

Pricing Asian Lookback Option based on Monte Carlo simulation

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Abstract. With the emergence and development of exotic options, the diversity of securities has largely increased. However, existing types of popular exotic options seem to be either limited or inflexible to satisfy buyers' personal needs. As for the Lookback option and Asian option, the Lookback option's application is limited in the OTC area with a high price. The Asian option is cheap but used mostly for hedging, leaving relatively little space for speculating. Thus, we created a new exotic option called the Asian Lookback option (ALB) as a combination and derivative of these two options with a flexible implementing way enabling both the requirements for hedging and speculating. In the process of building the model of ALB, these two options' models are referenced, together with the widely used option pricing method Monte Carlo Simulations based on the assumptions of the Black-Scholes model. To simulate the practical function and price of ALB, we set a control experiment of the prices of four options: two types of ALB, Asian option, and Lookback option in three different markets (S&P 500, Corn, COMEX Gold). It is shown that the price of ALB can be switched from Asian-like to Lookback-like, realizing the function of customized usage from hedging to speculating. These results shed light on a more flexible and personalized development tendency of derivatives.

Keywords: Asian option; Lookback option; ALB; Monte Carlo Simulations.

1. Introduction

In developing the option innovation process, an exotic option is one symbol among the most popular options. Exotic options are different from traditional options in their payment structures, expiration dates, and strike prices [1]. The underlying asset can vary with exotic options, providing more investment alternatives. Exotic options are hybrid securities that are often customizable to the investor's needs. The lookback option and Asian option are two of the most representative.

A lookback option is a path-dependent option. Its strike price depends on the price of the original assets over a certain period [2]. The buyer receives a cash settlement at execution based on the most favorable margin between the peak and the bottom prices during the purchase period. Sellers would price the option at or near the widest expected price difference based on historical volatility and demand. The option premium would be paid in advance. The settlement will equate to the profits made from buying or selling the underlying asset. If the settlement was greater than the option premium, the option buyer would have profit at settlement, otherwise loss. Generally, the lookback option has two advantages. First, it benefits from eliminating market timing and entry problems. Second, it helps to maximize profits within the option's term based on the lookback option's features. According to the historical data and their preferences, the investors could choose the exact time to enter and exit. Thus, the Lookback option reduces uncertainties associated with market entry timing and increases the chances to maximize investors' margin. However, there are two disadvantages related to the lookback option. On the one hand, Lookback options are expensive to execute. On the other hand, its trading scope is relatively limited.

An Asian option is an option type where the payoff depends on the average price of the underlying asset over a certain period instead of standard options, where the payoff depends on the price of the underlying asset at maturity. Asian option allows the buyer to purchase or sell the underlying asset at the average price instead of the spot price. Based on the mechanism of the Asian option, it shows superiority in two aspects. First, the Asian option reduces the market manipulation risk of the underlying instrument at maturity. Another advantage of the Asian option is that it decreases the volatility inherent in the option, making Asian options cheaper than Vanilla options. Nevertheless, the mechanism of the Asian option makes the profit below the average option margin.

To optimize these two options, Asian Lookback (ALB) option is proposed here, which synthesizes the advantages and disadvantages of these two options. This ALB Option can satisfy the needs of both speculators and hedgers. We apply Monte Carlo simulations based on the assumption of the Black-Scholes model (B-S model) to price ALB options on three kinds of securities (S&P 500, CME Corn, and COMEX Gold). Aiming to explore the characteristics of the ALB option, sensitive tests have been carried out on the three factors (strike price, volatility, and interest rate). Through a series of complex simulation operations, it is found that ALB option price moves in the same direction with strike price and the opposite direction with volatility in these three markets. Besides, the interest rate and option price have a positive relationship, but it is quite weak. Overall, the ALB option explains the traits of relatively low risk, high yield, and high customization. Since its payoff relies on the best price of those average prices over a specific period, we can select different periods of ALB, attaining a higher level of customization. However, the ALB option is restricted by counterparty risk and liquidity risk while being put into practice.

The rest of the paper is organized as follow: Sec. 2 introduces the data collection and utilization method; Sec. 3 presents the findings and results in three securities; the Sec .4 discuss the results of three market systematically and ALB option's features and restrictions; the Sec. 5 gives a summary eventually.

2. Data & Methods

2.1 The ALB Option model

As mentioned above, the ALB option is a combination of the Asian option and the Lookback option. We firstly present the model and equation of these two models for an overall cognition. The Asian option's payoff depends on the difference between the average price of the underlying asset over a certain period and the strike price. A continuous-time stochastic model is constructed for asset prices, denoted by $\{X_t, t \geq 0\}$ with $X_0 = x$. The payoff from a continuous European-style Asian call option with fixed strike price K and maturity T is determined by:

$$\max \left(-K + \frac{1}{T} \int_0^T X_t dt, 0 \right) \quad (1)$$

A review of historical references and examples of Asian options can be found in [3]. The pricing of Asian options led to a flourishing of computational techniques in the mathematical finance literature. Monte Carlo simulation was one of the earliest pricing methods proposed by [4, 5], which served as the main valuating method here as well. For the Lookback option, its payoff depends on the difference between the maximum price of the underlying asset over a certain period and the strike price. A continuous European-style Lookback call option model can be constructed with similar features to the Asian option likewise. The payoff is determined by:

$$\max \left(\max(X_t) - K, 0 \right) \quad (2)$$

Further information and pricing about the Lookback option are described in Ref. [6].

