Earnings announcement impact on european options pricing: a trading strategy development

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Earnings Announcement Impact on European Options Pricing: A Trading Strategy Development

Final Thesis

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Introduction

Market efficiency describes how the market prices absorb information. If market prices do not accurately represent the information available then opportunities for alpha generation are feasible thus making the subject of market efficiency of great importance to investment managers.

There are three forms of Market Efficiency: Weak, semi-strong form, and strong form of Market efficiency. Weak Form, the prices incorporate precedent information therefore abnormal returns are infeasible using past information. In semi-strong form public information is priced in, thus making abnormal returns based on public information not possible. Strong form efficiency incorporates all info and private information, making it impossible to earn abnormal profits with the use of private information. Research has shown that markets are semi-strong form efficient.

Since Markets are semi strong and efficient active trading based on the use of public information and/or past trends will not outperform the market meaning portfolio managers will not outperform the market. evidence for this is in the Research that was conducted that concluded that mutual funds perform the same as the market and after taking fees into account worse than the market (Malkiel, 1995). this begs the question what role do portfolio managers play if, in the long run, it is not possible to outperform the market?

there exist several market inefficiencies and anomalies that are considered exceptions to the EMH which can aid in generating returns in a semi-strong efficient market. One anomaly that has is the earnings surprise anomaly. Earnings surprise represents the part of an earnings announcement that was not anticipated by investors and the market therefore thus not priced in.

Objectives and contribution to research

The Capital Asset pricing model demonstrates what the return should be given a level of risk. The model shows that investors are only rewarded for taking on systematic risk (beta), this approach does not provide an *absolute source of return*. An absolute source of return will provide a return despite the movement of the market. Which further begs the question, how can portfolio managers achieve a return despite the movement of the market?

Hedge funds use a wide variety of techniques asset classes and skills to obtain absolute returns. Unlike traditional investment funds, hedge funds approach return generation in a different way by significantly reducing and limiting returns from Beta ie market exposure, and primarily focusing on generating idiosyncratic returns which are unique sources of returns also known as alpha. The sources of alpha are usually market inefficiencies and the skills of the hedge fund.

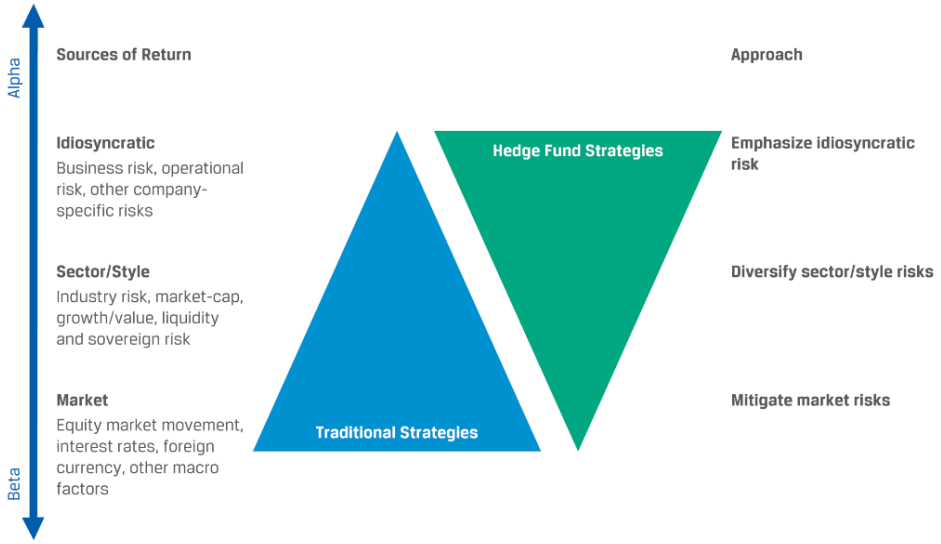


Figure 1: the sources of return for traditional strategies and hedge fund strategies

Studies have shown that since 1990 hedge funds have shown a return higher than stocks and a standard deviation identical to bonds.

This begs the question of what value this brings to individual investors. The return-generating methodology employed by hedge funds which is through market inefficiencies can be used by an individual investor. By adding another source of return that is not based on the market but on the market inefficiencies, an individual investor can enhance the risk-adjusted return of their portfolio.

according to the CAPM model, this implies that there is an opportunity to outperform the market independent of systematic risk This offers a diversification benefit to investors as these returns are not dependent on overall market performance.

In terms of the Markowitz model, this source of return introduces additional opportunity within traditional asset classes by targetting sources of alpha that are uncorrelated to the market beta

this source of return expands the opportunity set available for portfolio construction which given how unique the source of return is and it's the independence of the market beta can further enhance the risk-return trade-off resulting in an outward shift of the efficient frontier showing an improved allocation. thus improving the efficiency of the portfolio and achieving a more optimized portfolio.

Therefore this research contributes to the already established modern portfolio theory and Markowitz optimal portfolio model as well as the CAPM model, providing return exceeding the CAPM model and enhancing the risk-return trade-off of the efficient frontier of the Markowtz model by adding a new source of return that is independent of market beta, the additional source of return is alpha which analogous to hedge achieve this source of return by limiting their exposure to beta and achieve return through market inefficiencies seeking absolute returns despite the movement of the market as a direct investment in hedge funds is unachievable to the individual investor, those individual investors should replicate the model of alpha generation and exploit market inefficiencies as part of their portfolio to further enhance their risk and return trade-off one of the market inefficiencies is the earnings surprise anomaly explained previously. Individual investors can allocate part of their portfolio into a trading strategy this strategy will be focused on exploiting this market anomaly of earnings surprises by adding this additional source of return into their portfolio the portfolio will generate a return based on the systematic risk it takes as well making use of market inefficiencies as a source of alpha generation, the market inefficiency it will exploit is the earnings surprise anomaly as well as reducing the overall risk of the portfolio due to the low correlation of the 2 sources of return. By doing so the risk-optimal portfolio and efficient frontier are enhanced due to a better return trade-off demonstrated by the Markowitz model and expected return is increased from sources other than beta demonstrated by the CAPM model.

Subject of interest- Intended audience

The intended audience of this paper is individual investors who are seeking alpha. Individual investors who do not have access to direct investing in hedge funds yet can apply the practices of hedge funds of exploiting market inefficient to generate a return independent of beta. this alpha generation will be through exploiting market inefficiencies independent of beta, the market inefficiency will be the earnings surprise anomaly.

Data and Methodology and Thesis Structure

This Paper will be purely theoretical, the structure of the paper will outline the different aspects of the trading strategy explain each aspect in detail, and look for ways to maximize potential returns. The First part of the paper will look into the literature review of hoe stocks react to earnings surprises as well as introducing the concept of PEAD. the second section will further examine this effect on options, the third section will develop a strategy.

Part 1: Earnings Announcement

Literature

There has been extensive research on this subject matter. In 1968 Ball and Brown (Ball & Brown, 2013) demonstrated that stock prices move in the same direction as earnings surprise. This is also known as Post Earnings Announcement Drift PEAD.

