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3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the last five years

Sr.No	Name of the Author/s	Title of the paper	Link to website of the Journal
1	Dr. Devidas Golhar	Learners Perception of the Transition to Instructor-Led Online Learning Environments: Facilitators and Barriers during the Covid-19 Pandemic	https://doi.org/10.19173/irrodl.v22i1.4971
2	Asst.Prof. Dr.Sandip Anpat	Confusion Matrix-Based Supervised Classification Using Microwave SIR-C SAR Satellite Dataset	https://www.researchgate.net/publication/349445825_Confusion_Matrix-Based_Supervised_Classification_Using_Microwave_SIR-C_SAR_Satellite_Dataset
3	Asst.Prof. Dr. Kalpana vaidya	Fostering organizational excellence in km environment: innovative perspective for the sustainable growth path	www.iaeme.com/ijm/index.asp
4	Asst.Prof. Dr. Ganesh R. Patare	A study on the use of option Greeks in derivatives for risk management	http://www.thedesignengineering.com/index.php/DE/article/view/8465

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International Review of Research in Open and Distributed Learning

Learners' Perception of the Transition to Instructor-Led Online Learning Environments: Facilitators and Barriers During the COVID-19 Pandemic

Aakash Kamble, Ritika Gauba, Supriya Desai and Devidas Golhar

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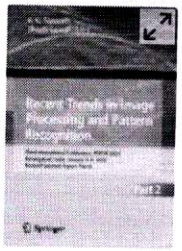
Article abstract

Online learning environments (OLE) continue to expand due to the COVID-19 pandemic and the transition of a majority of educational institutions and universities worldwide from traditional classroom settings to online learning methods. The purpose of this study was to understand the perceptions of learners at a university in India toward the sudden transition from traditional face-to-face learning to an instructor-led OLE due to the pandemic-induced lockdown enforced across India in March 2020. Using a qualitative case study approach, structured interviews were conducted via Microsoft Teams with 35 learners from Savitribai Phule Pune University, a large public university in India. Interviews comprised eight open-ended questions, which were validated by experts. Results indicate that learners accepted the transition toward the OLE. Five key themes arose from the interview data: accessibility and comfort, Internet connectivity, OLE effectiveness, course content, and interactions between students and instructors. The study provides insights to the researchers with the emergent themes from the research. Also, it carries practical implications concerning implications regarding infrastructure readiness for remote learners, acceptance, and adoption of OLEs by faculty instructors, organizational support, and facilitating conditions.



International Conference on Recent Trends in Image Processing and Pattern Recognition

RTIP2R 2020: **Recent Trends in Image Processing and Pattern Recognition** pp 176–187

Confusion Matrix-Based Supervised Classification Using Microwave SIR-C SAR Satellite Dataset

Shafiyoddin Sayyad, Mudassar Shaikh, Anand Pandit, Dattatraya Sonawane & Sandip Anpat

Conference paper | First Online: 19 February 2021

Part of the book series: Communications in Computer and Information Science ((CCIS,volume 1381))

Abstract

The microwave Synthetic Aperture Radar (SAR) is an active type of remote sensing. The classification analysis has become one of the very important task, after the availability of microwave SAR datasets from the satellite. The one of the major challenges faced is the accuracy regarding classification analysis. In the present paper the two supervised

FOSTERING ORGANIZATIONAL EXCELLENCE IN KM ENVIRONMENT: INNOVATIVE PERSPECTIVE FOR SUSTAINABLE GROWTH PATH

IAEME PUBLICATION, 2020

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FOSTERING ORGANIZATIONAL EXCELLENCE IN KM ENVIRONMENT: INNOVATIVE PERSPECTIVE FOR SUSTAINABLE GROWTH PATH

Dr. Rachana. R. Shikhare
Professor, MEF's Matrix School of Management Studies, Pune, India

Dr. Vinod Mohite
Assistant Professor, MM'S Institute of Management Education Research and Training, Pune, India

Dr. Vaishali Ajotikar
Assistant Professor, MEF's Matrix School of Management Studies, Pune, India

Dr. Kalpana Vaidya
Assistant Professor, Marathwada Mitra Mandal College of Commerce, Pune, India

ABSTRACT

In the world today dynamic Knowledge is the key ingredient for the success of any organization in the new economy. We are in an age where business is just not measured in terms of historical performances alone, but also in terms of how utilizes and manages the knowledge and the intellectual capital. Furthermore, it has been now agreed in the known universe that the human side of Knowledge Management (KM) is more difficult to manage than the technical side. It is definitely the knowledge workers who make knowledge based systems a success and radically leverage the companies' competitive edge.