Therefore, based on the basic models and features of the Asian option and the Lookback option, the payoff model can be built by the combination of the two models. The value (payoff of ALB option) depends on the difference between the maximum price of the underlying asset of all the periods in the time to maturity. In this case, the ALB option divides the time to maturity into small periods with the same time interval. The exercise price is the maximum price of all the average prices of those periods, just as the Lookback option is embedded with short Asian options. The payoff equation with the time interval of each period P and the first day of period n as t_n appears to be:

$$\max \left(\frac{1}{P} \int_{t_n}^{t_n+P} X_t dt - K, 0 \right) \tag{3}$$

where n refers to the sequence number of different periods. It can be easily detected that the ALB option is equipped with a special factor period. In reality, this factor serves as the key value of the ALB option as it can adjust the function of the ALB option flexibly to satisfy different customers' needs. Consequently, the prices of the ALB option will be changed according to different periods, whether a short period containing few days or a long period. On this basis, the Asian option and the Lookback option can both be recognized as exceptional cases of the ALB option. Asian option appears as the ALB option with the longest period as the time to maturity. In contrast, the Lookback option seems to be a kind of ALB option with the shortest period only consisting of one day.

2.2 Valuating methods

The option valuation model employed here is Monte Carlo simulations based on the assumption of the B-S model, whose central significance lies in the simulations of the prices of the underlying asset. According to the assumptions of the B-S model, stock prices follow the regularity of geometric Brownian motion. Thus, it can be deduced from the differential model of stock prices that

$$\frac{\Delta S_t}{S_t} = \mu \Delta t + \sigma \Delta z_t \tag{4}$$

Where μ stands for expected return, σ stands for the standard deviation of yield rate $\Delta z_t = \varepsilon \sqrt{\Delta t}$, and ε is of standard normal distribution. Therefore, we can infer that

$$\frac{\Delta S_t}{S_t} \sim N(\mu \Delta t, \sigma^2 \Delta t) \tag{5}$$

Supposing that

$$G(S_t, t) = \ln S_t \tag{6}$$

And transferring Taylor expansion

$$dG = \left(\frac{\partial G}{\partial S_t} \mu S_t + \frac{\partial G}{\partial t} + \frac{1}{2} \frac{\partial^2 G}{\partial S_t^2} \sigma^2 S_t^2 \right) dt + \frac{\partial G}{\partial S_t} \sigma S_t dz_t \tag{7}$$

With

$$\frac{\partial G}{\partial S_t} = \frac{1}{S_t}, \frac{\partial G}{\partial t} = 0, \frac{\partial^2 G}{\partial S_t^2} = -\frac{1}{S_t^2} \tag{8}$$

We derive

$$d(\ln S_t) = \left(\mu - \frac{1}{2} \sigma^2 \right) dt + \sigma dz_t \tag{9}$$

By integration, one obtains the Eq. (8) in a continuous form

$$S_t = S_t e^{(\mu - \frac{1}{2}\sigma^2)(T-t) + \sigma\varepsilon\sqrt{T-t}} \tag{10}$$

Therefore, we can simulate the future changes of stock prices by using this formula within the risk-neutral principle (assuming the expected yield rate of the underlying asset equals risk-free rate). After simulating plenty of times, it is available to obtain a relatively accurate future payoff. Then, the present value can be discounted based on future simulated payoff,

$$PV = e^{-r(T-t)}FP \tag{11}$$

Where PV stands for present value and FP for a future payoff. As Buffet once said that it is better to be vaguely right rather than precisely wrong, the maximum error of the present value is calculated to evaluate the confidence interval to be “vaguely right”. Although the Monte Carlo model and B-S model possess some limitations for their relatively demanding assumptions on the underlying asset and environment, they are still powerful valuating weapons in the valuation process of the ALB option.

2.3 Data presentation

2.3.1 General hypothesis

The general assumptions in this model are as below:

- a) *The dynamics of the underlying asset follow geometric Brownian motion.*
- b) *The simulation of the ALB option price’s movement applies the Monte Carlo method.*
- c) *The risk-free rate γ is a random parameter.*
- d) *The dividend payment rate on the underlying assets is measured with δ .*
- e) *The strike price of underlying assets is noted by K .*
- f) *The expected return on the underlying assets is noted by α .*
- g) *The option maturity annually for the underlying assets is noted by T .*
- h) *The volatility of an underlying asset is noted by σ .*
- i) *The option can only be exercised at maturity.*
- j) *All kinds of options are call options.*

2.3.2 Data statement

Table 1. Data information on three specific assets

	Data source	Sample frequency	Sample period
S&P 500	<i>Yahoo! Finance</i> [7]	Daily	21/5/2020-19/5/2021
CME Corn	<i>Yahoo! Finance</i> [8] <i>CME group</i> [9]	Daily	1/4/2021-21/5/2021
COMEX Gold	<i>Yahoo! Finance</i> [10]	Daily	19/5/2020-21/5/2021

Table 1 lists the basic data information from three markets. The simulation of option price in S&P 500 applies S&P 500 ETF Trust historical data.

