

# Chooser Options and Their Pricing

February 7, 2024

## 1 Introduction

Chooser options, also known as "as-you-like-it" options, offer the flexibility to choose between a call and a put option at a specific point before expiration. This feature makes them particularly valuable in volatile markets where the direction of the market trend is uncertain.

## 2 Characteristics of Chooser Options

Chooser options combine features of both call and put options. The holder has the opportunity, up to a certain date, to choose the type of option. This decision is typically made when the option is purchased.

### 2.1 Types of Chooser Options

Simple chooser options allow a single choice between a call and a put. Complex chooser options might include several exercise dates or other features that increase their flexibility and potential payoff.

## 3 Pricing of Chooser Options

The pricing of chooser options can be complex due to their inherent flexibility. The valuation typically depends on the Black-Scholes model, adjusted for the option's unique features.

### 3.1 Black-Scholes Model

The Black-Scholes model provides a theoretical foundation for the pricing of European options and is adapted for chooser options. The model is based on the following formula for call and put options:

$$C(S, t) = S_0 N(d_1) - K e^{-rT} N(d_2), \quad (1)$$

$$P(S, t) = K e^{-rT} N(-d_2) - S_0 N(-d_1), \quad (2)$$

where:

- $C(S, t)$  and  $P(S, t)$  are the prices of the call and put options, respectively.
- $S_0$  is the current price of the underlying asset.

- $K$  is the strike price.
- $r$  is the risk-free interest rate.
- $T$  is the time to expiration.
- $N(\cdot)$  denotes the cumulative distribution function of the standard normal distribution.
- $d_1 = \frac{\ln(\frac{S_0}{K}) + (r + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}$ , and  $d_2 = d_1 - \sigma\sqrt{T}$ .

### 3.2 Pricing Formula for Chooser Options

The price of a chooser option is calculated by taking the present value of the option's value at the decision time. The formula is adjusted from the Black-Scholes model to account for the option's flexibility:

$$\text{Chooser Price} = e^{-rT_c} [C(S, T - T_c) + P(S, T - T_c)], \quad (3)$$

where  $T_c$  is the time until the choice must be made.

## 4 Conclusion

Chooser options offer investors flexibility in their investment strategies, allowing them to adapt to market conditions. Their pricing, while complex, can be approached through modifications to the Black-Scholes model, providing a theoretical basis for their valuation.