Research Paper Commerce

A Study on the Feasibility of Weather Derivatives in India

* Jayeeta Paul

* Assistant Professor, Institute Of Business Management National Council Of Education, Bengal.

ABSTRACT

Weather can be measured, commoditized and monetized through a risk management tool known as weather derivative. Weather derivatives address the risks not of front page events such as hurricanes, but the slow, long term effects of deviations from average temperature, precipitation, rainfall, etc. These allows companies, to manage or 'hedge' their weather related risk exposures. This study focuses on the feasibility of weather derivatives in the agricultural sector in India.

Keywords: weather, derivatives, india

INTRODUCTION

For many industries, weather makes earnings volatile. (Hyman, 2001). Specifically, weather influences the price and sales volume of a commodity bought or sold by a company. Weather risks is an inherent part of many businesses. Although the physical hazards created by weather events cannot be eliminated, the financial risks can be reduced through effective use of weather derivatives (Hyman, 2001). Moreover, companies are exposed to many different weather risks besides just temperature and precipitation. The creation of new weather derivatives to address these other risks will become increasingly important in the future.

CONCEPT OF DERIVATIVES AND WEATHER DERIVATIVES :

A derivative is a financial instrument that derives its value from an underlying asset. This underlying asset can be stocks, bonds, currency, commodities, metals and even intangible pseudo assets like stock indices. The phrase 'value from an underlying asset' means that the derivative on its own does not have any value. It is considered important because of the importance of the underlying.

Weather derivatives are financial instruments that can be used by organisations or individuals as part of a risk management strategy to reduce risk associated with adverse or unexpected weather conditions. The difference from other derivatives is that the underlying asset (rain/ temperature/ snow) has no direct value to price. Farmers can use weather derivatives to hedge against poor harvests caused by draught or frost; the parks may want to insure against rainy weekends during peak summer seasons; and gas and power companies may use heating degree days (HDD) or cooling degree days (CDD) contracts to smooth earnings. Weather derivatives cover low-risk, high –probability events. Weather insurance, on the other hand, typically covers high-risk, low-probability events, as defined in a highly tailored, or customized, policy. Insurance provides protection only against catastrophic damage. Insurance does nothing to protect against the reduced demand that business experience as a result of weather that is warmer or cold than expected.

ANATOMY OF A WEATHER DERIVATIVE:

Trading mechanisms of weather derivatives involve the following components –

Reference Weather Station – All weather contracts are based on the actual observations of weather at one or more specific weather stations.

Index – The underlying index of a weather derivative defines the measure of weather which governs when and how payouts on the contract will occur.

Term – All contracts have a defined start date and end date that contain the period over which the underlying index is calculated.

Structure – Weather derivatives are based on standard derivative structures. Key attributes of these structures are the strike (the value of the underlying index at which the contract starts to payout), the tick size (the payout amount per unit increment in the index beyond the strike), and the limit (the maximum financial payout of the contract).

Premium – The buyer of a weather option pays a premium to the seller that is typically between 10% and 20% of the notional amount of the contract , however, this can vary significantly depending on the risk profile of the contract.

LITERATURE REVIEW:

Many studies have been done in the US regarding weather trading and sensitivity. Öpportunities and Priorities in a New Era for Weather and Climate Services" by Dutton, is the most popular study which relates the sensitivity of weather to the various economic sectors. According to the paper published by him approximately a little more than 30% of the United States economy is some way or the other related to the vagaries of weather. Though popular in the weather trading universe his work was more qualitative rather than quantitative.

Larson took ahead the study done by Dutton and tried to quantitatively define the effect of weather. In his two thousand and six reports Än evaluation of the Sensitivity of US Sectors to Weather" he tries to prove qualitatively by using econometrics that different economic sectors are affected by weather risks. He used Monte Carlo Simulations, transcendental logarithmic functions (TRANSLOG) to suggest the dependency of different economic sectors on weather. He also studied the effect of weather in different regions and came to the conclusion that the effect of weather was different for different economies in different regions.

In the Indian context, weather futures would prove to be immensely beneficial, especially to the agricultural sector. With a wide scope for weather derivatives in India, a number of trading firms are expected to offer customized weather derivative products, and lot more industries are expected to be covered in this net. A farmer's common complaint, " Everybody talks about the weather, but nobody does anything about it" will

soon become a thing of the past with weather derivatives. Weather derivatives like any other exchange traded instrument can serve the purpose of its creation only if it increases in volume and is in demand. Instruments which work in one country may pass or fail in another region. But from the empirical studies conducted in other developing countries and with the success of weather derivatives there, India seems to have the potential to have a weather derivatives market. The key challenge is to educate the farmers about such contracts and their usage. The knowledge of derivatives in itself is limited to certain segments of the society, leave alone the weather derivatives. Inspite of the challenges, it is time the government speeded up the process of launching weather derivatives in India too.