The historical data of S&P 500 ETF Trust on May 22nd, 2021, is cited as spot price at time 0. The Employment of historical data, with a sample period from May 21st, 2020, to May 19th, 2021, is cited for calculating S&P 500’s price volatility. These data are quoted from Yahoo! Finance with daily sample frequency.

The historical data in Corn futures utilize the option price from Yahoo! Finance and CME group with daily frequency. The spot price at time 0 is obtained from the CME group on June 17th, 2021. Take advantage of the open and close price on Yahoo! Finance, with a sample period from January 4th, 2021, to May 21st, 2021, to calculate the price volatility of corn.

The historical data in Gold use the futures price on COMEX Gold with daily frequency. From May 19th, 2020, to May 21st, 2021, is employed to assess the price volatility of gold.

2.3.3 Parameter

The specific parameters values for the three products are summarized in Table 2, respectively. The strike price K is postulated reasonably by the historical data. The spot price S_0 at time 0 is cited from the historical data. All of the option maturities are equal to 3 months by assumption (0.25 annually). The dividend payment rate on the underlying assets δ is set according to the characteristics of the specific asset. The risk-free rate γ is assumed reasonably based on underlying asset features. The expected return on the underlying assets α is the difference between the risk-free rate and dividend payment ratio. The volatility of a specific asset is measured by the standard deviation of expected return, calculated by the quotes from a powerful financial website. It is worth noting that no dividend is obtained from corn and gold because gold and corn are commodity futures. Thus, their dividend payment rates on the underlying assets equate to 0. Unlike the equity market, the interest rate has no direct effect on agriculture's option price movement, so the risk-free rate is assumed to be 0, which causes the value of the expected return on corn to equal 0.

Table 2. The specific value of the parameter

	$\gamma(\%)$	$S_0(\$)$	$\delta(\%)$	$\alpha(\%)$	$\sigma(\%)$	$K(\$)$	$T(\text{year})$
S&P 500	1.50	411.0	1.75	-0.25	17.20	410.0	0.25
CME Corn	0	629.6	0	0	30.00	662.5	0.25
COMEX Gold	1.50	1,876.7	0	1.50	17.45	1880.0	0.25

2.3.4 Simulation

The simulation process includes 6 steps. First, the application of the B-S model with Eq. (9) simulates the prices of underlying assets for 63 days. Second, calculate the Asian option payoff and the Lookback option payoff. The ALB option's prices for a 5-day period and 30-day then are calculated by

$$\frac{1}{t} \sum_{n(t-1)}^{nt} S_i \quad (12)$$

where n refers to the sequence number of different periods, t refers to the selected periods of ALB, and the simulation of the asset's option price is denoted by S_i . After calculation of ALB's option prices, the Asian payoff, Lookback payoff, and ALB payoff are calculated by Eqs. (1)~(3) respectively. Once the option payoffs are calculated, the present value of these payoffs is obtained with the formula (10). Finally, Excel's sensitivity text of strike price, volatility, and the risk-free rate are done.

3. Results

3.1 Valuation of ALB (Asian Lookback Option) in S&P500

To assess the price of the ALB option precisely, the Monte Carlo simulation has been carried out 5000 times with 95 percent confidence intervals. As a result, we build a table of different kinds of ALB options' prices to present a contrastive analysis (Table 3).

Table 3. Contrastive price analysis

	Price Interval
Lookback(1-day-period)	26.68-28.00
ALB(5-day-period)	22.38-23.65
ALB(30-day-period)	14.04-14.99
Asian(maturity)	8.37-9.10

The results obtained from the preliminary analysis of ALB options' prices are shown in Table III. As can be seen from the table above, the price of ALB options will rise as the divided periods extend. In other words, the time to maturity is allocated in more periods. ALB options with short periods are closer to the Lookback Option, which can be seen as 1-day-period ALB. In contrast, ALB with long periods appears closer to Asian Option can also be seen as ALB with one period contains the time to maturity.

Based on the fundamental results of prices of different kinds of ALB options, we shall also present some results that indicate how the prices will react when those indexes in the B-S pricing equation change and the difference between their reactions.