The proposed research paper deliberates on issues concerned with soft side of KM environment and culture. The crux of effective knowledge based system implementation hinges upon two vital aspects – the people and the culture. Technology alone may not help to meet the challenges in the ever changing environment in an organization and environment cannot be bypassed for that matter. In the sense it focuses the manner in which the people and technology that the organization utilizes, in order to get a energetic leap for achieving organizational excellence. We have considered KM environment as being an approach as well as a discipline to improve the overall organizational performance. Certain issues like the technological implications, understanding of the KM essence by the people leading our group has been briefly

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A Study on use of Option Greeks in Derivatives for Risk Management

Dr. Ganesh R. Patare
Assistant Professor,
MES Garware College of Commerce, Pune-04
Email- grp.gcc@mespune.in

ABSTRACT

Financial Derivatives have a great significance in risk management. A proper use of derivatives in a right proportion enables an investor to minimize risk and maximize the return. Under financial derivatives different sub-types of derivatives emerge, for present study researcher has selected only option trading as a risk management tool using option Greeks. Option trading is the process of buying and selling options in the stock market. Option trading is an exciting process and almost every market participant has at least experienced the thrill of trading options, almost all the time with unsatisfactory results.

Trading options is like driving at a very high speed, it may be thrilling but it is extremely risky and most of the time results in accidents. To avoid such accidents and systematically profit from such ventures, an option trader seeks to improvise trading by using as many tools as are available for disposal. The most important of such tools are the Option Greeks and they are usually the first metric looked upon by option traders.Option Greeks are the most powerful tool for an option trader. They help an option trader make informed trading decisions. Thereby, providing them with an unparalleled edge to trade options.

Option Greeks are computed using various pricing models. These models seek to estimate the influence of the various market conditions on the price of an option. Together they provide a holistic view.The present research studies the use of commonly used option Greeks such as Delta, Gamma, Theta, Vega, and Rho and their significance in managing various types of risks associated with an option contract.

Keywords:Financial Derivative,Option Greeks, RiskManagement,Option Pricing

INTRODUCTION

In Financial or Investment Management unpredictableeventsthatwouldcreatean adverseeffect. Many Investors ortraders may face financial risk exposures suchas Price exposure, foreign rate exposure, interest rate exposure and inflation rateexposures etc. Derivatives are a specific type of instruments that derive their value over time from

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theperformanceofunderlyingassetsi.e.equities,bondsandcommoditiesforhedgingthefinancial risk. In order to determine theoretical price of the option few models have been developed globally. Essentially the difference between the theoretical price of the option and the price whichis actually paid (actual premium paid by the option holder to option the writer) by the holder in realpracticeshouldnotbesignificant.Incasethedifferenceishighlysignificant,thenthefinancialmarketof a country will be under stress.There are various factors which determine the value of an option i.e.CurrentMarket Price of the underlying assets, Strike Price, Expiry date, Implied Volatility of the Underlying assetsand Risk-FreeInterest etc. most of the investors or traders use option trading for hedging, they minimize their risk on both side i.e. unpredicted downward or upward move (upward move basically useful to traders those who have created strangle). Option trading means buying and selling option. The principle of options trading is to maximizepayofforminimizespotentialrisklookingatthestockmarketbehavior.Theoptionstradershould beknowledgeable in measuring various categories of risks associated with trading. Through mathematicalformulae,certainnumbersaregeneratedtomeasuretheserisks.Collectivelythesenumbersa retitledas Option Greeks. These option Greeks are named as Delta (Δ), Gamma (γ), Theta (θ), Vega (ν) andRho (ρ).

STATEMENT OF THE PROBLEM: -

Financial derivatives help investors or traders to manage their risk, it helps them in an uncertain event, Identifying the actual price of any contract will help to reduce the chances of risk for anindividual, business firms and fundmanagement houses. Since it is known to everyone that the financial awareness in India is significantly low, investors do not aware about the use of options for protection of their investment and wealth through derivatives and at the same time those who are aware about option contract as a risk management tools, they do not have understating of how option contract works, so, it becomes necessary to study various option Greeks to use option contract effectively, Hence, The present research paper willhighlight the research question that is "How to use the Option Greeks for systematic risk managementbyconsideringallthe determinants?"