Potential drivers of the Post earnings announment drift

5 possible areas can explain the post-earnings announcement drift there five areas are as follows: (1) Risk (2) Trading frictions (3) Cross-sectional Drivers of earning (4) Behavioral biases

1-Risk

By extending the Fama French three-factor model additions were made to the model in an effort to increase the explanatory effect of the model in explaining PEAD returns, it was found that **Accounting integrity**, **Price trend, Systematic Risk**, **dividend return**, and **inflation expectations, Earnings surprise, Solvency risk**, **Trading opportunities risk** helped explain the model better meaning all of these factors contribute to explaining the PEAD effect.

Information uncertainty causes slow responses and delayed reactions, leading to PEAD. Factors increasing uncertainty and PEAD include market shifts, economic volatility, opinion divergence, analyst forecast dispersion, increased trading activity, market-wide uncertainty, and general

sentiment. Conversely, reliable past earnings, accurate earnings announcements, reputable auditors, trusted media, and common accounting standards reduce uncertainty and PEAD.

2-Trading frictions

Trading frictions like transaction costs and liquidity correlate positively with PEAD, partly explaining it. Research consistently shows higher PEAD with higher direct costs (Bhushan, 1994; Doyle et al., 2006; Ng et al., 2008; Zhang et al., 2013) and indirect costs (Chordia et al., 2009; Chung and Hrazdil, 2011), attributed to illiquidity.

Active institutional ownership reduces PEAD, with a negative correlation noted in studies. Institutional trading volume is a stronger indicator of reduced PEAD than ownership alone. Transient institutional owners and high-frequency traders mitigate PEAD, while passive institutional owners increase it by reducing price transparency.

Higher institutional ownership affects price adjustment, reducing returns during announcements and limiting short-selling and arbitrage opportunities, thus increasing PEAD (Porras Prado et al., 2016). Institutional constraints, like position limits and portfolio turnover, may prevent timely reactions to earnings surprises, contributing to underreaction (Cao et al., 2017).

3- Cross-sectional Drivers of Earnings

PEAD is more pronounced when the earnings surprise is driven by a more beneficial cashflow instead of accruals or revenue instead of expense surprises and a surprise that is driven by revenue as opposed to expenses

A High Standerdised Unexpected Earnings (SUE) combined with low accruals leads to a stronger positive PEAD, conversely, a Low SUE combined with high accruals gives a Stronger negative PEAD.

If a firm implements conservative accounting practices as opposed to aggressive accounting practices it will lead to a more predictable variation in SUE autocorrelation thus better prediction of how earnings correlate with itself over time. (Narayanamoor- thy, 2006),

Earnings sensitivity to inflation can partialy explain PEAD. investors are more concerned with the inflation effect on discount rates and not with the inflation effect on nominal growth. this suggests that inflation plays a significant role in influencing earnings and returns.

4- Behavioral Biases

Investors' attention affects PEAD significantly. Distractions, such as multiple earnings releases on the same day or earnings announced on Fridays, lead to delayed price responses and higher PEAD. Complex information environments, like conglomerates, result in initial underreaction, leading to stronger PEAD. Increased demand for information before earnings announcements, reflected in higher search traffic on platforms like EDGAR, social media engagement, and Google searches, signals increased attention and can affect PEAD.

Overconfidence bias and cultural dimensions, such as individualism and uncertainty avoidance, also contribute to PEAD. The disposition effect, where investors hold onto winning stocks and sell losing stocks, impedes price adjustments following earnings surprises, impacting PEAD.

Anchoring and recency bias, particularly related to the 52-week high of a stock, influence PEAD. Investors underreact to positive surprises when the stock is close to its 52-week high, leading to a stronger downward drift. Additionally, recent occurrences of the 52-week high make investors more cautious following positive earnings surprises.

Part 2 Earnings surprise effect on options

Risk Measurement I

The Risks that an option trader faces are extremely complex and there are many factors that may affect an option’s values driven by its risk. an option trader’s education and focus should be on risk and how risk may change

Delta

Delta option price based on changes in the underlying. A positive delta will indicate a tendency for a positive movement of an options price when the underlying stock prices increase while a negative delta will indicate a negative movement in an options price when the underlying stock

increases. The delta has many interpretations which include (1) Rate of Change and (2) Probability

1- Rate of Change

At the time of expiration, the value of the option will equal its intrinsic value however before expiration the value of the theoretical option will be a curve that will approach its intrinsic value as it goes deeper into money and zero as it goes deeper out of the money.

As the underlying price increases, the slope of the theoretical value approaches 1, while it approaches 0 when the underlying price decreases.

In theory, option delta is expressed in decimal points ie for calls it is expressed in terms of 0.00 to 1.00, and for puts it is expressed from -1.00 to 0.00. however, in practice, it is much more convenient to express delta in the scale from 0 to 100 for calls or -100 to 0 for puts. therefore for the rest of this passage, we will refer to delta with the convention of 0 to 100 for calls and -100 to 0 for puts

Probability

The delta's alternate interpretation is probability. Its absolute value reflects the likelihood of the option expiring in the money. The at-the-money options have a delta of 50, signifying an equal chance of expiring in or out of the money under random price movements.

Gamma

The Gamma (Γ), shows the change in delta after a change in the underlying. It can be defined as the delta lost or gained per 1 unit of change in the price of the underlying.

gamma is the slope of the delta graph. gamma is always positive regardless of whether we are trading a call or put. Positive gamma causes delta to increase when the market increases and vice versa

Theta

theta Θ is a measurment of the time decay of options showing how much value an option loses as time passes. It is expressed as the value an option loses when a day passes, One important charecteritic of theta is that it increases the closer an option comes to expiration.

Vega

Vega shows the change in an option price due to changes in volatility, as cvolatility increases the price of an option increases

Interpreting the Risk Measures

The main reason why a trader will enter into a trade will be to generate a return to do this there should be a theoretical edge.

Figure 10- Position best case

If your delta position is …	You want the underlying price to…
Positive	Rise
Negative	Fall
If your gamma position is …	You want the underlying contract to…
Positive	Make big moves or move very quickly
Negative	Sit still or move very slowly
If your theta position is …	The passage of time will…
Positive	Increase the value of your position
Negative	Reduce the value of your position
If your vega position is …	You want implied volatility to…
Positive	Rise
Negative	Fall
If your rho position is …	You want interest rates to…
Positive	Rise
Negative	Fall

On the right is a table that summarizes what a trader will desire depending on the position taken.

These risk measures are subject to change therefore they should be used not to eliminate risk but to identify which risks to be tolerated and which are to be avoided to position the trader in a way that the laws of probability will fall in the trader's favor.