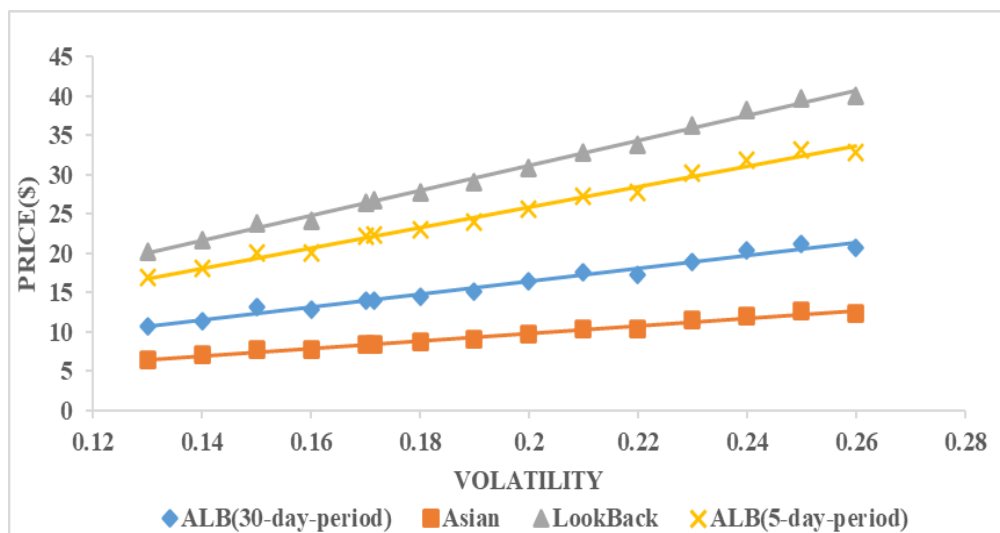


Figure 1. Option price as a function of volatility in S&P 500

It is apparent from Fig. 1. that the prices of all ALB options are directly proportional to volatility, which means all these options will perform better in a market or an asset with higher volatility. Worthy of noting here is that these four regression lines can be separated into two groups according to their slopes: Asian and ALB (30-day-period); Lookback and ALB(5-day-period). The former group reacts relatively gently to the volatility compared to the latter. In addition to the index volatility, strike price also occupies a crucial position in evaluating these option prices.

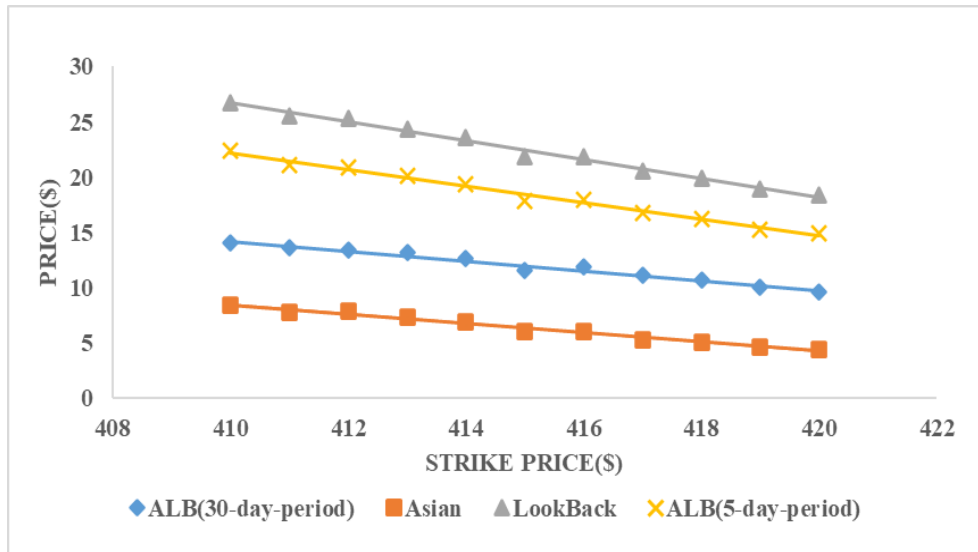


Figure 2. Option price as a function of strike price in S&P 500

Contrary to volatility, the strike price obtains an inversely proportional relationship with the option price. However, these four lines (as shown in Fig. 2), similar to those in Fig. 1., can still be divided into the same two groups in line with slopes.

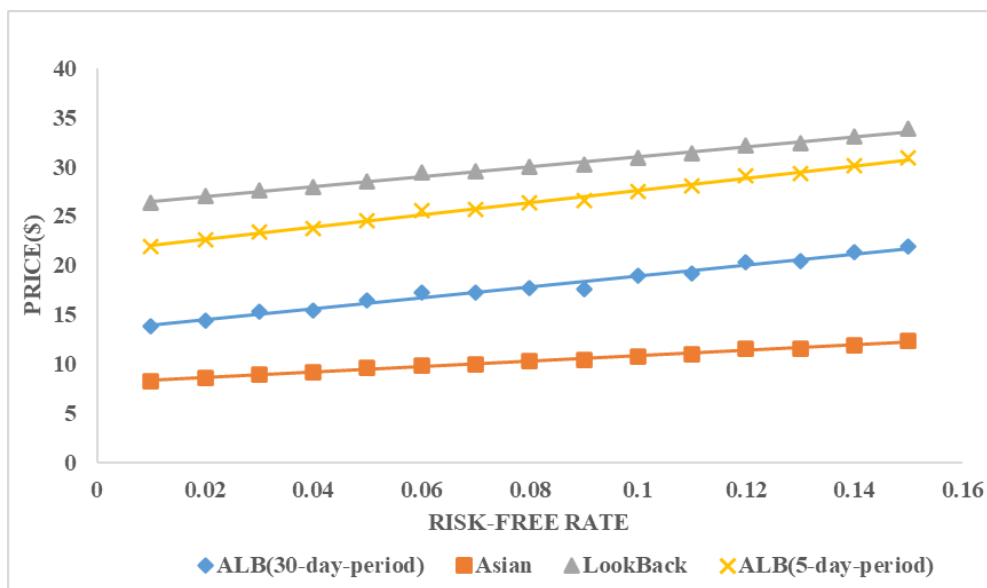


Figure 3. Option price as a function of the risk-free rate in S&P 500

The last experimental index is the risk-free rate, which affects the index α in the B-S pricing equation. Same as volatility, price is positively related to the risk-free rate, as illustrated in Fig. 3. Nevertheless, the single most striking observation to emerge from the data comparison was the slope of the Asian Option, appearing to be the only exception with a flat trend line.