OBJECTIVESOFTHE STUDY

- ToStudy & Understand the Option Greeks.
- Toanalyze the relationship of various Option Greeks with Option Contact.
- Tounderstand the hedging or Risk Management strategy using Option contacts.
- To analyze the actual use & working of option Greeks.

LITERATUREREVIEW

- Delta hedging has been widely applied by investors who have positions of long or short options in their portfolio to hedge risks from the changes of the price of option. Due to its broad application in financial engineering, there is a vast literature on delta hedging. Hull (2003) provided an introduction of hedging strategies including delta hedging. Jarrow and

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Turnbull (1999) provided a detailed explanation of how to replicate portfolios in order to achieve a delta-neutral position and implementation of dynamic delta hedging.

- ThomasF.Coleman, YohanKim,Yuying LiandArunVerma(2001),thevolatility smileisderivedoutoftheimpliedvolatility.Thoughthisensuresintegrityofvaluation,itdistortsthe delta and other Greeks because using the implied volatility cannot ensure integrity of Greeks.Thus there is a volatility smile adjustment to be made to the Greeks, especially Delta, because weuse thisGreektospothedge(Thomas F. Coleman, 2001).
- Shonkle M. Bartam (2006), Use of option as a risk management tool by non-financial firms.Consider accounting treatment of derivatives and liquidity effects for determining the derivativeinstruments(Bartam, 2006).
- Ms. Shalini andDr. Raveendra, (2014). Derivatives are tool for managing risk and the growth ofderivativesintherecent yearshassurpassed thegrowthofitscounterpartglobally(Raveendra, 2014).
- Fischer Black and Myron Scholes (1973).An empirical test made and observed option buyerspays more than that is predicted through formulas as there is larger transaction costs in optionmarket(Scholes, 1973).
- Hemal Thakker and& A.A Attarwalla (2016), the analysis is done to identify that price discoveryis possible through binomial option pricing model. The result states that the market value of Niftyoptionpricingand Binomial optionpricingmodel is significantlydifferentfromeachother(Attarwalla, 2016).
- Midhula Mohan K. and A.V. Hemalatha (2016) the financial derivative in recent trend has showna highest growth in financial market. The result states that most of the private and governmentsector are engaged in derivative trading rather than post office saving, FD or LIC. However,commonpeople are not aware whichcanbe donethrough thebrokerandexchanges(Hemalatha, 2016).
- Yuh-DauhLyuu. Huei-Wen Teng, (2011), Risk hedging through Option Greeks is observed to beless variate from the actual result this help for predicting by using various formulas numericallywhichare unbiased(Teng, 2011).
- Luis H. Ederington and Wei Guan, (2007). There are other higher order derivatives can beconsidered. Particularly important in accounting for option price changes delta and others also hastherole, butgamma hasgained allkind of popularity(Guan, 2007).

RESEARCHMETHODOLOGY

Basically present study is conducted fully based on secondary data, that have been collected through various reference books on Risk Management, Option Volatility & Pricing etc., data also have been collected through various research articles & blogs on this topic etc. Practical experience based data or views also have been considered for the study since researcher himself using option Greeks as a hedging tool for his investment.

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MAJOR DISCUSION: -

According to the formal definition of Options trading, it is an agreement between two parties' buyers and sellers of an underlying asset at a predetermined price and within a fixed period of time. Under a particular options contract, buyers are named as holders and sellers as the writer. In order to do options trading, holders (Buyers) only have to pay a minimum premium to the writer (Sellers). So, unlike the future trading, options don't need much capital. Therefore, Options give the right to the buyers to execute the contract while sellers have the obligations. Hence, buying options contract is riskier in comparison to selling it.

Options Types based on the Trading Method

Calls: Call Options offer the right to buy an underlying asset at a predetermined price. However, if traders are confident and predictable about the uplifting market price, they can book a call option. Depending on the terms of the contract, calls have the expiry date. Hence, traders can buy the underlying asset prior to or on the date of expiry.

Put: Put options carry exactly the opposite statement of Calls. Here, Owners get the right to sell the underlying asset at a predetermined price and date. So, in case, if traders predict the falling price level, they could book the put options. There is an expiry date too.

Terms in Options Market

Options Premium: In options premium, there are two components, intrinsic and time value. Premium is decided according to the Options contract amount.