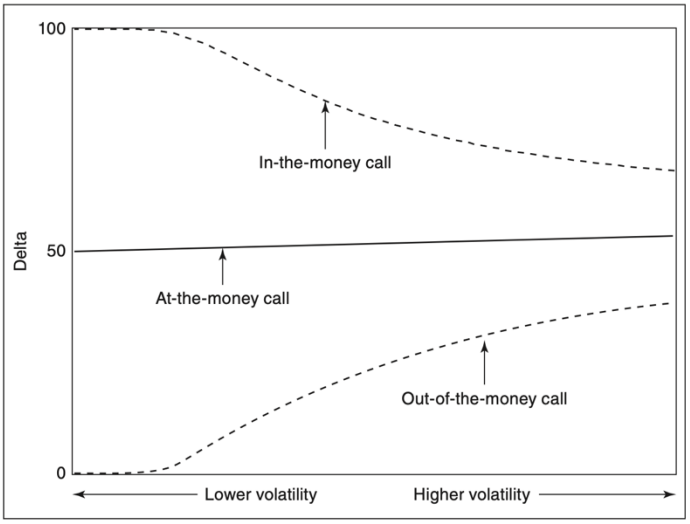
Risk Measurment II

An important aspect in options trading is that nothing is constant. Just as the theoretical value changes due to changes in the market the options sensitiveness also changes. A small risk today can become a huge risk the next day therefore an options trader must know how a stock position can change.

Delta

Delta is sensative to changes in volatility and time.

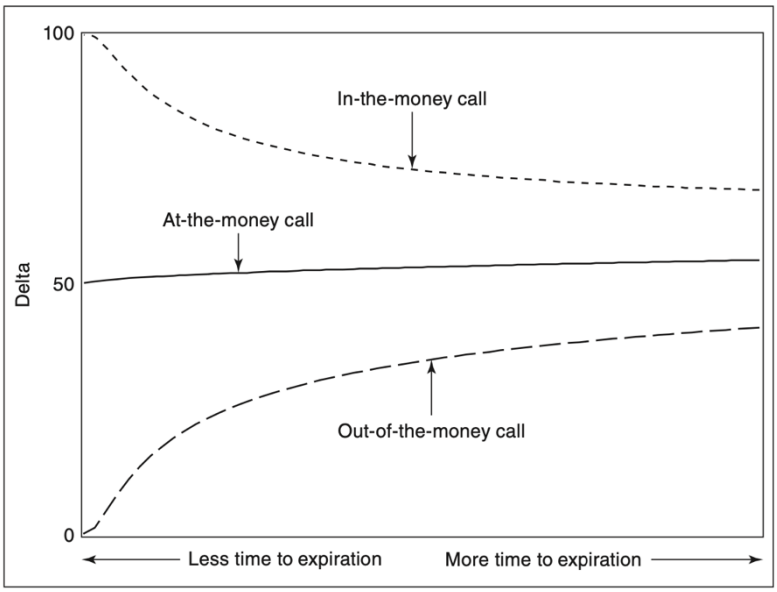
Figure 11- call delta value as volatility changes



The figure above delta sensitivity to volatility. As volatility increases the delta of an out-the-money call will increase while the delta of an in the money call will decrease converging towards 50 as volatility increases. A higher volatility increases the probability of an option to change from in the money to out the money and vice versa.

Time effect on delta

Figure 12- call delta value as time passes

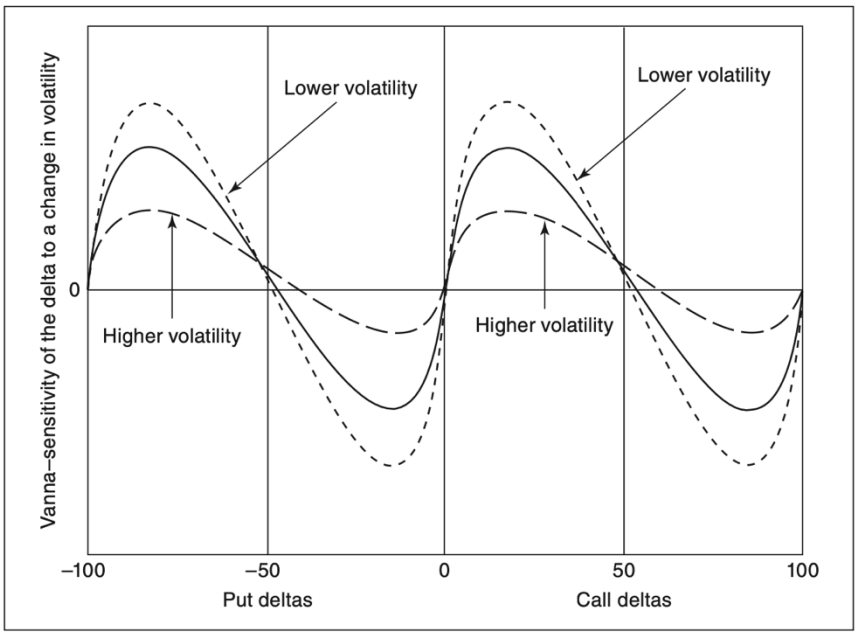


An increase in time to expiration will lead the delta to go towards 50 and less time to expiration will lead the delta to go away from 50.

Vanna is the measure of delta rate of change to volatility change while charm measure the rate of change of delta in changes in time

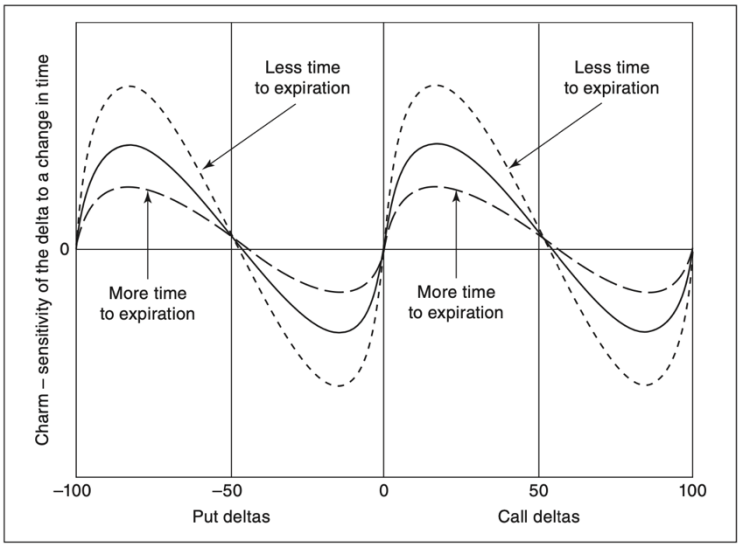
the graph below shows the Vanna of an option (y-axis) given different deltas (x-axis) as

Figure 13- Vanna of an option



Vanna is 0 as the delta approaches -50 for puts or 50 for calls, vanna is greatsest at a delta of 20, 80 for calls and -20,-80 for puts. Rate of change of vanna is the most the closer it goes to 50 delta.

