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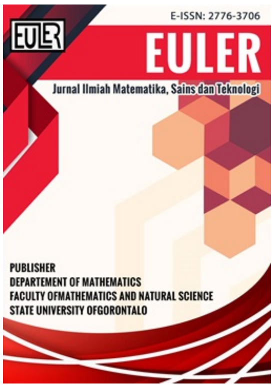

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Research Article

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Hedging Strategy Analysis of GOTO Stock Using Collar, Bear Put Spread, and Long Strangle

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ABSTRACT. *This study compares the performance of three hedging strategies, Collar, Bear Put Spread, and Long Strangle, in a case study of PT GoTo Gojek Tokopedia Tbk (GOTO) stock. The analysis focuses on the risk management effectiveness and profit potential of these strategies within an emerging market context. The research utilizes weekly stock price data from July 2023 to June 2024 (54 observations). The methodological procedures include calculating returns and volatility, testing return normality using the Shapiro-Wilk test, determining European option prices using the Black-Scholes model with a 6% risk-free interest rate, and conducting profit simulations. The findings indicate that the Collar strategy provides maximum protection against stock price declines, albeit with limited profit potential. The Bear Put Spread strategy proves effective in generating returns during moderate price decreases while offering lower risk and cost. Conversely, the Long Strangle strategy possesses high profit potential during significant price volatility but carries the risk of total loss if stock prices remain stagnant. As a comprehensive comparison of these three option strategies applied to GOTO stock, this study recommends the Collar strategy as the optimal choice for risk-averse investors during bearish trends.*

1. Introduction

Stock price fluctuations in emerging markets, particularly within the technology sector, pose significant risk management challenges for investors. In this context, derivative instruments such as options offer flexibility in constructing hedging strategies that can be tailored to individual risk profiles and market expectations. Options, as derivative contracts, grant the holder the right, but not the obligation, to buy (call) or sell (put) an asset at a predetermined price and time [1]. A combination of call and put options can be utilized to formulate hedging strategies aligned with market direction and volatility levels.

Within the Indonesian capital market, the stock of PT GoTo Gojek Tokopedia Tbk (GOTO) represents a highly volatile technology asset. As one of the country's leading tech companies listed on the exchange in April 2022, GOTO's stock has experienced extreme price fluctuations, ranging from Rp80–100 to Rp90–120 throughout 2024 [2, 3]. These conditions make GOTO a relevant subject for strategic testing and comparative evaluation of three option-based strategies: collar, bear put spread, and long strangle.

Previous studies have shown that the effectiveness of these strategies is highly dependent on stock characteristics and market conditions. The collar strategy is most commonly analyzed in the context of blue-chip stocks and moderately volatile markets [4], and has been shown to provide protection from downside risk in index-based applications [5–7]. A number of comparative studies have also highlighted the role of pricing models such as Black-Scholes and GARCH in measuring collar strategy performance within emerging markets [8].

The bear put spread is designed for assets exhibiting consistent downward trends [9, 10]. The bear put spread has been applied in both equity and commodity markets to enhance risk-return efficiency [11, 12]. Meanwhile, the long strangle is considered suitable for high-risk, highly volatile stocks [13]. The long strangle strategy has also been explored using barrier-type options for protection against short-term increases in price uncertainty [14]. Studies in the Indonesian market emphasize the importance of volatility estimation when applying long-strangle strategies, particularly when comparing Black-Scholes and GARCH models on index-based assets [15, 16].

However, most existing research has focused on developed markets or assets with moderate volatility, leaving the application of these strategies to technology stocks in emerging markets substantially underexplored. The literature demonstrates a clear preference for index-level hedging [5], foreign-exchange risk management [17], and commodity-based hedging [12], rather than applications to individual technology equities. While recent Indonesian studies have begun examining option

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strategies on market indices [8, 15, 16], a significant gap persists in their application to highly volatile individual technology stocks like GOTO. This study aims to address this gap by conducting a comparative analysis of collar, bear put spread, and long strangle strategies specifically for GOTO stock. The findings are expected to provide investors with a practical framework for selecting optimal hedging strategies based on market conditions and risk tolerance, while simultaneously contributing to the behavioral finance literature in the Indonesian capital market context.

2. Methods

2.1. Data

This study uses weekly stock price data of PT GoTo Gojek Tokopedia Tbk (GOTO) from July 9, 2023, to June 30, 2024, comprising 54 observations of closing prices [2]. The risk-free interest rate refers to Bank Indonesia's rate in January 2024, which stood at 6% [18].