Lot Size: It defines the number of the underlying security.

Expiry Date: The day when the contract will expire.

Spot Price: Spot market trading price is referred to as the spot price.

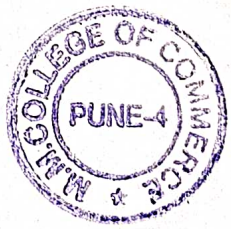
Strike Price: This is the price at which an asset is sold or purchased.

The Greeks are a group of mathematical derivatives applied to help manage or understand portfolio risks. They include delta, gamma, Theta, Vega, and rho.

Delta

Delta is the rate of change of the option's price with respect to a given change in the price of the underlying instrument, holding other parameters constant. The delta of long one stock share is +1 while that of short one share of stock is -1.

The option deltas of a call and put options are given as:



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$$\text{Delta}_c = e^{-\delta T} N(d_1)$$

$$\text{Delta} = -e^{-\delta T} N(-d_1)$$

Where δ is the continuously compounded dividend yield of the underlying stocks, note that δ will be zero for non-dividend paying stocks.

Call options have positive deltas as the value of a call option increases with an increase in the underlying asset price. Conversely, put options have negative deltas as the value of a put decreases with an increase in the underlying price.

Gamma

Gamma is the rate of change of portfolio delta with a change in the underlying price, holding all the other parameters constant.

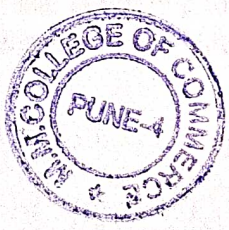
Option gamma measures the convexity or curvature of the relationship between the price of the option and the price of the underlying asset.

A high value of gamma means that delta is more sensitive to the share price changes and vice versa. The gamma of a long or short position in one share of stock is zero. Recall that the delta of the underlying share is equal to one. The derivative of a constant is zero, and so the gamma of the underlying asset must be zero.

Gamma is always positive, and its value is highest when the option is near at the money and close to expiration. The portfolio gamma can be lowered by going short options and increased by going long options.

Both put and call options have equal gamma.

$$Gamma_c = Gamma_p = \frac{e^{-\delta T}}{S\sigma\sqrt{T}} n(d_1)$$



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Where:

$n(d_1)$ is the standard normal probability density function

Theta

Theta measures the sensitivity of the option value to a small change in calendar time, holding all else constant. Note that time is a variable that progresses with certainty. Therefore, it does not make sense to hedge against changes in the time since the start of the contract, similar to what we do for unexpected changes in the underlying asset price.

The greater the time to expiry, the higher the possibility that the share price will move in favor of the holder, given that the downside loss is capped. However, Theta is usually negative for both a call and a put option as the expiration date gets nearer. The speed of the decline in the option value increases as time goes by. The option will thus expire worthless. I.e., S=K. The change in option prices as time advances is known as time decay. The Theta of a stock is zero since stocks do not have an expiry.

Vega

Vega is the sensitivity of a portfolio to a given small change in the assumed level of volatility; all else held constant. The assumption of future volatility makes Vega a subjective risk management tool.

The Vega of both call and put options are equal and always positive. If the underlying security becomes more volatile, then there is a greater chance of the price moving in favor of the option holder.

Vega is high for at or near the money options and short-dated options.

Rho

Rho is defined as the change in a portfolio with respect to a small change in the risk-free rate of interest, holding everything else constant. Although the risk-free rate of interest can be determined with a good degree of certainty, it can vary by a small amount over the contract term.

Holding a call option can be viewed as having cash in the bank waiting to purchase the share. The holder of the call option will benefit in the meantime when interest rates rise.

Conversely, we can think of a holder of a put as already owning a share and is waiting to sell it for cash. The holder of the put will thus lose out on the interest in the meantime when interest rates rise.

Therefore, rho is positive for a call option and negative for a put option.

