

Option Pricing Models and their Accuracy

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Aim of option pricing theory and its models

► So, in this trading world the assets which are traded are known as options. A stock option provides the holder with the right to buy or sell a specified quantity of an underlying asset at a fixed price (called a strike price or an exercise price) at or before the expiration date of the option. Since it is a right and not an obligation, the holder can choose not to exercise the right and allow the option to expire. The present value of the expected cash flows on these assets will understate their true value and a trader keeps a check over those to decide upon what kind of option trading to practise over those assets. There are two types of options used for different situations: either calls, betting a stock will increase in value, or puts, betting a stock will decrease in value. So basically option pricing theory estimates a value of an options contract by assigning a price, known as a premium, based on the calculated probability that the contract will finish in the money (ITM) at expiration. There are many models used for this analysis and calculations, we did our case study analysis based upon the Black Scholes model. Main aim is to help a trader in understanding the profitability of the option and then come up with a relevant option trading strategy.

Case Study Analysis: Bank Nifty

► Here's a run to the code we used for backtesting the calculations of NIFTY Bank stocks under Black Scholes model.

► https://colab.research.google.com/drive/1Ap0lWf-flC5wV8dGc3_MbZfsrd2XSC_0



NIFTY Bank option stocks data used for analysis

► https://docs.google.com/file/d/185H2Wggr39PxVa2l2bwEX511EC6sERMv/edit?usp=docslst_api&filetype=msexcel

Accuracy of the model

- ▶ As per our calculations the volatility of actual prices of options is: 4.88
- ▶ As per the calculations of Black Scholes model, the volatility of prices of options is: 7.04
- ▶ Further the volatility difference i.e. the rmse value gives us the error in the actual option prices and the ones which the Black Scholes model predicts.
- ▶ So the rmse value is: 2.16
- ▶ Hence the accuracy of this model is: 2.16
- ▶ (all units are mentioned in dollar \$)

Good Strategy in case of a bearish outlook

A good trading strategy needs to have a good risk reward ratio. The following strategy gives an amazing **risk reward ratio of 1:2.64**

As we have a bearish outlook on NIFTY, let us look at a **Bear Put spread** in NIFTY on let's say 29th October expiry option contracts.

Now, the strategy works out like:-

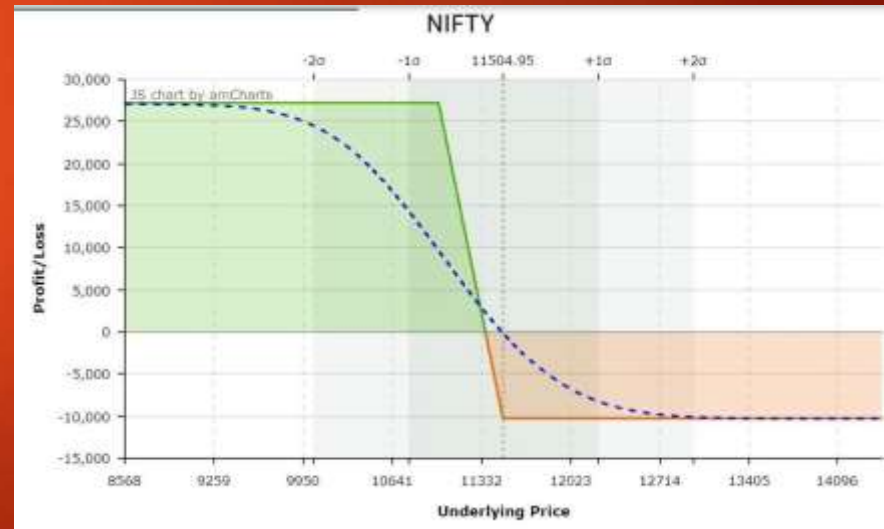
Margin required for this strategy is **Rs.17,257**

Maximum possible Profit is **Rs.27,210 (157.68%)**

Maximum Loss is **Rs.10,290 (-59.63%)**

Risk Reward Ratio is **1:2.64**

In this, we can go long on NIFTY 29th October 11500 Put (Rs.257.75) and short on NIFTY 29th October 11000 Put (Rs.120.55).



Alternative Suggestions/Theories

- ▶ One needs to limit the impact of time decay - The basic trade-off in theta (time decay) is that reducing theta means increasing gamma (exposure to price moves in the underlying) and vice versa. If you have negative theta exposure, you lose money if time passes and price moves are small, but you make money if time passes and price moves are big. If you reduce your theta, you reduce both the gains and the losses. If you move to positive theta, you make money if time passes and price moves are small, but you lose money if time passes and price moves are big. If price moves equal the implied volatility; you neither gain nor lose. Therefore, to limit time decay you will need to limit gains from big moves in the underlying.
- ▶ Hedging always better than technical analysis - Technical analysis is just analysis. Precise trade execution requires doing things to protect risk. How you do this depends on you. Although most people will say that hedging over the weekend with put option will cost you a lot of money because the premium paid will become zero at expiry is not necessarily true. You could exit the hedge multiple times during the trade as well. That way your cost of hedging can be significantly reduced.



► To state an example (for theory 2):

► You can protect your downside in futures trading by buying Out of The Money (OTM) options as a stop loss. So for instance, if you want to hedge your long position, you'd be buying a put option at the suitable strike price and vice versa. This is one of the only ways of hedging your position other than maybe trading an inversely correlated instrument.

► For example, buying USDINR futures when you are long Nifty futures because they are more or less inversely correlated over a longer time-frame and if there is a correction in Nifty, then USDINR can go up if the conditions are supportive (just a hypothetical example).

Conclusion of this whole topic

► Choosing a option trading strategy such that you earn maximum profits and have risks limited to only premium depends on person to person and their strategic intelligence. You can make profits by either buying an option or writing an option. As it's a zero-sum game so the one who writes doesn't mean they always make the profit, some write so that some can gain from other's loss.

Now, which strategies are useful?

Naked Call,

Bull/Bear Spread,

Butterfly Spread,

Covered Option or any other out of many strategies available.

► Now comes the selection of the strategy, it entirely depends on the following factors:

Personal Observation,

Market Trends which are prevailing,

Optimum Personal & Market Analysis,

The behavior of greed & fear, as to others mindset analysis as well.

► If we will manage all these factors efficiently then our trades will be very effective.

► To end it; Always remember, trading isn't a game of gamble, it is a game between the smart and the smartest.



THANK
YOU!!