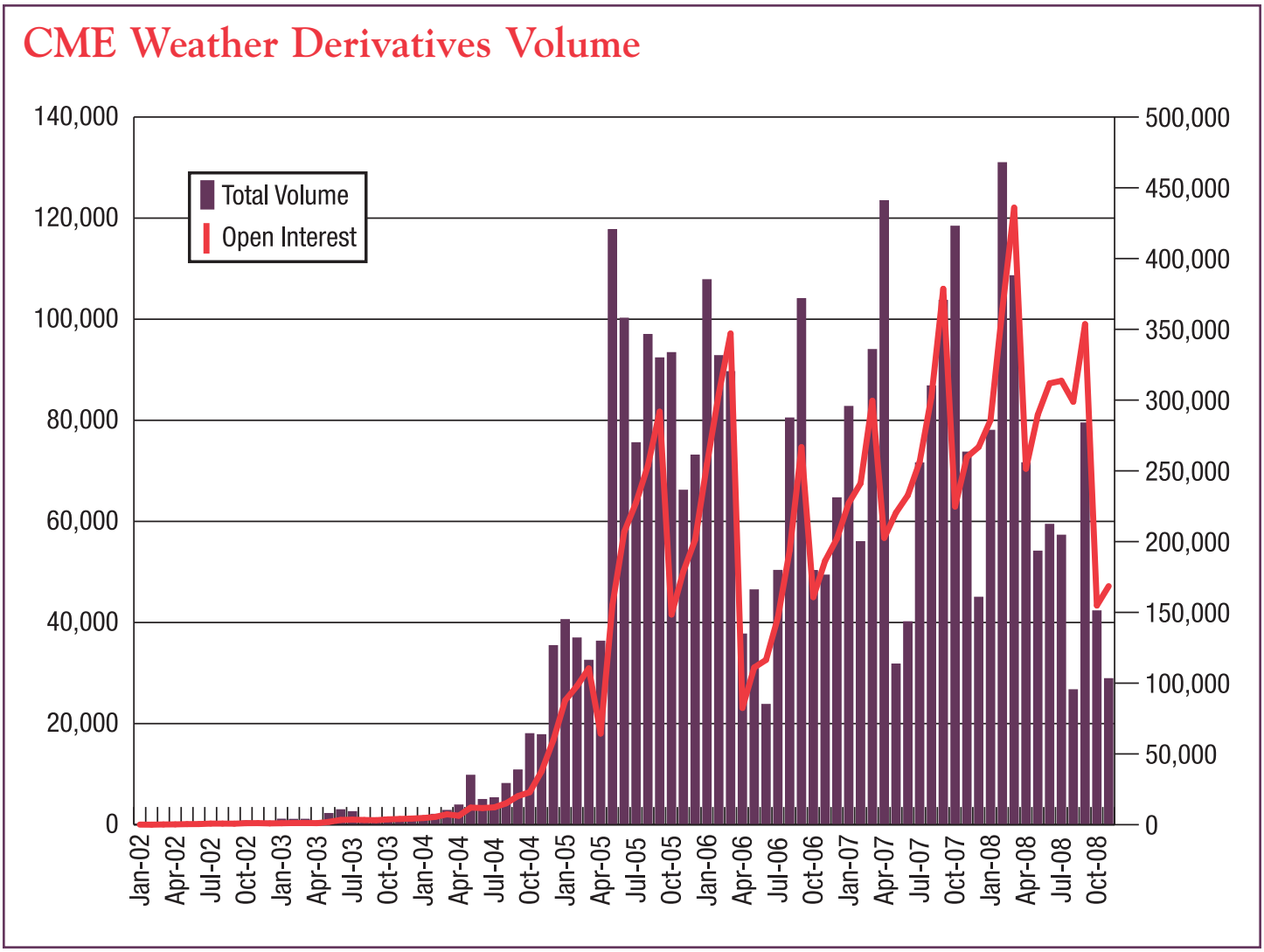
Storm Exchange's Riker says the challenge now is to get other sectors to approach weather risk in the same way.

Even though retailers typically blame weather for lackluster sales, virtually none of these businesses have turned to the derivatives markets to offset these risks. Instead they hedge by varying their inventory or by deeply discounting their merchandise. But in a cash-strapped economy, these approaches will prove more difficult.

"We're taking that model and transferring it to agriculture and retail. Retail has been slow to adopt because firms in this sector have a lot of options, including discounting ahead of a season and liquidating at the end of a season."

Fashion Forward

The trend for using weather derivatives may grow as companies find that the reces-



sion gives them less flexibility to absorb a hit from abnormal weather patterns.

Weatherproof Garment Company, a New York-based company that manufactures men's outerwear, sweaters and other cold weather accessories, became the first apparel maker to use a weather derivative after being hit by a mild weather that dramatically cut into coat sales.

In 2007, the company bought an option to offset the risk that December would be warmer than expected. After seeing sales of jackets in December 2006 tumble by 30% because of unexpected warm weather in the Northeast, the company decided to buy a contract for the following winter to cover up to $10 million in potential losses if temperatures in December 2007 were warmer than normal.

This was more preferable than the alternative, which is to carry inventory longer and then take deep discounts, said Eliot Peyser, Weatherproof's chief executive officer.

As it turned out, December was cold and the threat of weaker sales did not materialize. "We didn't have a mild winter in December, so we didn't get the payout, but that's okay." Peyser said, adding that he liked having the hedge as an insurance policy against warm weather.

"I think we are going to continue to try and figure out different ways to utilize these derivatives," Peyser said, but he added that it may be difficult for retailers with a more diverse inventory to use these hedges. Larger and more diverse retailers can hedge their exposure to unexpected weather trends by diversifying their inventory, in other words, lighter jackets and apparel they can carry directly offset heavier outerwear apparel.

"It's something that works for an outerwear company within a certain degree. It doesn't always work for Macy's to buy a weather derivative to hedge," Peyser said.

The Benefits of Clearing

Many of these contracts are highly customized and transacted on a bilateral basis and industry experts expect that much of weather risk management will remain off-exchange. Almost all of weather business at the CME is for clearing only. Exchange officials accept that a wider use of clearing is an attractive approach for these contracts, particularly given the increased concern among corporations about counterparty risk.

"You are going to start to see more climatic phenomena risk products cleared at CME Group," said Felix Carabello, director of alternative investment products at the exchange. He asserts that the focus in the industry is to provide hedges through a broad range of platforms and that may be through electronic platforms bi-laterally or through traditional exchange trading. "Many industry participants ask if these products will be available for floor or screen-based trading. We tell customers that products will be listed on the trading venue that makes the most sense," Carabello said.

Lately the CME is working to provide clearing for highly customized structures that would be linked to specific commodities. According to Carabello, CME plans to offer contingent structures such as weather-triggered gas options and agriculture structures.

Providing a clearing solution is key, Carabello says, because it allows counterparties access to additional players. Industry experts agree that in this cash-constrained environment, reducing counterparty risk is crucial.

"I think there is going to be more of that," agreed Galileo Weather's Malinow. "With weather derivatives you have a whole slew of end users who will have to de-risk going forward to gain access to new capital. You are going to see people making more effective use of these products." ■

Joanne Morrison is the deputy editor of *Futures Industry*.