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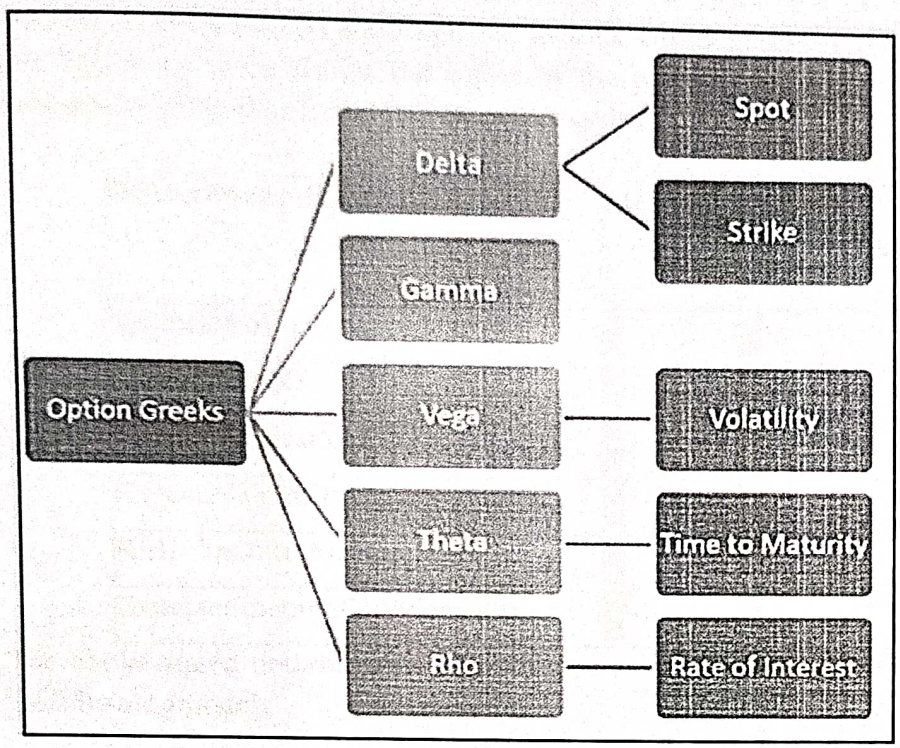

(Source: elearnmarkets.com)

OptionGreeks: Concept,DerivationandModelling Approach

Greeks	CallOption	PutOption	Values
OptionDelta(Δ)	$\frac{\partial C}{\partial S}$	$\frac{\partial P}{\partial S}$	Where,∂=PartialDerivative,C=CalloptionPrice,S=priceoftheunderlyingasset,P=Putoptionprice
OptionGamma(γ)	$\frac{\partial \Delta}{\partial S}=\frac{\partial^2 C}{\partial S^2}$	$\frac{\partial \Delta}{\partial S}=\frac{\partial^2 P}{\partial S^2}$	Where,γ=Gamma,Δ=OptionDelta,S=StockPrice,C=CalloptionPrice,P=Put optionprice
OptionTheta(θ)	$\frac{\partial C}{\partial t}$	$\frac{\partial P}{\partial t}$	Where,∂=PartialDerivative,C=CalloptionPrice,t=timetill expiration,P=Putoptionprice
OptionVega(ν)	$\frac{\partial C}{\partial \sigma}$	$\frac{\partial P}{\partial \sigma}$	Where,∂=Partialderivative,P=Putoptionprice,C=Callprice,σ =volatility
OptionRho(ρ)	$\frac{\partial C}{\partial r}$	$\frac{\partial P}{\partial r}$	Where,∂=Partialderivative,P=Putoptionprice,C=Callprice,r =Risk-free interestrate

Theimpactofdeterminantsonoptionprice- Apractical approach

Option strategy is a zero-sum game, so the option premium paid (transaction value of the option)should not significantly differ from the theoretical value of the option. To determine the theoreticalvalue of the option six factors are to be considered. These determinants are the Spot price of theunderlying asset (S), Strike Price (X), Time till Expiration (T), Expected Volatility (σ),

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Risk-FreeInterest Rate(r) and Expected Income/Dividend(D).
The Following table shows the effect of the price of an option when one of the determinants increaseskeepingother five determinantsas constant.