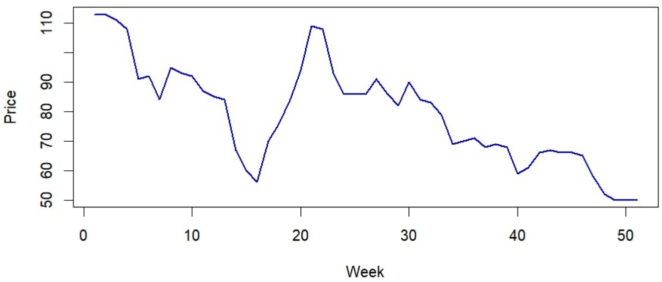

Figure 1. Weekly price movement of GOTO stock

Figure 1 illustrates the GOTO's price movements reflect the high volatility typical of Indonesian tech stocks, with a peak of Rp113 (July 2023) and a low of Rp50 (Week 51). This characteristic underlies the selection of GOTO as a case study for hedging strategies in a high-volatility environment.

2.2. Black-Scholes Model

This study employs the Black-Scholes model to determine option prices, thereby using European-style options. The Black-Scholes model for European options is applied with the following key assumptions as asset prices follow Geometric Brownian Motion with constant volatility, no transaction costs or taxes, continuous trading, and constant risk-free interest rate. While providing a robust theoretical foundation, these assumptions present limitations. The constant volatility assumption may not fully capture GOTO's dynamic risk profile, and neglecting transaction costs could overestimate strategy profitability. These limitations are considered when interpreting results. The formulas for calculating call (c) and put (p) option prices are as follows [1]:

$$c = S_0 N(d_1) - Ke^{-rT} N(d_2), \tag{1}$$

$$p = Ke^{-rT} N(-d_2) - S_0 N(-d_1), \tag{2}$$

where

$$d_1 = \frac{\left(ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)\right)}{\left(\sigma\sqrt{T}\right)},$$

$$d_2 = d_1 - \sigma\sqrt{T},$$

with

S_0	:	spot price,
K	:	strike price,
T	:	maturity time,
r	:	continuous compounding,
σ	:	Annual volatility of the underlying asset,
$N(.)$	:	Cumulative normal distribution function.

2.3. Return and Volatility

Returns are calculated using log returns, which measure the percentage change in asset prices over time using the natural logarithm. Log returns tend to follow a normal distribution, making them suitable for application in the Black-Scholes model. The log return formula is:

$$R_t = ln\left(\frac{S_t}{S_{t-1}}\right), \tag{3}$$

with:

R_t	:	Return at time t,
S_t	:	Asset price at time t,
S_{t-1}	:	Asset price at time $t-1$.

Empirical volatility is expressed as the standard deviation (σ) of asset returns over one year, calculated using historical data:

$$s = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}\left(R_t - \overline{R_t}\right)^2}. \tag{4}$$

Estimated stock price volatility ($\hat{\sigma}$) is derived using:

$$\hat{\sigma} = s\sqrt{\Delta t}, \tag{5}$$

where s is empirical volatility and Δt is the time interval in one year [1].

2.4. Normality Test

The Shapiro-Wilk test is used to assess the normality of return data with hypotheses:

H_0	:	Data follows a normal distribution,
H_1	:	Data does not follow a normal distribution.

Statistical significance ($\alpha = 0.05$) determines normality acceptance. The Shapiro-Wilk test statistic is defined as [19]:

$$W = \frac{\left(\sum_{i=1}^{n} a_i x_i\right)^2}{\sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2}, \tag{6}$$

with

W	:	Shapiro-Wilk test statistic,
x_i	:	ordered data,
$\overline{x}$	:	mean of the data,
a_i	:	weights based on expected values and variance-covariance matrix of normal statistics,
n	:	number of observations.

A W value close to 1 indicates normal distribution. The resulting p-value guides the decision on data normality.

2.5. Collar Strategy

The collar strategy combines a long put option and a short call option, both with the same underlying asset and expiration date [5, 6, 8]. Let the put option price be p with strike price K_1, and the call option price be c with strike price K_2, where

