It can affect as much as 20% of the US economy, and nearly every industry worldwide is affected by it. But blaming poor results on the weather is no longer an excuse: weather derivatives are on the rise. *Eric Fishhaut* reports from Chicago on the growth of a new commodity

Making an impact

★ The popularity of weather futures is rapidly growing and becoming a valuable method for energy companies to hedge against a change in demand due to changes in temperature. Weather is quite unique in that it is highly localised, cannot be controlled and. despite great advances in meteorological science, still cannot be predicted accurately with any consistency.

A substantial portion of the economy is directly affected by the weather. By some estimates, as much as 20% of the US economy and nearly every industry is affected by weather. As a result, the earnings of businesses can be adversely affected by summers that are hotter than normal or winters that are much colder than anticipated.

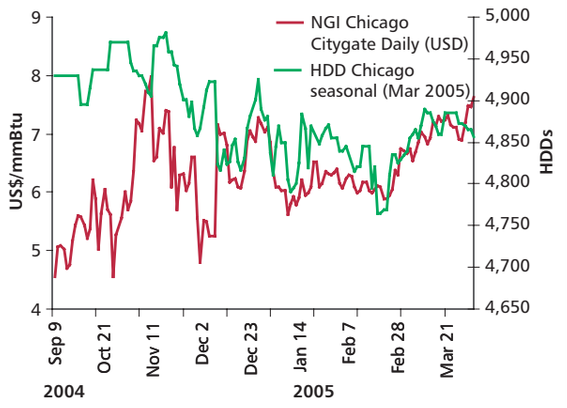
Conversely, revenues of power providers and utilities can suffer from either cooler summers where there is less need for air conditioning, or from mild winters with less heating demand from consumers.

Weather conditions tend to affect volume and usage as well as price. An exceptionally warm winter, for example, can leave utility and energy companies with excess supplies of heating oil or natural gas while pushing prices down.

Weather risk is the potential impact on business, both with respect to overall profitability or simply success or failure, that relates directly or indirectly to the weather. The US Department of Commerce estimates that nearly one third of the US economy – trillions of dollars – is modulated by the weather. It is common to see in financial statements comments such as "income decreased $6.7 million as a result of wetter-than-normal conditions" or "shipments were down 4.5% due the cooler temperatures during the summer months." In the past, statements such as these were accepted as part of doing business. In today's business world, blaming poor results on weather is no longer excusable.

The worldwide weather derivatives market continues to grow, and was worth more than $4.5 billion at the close of 2004, according to a survey conducted by PricewaterhouseCoopers for the Washington, DC-based Weather Risk Management Association (WRMA). Initially focused on the energy industry, the market for weather derivatives has grown to include participants in such diverse sectors as retailing, agriculture, construction, transportation and managed funds. Managing

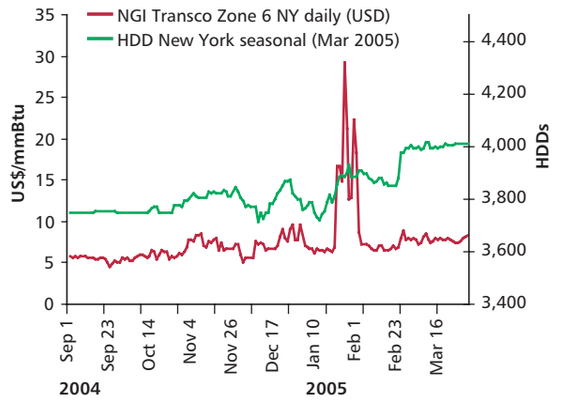
F1. Chicago gas and weather



Source: NOAA and Natural Gas Intelligence

The comparison of natural gas prices in Chicago to the heating degree days (HDDs) shows a very distinct correlation.

F2. New York gas and weather



Source: NOAA and Natural Gas Intelligence

The natural gas prices in New York, overlaid with HDDs, show some correlation, along with an unrelated price spike.

energy risk uses tools that potentially hedge volume-related risks caused specifically by variations in average temperatures over defined future time periods.

The basic trade inherent in weather related risk management products is indexed on the heating degree day (HDD), a widely used measure for the relative temperature in a given region during a specified period of time, calculated using data provided by national weather services. The HDD for a given day is calculated as 65 degrees Fahrenheit (18 degrees Celsius) less the midnight-to-midnight average of the high and low temperatures for the day, but can be no less than zero.

The weather risk management product class includes caps, floors, collars, and swaps with payouts defined as a specified dollar sum multiplied by differences between the HDD level specified in the contract (the strike) and the actual HDD level that occurred during the contract period.

Conversely, the cooling degree day (CDD) measures the warmth in the weather that will affect the demand for cooling factors such as electricity.

Weather as a commodity

From a trading standpoint, weather can be viewed as one more commodity that can make the difference between profit and loss. The idea is to give companies a hedge so that a smart weather futures trade could make up some of the shortfall a company realises when weather goes the wrong way. While weather factors in heavily for the energy industry, weather contracts could be useful for transportation, hotels, golf courses, pools, construction firms and others that need to hedge the risks of weather.

