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EMISSIONS TRADING

# The market as mystic

A market for trading carbon credits, with potential transactions in billions of tons could develop into an important global financial market. But what can today's market indicators tell us about the future expectations for that market? **BY JEREMY WEINSTEIN**

Energy risk management is becoming increasingly permeated by environmental risk management. Modern energy risk management is young, especially when compared with management of foreign exchange or interest rate risks; but even the more mature financial risk management sectors generally do not consider the kind and array of environmental regulatory risks that energy risk management must face.

The markets used by energy risk management are subject to substantial imperfections from regulations, taxes and fiscal incentives. But the markets themselves can give some clues on expectations from these factors. For example, markets for fuels, emissions, and carbon can tell us the market's expectations for carbon constraining regulations.

The spot markets setting prices for items to be delivered now, and options, futures and forward markets setting prices for items to be delivered later, can help predict future prices. For any particular commodity, putting together its prices at each forward period reveals its term structure. Since arbitrage – the buying and selling of the same thing simultaneously at a profit – is easy money and hence heavily sought after, market prices move to eliminate arbitrage opportunities. For example, within the term structure of interest rates – the yield curve – the cost to borrow for two years today should equal the cost of borrowing for one year today and then for another year at the end of that first year. Documents obtained under the US Freedom of Information Act reveal that the interest rate models developed by the US' central bank, the Federal Reserve, cannot predict future interest rates any more accurately than can the yield curve, which embodies the consensus of every market participant.

Greenhouse gases, especially carbon dioxide ($CO_2$) from car exhaust and the burning of fossil fuels for energy, that get trapped in the atmosphere are blamed by most scientists for increasing global temperatures. The 1997 Kyoto Protocol to the United Nations (UN) Framework Convention on Climate Change would require Western countries, Eastern Europe and Japan to reduce emissions of greenhouse gases to a collective 5.2% below 1990 levels by 2008–2012. For the US to hit its assigned target of 7% below 1990 levels, its 2010 emissions would have to be 20%–35% below expected levels at that time. Since some countries, such as Japan, have already made strides in cutting emissions, the Protocol contemplates international $CO_2$ emissions trading to help equalise compliance costs across nations. This could include trading in credits generated by projects in developing nations under the clean development mechanism, although some want to limit these flexible mechanisms of the Protocol.

Many critical issues remain to be resolved, and an attempt will be made at the Sixth Conference of the Parties (Cop 6) in The Hague in November. Cop 6 is the latest of a series of international meetings to implement the UN Framework Convention on Climate Change; the Protocol was the product of Cop 3 in Kyoto in 1997. At present, the Protocol has been signed but not yet ratified by the US. Two-thirds of the US Senate, which previously passed a unanimous resolution against the Protocol in its current form, would have to vote in favour of ratification. Without the participation of the US, there are unlikely to be sufficient country ratifications from the necessary 55% of greenhouse gas emitters for the Protocol to go into force. But even without the Protocol, it is possible that greenhouse gases will be regulated, even in the US, under domestic or multilateral regimes. The US Environmental Protection Agency (EPA) has hinted in memos and Congressional testimony, not without contradiction from Congressmen and industry groups, that it already has the authority to regulate $CO_2$ emissions under the country's Clean Air Act.

Many European Union countries have set their own targets beyond those required by the Protocol. The UK, for example, has committed to cut emissions by 20%, far beyond its 12.5% assignment.

Markets that attribute real value to $CO_2$ emission credits, factor $CO_2$ emissions into the prices of fuels, or price other commodities with the expectation of mandatory $CO_2$ mitigation, could be reflecting the risks of some sort of regulation of greenhouse gas emissions, up to and including ratification of the Protocol. The greater the impact on prices, the greater the perceived risks and compliance costs.

There is already a nascent market in $CO_2$ emissions credits in the US at a few dollars per ton, useful for price discovery and to help finance offset projects and diversify existing offset portfolios. Environmental brokerage houses such as Natsource and Cantor Fitzgerald have reported bids for options to buy 2008–2012 credits at $2 per ton for $0.50–$0.80/ton premiums. Since prices under the Protocol are predicted by think tanks and industry groups to range from $6 to more than $100 per ton, net sellers are not worried about their compliance risk, while net buyers may be picking up tremendous bargains, if the credit of their sellers lasts. Ordinary models used to value this optionality, such as the Black-Scholes model, do not seem to work in this market because, among other reasons, they generally assume continuous price discovery and therefore the continued existence of a market in the item. At present, that may not be the case; if Kyoto

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is not ratified with flexible mechanisms intact, there may never be an international market for $CO_2$ emissions.

But the prices of other commodities may also reflect the expected risks of carbon regulation. The prices of fuels such as high-carbon coal and low-carbon natural gas can be converted into dollars per units of energy received from burning them in order to compare their costs both in terms of energy and carbon. If, for example, on this basis natural gas to be delivered in 2008 became much more expensive than coal in that year compared with that spread in their spot prices, it could indicate that the market expects that in 2008 compliance costs to use coal, such as the need to purchase $CO_2$ credits, will make it less attractive than natural gas.