$K_1 < K_2$. If S_T is the stock price at maturity, the profit from the collar strategy (P_c) is

$$P_c = \max(K_1 - S_T, 0) - \max(S_T - K_2, 0) - p + c. \quad (7)$$

2.6. *Bear Put Spread Strategy*

The bear put spread combines a long put and a short put option with a lower strike price, both with the same underlying asset and expiration date [11, 17]. Let the long put price be p_1 with strike price K_1,and the short put price be p_2 with strike price K_2, where $K_1 < K_2$. If S_T is the stock price at maturity, the profit from the bear put spread (P_{BC}) is

$$P_B = \max(K_2 - S_T,\ 0) - \max(K_1 - S_T,\ 0) + p_1 - p_2. \quad (8)$$

2.7. *Long Strangle Strategy*

In a long strangle strategy, an investor buys two options simultaneously, one call option with a higher strike price, and one put option with a lower strike price. Both of these options must have an identical expiration date [12, 14, 15]. Let the put option price be p with strike price K_1 and the call option price be c with strike price K_2, where $K_1 < K_2$. If S_T is the stock price at maturity, the profit from the strategy is

$$P_L = \max(K_2 - S_T,\ 0) + \max(K_1 - S_T,\ 0) - (p - c). \quad (9)$$

2.8. *Unsecured Position*

An unsecured position refers to holding an asset without applying any hedging strategy against price movements. The performance of the unsecured position will be compared with secured positions using hedging strategies. Suppose an investor purchases n units of an asset at time ($t = 0$) at price S_0, and sells n units at time T at market price S_T, then the portfolio value function for the unsecured position is

$$U(S_T) = n(S_T - S_0). \quad (10)$$

The portfolio value of secured positions using each strategy will be calculated and compared to the unsecured position to evaluate risk levels. The secured portfolio value function is obtained by summing the unsecured portfolio value with the profit function of each strategy.

2.9. *Research Steps*

The following steps outline the analytical procedures conducted throughout the study:

1. The analysis began with the computation of weekly returns for GOTO stock, followed by the estimation of its historical volatility as the basis for option pricing.
2. To verify the suitability of the data for the Black Scholes framework, the normality of returns was examined using the Shapiro Wilk test.
3. European call and put option prices were then derived using the Black Scholes model across several strike prices, incorporating the calculated volatility and the prevailing risk-free interest rate.
4. Using the option valuation results, three hedging strategies, collar, bear put spread, and long strangle, were systematically constructed in accordance with their respective payoff structures.
5. For each strategy, the profit outcomes and portfolio values were assessed by simulating price conditions at maturity, reflecting both risk exposure and return potential.
6. The performance of the hedged positions was subsequently compared to determine the relative effectiveness of each strategy in providing downside protection and managing portfolio outcomes.

3. Results and Discussion

3.1. *Return and Volatility*

GOTO stock exhibited varied performance during the period from July 2023 to June 2024, with returns ranging from 22.60% to 22.30%. The returns were determined using eq. (3).Graphical analysis reveals that although the stock was capable of generating substantial positive returns, such as 22.30% in the fifth week of October 2023, the majority of the period (76%) recorded negative returns. This return pattern indicates that, despite GOTO's promising upside potential, the frequent and substantial downward movements represent a critical risk factor that must be carefully considered.

The annual volatility of GOTO stock, determined using eq. (5), measured at 60.34%, reflects a highly fluctuating price behavior over the one-year period, signifying a considerable level of risk for investors. With volatility exceeding 60%, GOTO stock falls into the high-risk, high-return category. Therefore, implementing hedging strategies becomes essential to safeguard portfolio value against adverse price movements.

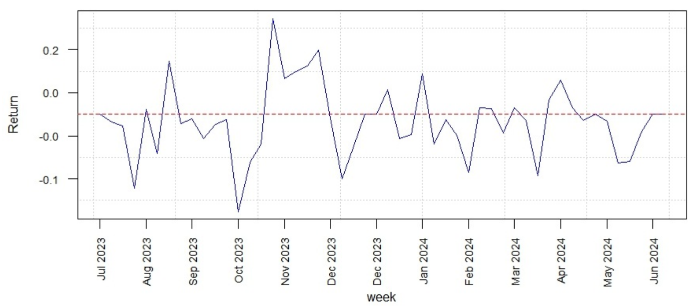

Figure 2. Weekly return of GOTO stock

3.2. *Normalitas Return*

According the Shapiro-Wilk normality test, the resulting p-value was 0.2811, which is greater than 0.05 at a 95% confidence level. This indicates that the evidence is not strong enough to discard the null hypothesis H_0, meaning that GOTO stock returns follow a normal distribution. This finding is important not only as a descriptive verification but also as a basis for validating the use of the Black–Scholes model in option pricing. Although a normal distribution does not guarantee full accuracy under volatile market conditions, this conformity provides an initial justification that log-normal return modeling can be technically applied in the analysis of hedging strategies.