Figure 14 – Charm of an option



Charm is 0 at delta 50 and -50 and it is greatest at delta -20,-80 for puts and 20,80 for calls. Charm changes the fastest when it is closest to delta 50 or -50

Theta

theta is greatest when the option is at the money as the option moves in the money or out of the money the theta will decline. Theta only affects the time value component of the option, when an option goes deeper in the money or out of the time value is diminished and dominated by intrinsic value diminishing the effect of theta

an increase in volatility will increase the time premium therefore increasing theta. The theta declines as volatility declines

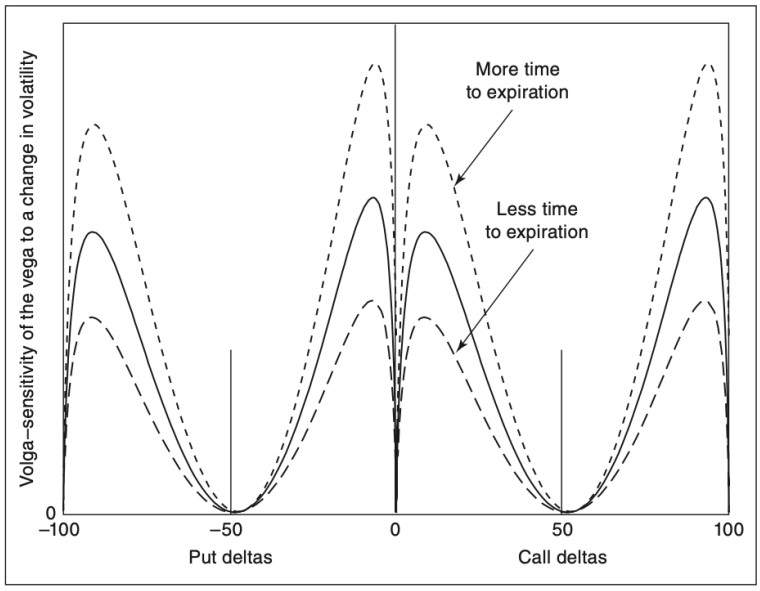
Vega

vega of an at-the-money option will remain constant.

however, the vega of an out-of-the-money and in the money option will increase as volatility increases.

the rate of change in Vega given a change in volatility is known as Volga

Figure 20- Volga of an option

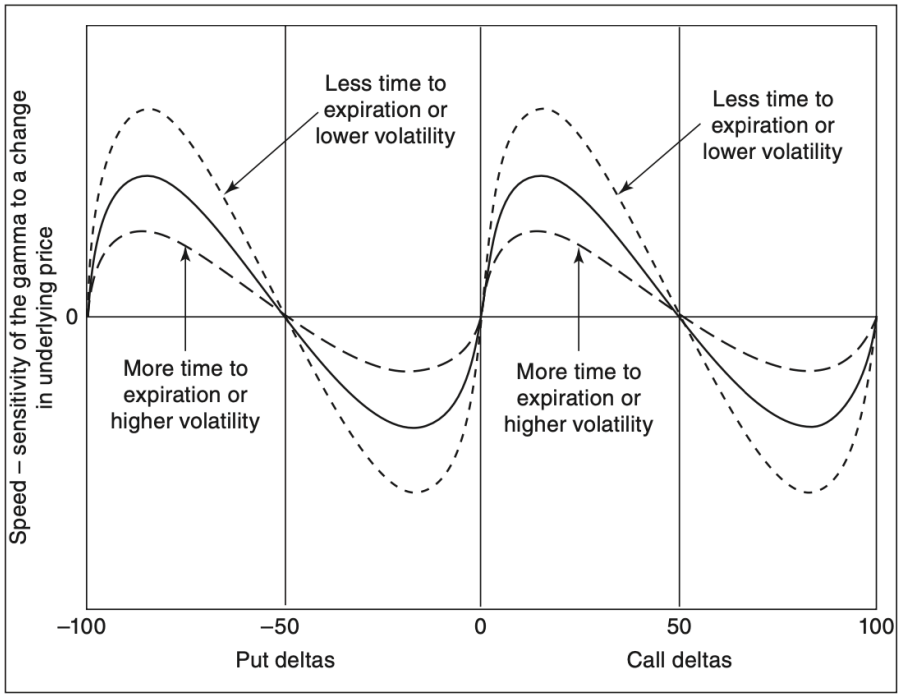


The figure above shows the value of Volga for calls and puts for differing deltas. The Volga is 0 at delta of 50 or -50 and its maximized at a delta of 10 and 90 or -10 and 90.

Gamma

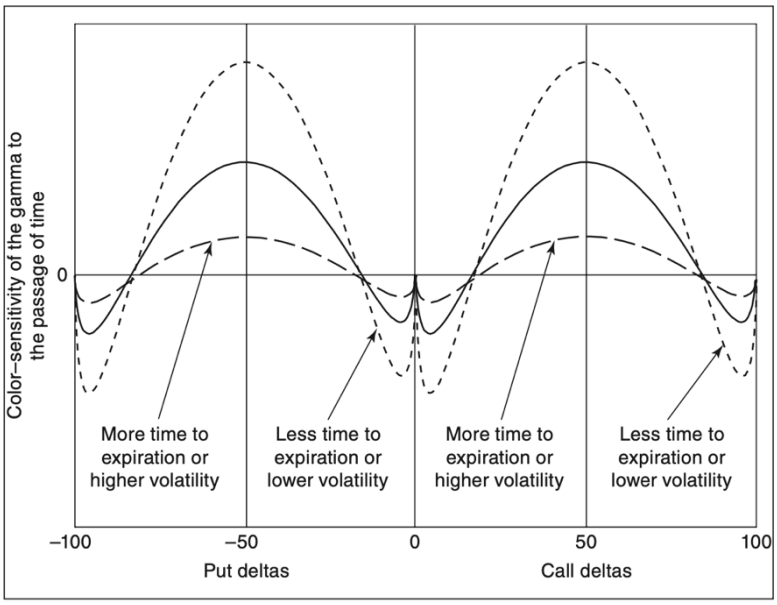
gamma itself is sensitive to other market conditions. The gamma is greatest when it is at the money.

Figure 22- Speed of an option



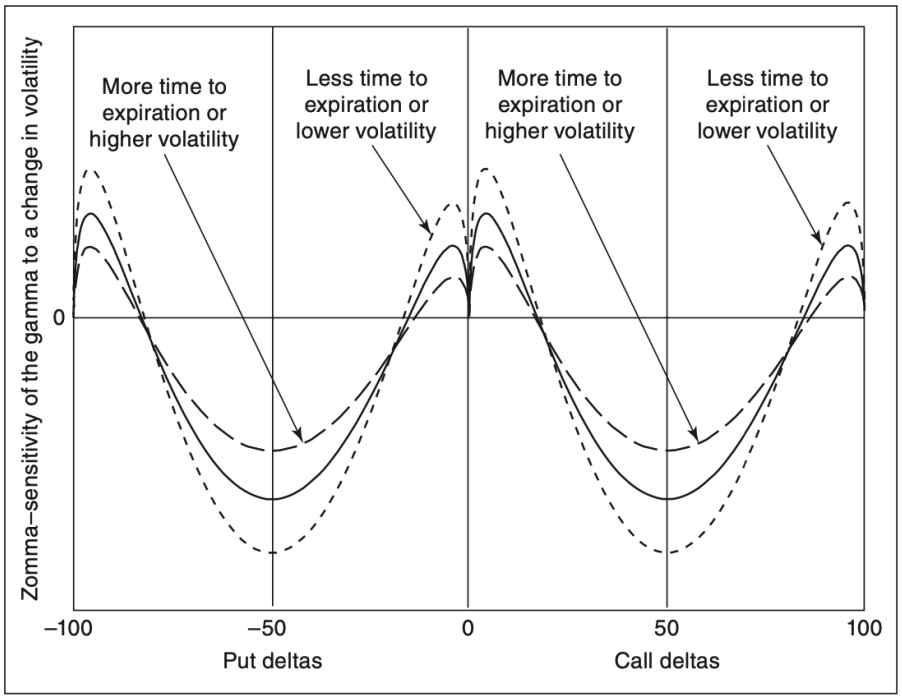
The figure above shows the Speed of the option which is the change in gamma given a chang in the underlying. speed is greatest at delta of 15 and 85, -15 and -85, and is 0 for delta of 50, speed changes the most the closest it is to 50