3.2 Valuation of ALB (Asian Lookback Option) in Corn

In the simulation of Corn’s option price, it is assumed that the dividend rate (δ) is equal to 0, based on the features of the option’s trade on corn.

Aiming to simulate ALB’s option price precisely, the Monte Carlo simulation has been run for 5000 times under 5% significance level (as same as the case for S&P500). Thus, a table with different kinds of options’ prices is built to present a contrastive analysis.

Table 4. Contrastive price analysis in Corn

	Price Interval
Lookback(1-day-period)	43.45-46.75
ALB(5-day-period)	34.65-37.69
ALB(30-day-period)	16.48-18.56
Asian(maturity)	9.25-10.58

The results observed from the basic analysis of ALB options' prices are shown in Table 4. ALB's option price will increase as the ALB option price is calculated more frequently. ALB options with short periods are closer to the Lookback Option, which can be regarded as 1-day-period ALB. On the contrary, ALB with long periods appears closer to the Asian Option, seen as ALB with one period containing maturity time.

Based on the results of different kinds of ALB options' prices, some results will be presented that imply the price reaction when those indexes in the B-S pricing equation change and the difference between their reactions.

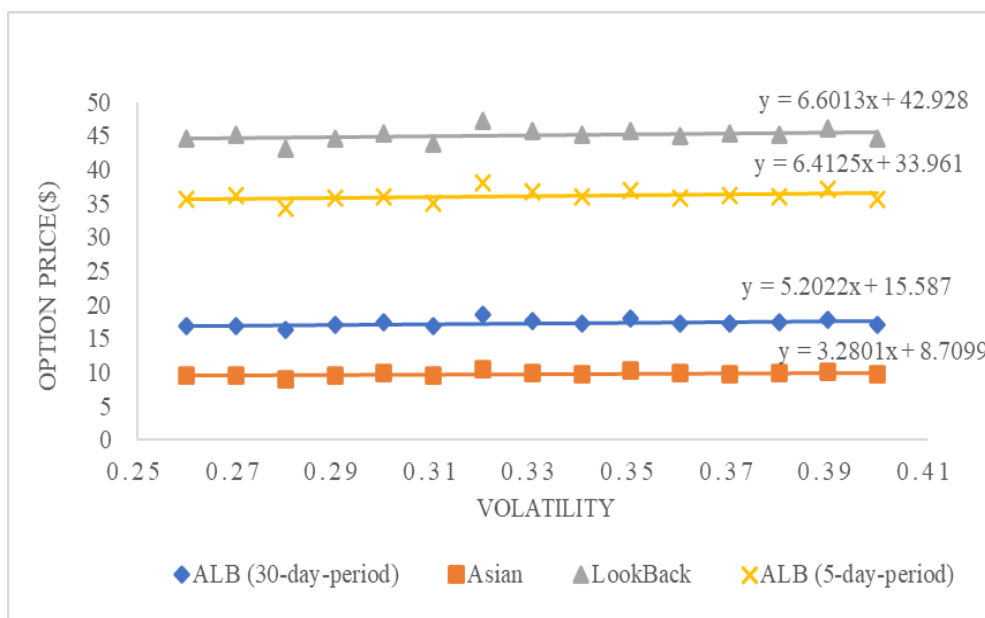


Figure 4. Corn option price as a function of volatility. y represents ALB's option price, and x symbolizes the CME Corn's volatility

As seen in Fig.4., all the ALB option prices have a positive relationship with volatility, which indicates they will outperform the market price in high volatility risk. Obviously, the slope of the Asian option (3.2801) is smaller than other options, i.e., it is less sensitive to market volatility. Moreover, the Lookback option and 5-day-period option slopes are rather close, illustrating that their performance is identical under various volatilities.