3.3. *Opsi Call dan Put*

European call and put option prices were derived from the Black-Scholes model (eq. (1) and eq. (2)) with a spot price (S_0) of Rp113, a risk-free interest rate (r) of 6%, and an option maturity period (T) of six months. For the strike price (K) variable, six

Table 1. European call and put option prices for GOTO stock

No	Strike	Call	Put
1	45	71.50431	0.8837142
2	66	55.01109	4.1675457
3	83	44.00405	9.1705043
4	91	39.54751	12.2480851
5	115	28.64905	23.9519722
6	120	26.78995	26.8016973

Table 2. Profit of the collar strategy

Strike Price		Max Profit	Collar Strategy Profit		
K_1	K_2		$S_T \leq K_1$	$K_1 < S_T \leq K_2$	$S_T > K_2$
45	120	70.90624	$70.9062358 - S_T$	25.9062358	$145.9062358 - S_T$
66	115	90.4815	$90.4815043 - S_T$	24.4815043	$139.4815043 - S_T$
83	91	113.377	$113.3770057 - S_T$	30.3770057	$121.3770057 - S_T$

values were selected around the quartile range of the stock price. The following table presents the European call and put option prices for six strike price variations (Table 1).

3.4. Profit Calculation and Portfolio Value of the Collar Strategy

The profit function of the collar strategy is constructed by combining a long position in n put options with strike price K_1, and a short position in n call options with strike price K_2, where $K_1 < K_2$. Let p denote the price of the put option and c denote the price of the call option. Using eq. (7), the profit function of the collar strategy $P_C\left(S_T\right)$ is

$$P_c(S_T) = \begin{cases} n(K_1 - S_T - p + c), & S_T \leq K_1, \\ n(-p + c), & K_1 < S_T \leq K_2, \\ n(K_2 - S_T - p + c), & S_T > K_2. \end{cases} \tag{11}$$

The profit calculation for the collar strategy is performed using one long put option with three strike price variations below the spot price (as K_1), and one short call option with three strike price variations above the spot price (as K_2). The results are presented in Table 2.

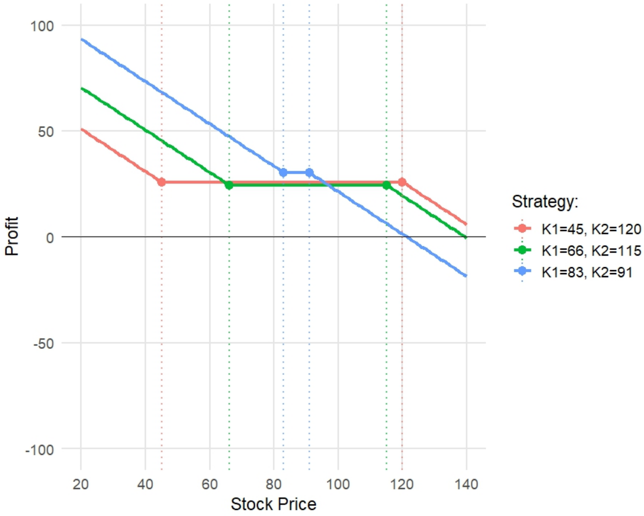

Figure 3. Profit of the collar strategy

Based on Figure 2 and Table 2, the combination of $K_1 = 45$ and $K_2 = 120$ provides active protection when the stock price (S_T) falls below 45, resulting in stable profit at a certain level, while the upside potential is capped above 120 due to the sale of the call option. The combination of $K_1 = 66$ and $K_2 = 115$ exhibits a similar pattern but with a narrower range, allowing for a quicker response to price movements. Meanwhile, the combination of $K_1 = 83$ and $K_2 = 91$ offers very tight protection, with profit immediately stabilizing below 83, although the potential gain is highly limited above 91. The closer the distance between K_1 and K_2 to the initial stock price (S_0), the stronger the protection against price declines, but with more restricted profit potential. Conversely, a wider gap weakens the initial protection but allows for greater upside when the stock price rises.

The portfolio value function of the secured position in the collar strategy can be expressed as follows:

$$C_C(S_T) = \begin{cases} n(K_1 - S_T - p + c) + (S_T - S_0), & S_T \leq K_1, \\ n(-p + c) + (S_T - S_0), & K_1 < S_T \leq K_2, \\ n(K_2 - S_T - p + c) + (S_T - S_0), & S_T > K_2. \end{cases} \tag{12}$$

Figure 3 presents the portfolio value of the collar strategy for $n = 1$, compared against the unsecured position (eq. (10)).

