A Study on the Comparative Advantages and Disadvantages of Different Options

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Abstract. This paper delves into the world of options, a type of derivative financial product that provides the right to buy or sell a specified asset at a predetermined price by a specified date. The historical evolution of options, from informal agreements among farmers to structured contracts in medieval Europe, is explored. The study highlights the versatility of options, including the creation of new options through combinations and constraints. It also critiques existing options pricing models, such as the Black-Scholes model, pointing out their limitations in capturing real market data. The paper categorizes options into call and put options, emphasizing their distinct purposes and risk profiles. It also examines American and European options, focusing on their differences and the factors influencing their suitability. The use of options in hedging strategies is discussed through various real-world cases, showcasing their effectiveness in managing risks, particularly in volatile markets. While options offer diverse opportunities for risk management and profit, they also come with challenges, including the cost of monitoring the options market and the potential pitfalls for retail investors. The paper concludes by highlighting the ongoing evolution of the options market and its potential to become more accessible and comprehensible in the future.

Keywords: Call Option, Put Option, Hedging Strategie.

1. Introduction

An option represents a unique type of financial derivative deal, affording the purchaser the privilege, albeit not the requirement, to purchase or sell a specific asset in a predetermined quantity at a set price on a specified future date. Typically, the buyer needs to acquire the contract at the prearranged price in order to facilitate a sale or exercise the option before it matures. The strike price, which can be determined by the market value of the underlying assets or commodities on the day the option is made available, may also be established at a discounted or premium rate.

In Geoffrey Poitras' "The Early History of Option Contracts," he mentions that early options were actually informal and often were unwritten agreements among farmers and producers. For instance, a farmer might grant a neighbor the right to purchase a portion of his crop at a predetermined price. In his book, he claims that options became more structured in medieval Europe. Options on the sale of land or the use of royal privileges appeared in this period. Moreover, options could be used for speculation, as traders sought to profit from price movements, or for risk management, as merchants used them to protect against unfavorable price shifts [1].

Also, the analysis of options could be quite complex. One could create a new option by combining two existing options. For example, the combination of a put and a call option makes a new option named straddle. Moreover, adding constraint to options could also generate new options. By setting a new strike price as upper bound, a put option becomes a bear put spread [2].

Furthermore, the setup of the structure of some existing pricing models of options has some potential drawbacks, which make the analysis even more complicated. For instance, a common assumption in option pricing models is that the returns on the underlying asset would have a normal distribution, even if this is only true in certain circumstances.

For instance, let's delve into the Black-Scholes model. Black, Scholes, and later Merton crafted this concept on the premise that one can replicate an option precisely by purchasing and vending the underlying asset along with a risk-free asset in a specific proportion, effectively eliminating risk. In simpler terms, the movement of the underlying asset's price indirectly impacts the option's value. To

grasp the model and its operational principles, one must consider the model's underlying assumptions. The model's originators made certain idealized assumptions about market conditions, including a known and stable short-term interest rate, a European-style option, absence of arbitrage opportunities, an underlying asset devoid of dividends, and negligible transaction costs or taxes, among other factors [3]. While the Black-Scholes model has been extensively used to explore potential pricing challenges, its assumptions often fall short when compared to real-world market data, such as continuous processes or normal distribution. On the other hand, the practical usefulness of even an accurate analytical model for option pricing can be primarily because most market players base their pricing forecasts on several models.

2. Categories of Option

2.1. Call vs. Put

Considering the rise or sink of the stock price, options can be divided into two big categories, which are call option and put option. They are in nature the same, since they are both derivative contracts and have a strike price. Also, their premiums could be similar in some cases. Actually, there is an arbitrage mechanism that should be used to maintain put and call prices in line with one another independent of the preferences of option purchasers. Considering the underlying relationship between call and put options, there is a unique and famous equivalence when the objective is European option, which will be covered in the next section. Put-call parity is the name given to this particular equivalence. Put-call parity, a fundamental concept in options pricing, demonstrates the need for equivalence in the pricing of puts, calls, and the underlying asset.

