

Trading while the temperature rises



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For young traders in a culture saturated with risk management tools and electronic trading, the pitch is easy but somewhat unsettling: forget global warming and focus on selling and trading new financial instruments that will facilitate living with climate change.

This year the capital markets are sending a highly focused message of establishing weather markets using both internet applications and traditional exchanges.

Weather has an impact on a wide variety of businesses around the world – from transport, agriculture and utilities to construction and hospitality. Its inherent unpredictability and volatility drives the demand for weather risk management. Although their roots lie in agriculture and catastrophic events (such as hurricanes), weather derivatives achieved a separate identity about three years ago. Since their inception in 1997, the growth has been exceptional. Market participants estimate that transactions in 1999 alone were worth a notional \$2–\$3 billion.

On the organised market run by the Chicago Mercantile Exchange, 341 contracts have been traded since its launch in September last year, with the single largest trade being 50 contracts based on heating degree days in Atlanta. The existence of both over-the-counter and listed markets may provide an arbitrage opportunity, thereby potentially enhancing the liquidity of both.

What are weather derivatives and how are they used? Simply stated, they are risk management tools based on a variety of metrics such as temperature or precipitation. Among the most frequently used metrics are heating degree days (HDDs) and cooling degree days (CDDs). HDDs are a measure of a day's coolness and are calculated by subtracting a day's average temperature from 65° Fahrenheit. For example, an average temperature of 45°F during a single day would result in a HDD of 20 (65–45 = 20). If the average temperature is above 65° the HDD would be zero. A CDD is a measure of a day's warmth. It is calculated by subtracting 65 from the average temperature during a day.

In the first quarter of this year alone, two online exchanges are being launched: Tradeweather and I-WeX. These will allow companies to post both bids and offers in a

wide variety of derivatives including puts, calls, and collars for both HDDs and CDDs which are location specific. The site then matches the buyer with the seller. Similar transactions could obviously occur using other weather metrics such as rainfall or snowfall. In addition, the Chicago Mercantile Exchange is planning to launch additional contracts for both HDDs and CDDs in 10 US cities (Atlanta, New York, Cincinnati, Chicago, Philadelphia, Dallas, Des Moines, Las Vegas, Portland and Tucson). It already lists some HDD contracts for Atlanta, Chicago, Cincinnati and New York (see table).

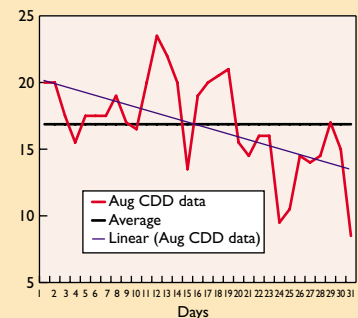
How are weather derivatives used? Global warming may have totally different impacts on farmers and utilities. Farmers in the US southeast that experience extended periods of high temperatures may lose a significant portion of their crops. Agricultural futures and options and/or crop insurance may be inappropriate or unavailable for transferring all their risk. Electric utilities, on the other hand, may benefit from hot summers, which increase the demand for air conditioning. A weather derivative might provide a win-win situation for both counterparties.

Pricing associated with weather events may require a historical database as well as the ability to run simulations. But the recent string of record warm temperatures experienced in many locations reminds us that excessive reliance on historical weather data may cause mispricing of these novel instruments. Global warming may already be changing the nature of this important new market.

A number of analytical services have already emerged to service this new market.

A final measure of the maturity of the weather derivatives market was the issuance of a weather-linked bond by Koch Industries (*Environmental Finance*, November 1999).

Atlanta CDD data, August 1999, daily



Source: Tradeweather.com

Goldman Sachs underwrote the \$50 million issuance of a bond, for which interest and principal is dependent on a portfolio of 28 separate weather risks. The securitisation of this market follows the pattern established by insurance derivatives. A repeat of that experience suggests that securitisation could grow into a market in excess of \$10 billion outstanding within a reasonable period of time.

Capital markets are providing new risk management tools, which provide temporary hedges in the face of climate change. The spirit of innovation will help economic entities to temporarily hedge against adverse movements in price and profits associated with global warming. But it is important to emphasize that these tools only minimise collateral damage of global warming in the short run. They are not long-range solutions for the environment.

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Salient features of HDD futures

Contract grade:	HDD for one month in Atlanta, Chicago, Cincinnati or New York
Contract size:	(HDD index) × \$100
Tick size:	1.0 index points each having a value of \$100.00
Contract settlement:	Cash settled to the index
Trading months:	Spot month and 11 consecutive months thereafter