DeterminantofOptionPrice	Increase	Call Option Price	Put OptionPrice
Spotprice ofunderlyingasset(S)	↑	↑	↓
StrikePrice(X)	↑	↓	↑
TimetillExpiration(T)	↑	↑	↑
ExpectedVolatility(σ)	↑	↑	↑
Risk-FreeInterest Rate(r)	↑	↑	↑
ExpectedIncome/ dividend(D)	↑	↑	↓

The above-stated determinants of option pricing and their respective implications can be put in thefollowingmodel:

OptionMoney-ness: At-the -Money(ATM),In -the-Money(ITM),Out–of-the-Money(OTM)
A call option gives the holder the right to buy at the exercise price while a put option gives the holderthe right to sell at the exercise price. At a particular time, the underlying may be greater, equal or lesserthan the Exercise Price. In such situations, the options are said to be at-the-money (ATM) or in-the-money(ITM)or out-of-the-money(OTM).These situationsareasshown below:

CallOption	Optionis said tobe	PutOption
ExercisePrice=Market Price	**At- the–Money**	ExercisePrice=Market Price
ExercisePrice<Market Price	**In-the –Money**	ExercisePrice>MarketPrice
ExercisePrice>Market Price	**Out–of- the- Money**	ExercisePrice<MarketPrice

RiskHedgingstrategiesbyusingoptionGreeks
Price of a call option or put option on non-dividend paying asset is a function of five variables namelytheSpotpriceof the underlying asset (S),StrikePrice(X), TimetillExpiration (T),ExpectedVolatility (σ), Risk-Free Interest Rate (r). If there is any change in any variable or determinant duringthe option contract, its effect will be on option price. In case the effect is negative, then the optionstrader will be at risk. Through mathematical formulae, certain numbers are generated to estimate theserisks. Collectively, these numbers are known as "Greeks". In this paper, we have discussed five GreeksnamelyDelta(Δ),Gamma(γ),Theta(θ),Vega(ν),Rho(ρ).EachGreekletterofanoptionmeasuresthe sensitivity of an option price with respect to change in the value of a given underlying parametersuchas underlyingassetprice.

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Hedging Methods

First we should clearly define two confusable terms that are hedging costs and transaction costs. Generally, hedging costs could consist of transaction costs and the losses caused by 'buy high' and 'sell low' transactions. Transaction costs can be broken down into commissions (paid to brokers, etc.) and the bid/ask spread. These two terms are usually confounded because both of them have positive relationships with hedging frequency. Mixing these two terms up may be acceptable, but we should keep them clear in mind.

Investors or traders may use following hedging techniques to minimize the financial risk;

- **'Covered' Positions**

A 'covered' position is a static hedging method. Most probably investors use this method (those who are aware about it). Let us take one example of covered call, Suppose Mr. Prashant has invested in Bharti Airtel's share, lot size of Bharati Airtel is 950 (Previously it was 1886), he has purchased 1886 shares at Rs. 650, the current market price of Bharti Airtel is Rs.700, so Mr Prashant is already having good profit i.e50*1886=94,300 but this is not realized profit, if Mr Prashant wants to enjoy this profit, he has to square off this position but he does not want do the same since he has made this investment for long term. So, the question arises that how he can earn on monthly basis? Here,Mr Prashant can use covered call strategy. To illustrate it, let us assume that he has sold 800 OTM call options priced with S (Option Premium) =Rs.10, X (lot size) =1886, T(expiry date) =30 days, r=0.5%, b=0, σ=30%, and has receivedRs.18860premium from this contract, if Bharti Airtel closes below 800 then Rs. 18860 will be gained by Mr Prashant as a rental income, he can use this strategy every month, if it goes up more than 800 then Mr Prashant can exercise his right and will the delivery of 1886 shares to the call buyer. So, the total gain of Mr Prashant would be 800-650= 150*1886= 2,82,900 from his investment along with Option Premium Rs. 18860, so, total gain of Mr Prashant is 2,82,900+18860= 3,01,760.The 'covered' position can offer some degrees of protection but also induces extra risks in the meantime. Thus, it is a desirable hedging method for short term investors not to the long term investors.

- **'Stop-Loss' Strategy**

To avoid the risks incurred by stock prices' downward trends in the previous instance the option seller could defer the purchase of stocks and monitor the movements of the stock market. If the stock price is higher than the strike price, 1886 stocks will be bought as soon as possible and the trader will keep this position until the stock price will fall below the strike. This strategy seems like a combination of a 'covered' position and a 'naked' position, where the trader is 'naked' when the position is safe and he is 'covered' when the position is risky.

The 'stop-loss' strategy provides some degrees of guarantee for the trader to make profits from option position, regardless of the movements of the stock price. However, in reality, since this strategy involves 'buy high' and 'sell low' types of transactions, it can induce considerable hedging costs if the stock price fluctuates around the strike.

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➢ **Delta–Hedging**

A smarter method to hedge the risks from the movements of the underlying price is to directly link the amount of bought (sold) underlying asset to the Delta value of the option position in order to form a Delta– neutral portfolio. This approach is referred to as Delta hedging. How to set up a Delta–neutral position?