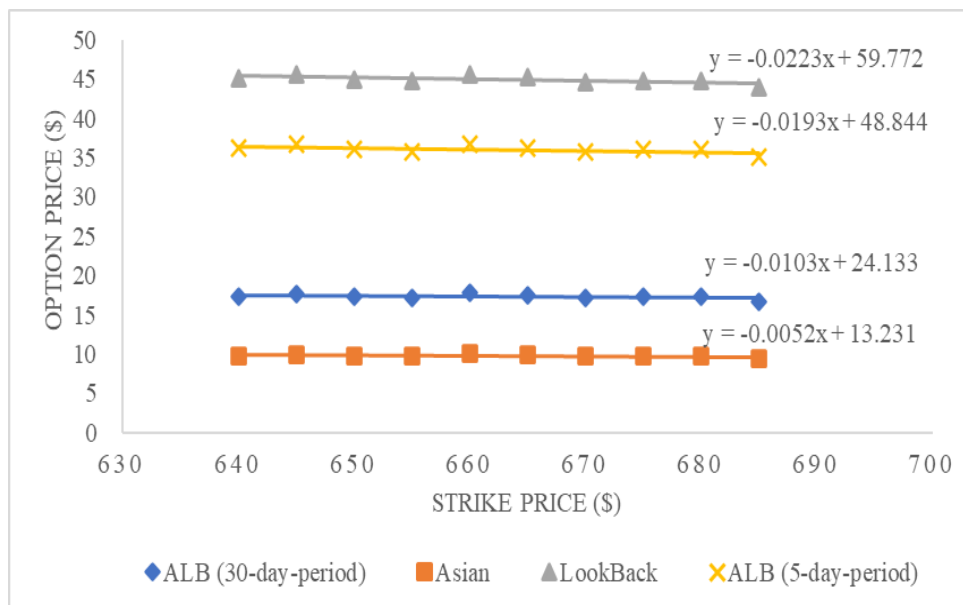


Figure 5. Corn option price as a function of strike price in Corn. y stands for ALB’s option price, while x signifies CME Corn’s strike price.

Apart from volatility, strike price also plays an essential role in option pricing. Different from volatility, strike price explains an opposite proportional relation with option price. Because of the small slope coefficients in all ALB options, the relationship between the strike price and the option price is inapparent. However, same as Fig.4., the slope of the Asian option is the smallest one, which indicates that it reacts relatively gentle to the strike price compared to others.

Based on the assumption in parameter, the impact of interest rate on corn option price is excluded because the interest rate has little impact on the investors’ investment decision.

3.3 Valuation of ALB (Asian Lookback Option) for COMEX Gold.

Subsequently, the paper offers a contrastive price analysis for COMEX Gold Lookback, ALB(5-day-period), ALB (30-day-period), and Asian options.

Table 5. Contrastive price analysis

	Price Interval
Lookback(1-day-period)	119.37-125.56
ALB(5-day-period)	98.96-104.93
ALB(30-day-period)	76.19-82.03
Asian(maturity)	36.74-40.08

The result from Table 5 demonstrates that with a 95% chance, the Lookback option price will lay on between \$119.37 and \$125.56; ALB(5-day-period) option price is between \$98.96 and \$104.93; ALB (30-day-period) option price is greater than \$76.19 and less than \$82.03; Asian option price would lay between \$36.74 and \$40.08. In this case, the Lookback option is assumed as a one-day-period ALB option. Combined with the result from Table 3, an ALB option with a shorter period is involved in a higher price. In addition, when the divided period of the ALB option gets larger, the price of the ALB option is close to the Asian option.