Figure 24 – Color of an option



Color is the change in gamma given a change in time and is shown in the figure above. The color will increase as we reduce the time to expiration and become smaller as we increase the time to expiration. Color is greatest for delta -5 and 95 and 0 for delta of -15 and 85.

Figure 25 – Zomma of an option

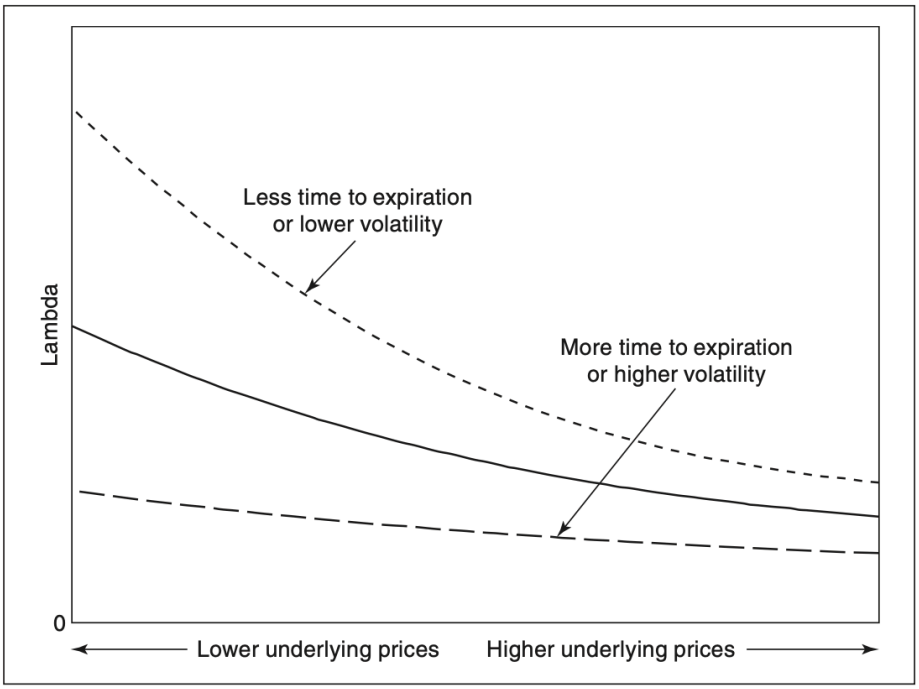


zomma is the rate of change in gamma given a change in volatility. And is shown in the figure above. Zomma value is the largest for at-the-money calls and puts (delta of 50). gamma values will decrease as volatility increases and gamma will increase as volatility decreases zomma is largest at delta of 5, 95 (-5,-95) and 0 for delta of 15 and 85 (-15,-85).

Lambda

The lambda shows us the percentage change of the value of an option for a given percent change in the underlying stock price.

Figure 26 - Lambda of a call as time or volatility changes



If a trader wanted to most return for his trade then the trader would want to have an option close to expiration, in a low volatility environment, and out of the money, as lambda is the largest the trader will experience the most return.

Natenberg, S. (1994).

Part 3 Trading Strategy Development

In this section, we will implement all that we learned from the previous sections to develop a trading strategy. we will first discuss the structure of the strategy and what to look for in each step. It is important to note that for simplicity reasons we will base our strategy on the possibility of a company achieving a positive earnings surprise as it is a lot easier to detect whether or not a company will do good as opposed to bad. Therefore the rest of our trading strategy will be based on a company having a good performance and growth in EPS as it is the best practice.
Steps:

1- Analyze companies that will report earnings in the foreseable future
2- Construct an option position that will benefit from the earnings surprise and PEAD
3- Allocate sufficient capital to strategy
4- implement adequate risk management practices

Step 1- Analyze companies that will report earnings in the foreseable future

This is the first step of the strategy. in this example the trader will operate on a weekly schedule ie the trader will prepare for earnings that will occur in the following week. An earnings calendar will be used to deduct the companies that will report earnings in the following week, of those companies the trader will choose the one that will most likely beat earnings. This will largely depend on the trader's skill in analyzing a company and developing financial models and forecasts. therefore the trader must work on this skill and financial acumen, educate, and develop knowledge in financial analysis.

From part 1 many observations could aid in helping us in what to look for. Here is what a trader should look for based on what we discussed in part 1 and the drivers of PEAD.

- *The trader should look for areas where there are information uncertainty* When assessing information uncertainty, focus on data accessibility, earnings persistence, past earnings predictability, forecasting precision, accrual reliability, auditor standing, opinion variation, analyst forecast range, trading activity, unusual volume, company tenure, and return instability. Additionally, consider media representation and the necessity for machine-readable reports.

- *The trader should look for areas where there are Trading frictions direct transaction costs, indirect transaction costs, and Liquidity risk.*

- *The trader should avoid areas where there is active institutional ownership*

- *The trader should incorporate and not underestimate earnings autocorrelation.*

- *The trader should look for earnings suprises that will be driven by cashflow suprises and revenue suprises*

- *The trader should recognize the effect of accounting practices and earnings management on PEAD*

- *The trader should look for areas where the inflation illusion hypothesis will hold*

- *Investors should look at areas with limited investor attention*

- *The trader should look for areas where there may be overconfidence bias as well as a high degree of individualism*

- *The trader should account for the disposition effect*

- *The trader should Account for recency bias and the stock price relative to the 52-week high when an earnings surprise is announced.*

Step 2 - Construct an option position that will benefit from the earnings surprise and PEAD

In this step, we will construct an option position that will profit from a positive earnings surprise and benefit from the subsequant PEAD. To create the most optimal position we will use what we discussed from the option Greeks in the earlier section and backtrack it to create an optimal position

Delta

The whole idea is to make the option the most sensitive it can be to changes in the underlying value so we can have the greatest potential return. Options with higher deltas will see more of a price increase. the higher the delta the better however a higher delta will come with an increased premium therefore we should aim for slightly out-the-money options with a delta of around 40-50.