Again, if a trader has sold 800 call option of Bharti Airtel priced with S=10, X=100, T=30 days, r=0.5%, b=0, σ=30% the Delta of his position will be -119 (-1,886*0.119), which means that if the underlying increases by Rs.1, the value of this position will accordingly decrease by Rs.1886 in both side. In order to offset this loss, the trader can buy 1186 units of underlying, say, stocks. This stock position will give the trader good profit if the underlying increases by Rs. 1. On the other hand, if the stock price decreases by Rs. 1, the loss on the stock position will then be covered by the gain in the option position. This combined position seems to make the trader immunized to the movements of the underlying price.

However, in the case the underlying trades at Rs.700, we can estimate that the new position Delta will be -146. Obviously, 1886 units of stocks can no longer offer full protection to the option position. As a result, the trader should rebalance her position by buying 27 more stocks to make it Delta–neutral again.

By doing this continuously, the trader can have her option position well protected and will enjoy the profit deriving from an improved volatility forecasting. Nevertheless, it should be noted that Delta–hedging also involves 'buy high' and 'sell low' operations which could cause a loss for every transaction related to the stock position. If the price of the underlying is considerably volatile, the Delta of the option position would change frequently, meaning the option trader has to adjust her stock position accordingly with a very high frequency. As a result, the cumulative hedging costs can reach an unaffordable level within a short period of time.

The aforementioned instance show that increasing hedge frequency is effective for eliminating Delta exposure but counterproductive as long as hedging costs are concerned. To reach a compromise between hedge frequency and hedging costs, the following strategies can be taken into considerations.

➢ **Delta–Gamma Hedging**

Delta hedging is one of the methods of hedging, in this method both Delta and Gamma used to hedge the positon. Both Variablesneeds to be rebalanced along with the movements of the underlying. In fact, if we can make our Delta immune to changes in the underlying price, we would not need to re–hedge. Gamma hedging techniques can help us accomplishing this goal (recall that Gamma is the speed at which the Delta changes with respect to movements in the underlying price).

The previously reported example, where a trader has sold 800 call options priced with S=Rs10, X=100, T=30days, r=0.5%, b=0,

σ =30% had a position Delta equal to -119 and a Gamma of -26. In order to make this position Gamma–neutral, the trader needs to buy some options that can offer a Gamma of 26. This can be easily done by buying 800 call or put options priced with the same parameters as the sold options.

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However, buying 800 call options would erode all the premiums the trader has gained while buying 800 put options would cost the trader more, since put options would be much more expensive in this instance. A positive net premium can be achieved by finding some cheaper options.

Let us assume that the trader has decided to choose, as a hedging tool, the call option priced with S=10, X=110, T=30 days, r=0.5%, b=0, σ=30%, with 0.011 Delta and 0.00374 Gamma. To offset his sold Gamma, the trader needs to buy 26/0.00374 = 6,952 units of this option which cost him 197.3 which leads to an extra Delta of 6,952*0.011=76. At this point, the trader has a Gamma–neutral position with a net premium of 237 (434.3–197.3) and a new Delta of -43(-119+76). Therefore, buying 430 units of underlying will provide the trader with Delta neutrality. Now, let's suppose that the underlying trades at 750, the Delta of this position would become -32 but since the trader had already purchased 430 units of stocks, she only needs to sell 120 units to make this position Delta–neutral.

However, Delta–Gamma Hedging is not as good as we expected.

CONCLUSION

Present Research Papergives emphasis on the easy use & understanding of risk management strategies through option Greeks.How Option Greeks can protect the portfolio of investors, it has been properly discussed by the researcher. To use the option hedging strategies investors or traders should have right kindof knowledge inunderstandingtheseGreeksandtheirjudiciousapplicabilityforhedginganykindofadverseexposure.Foranyoptionstrading,aninvestormust considerthesensitivityoftheoption. Although Long term & short term investors are getting good return from their investment, they can also earn rental income on monthly basis on their investment portfolio using option strategy like Covered Call, at the same time traders can use option Greeks to hedge their positions like Delta Neutral, Detla-Gamma etc. to earn more return. While doing the research, the researcher has observed that many of the investors are not aware about various hedging strategies, they just keep on investing without protecting their portfolio, it seems very risky, for which regularawarenessprogrammeshouldbeconductedby the securities Market regulators or exchanges fortheinvestors inIndia. People consider option trading as a trading platform or avenue, they should realize that it is risk management tool, can be used from that perspectives only.