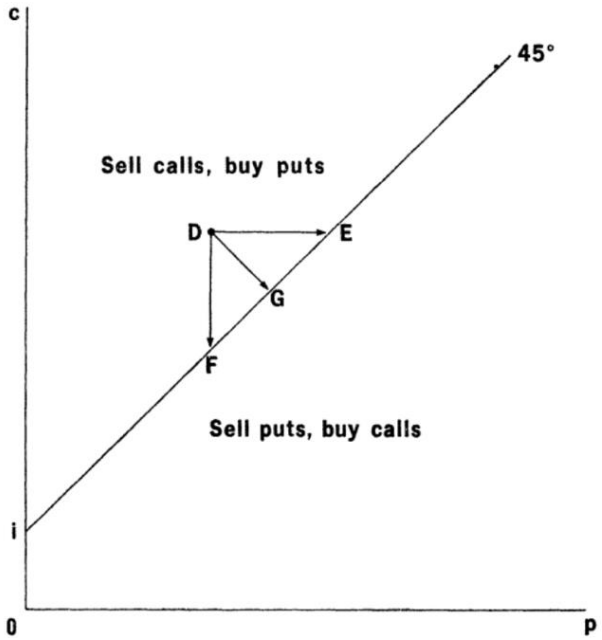


Figure 1. The relationship between call and put options prices

The relationship between call and put options prices is shown in Figure 1. Put-call parity is shown by the 45-degree line. All points must be in the first quadrant because of the way option contracts are currently written, which requires premiums to be positive. The intercept stands for the interest rate that is guaranteed. When the data points fall below the reference line, indicating elevated put prices relative to call prices, it becomes advantageous to engage in selling puts and acquiring calls (thus taking a short position to complete the hedge). This action will lead to a decrease in put premiums and an increase in call premiums. Conversely, when data points reside above the reference line, indicating that call prices surpass put prices, it is conducive to sell calls and buy puts (thus adopting a long position to complete the hedge). These strategic moves will result in a decline in call premiums and an increase in put premiums, respectively [4].

While there are numerous similarities and consistencies between these two options, the disparities of them are also important. First, each of their goals is distinct. A call option grants the holder the right to purchase the asset at the strike price, signifying that it will yield a positive return when the market price ultimately exceeds the strike price. Conversely, a put option is employed when a trader anticipates a decline in the underlying asset's value, allowing the holder to sell the asset for a price greater than the prevailing market value. Furthermore, their potential profit and loss profiles differ significantly. For a call option, a positive return is realized when the market value of the underlying asset reaches or surpasses the strike price. Consequently, the potential profit for a call option can theoretically extend to infinity, while the maximum loss is confined to the option's premium. In the case of a put option, the payoff exceeds that of a call option when the market price of the underlying asset falls below the strike price. The potential profit is determined by the difference between the strike price and the premium paid, serving as the upper limit for potential losses. In essence, call options are tailored for anticipating price increases, while put options are designed for predicting price declines, each fulfilling specific roles in trading and risk management [5].

In conclusion, there is an undeniable consistency between call and put options, and each option has its unique application scenarios and shining points in different markets.

2.2. American vs. European

By the right to exercise the options, options can also be divided into two groups, which are American option and European option. The primary differentiation between these two options lies in the fact that European Options impose limitations on the option holder's capacity to execute the option, confining it to the predefined future date and price. In contrast, the American Option provides the option holder with the liberty to exercise the option at any point before the expiration date. This considerable flexibility associated with American options mitigates the challenges of forecasting stock prices, rendering them far more prevalent in practical, real-world scenarios compared to their European counterparts [6].

Appealing to the same underlying index, American and European options display following characteristics. When American options are sold short and European options are held long in convexity testing, these conditions are implemented. Ex post investigation reveals a large incidence of violation, suggesting that American options are typically expensive. The convexity test is reversed, signifying that the short-sold option is European while the long-held option is American, and it reveals a matching degree of infringement. It seems that the excess valuation of the option for early exercise is attributed to a disruption in the correlation between the prices of these two option types, rather than a systematic overestimation of the early exercise privilege [7].

Trading the observed mispricing is a formidable challenge due to the substantial bid-ask spread and the erratic nature of these deviations. This renders the ex-ante trading rule ineffective. However, it appears that the mispricing is persistent. This study examines the market after the introduction of European options over approximately 2.5 years, and it aligns with the conclusions of an earlier pilot study conducted during the initial six months following the introduction of European options. Consequently, it may be imprudent for investors, particularly concerning call options, to favor American options. Investors initiating positions are advised to employ a strategy that involves requesting quotes for two option series: one American and one European, preferably in close proximity.

