19BAE710-FINANCIAL DERIVATIVES

Intrinsic Value and Time Value of Options

Intrinsic and time value of options are two of the most critical factors in making profits in options trading. They help you understand which way the option's price is going to move in the future.

Basics of options

Options are contracts of two types - call option and put option. Call option is a contract under which the option-buyer buys the right (but not the obligation) to buy an asset from the option-seller at a particular price (i.e. strike price) on a particular day (i.e. expiry day). Put option, on the other hand, is a contract under which the option-buyer buys the right to sell an asset to the option-seller at a particular price on a particular day. Under both circumstances, the option-buyer pays a premium to the option-seller.

How is the premium of an option calculated?

The value of the premium of an option, like the price of any asset, depends on the demand and supply. The formula for calculating the option premium is as follows - Option Premium = Time Value + Intrinsic Value Let us now examine what intrinsic value and time value (also called extrinsic value) exactly mean.

Intrinsic value of options

This is the most simple portion of premium calculation. Logically speaking, whether or not a trader wants to buy an option depends on how much profit they expect to make out of the contract. Now, for the option buyers, the difference between the strike price and the spot price (i.e. the price of the asset in real time in the market) is the profit that they will earn if they hold the option till maturity. However, even before the expiry date, there exists differences between the price and the spot price of the asset on those days - this difference helps traders predict the profitability of the option on the day of expiry. This notional profit determined by the difference between strike price and spot price is known as the intrinsic value of an option. Intrinsic value of call option = Spot Price - Strike Price Intrinsic value of put option = Strike Price - Spot Price Suppose, an option-buyer Mr. B buys a call option on a stock X at Rs. 1000 strike price from the seller Mr. S. The date of expiry of the option is one month from now. However, two weeks in, the spot price of the asset is Rs. 1020 already. Therefore, the intrinsic value of the option is equal to Rs. 20. However, had the spot price of the asset fallen to something less than Rs. 1000, like Rs. 980, then the intrinsic value of the option would not have been Rs. (-20). Instead, it would have been Rs. 0. Therefore, intrinsic value strictly shows the level of profit and is therefore never negative. Thus we can see that the portion of the option premium that is influenced by the changes in the absolute value of the potential profit from the option is known as the intrinsic value of the option. This is because the profit i.e. the difference between strike price and spot price is intrinsic to the details of the option contract itself.

Time value of options

Take the example stated earlier. Suppose that the time remaining to expiry of the option contract is two weeks. Therefore, even if the spot price of the stock X is Rs. 1020 today, there is still a chance that the price of the stock may increase further beyond Rs. 1020 in the coming two weeks. Therefore, in addition to the existing intrinsic value of Rs. 20, there is an extra value of, suppose, Rs. 10. This Rs. 10 is the time value of the option. The time value is charged because the buyer of the option must not only pay for the intrinsic profit from the option but also the potential profits that are possible given the time gap. Therefore, the option premium becomes the total of the intrinsic value and time value i.e. Rs. 30. Options which are ATM (or at-the-money) and/or farthest from the expiry date tend to have the highest time value. However, as the days pass and the price of stock X does not rise any further, the likelihood of the price of stock X crossing above Rs. 1020 becomes lower and lower with time. Since the chances of greater profitability than Rs. 20 thereby become lower and lower with time, the time value and consequently the price of the option (i.e. the premium) also decreases. In fact, the rate of decrease in the option premium becomes higher as the day of expiry gets closer. This phenomenon of a fall in the price of an option with time is known as 'Time Decay' and can be measured by the option greek **θ** (pronounced theta). Suppose the theta of the particular option in question is (-0.25). Therefore, every day the price decreases by the amount of Rs. 0.25 - so if the price on the first day is Rs. 30, on the second day is RS. 29.75, on the third day is Rs. 29.50 and so on. Therefore, the portion of the premium that is influenced by the time decay of the option contract is called the time value of the premium.

Risk management using extrinsic and intrinsic values

Now imagine the situation of an option buyer Ms. T who wants to buy the option from Mr. B. She has to make the choice of whether to buy the call option or not. The best way to understand if she should trade the option or not is by examining whether the option premium is going to increase or decrease with time. If the option premium is expected to increase, then Ms. T can expect to buy the option today for say Rs. 30 and then sell the option contract later at a higher premium, say Rs. 40 - thereby gaining a Rs. 10 profit on the option contract. Since, time value tend to decrease with time, the intrinsic value will have to increase by a greater amount for the option premium to increase. Now how can Ms. T predict whether the option premium is going to increase or decrease? She can start by considering the following factors -

1. **Implied volatility -**

Implied Volatility or IV represents the expected volatility of the stock price during the life of the option contract. If IV is high, then the price of the stock is expected to have a higher chance of increasing further during the period until the expiry date.

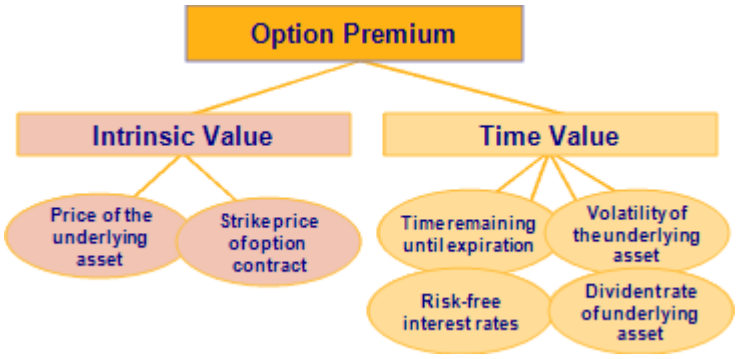
2. **Technical analysis -**

In the short term, it is best to rely on technical analysis (i.e. analysing price and volume trends only) in order to gauge which way the price of the asset is going. It will help in predicting the intrinsic value of the option by predicting the spot price (strike price is known already under the contract). The various tools of technical analysis include trend indicators (like Supertrend, MACD), momentum indicators (like RSI), volatility indicators and volume indicators.

3. **News analysis -**

Stock prices change not only due to actual events in the market but also the perception of those same events among both institutional and retail investors. Therefore, keep track of the news to check if any positive or negative news is coming up.

One can use the above metrics to not only decide on whether to trade an option, but also to choose between two or more options.



Intrinsic* Value = Current Stock Price − Strike Price

*Option must be in-the-money in order to have an intrinsic value.

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Time Value = Option Premium − Intrinsic Value