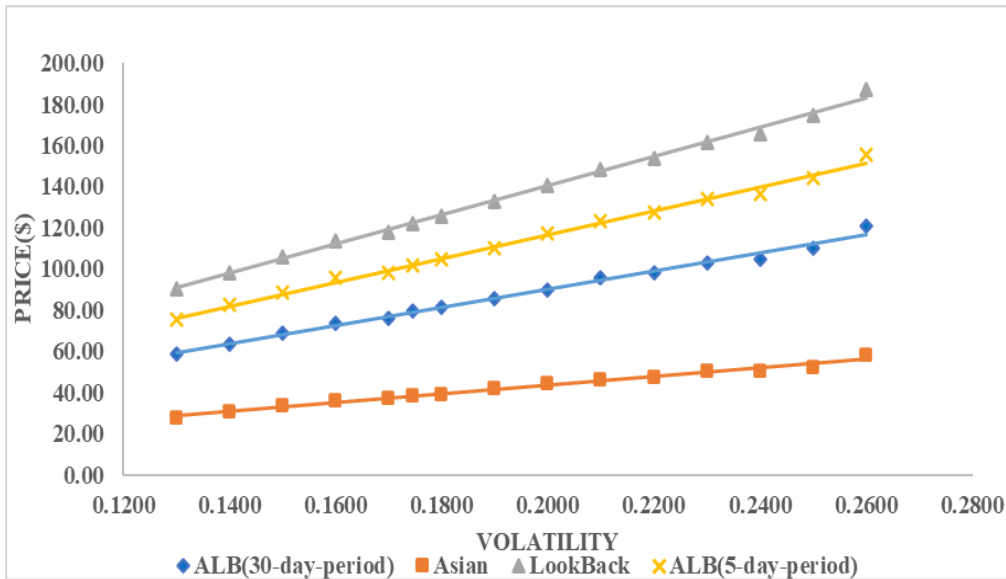


Figure 6. Option price as a function of volatility in COMEX Gold market

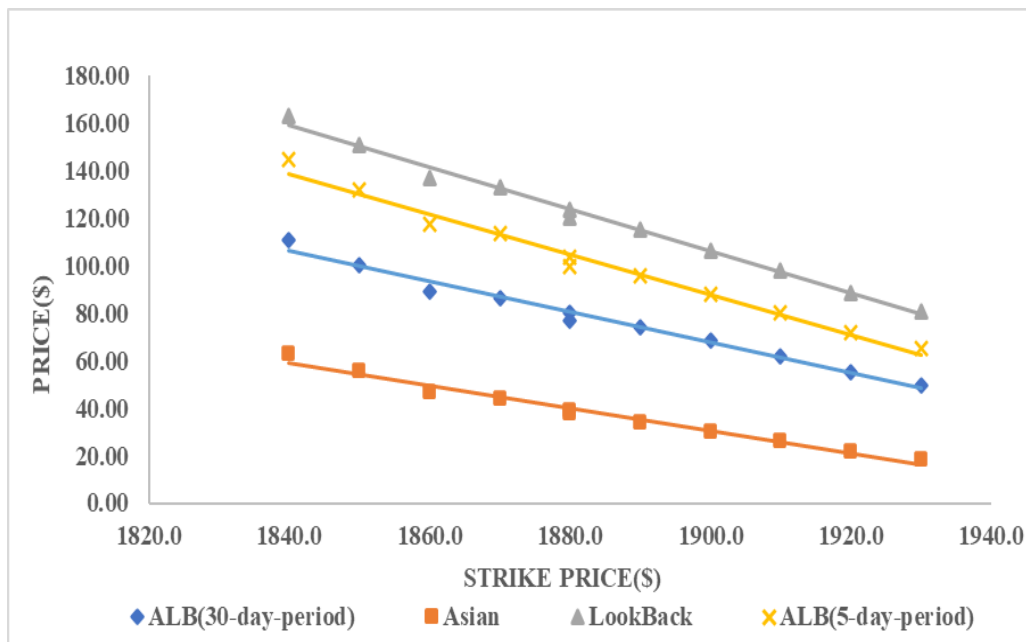


Figure 7. Option price as a function of Strike Price in COMEX Gold market

Fig. 6. shows that with the volatility of COMEX Gold price increasing, the price of all kinds of options will rise. Volatility is an important factor that can affect the options price. Besides, the relationship among the above options does not change. The lookback option has the highest price, while the Asian option has the lowest price. Under the same volatility, the ALB option with a 5-day-period is always greater than one with a 30-day-period.

From Fig. 7., one sees that the increase of strike price will lead to the fall of the option price. The price of all kinds of options tends to zero when the strike price increase, but it will not be a negative value since the option price is equal to the maximum value between zero and the difference between underlying asset price and strike price. In addition, strike price does not affect the relationship among those options. If the strike prices of the above options are the same, the ALB option with a short period has a higher price.

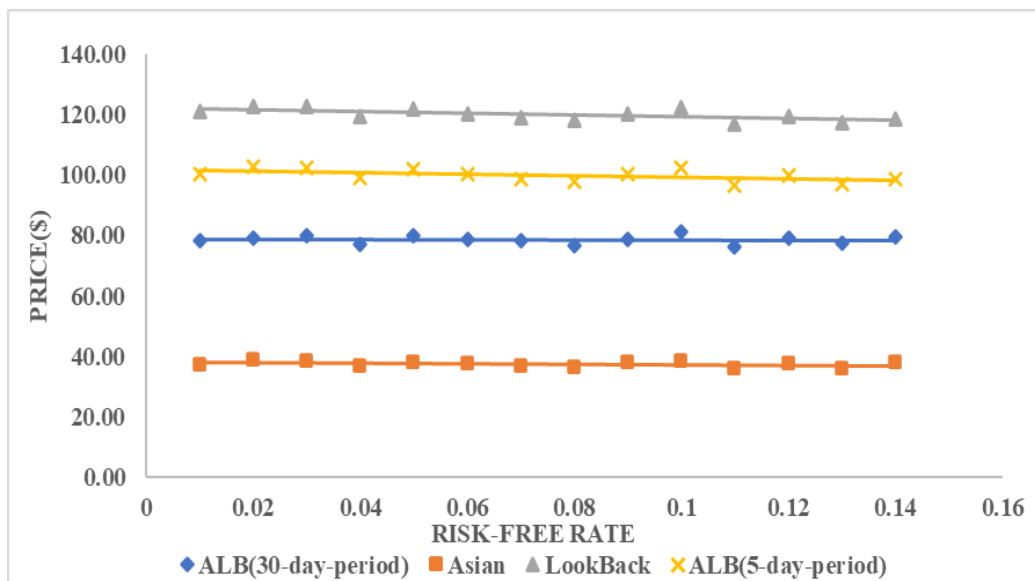


Figure 8. Option price as a function of the risk-free rate in COMEX Gold market

From Fig 8, one cannot find an obvious change in option price under different risk-free rates. Since the value of the risk-free rate is too small, the change of the risk-free rate cannot lead to an observable increase in the option price. The relationship among the price of those options remains the same ascending sequence: Asian, ALB (30-day-period), ALB (5-period-period), and Lookback options.

