How to price commodity options?

The underlying in the case of commodity options is the relevant futures market

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The options market brings together various participants with different goals and expectations. While some participate with a view on possible price movements in the futures, others intend to use it to protect their positions in other markets against unfavourable price movements or act as arbitrageurs who profit from price discrepancies in related markets.

The questions common to all are, what is the underlying, hence which formula is used in pricing the options and what information are they receiving from the underlying?

MCX launched options (on gold futures) on October 17, 2017, on the occasion of Dhanteras. Being a teacher of finance in a management school and sensing the eagerness of his students to know about the significance of the launch of India's first commodity option contract, Prof Jain started his class the very next day discussing pricing of options and, in particular, commodity options, in an effort to make them understand the genesis of options in a commodity market.

Prof Jain thought that the students would best understand commodity options as launched in India if they knew how it would be priced, as he had just finished his previous class on pricing equity options that are widely traded in Indian markets.

He started off by telling the students that it would have to be priced differently using Black 76 model compared with Black-Scholes as the underlying in the case of commodity options is the relevant futures market.

Inquisitive student Sam wondered why commodity options are on the underlying commodity futures and not on commodity cash.

Appreciating Sam's keenness, Prof Jain explained that globally, in the developed markets as well, the underlying for commodity options are commodity futures.

Sensing that Sam is not satisfied with the answer, Prof Jain elaborated that, one of the crucial variables is the underlying price which would have to be actively traded.

The integrity of this underlying price is the sanctum of the trust in the options market, since using the reference underlying prices, options traders estimate expected volatility, which is a crucial variable for pricing.

World over, there are generally no organised spot markets for commodities from where reliable price signals could be constantly received for pricing the volatility. Hence, globally, the underlying for commodity options are commodity futures, which are continuously discovered on futures platform by market participants.

'Demand and supply' factors

Curious Vinod then asked what makes Black 76 a suitable model for pricing commodity options than the Black-Scholes model.

Prof Jain replied that owing to the unavailability of continuous commodity spot prices, Black 76 formula uses discounted futures price (which are continuously discovered on futures platform) in place of spot prices that are otherwise used in Black-Scholes model.



The laws of probability and its distribution are then used to arrive at the option price , wherein the theoretical price is a function of the continuously compounded risk-free interest rate 'R', the discounted underlying futures price 'F', the strike price 'K', the implied volatility of the underlying futures price 'S', time to expiry in years of the options contract 'T'.

Prof Jain further went on to explain that unlike equities that are financial assets, commodities are physical goods . The price behaviour of commodities is more influenced by seasonal supply and demand factors than those factors that affect financial instruments such as equities.

Isha, nodding her head in agreement, said, "Sir, the spot market for commodities in India is actually largely a privately negotiated market, with online trading being almost absent. Hence, I agree that there is no continuous flow of referenceable spot commodity prices unlike the cash market for equities."

Prof Jain added that various noteworthy global commodity exchanges like the Chicago Mercantile Exchange, Intercontinental Exchange, etc., trade commodity options with respective futures as their underlying and are theoretically priced using the Black 76 model.

He further stressed that there are reports of a great deal of disagreement among traders on the usefulness of option pricing models.

While some traders feel there is little relationship between the real and theoretical prices, others feel that having theoretical prices is just enough to solve the options puzzle. The reality of pricing in the options markets seems to be somewhere in between. In any case, the theoretical pricing models provide some light to market participants and, hence, it is always better to have some idea rather than no idea on the pricing of options, while commencing options trading.

Also, at times, in the absence of a transparent traded market for options, such theoretical option pricing models help auditors value the option position of corporates appropriately.

Prof Jain closed the class telling the students that markets consist of minds and theoretical models such as Black 76 can only guide these minds and not govern.

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