early stage of the PEAD is the strongest and shows the most increase in the stock price. we will tailor our option positions' exposure to volatility and time to maximize this

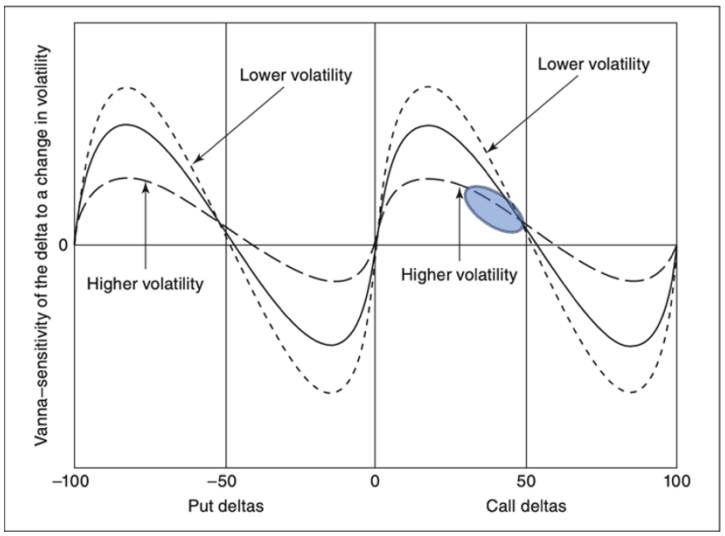
As stated, the greatest increase in price from an earnings surprise is during the early phase of the PEAD therefore to generate the most return it is of utmost importance for our option position to have the greatest delta during this time. Therefore, our initial priority should aim for slightly out the money options with a delta of around 40-50. we do not go In-The-Money to achieve a higher delta since when we go deeper into the money the option will be sold at a high premium and become expensive, we also want to benefit earnings effect on options shown by the higher derivative risk measurement, therefore, it is best to be slightly Out the money in order to benefit from other risk measurements as will be shown below.

Now looking at the effect of volatility and time on the delta,

around our the announcment volatility of an option will change and will increase, yet an earnings announcement has no effect on the time to expiration of the option therefore it is imperative for us to construct a position that will benefit from the increase of the volatility around an earnings announcement as well. As volatility increases around an earnings announcement and we want to increase delta as much as possible, a higher Vanna will lead to

the most increase in delta per unit of increase in volatility therefore we will choose the option with a higher vanna. As vanna is maximized at a delta closer to 20 we will choose the lower end of the delta of 40-50 we had chosen for our positions delta to increase as volatility increases around an earnings surprise.

Figure 30- Making use of Vomma

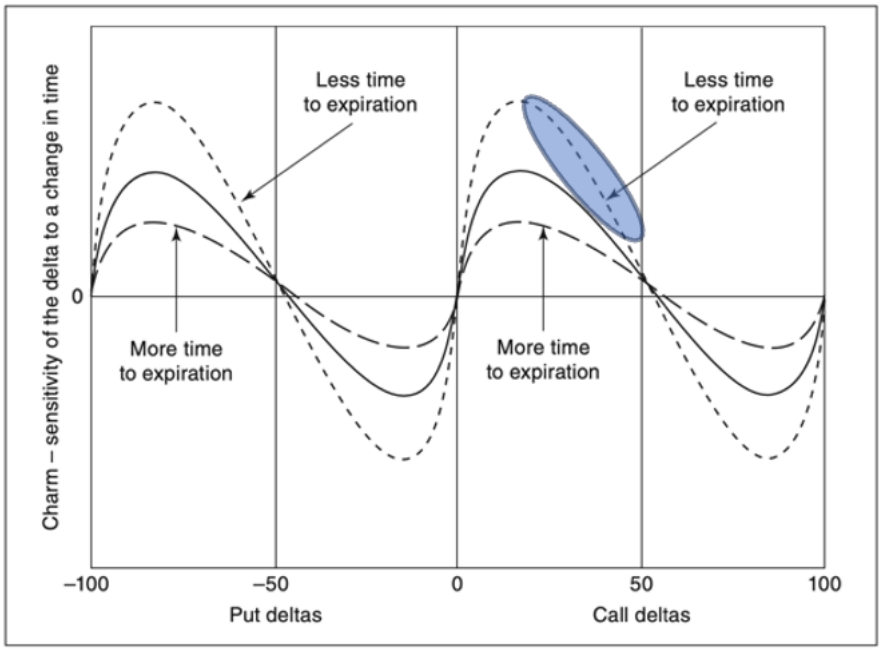


However, it is important to understand that following an earnings announcement there is usually an IV crush in this case we would want to adjust our position where the delta is not sensitive to volatility and the Vanna is 0 we can do this by buying/ shorting positions with offsetting Vanna for example say you first long a call option with a Vanna of 0.1 following the earnings announcement I expect there to be a volatility crush, therefore, will purchase a long put that has a Vanna of -0.1 this will neutralize Vanna thus making my positions delta insensitive to the IV crush as my net Vanna will be 0 (0.1+-0.1).

And since earnings announcement does not affect on time to expiration of an option we are free to choose a time to expiration that will benefit us the most. If an option has a positive charm then the delta will increase as time passes out the money options. We still have a priority to stay in the 40-50 delta range, given the volatility effect of delta through gamma we will stay in the lower end of the 40-50 delta range.

In this case, the thing that will add to our delta the most is an option that is close to expiration as can be seen in the diagram this will put us in a higher curve, and as time passes delta will increase the most.