4. Discussion

4.1 Three Market results explanations

In S&P 500, the 95% confidence interval of the Lookback option is \$26.69 to \$28, and the price interval of the Asian option is \$8.37 to \$9.10 (Table 3). Two ALB options with different durations are designed: one is for a 5-day-period, one is for a 30-day-period. Two ALB options prices lay on between the Lookback option's price and the Asian option's price. We design the same period ALB option for corn and COMEX gold, and the same phenomena are found in three markets.

From Fig 1, 4, and 6, the volatility has a positive relationship with option price. When the volatility remains constant, the Lookback option is the most expensive, followed by ALB(5-day-period), ALB (30-day-period), and the Asian option. As demonstrated in Fig 2, 5, and 7, an inverse relationship exists between the price of option and strike price. In those three markets, a higher strike price will lead to a lower option price. Besides, Fig 3 displays that a risk-free interest rate can affect the options price. An increase in the risk-free interest rate causes the rise of the price of all kinds of options in S&P. From Fig 8, all types of the option of COMEX Gold do not have an obvious difference under different risk-free interest rates. Nevertheless, from the formula, the risk-free interest rate should be positively related to the option price. The relationship is not obvious in Fig 8. because the risk-free interest is relatively small.

Tables 3~4 show that in three markets: S&P 500, corn, and COMEX gold, the Asian option is the cheapest one, followed by ALB (30-day-period), ALB(5-day-period) and Lookback option. Additionally, under the same volatility, strike price, and risk-free rate, the Lookback option of the same underlying asset is higher than the other three options. The Asian option is the cheapest one. The basic descriptions of the design help to illustrate the phenomenon. Asian option's price relies on the average price of the underlying asset, while the Lookback's price depends on the maximum underlying asset's price. The maximum asset's price is always much higher than the average asset's price, making the Asian option cheap and the Lookback option expensive. The ALB option's price is mainly determined by the maximum value of the average asset's price during a specific period. The specific period used to calculate the average asset's price is a key variable that affects the ALB price. Therefore,

we can set the divided period to change the ALB price. The upper limit of the ALB option's price is the price of the Lookback option in the same underlying asset, and the lower limit is the price of the Asian option in the same underlying asset.

4.2 Characteristic of ALB

In this study, a brand-new exotic option ALB is designed that combines the characteristic of Asian options and Lookback options. Asian option can be regarded as a specific ALB option whose period is maturity. Asian options' price depends on the average price of the underlying asset until maturity, making Asian options' price cheap. We regard the Lookback option as a unique ALB option whose period is one day. As an exotic option that allows holders to look back at the historical data to determine if they exercise it, the Lookback option can bring up a substantial profit.

Inherited the merits of the Asian option and the Lookback option, ALB options can bring high profit or be cheap depending on how to design it. If the divided period of ALB is short, the ALB option is close to the Lookback option. It can bring a great deal of profit but is also expensive. If we design an ALB option that has a long period, it will own the merit of the Asian option: cheap. In addition, the option is essentially a right to determine if execute the contract. The holder of this contract can choose not to exercise it when the underlying asset price is below the strike price, which makes the loss controllable. Therefore, ALB options have features of low risk, high profit, and high customization. Its characteristics can be altered by changing its period.

4.3 Limitations

Some limitations should be considered when the ALB options are applied in the real market. The first limitation is that the ALB option is hard to implement in option exchanges. Owing to its high customization, the ALB option is difficult to become a standard contract traded in option exchanges. Therefore, ALB options only are available over the counter (OTC). Counterparty risk is involved because OTC trade does not have a clearinghouse to minimize the default risk. In this case, ALB options become riskier. The second limitation is that liquidity risk exists when trading ALB options. As a complex, exotic option, the ALB option might not be suitable for many investors. Additionally, the threshold of the ALB option is high-level, and the demand for ALB is limited. More research is needed to figure out the ALB characteristic and the corresponding risk in the real market.

5. Conclusion

In summary, this paper designs a brand-new call option: the ALB option by combining the Asian option and the Lookback option. The ALB option integrates the average price, which comes from the Asian option, and the best price inherited from the Lookback option. The function and features of the ALB option are investigated in three markets: S&P 500, corn, and COMEX gold. According to the results, the ALB option's price is altered by changing the underlying asset and strike price volatility. With the increase of the volatility of the underlying asset, the price of the ALB option will rise obviously. As for the strike price, it has a negative relationship with the ALB option's price. The rise of the strike price leads to the decrease of the ALB option's price. Besides, the risk-free interest rate can affect the ALB option price positively. Nevertheless, the risk-free interest rate is relatively low with a minor change, i.e., the fluctuation of the ALB option's price by the risk-free interest rate is not visual.

ALB options possess features of low risk, high profit, and high customization. The biggest loss is the option fee which makes the risk controllable. ALB options can bring a high profit because the payoff depends on the best price of those average prices for a specific period. Besides, we can change the divided period of ALB to achieve high customization. The property of ALB options makes it outstanding among many exotic options. When ALB options are put in the real market, the counterparty risk and liquidity risk are needed to be considered because ALB options are only available

over the counter (OTC). These results offer a guideline for providing a flexible investment based on the purpose of investors.

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