Trading weather primarily involves future temperatures, not weather events. Weather derivatives cover low-risk, high-probability events. Weather insurance, on the other hand, typically covers high-risk, low-probability events, defined in a customised policy. While a company might use a weather derivative to hedge against the possibility of a winter 5° Fahrenheit warmer than the historical average (a low-risk, high-probability event), that company would be more likely to purchase an insurance policy for protection against damages caused by a tornado or flood (high-risk, low-probability events).

The US weather derivatives market was developed in response to the deregulation of the power industry. The emergence of the wholesale power market forced the role of the utilities to change from monopoly to market participant. Now forced to manage their exposures, these companies needed a financial vehicle to help manage their weather risk. Initially, structures were designed and transacted by large energy trading companies, notably Koch and Enron. Insurance and financial institutions entered the market soon after. Now the market has expanded to include many industries that are affected by the weather, ranging from agriculture to beverage sales.

Weather was both commoditised and monetised via the Chicago Mercantile Exchange (CME). In 1999, the CME furthered weather derivatives by introducing exchange-traded weather futures and options on futures – the first products of their kind.

CME futures

The CME now offers a wide range of weather products for risk management in the futures markets. The CME currently lists weather futures, and options on futures contracts, based on aggregate temperatures for 29 cities, including 18 in the US, nine in Europe and two in Japan. It developed Pacific Rim Index Weather Futures with contracts for the Japanese cities of Tokyo and Osaka, the first exchange-listed contract for that region. Wolverine Trading, a leading energy trading firm headquartered in Chicago that serves as lead market maker for the other CME weather contracts, also serves as lead market maker on the Japanese contracts.

Initially, only monthly futures contracts were offered, but these were not perfect for the industry. For example, the monthly structure forced participants wanting a three-month contract to come into the market three separate times (losing the bid-offer spread each time). Many that trade in the over-the-counter (OTC) market prefer seasonal contracts covering a longer time period. The CME now offers both monthly and seasonal contracts for each of the cities, which tend to show strong relationships to commodity prices (see figures 1 and 2). The CME contracts trade on a basis of $20 per degree day index point.

For European cities, CME weather futures for the HDD months are calculated according to how much the day's average temperature is lower than 18° Celsius. However, CME weather futures for the summer months in European cities are based not on the CDD index but on an index of accumulated temperatures, the Cumulative Average Temperature (CAT).

In addition to the CME futures, there is an OTC market for weather derivatives where investments can be made on other natural phenomena, such as rainfall. But because such deals are between two parties, the market is far from transparent, making it difficult for both sides of the transaction to be sure they are getting the best deal possible.

Since the weather futures are traded electronically on the exchange, everyone taking part in the market knows exactly what prices are being bid and offered for contracts.

Volume explodes

On the CME, weather trades are small change next to the 48.8 million foreign currency contracts traded on the exchange in 2004. But the growth has been substantial recently. The CME

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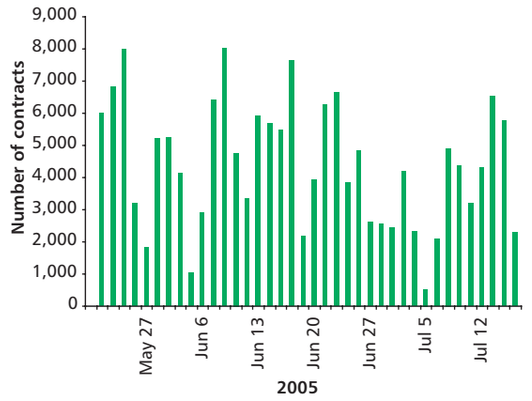
PricewaterhouseCoopers survey

F3. CME weather volume



The volume of contracts traded has been consistently high in recent months, indicating a dramatic increase over historical levels.

Source: Chicago Mercantile Exchange

announced in April that year-to-date trading of futures and options on futures in its weather derivative contracts had surpassed the total volume of contracts traded in 2004. A total of 124,177 contracts had traded by mid-April, compared with 122,987 in all of 2004.

Weather traded in 2005 reached a total of 307,000 contracts by mid-June. In May 2005, CME for the first time surpassed 100,000 weather contracts traded in a single month. The exchange also established a single-day trading record on Monday, April 11, 2005, with 4,850 contracts traded. Average daily volume of CME weather contracts traded this year is more than 2,500 – compared with an average daily volume of 344 in 2004. And over the past eight weeks, volume has averaged over 4,400 contracts (See figure 3).

This growth trend is substantial and the market is really just starting to gain traction after being quiet in its first few years. With the ever-increasing cost of energy and increased market volatility, the energy industry is moving to cover all possible hedging strategies.

Other industries are catching on to the risk management trend as business practice grows in sophistication. The role of weather derivatives is likely to become quite prominent in the global economy going forward. ER

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