REFERENCES

1. D.B. Madan and E. Seneta (1990), "The Variance-Gamma (V.G.) model for share market returns", Journal of Business, Vol 63, pp. 511–524.
2. EspenGaarderHaug (2007), "Derivatives Models on Models", John Wiley & Sons.
3. Fabrice Douglas Rouah and Gregory Vainberg (2007), "Option Pricing Models and Volatility", John Wiley & Sons.
4. Jamil Baz and George Chacko (2004), "Financial Derivatives, Pricing, Applications and Mathematics", Cambridge University Press.

ISSN: 0011-9342 | Year 2021
Issue: 9 | Pages: 13223 - 13234

5. Broadie, M., Glasserman, P (1996), "Estimating security price derivatives using simulation", Management Science, Vol 42[2], 269–285 (1996).
6. Sanjana Juneja (2013), "International Journal of Research in Commerce, IT & Management", Vol 3, pp. 146-149.
7. Simon Benninga (2004), "Financial Modelling", 3rd edition, MIT Press.
8. Jaschke, S. R. (2002), "The Cornish-Fisher Expansion in the Context of Delta-Gamma-Normal Approximations", Journal of Risk, Vol 4[4], pp. 33-52.
9. John. C. Hull (2011), "Options, Futures and other Derivatives". 10. T W Epps (2007), "Pricing Derivatives Securities", 2nd Edition, World Scientific Publishing.
10. Black, F., & Scholes, M. (1973). The Pricing of Options and Corporate Liabilities. Journal ofPoliticalEconomy, 81(3), 637-654. http://dx.doi.org/10.1086/260062
11. Paunovic,J.(2014). Options,Greeks,andriskmanagement.Singidunum Journal ofAppliedSciences,11(1), 74-83. http://dx.doi.org/10.5937/sjas11-5820
12. Mohan K, M., & Hemalatha, A. (2016). A Study on Awareness About Investment in DerivativesAmong Government Employees in Calicut District of Kerala. Abhinav International MonthlyRefereedJournalofResearch in Management&Technology, 5(2), 1-8.
13. Prakashyalavatt,2015"AstudyonstrategicgrowthinIndiafinancialderivativesmarket",InternationalJournalofRecentScientific Research, vol.6, Issue, 10,pp. 6589-6593
14. Chen, R., & He, W. (2015). The Valuation of Compound Options: A Correction and an Extension.TheJournalofDerivatives,22(4),92-104. http://dx.doi.org/10.3905/jod.2015.22.4.092
15. Sanjana Juneja, 2013. Understanding the Greeks and their uses to measure risk, InternationalJournalofResearch inCommerce,IT and Management, 3(10).
16. Thakker, H., & Attarwala, A. (2016). Testing the Efficiency ofthe Binomial Option PricingModel in The Indian Equity Options Markets for The Period 2010 To 2015 Using The NiftyOption. Abhinav National Monthly Refereed Journal of Research in Commerce & Management,5(11), 29-36.
17. YaminLiandGeralSalkin,2002,"HedgingoptionportfolioswithoutusingGreeks",Derivatives Use,Trading &Regulation,ABI/InformGlobal, page 362.
18. SwainP.K.-2012"Fundamentaloffinancialderivatives",1st edition.HPHPvt.Ltd.
19. VarmaJ.R.2010"DerivativesandRiskManagement,3rdEdition.Mc.GrawHillEducationPvtLtd
20. https://analystprep.com/study-notes/cfa-level-2/option-greeks/
21. Wadhawan, Dikshita & Singh, Harjit. (2015). Hedging Option Greeks: Risk Management Tool for Portfolio of Futures and Option.
22. https://tradeoptionswithme.com/hedging-with-options/
23. https://medium.com/hypervolatility/option-greeks-and-hedging-strategies-14101169604e#:~:text=%20Option%20Greeks%20and%20Hedging%20Strategies%20%201,time.%20It%20is%20also%20called%20%E2%80%98time...%20More%20
24. https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/option-greeks/
25. https://www.analyticssteps.com/blogs/5-option-greeks-delta-gamma-theta-vega-rho
26. https://www.elearnmarkets.com/school/units/option-greeks-1