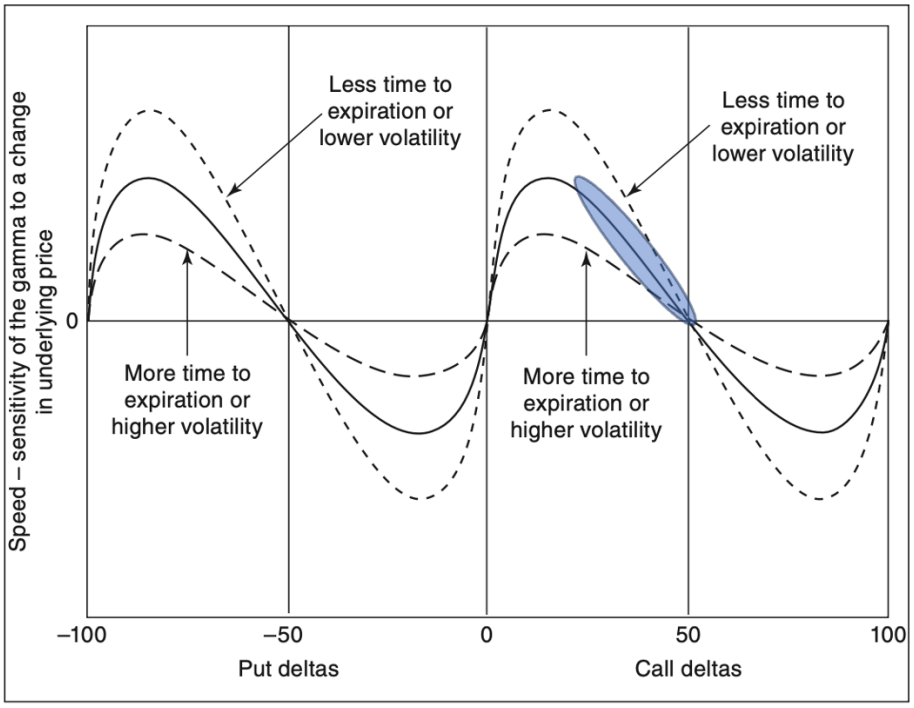
Figure 31- Making use of charm



Gamma

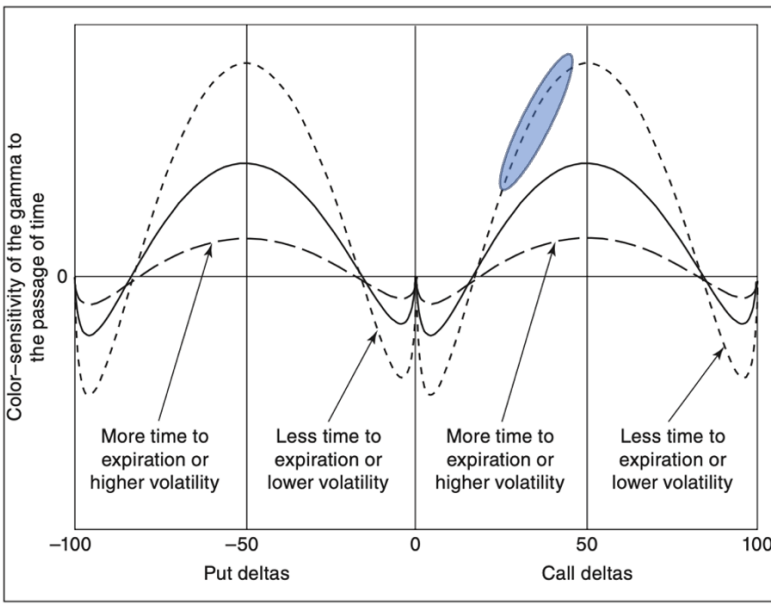
As the gamma is the rate of change of delta given a unit change in the underlying, we are expecting the underlying to increase and we want to maximize delta it is in our best interest for gamma to be positive and the greatest. We want to optimize gamma therefore delta closer to 50

Figure 32 - Making Use of Speed



At a delta of 50 speed is 0 therefore we can not benefit from speed, to have speed play in our favor a lower delta will be used . We will also choose an environment of low time to expiration and higher volatility this places us in the blue-shaded area in the figure. Within this region, a rise in the underlying price maximizes gamma, subsequently elevating delta, thereby enhancing the options' sensitivity to earnings surprises and potentially boosting profits."

Figure 33 - Making Use of Color



When looking at the color of the option we will choose one that will increase gamma the most as time passes. Gamma will increase the most as time passes when the delta is close to 50 and it is least sensitive to changes in time when the delta is at 85 or 15 for calls. Therefore we will choose a gamma that is close to 50 therefore our range for delta still is in the 40-50 range where the higher we go the more gamma will change concerning the passage of time. The option we will choose will be one that is closest to expiration as that is where the color of the option is greatest as shown in the figure

Zomma which is the gammas sensitivity to volatility will be the highest for the money option therefore we choose deltas that are closest to the money.

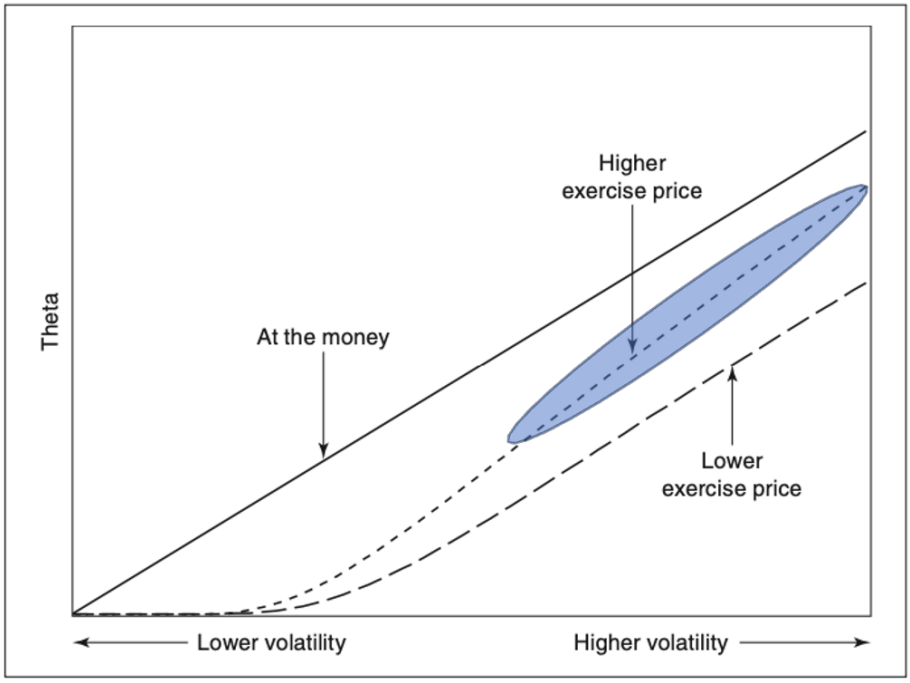
We don't choose at-the-money options due to their cost as well as the possible benefit from vanna charm etc has on Delta.

Theta

Although theta can be seen as a cost for traders theta can also be beneficial it can act as a discount and be further implemented into our strategy. As we are anticipating the stock price to increase substantially after an earnings surprise we can buy options that are extremely close to expiration as these option's prices will be severely reduced due to theta time decay on its value

in this situation theta can be seen as a discount ie we are buying the option at a discount as theta diminishes the options so much that we can buy the option for very cheap. In this case, we will want to increase theta as much as possible to increase our discount as much as possible. To increase theta we must look for higher exercise price, higher volatility as well as close to at the money as these conditions offer the highest theta ie the highest discount.