In fact, according to the discrepancy on flexibility between these two options, the results of which is better in most cases depends on the underlying assets. Actually, dealing with American options would be a more favorable one if the underlying assets are stocks or exchange-traded funds (ETFs) on a regular basis. On the other hand, if the underlying asset is an index investment strategy, investing in European-style options would be much better.

3. Hedging Strategies based on Case Studies

3.1. Positive Impact: Fuel Companies

From the conflict between Russian and Ukraine to the Israel-Gaza mess, the price of fuel is actually of unprecedented volatility. This tremendous volatility not only forces to pay more for the gasoline but also affects and harms the usual operation of some huge companies in this field. Thus, possessing a powerful method to hedging the risk is vital, particularly for the huge companies. In fact, options provide consumers one of the most advantageous strategies for hedging. When the market price surpasses the strike price, rather than purchasing the stock outright, consumers can establish a hedge against fuel prices by acquiring call options.

Considering the efficacy of using options as a manner of lowering risk, many companies add options in their hedging portfolio. Take Shell Global, a global group of energy and petrochemical companies, as an example. In order to mitigate market risks, particularly during the Russian invasion of Ukraine, which led to supply shortages and elevated commodity price volatility during the time period, Shell did actually purchase options, according to the company's annual report for 2022. Moreover, by applying the derivative of options, Shell successfully offset some potential lost due to the increased commodity cost and higher operating expenses. Furthermore, the effect of price volatility on upcoming LNG sales and purchases on Shell is partially mitigated by using commodities derivative hedge contracts including options.

In addition, the volatility of fuel price would also influence the downstream industries such as airline. For example, Cathay Pacific also utilizes options as a hedging strategy to lower the risk. Hedging is a strategy used by Cathay Pacific to control its fuel expenses and the short- to medium-term volatility of oil prices. Figure 2 shows the anticipated proportion of predicted consumption by year that has been hedged at different Brent strike prices.

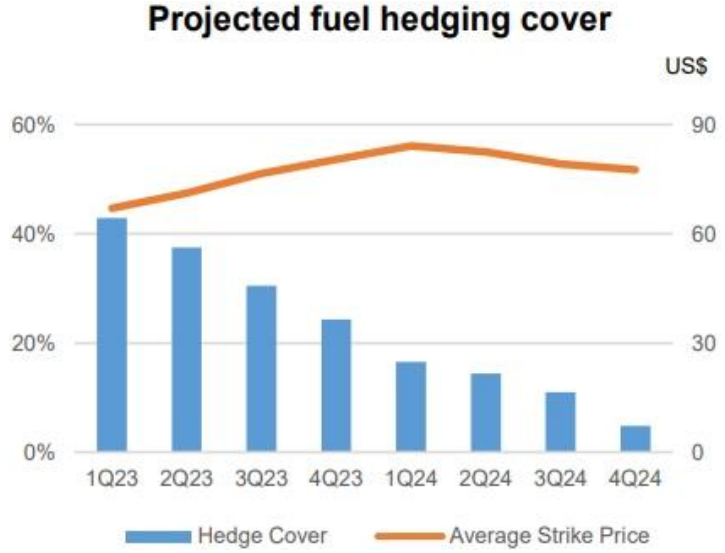


Figure 2. Anticipated proportion of predicted consumption by year

3.2. Positive Impact: Food and Beverage Companies

By adjusting their payment structures, expiration dates, and strike prices, conventional options can be transformed into exotic options. This expanded range of customization offers consumers increased flexibility when designing their hedging strategies. An example of an exotic option is a barrier option, which features a payout contingent on the underlying asset's price surpassing a predefined barrier level during the option's lifespan. Such options come into play solely if the underlying asset breaches the predetermined threshold (the barrier). Depending on the specifics of the barrier's configuration and the option's operational characteristics, there are four primary types of barrier options, each incorporating the barrier in a distinct manner.