There also could be other explanations for this spread were it to appear. For example, US regulations intended to reduce ground level ozone called the $NO_x$ SIP Call will require such huge amounts of made-from-natural gas ammonia to clean smokestack flue gas that generators will be required to implement risk management plans that include instantaneous evacuation of a 1.5km radius 'kill zone' surrounding the ammonia tanks in the event of leaks. Nevertheless, any forward $CO_2$ credit market that does develop could play a role in arbitrage opportunities presented by inter-delivery, inter-commodity fuel spreads.

The pioneer successful market model for emissions trading is the EPA's acid rain cap and trade programme (see *EPRM* Weather Risk special report September 1999, pages 29–30). Power plants were assigned sulphur dioxide ($SO_2$) emissions allowances nationally aggregating to about one-half 1980 levels, or 8.95 million tons a year. A company that brings its emissions below its cap can sell its excess allowances to others, who can use them with new power plants or instead of reducing their own emissions. Allowances have vintage years in which they may first be used, but are bankable. Although projections for $SO_2$ compliance costs were as high as $8 billion, the programme has cost less than $1 billion, in large part due to the trading.

Figure 1 shows the current term structure of $SO_2$ allowances. Prices in forward years are generally close to those in the spot year, reflecting the bankability of earlier years. Since, among other reasons, permitting and constructing power plants takes a long time, $SO_2$ allowances trade far into the future, although liquidity is generally limited to 1999–2004 vintages.

Some actions taken to reduce $SO_2$ emissions, such as using lower sulphur coal, can reduce $CO_2$ emissions; others, such as adding adding 'scrubber' pollution control technology, can increase $CO_2$ emissions as more power is required to operate the scrubbers. Actions taken to reduce $CO_2$ emissions, such as switching to natural gas, can reduce $SO_2$ emissions. Therefore, a market that expects $CO_2$ emissions to be reduced in a manner that as a side effect reduces $SO_2$ emissions would not highly value $SO_2$ allowances post-dating such anticipated $CO_2$ reductions.

Figure 2 shows that this indeed may be the case – the spread between the spot and post-2007 $SO_2$ allowances has been widening as the distant allowances get relatively cheaper. However, the data currently available is sparse, and may not be statistically significant. In addition, other factors, such as regulations on other pollution concerns such as soot and regional haze, as well as the potential for large accumulated banking of earlier year vintages flooding the market, to the extent not already discounted into the spot price, may also be putting pressure on distant $SO_2$ prices.

Carbon credit trading would dwarf $SO_2$ allowance trading; with potential transactions in billions of tons under global regulation, it could develop into an important global financial market. For now, spot and forward market prices for carbon, fuels and emissions can inform us as to the risks and expectations from carbon emissions regulation and markets. ■

Notes:

NatSource and Cantor Fitzgerald provided $CO_2$ equivalent indicated prices and the data for figures 2 and 1 respectively.

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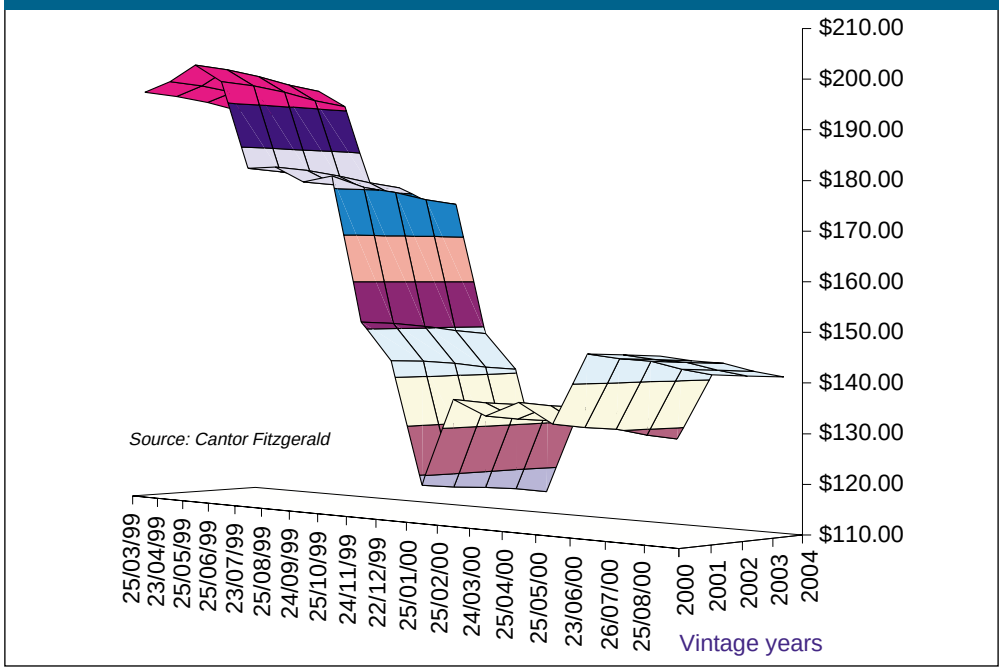
## Figure 1: $SO_2$ term structure surface




## Figure 2: Spread between spot and distant $SO_2$