Figure 34 - Making use of theta as volatility changes



Vega

Pre earnings announcement the implied Volatility for an option will increase significantly, this rise in IV will Increase the premium therefore increasing the return generated for a bought call option, however post earnings announcement a phenomenon called an IV crush will happen this is when Implied volatility decreases significantly as uncertainty around the option disappears when this happens the value o the option will reduce significantly. A trader has two options to deal with this, the trader can first increase vega as much as possible pre-earnings announcement to make use of the increase in IV and time the sale of the option before the IV crush. If the trader chooses to ace vega using the first option then a vega will be maximized when it is closer to the money (therefore delta range of 40-50) In our strategy we purchased the option at such a huge discount because of theta therefore we will still make returns even after the IV crush and delta will be high enough too offset the loss made after the IV crush yet the

trader still must sell the option before or the early stages of the IV crush. It should be noted that Volga which is the Vegas sensitivity to volatility is maximized when the delta is closest to10 90 and the least when the delta is closest to 50, if the option trader chooses the first option then the trader will want a vega closer to 10 thus going on the lower end of out delta range 40-50

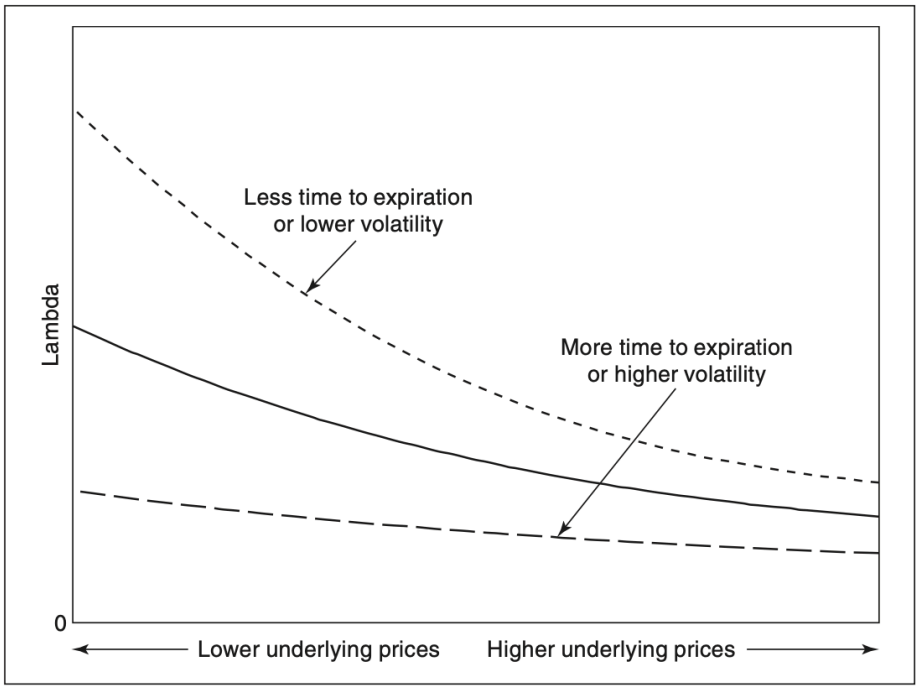
The other option will be to neutralize Vega this can be done by taking a position on an option that has the opposite Vega exposure, if the trader wanted to do this option then it is beneficial to take a position at the higher end of 40-50 delta range where Volga is the least.

it should be noted as the option goes closer to expiration Vega will decrease significantly therefore Vegas' effect on the option will be minimal thus the effect of the IV crush will be minimal, due to Vega's decay of options
Vega decay of options is maximized when the delta is at 10 or 90 for call options therefore we will want to go closer to 10, thus we choose the lower end of our initial delta range of 40-50.

Lambda

In order to increase and leverage the return we get it is imperative to increase lambda as much as possible, given the other inputs we will keep volatility higher yet we will make time to expire as less a possible in order to increase lambda

Figure 35 – Making Use of Lambda



understanding the risk measurements (Greeks) arms the trader with sufficient knowledge to navigate risks intelligently and to profit from market movements while reducing risks that do not need to be taken. Understanding the risk measurements is not only applied to one individual option, the Greeks can be used to compare and contrast the risk of many options which will influence where and how much the trader will allocate capital to which positions based on which one offers the most return given our forecast and per unit of risk.

Step 3/ Step 4 - allocating cent capital and risk management

The risk inherent in trading options should not be underestimated. Although trading option may prove to be highly profitable if the trader is wrong in forecasting, then the losses are significant, therefore it is o extreme importance to not allocate a significant amount of the total portfolio to this strategy it should be reminded what the purpose of this strategy is which is to help aid the portfolios add an extra source of return than beta through alpha. The alpha source of return will be an extra source that will complement the beta, beta being the main source of return.

this strategy depends on the trader's ability to analyze firms, generate forecasts, and predict earnings the greater ability and skill the trader has in doing so the greater this strategy will work therefore it is important for the trader to work on the skill and enhance knowledge and education and use this strategy get the most possible return given an accurate forecast

When dealing with options, risk management is of extreme importance the trader should monitor all positions and the exposure the trader has concerning the Greeks and change his exposure when necessary.

To enhance efficey of portfolio allocation the trader does not need to indulge in option trading it is sufficient enough to trade on earnings surprises and PEAD just by undertaking a position in the stock itself rather than options and this is what is advised for the unsophisticated trader or one that does not have the time, skill or knowledge to deal with options and the risk it entails. However, given a forecast by the trader that a company will beat earnings consensus given the same time effort, and cost it took to make this forecast the trader can use options to maximize returns as much as it is possible given the financial tools available.

To reduce risk the option trader can diversify positions and place his positions for a wide range of stock that may beat earnings by doing this I the trader is wrong on one stock forecast it will be more than offset by other right ones (given the large discount of theta the loss wont be a lot)

In summary the trader will. Allocate a small portion of his total portfolio to this strategy, the trader will start by analyzing companies for the following week in hopes of finding ones that will beat earnings consensus, the trader will choose a number of these companies that will most likely beat earnings consensus. Pre-earnings The trader will take an option position on all of them where the allocation of capital will be driven by an increase in the diversification of positions. The call option position taken will be in the lower part of the range of delta of 40-50, ie slightly out the money options, very close to expiration, with high volatilities. Post earnings the trader should try and time the sale of the option to avoid volatility crush or create a Vega natural position.

Conclusion

The purpose of this thesis was to research different areas of finance and look at relationships between to understand these areas and look at how these areas' implications can be used in cohesion to develop a viable strategy. Throughout this thesis, the relationship between market efficiency, Markowitz Portfolio theory, CAPM model, Market sources of return (Beta), Hedge funds sources of return (alpha), earnings surprise, Post Earnings Announcement Drift, option trading, options risk, and many other areas of finance were used in Harmony to generate a trading strategy that can be used by the everyday individual investor to improve the efficeny of the portfolio allocation prcoess showing enhanced while also achieving absolute returns

Firstly started by discussing the efficient market hypothesis of which anomalies were discovered giving rise to inefficiencies that could be systematically targetted for alpha generation, after identifying a way to generate alpha the thesis delved into literature that investigates the Earnings surprise and PEAD. later these earnings surprises and PEAD effects on options were analyzed through risk measurement known as the option Greeks, finally, a trading strategy was developed by making use of the option Greeks and use of the PEAD relationship with stock prices to generate absolute return.

The Strategy developed was to take a call option position in the lower range of 40-50 delta in very close to expiration call options with high volatilities for stocks that have a high probability

of beating earnings. It is highly advisable to conduct proper risk management in this trading strategy and to allocate a small portion of the total portfolio to this strategy as it is highly risky.

This trading strategy should be tested through methods such as backtesting to determine its viability in real-world applications and areas of future research could be conducted on other anomalies that are present which can be exploited and used to generate alpha and absolute returns. It is also advisable to research to determine the effect of trading costs in this strategy and how that will affect the total return

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