TYPES OF WEATHER DERIVATIVES :
Some of the common weather derivative products include –

1. Swaps – Swaps are contracts where two parties agree to exchange their risks. This will produce a more stable cash flow when weather conditions are volatile.

2. Collars – Collar is similar to swap in that protection against adverse weather is provided in return for giving up some of the returns generated in favourable conditions.

3. Puts (Floors) – Put options or floors are contracts that compensate a buyer if a weather variable falls below a predetermined level. This type of protection involves a premium being paid up front.

4. Calls (Caps) – Call option or caps are contracts that compensate a buyer if a weather variable falls above a predetermined level. This type of protection involves a premium being paid up front.

RESEARCH OBJECTIVE :
This study focuses on the feasibility of weather derivatives in the context of Indian economic and agricultural scenario.

DISCUSSION :
Weather Derivatives came into existence due to the problems and loopholes found in the crop insurance programs. Insurance can help only after the damage is done or the loss has occurred. Huge premiums are also associated with insurance. Proof of potential damage of assets or proof of loss of profits is needed.

Insurance provides a good cover against huge calamities like Tsunamis and Earthquakes that obviously happen over larger areas. But it proves useless at a smaller scale, like if monsoons are a month late. Such late occurrences of monsoon leave the small farmers nowhere, who don't even have a good irrigation system in place, unlike rich farmers. This also does not call for insurance, as it is provided on a common damage. Hence instruments like weather derivatives come in useful, where in farmers, small or big, can hedge their risks due to unpredictable disturbances in the climate.

Till now, the only way to subsiding the risk from intemperate weather has been crop insurance. Due to sudden decrease or increase in the rain, the insurance policies and markets are unable to cope with the certain disasters. Also what acts a damper is the fact that people want to take advantage of farm loan waivers and subsidies to farmers, thus bringing in the moral hazards. Another issue is that not all crops fall under insurance schemes. This inclines farmers to grow the insurance covered crops only, which are staple food crops and crops traded in the commodities market. Less than (X) percent of the income generated by agriculture is covered by crop insurance. It has been seen, that the amount of payout is far more that the amount of premium collected. This fact acts as a deterrent to private companies, thus leaving the business of agro-based insurance to the government. Claim settlement also takes time due to operational inefficiencies and information issues. The various National Insurance Schemes launched by government have not been successful, as a result of which farmers participating in such schemes have dropped.

Weather derivatives can prove to be very useful here, as they can be used as an effective alternative to hedge the weather risks. For a claim, the loss has to occur, and a proof has to be produced. But in the case of a derivative, it does not require a loss to occur. A farmer can buy an option and decide the strike price on a derivative and pay or receive the difference within a matter of days. The underlying for weather derivatives may be anything related to weather. It can be rainfall, temperature, snowfall et al. "A financial weather derivative contract may be termed as a weather contingent contract whose payoff will be in an amount of cash determined by future weather events. The settlement value of these weather events is determined from a weather index, expressed as values of a weather variable measured at a stated location". (Dischel and Barrieu)

It is very cost effective for farmers, as they have to shell out fewer premiums and invest in derivatives and hedge off their risks. As the derivatives can be individually bought and sold by each farmer he can hedge his own risk unlike proving individual loss for getting individual claims. Also as these options will be traded on the exchange, it would be possible to cater to the larger market.

IMPLEMENTATION ISSUES :
There are a lot of factors which would determine the success of weather derivatives. A few could be:

The Infrastructure – Derivative exchanges, consumer associates, weather observatories and brokers are all a part of the infrastructure required for implementing weather derivatives trading.

The Regulation – The need of the hour is to put in place a strong regulatory mechanism before the introduction of weather derivatives. The Forward Contract (Regulation) Act at present covers forward trading (derivative) in goods only. The act needs to be broadened so as to permit trading on intangibles like weather parameters, electricity, etc.

The awareness among Market Participants – For understanding the nuances of weather derivatives, proper training and education ought to be imparted to market participants like farmers, consumers and financial institutions, etc.

CONCLUSION
Weather Derivatives in India has a long way to go. Few issues which need to be tackled:

1. The bill needs to be passed, which would basically allow trading on intangibles such as rain.
2. To support the weather trading, strong infrastructure would have to be put in place, so as to be able to reach everywhere.
3. For effective reach, help of the local Gram Panchayats and e-choupals could be taken
4. Weather Derivative awareness should be built amongst the traders and farmers so as to reduce the menacing role of money lenders
5. Technology should be made full use of here. Data Warehouses containing archives of rainfall indexes should be updated so as to be effective.

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