One of examples of using the derivative of options as a hedging strategy is Pepsi Co. According to the annual report of Pepsi, it spent $2.9 billion on the investment of hedging. For the benefit of its divisions, Pepsi manages commodities derivatives centralized. Among these derivatives of commodities are metals, energy, and agricultural goods. Profits and losses stemming from commodity derivatives that don't meet the criteria for hedge accounting treatment are acknowledged within corporate unallocated expenses. The specific classification, whether as a cost of sales or under selling, general, and administrative expenses, depends on the underlying commodity. When the business divisions incorporate the underlying commodity costs into their operational profits, any resulting gains or losses subsequently impact the financial results of those divisions. Consequently, the divisions encounter the economic consequences of the derivatives without being influenced by the mark-to-market volatility, which remains within corporate unallocated expenditures. It's essential to note that these derivatives weren't entered into for trading or speculative purposes but rather to mitigate the risk associated with fluctuations in the price of the underlying commodity [8].

Furthermore, the realm of food commodities witnessed unforeseen disruptions due to options derivatives. At the onset of the Ukraine conflict, a consortium of ten leading "momentum-driven" hedge funds reaped an approximate windfall of $1.9 billion by speculating on the upswing in food prices, impacting millions with food shortages. Employing computer algorithms to identify upward or downward price movements and automatically execute transactions in financial derivatives, they amassed substantial profits through these "trend-following" strategies. Some experts argue that the global food price crisis, exacerbated by Russia's invasion of Ukraine in 2022, was exacerbated by this automated speculative trading. Prior to Putin's February 2022 invasion, approximately one-third of the world's wheat exports originated from Russia and Ukraine. Wheat futures prices increased by 50% in a single month by early March 2022, hitting their highest level in 14 years. This exacerbated a growing worldwide food crisis brought on by broken supply lines following the outbreak and a string of bad weather that ruined harvests. According to the World Food Programme, at least 33 million people worldwide are now in severe famine as a result of increases in food and energy prices brought on by the invasion of Ukraine [9].

Although it would be unfair to link financial speculation to the crisis in any one country, as it would ignore other shocks driving the crisis, the consequence and profit of using the derivative as hedging strategies is concrete and impressive.

3.3. Negative Impact

However, using options for hedging strategy could have some potential downsides. For example, the cost of keeping track of the option market is one of the biggest drawbacks of using options for hedging. It can be considerably hard to execute than a straightforward portfolio hedge. A hedged portfolio using options will necessitate a hedger to watch the market price of an option in order to modify the hedge in a timely manner, as opposed to a hedged portfolio that only entails a long position in a hedge fund that is inversely correlated to a portfolio.

Additionally, options market is not kind to the retail investors. It is tempting for them to buy options when they witness the huge volatility in many fields. Indeed, purchasing an option requires simply a minimal sum of money. Also, if everything goes well, it can pay off handsomely. However, this merely works for sophisticated investors that invest in another field. In many situations, there is no reward, and they just lose their entire investment. Moreover, blindly buying options would result in an increasement on the price of the options. In reality, investors would incur substantial losses as they are, in fact, driving option prices to levels exceeding what's justified by the actual level of realized volatility. Furthermore, in numerous instances, they incurred significant expenses in the form of "considerable" bid-ask spreads, representing the disparities between the highest price a buyer is willing to offer and the lowest price a seller is willing to accept. Furthermore, for retail investors, even though the volatility immediately decreased once the earnings were revealed, they were hesitant to close options. The researchers discovered that these factors together result in losses for earnings

releases that range from 5% to 9% on average and even more (10% to 14%) for those with significant predicted volatility [10].

4. Conclusion

In conclusion, an option is a derivative financial product that grants a buyer the right to buy or sell a specific asset at a specific price by a predetermined date. Options can be used for speculation or risk management. Analysis can be complex, and pricing models may have drawbacks. In trading and risk management, call options are used when expecting price rises, while put options are used when expecting price drops. Also, the choice between American and European options depends on the underlying assets. American options are more favorable for regular stocks or ETFs, while European-style options are better for index investment strategies. Then, options could be an advantageous hedging strategy for companies or individuals investing in fuel, while the derivative of options is also quite pragmatic in many areas. Finally, it is reasonable to conclude the diversity of options according the case discussed above, the material covered in this essay is just tip of the iceberg for options. Indeed, the options market also has some potential drawbacks. Following the development of the contemporary society, it is reasonable to think that one day the options market will eventually become sounder and allow ordinary investors to better understand the stakes involved.

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