$$U\left(S_T\right) = \left(S_T - 113\right). \tag{13}$$

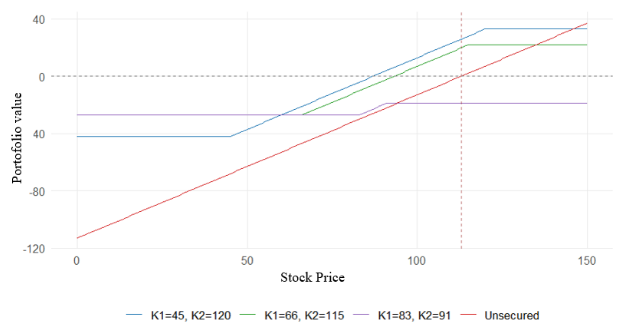

Figure 4. Portfolio value of the collar strategy

Table 3. Profit of the bear put spread strategy

Strike Price		Max Profit	Bear Put Spread Strategy Profit		
K_1	K_2		$S_T \leq K_1$	$K_1 < S_T \leq K_2$	$S_T > K_2$
45	120	49.08202	49.0820169	$94.0820169 - S_T$	-25.9179831
66	115	29.21557	29.2155735	$95.2155735 - S_T$	-19.7844265
83	91	4.922419	4.9224192	$87.9224192 - S_T$	-3.0775808

Figure 4 compares the portfolio value of a secured position using the collar strategy with that of an unsecured position. The red line, representing the unsecured position, shows a steep decline in value as the stock price falls, indicating high exposure to loss without protection. In contrast, the blue line ($K_1 = 45$, $K_2 = 120$) demonstrates that losses are capped once the price drops below K_1. The green line ($K_1 = 66$, $K_2 = 115$) offers tighter protection, limiting losses earlier than the first combination. The purple line ($K_1 = 83$, $K_2 = 91$) provides the most stringent protection, resulting in minimal losses at low prices, albeit with a narrower profit range. These results highlight the collar strategy's effectiveness in mitigating downside risk compared to an unsecured position. However, the risk of this strategy is considered high, particularly during bullish market periods, due to the potential for losses from the short call option [14].

3.5. Profit Calculation and Portfolio Value of the Bear Put Spread Strategy

The bear put spread strategy combines a long position in n put options with strike price K_2, and a short position in n put options with strike price K_1, where $K_1 < K_2$. Let p_1 denote the price of the put option with strike price K_1, and p_2 denote the price of the put option with strike price K_2. Using eq. (8), the profit function of the bear put spread strategy ($P_B(S_T)$) can be expressed as follows:

$$P_B(S_T) = \begin{cases} n(K_2 - K_1 + p_1 - p_2), & S_T \leq K_1, \\ n(K_2 - S_T + p_1 - p_2), & K_1 < S_T \leq K_2, \\ n(p_1 - p_2), & S_T > K_2. \end{cases} \quad (14)$$

The profit calculation for the bear put spread strategy is conducted using one long put option with three strike price variations below the spot price (as K_1), and one short put option with three strike price variations above the spot price (as K_2). The results are presented in Table 3.

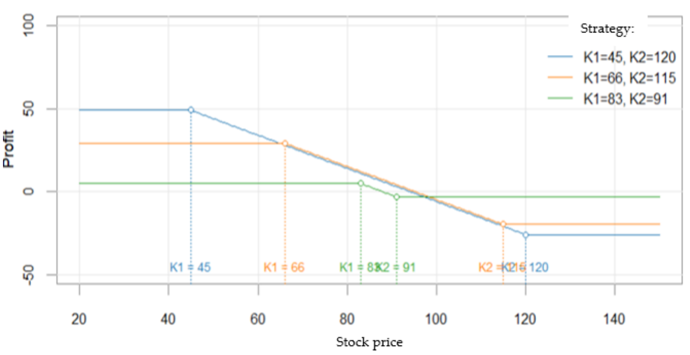

Figure 5. Profit of the bear put spread strategy

Based on Figure 5 and Table 3, the bear put spread strategy offers varying levels of protection and profit potential depending on the combination of strike prices K_1 and K_2. The combination of $K_1 = 45$ and $K_2 = 120$ yields the highest maximum profit of 49.08, providing strong downside protection when the underlying price declines. The combination of $K_1 = 66$ and $K_2 = 115$ results in a maximum profit of 29.22, while $K_1 = 83$ and $K_2 = 91$ offers a limited profit of 4.92, making it a more conservative position. The wider the gap between K_1 and K_2, the greater the profit potential during a price decline, but this also increases the risk of loss. Conversely, a narrower spread limits profit but minimizes risk exposure.

The portfolio value function for a secured position under the bear put spread strategy can be expressed as follows:

$$C_B(S_T) = \begin{cases} n\big((K_2 - K_1 + p_1 - p_2) + (S_T - S_0)\big), & S_T \leq K_1, \\ n\big((K_2 - S_T + p_1 - p_2) + (S_T - S_0)\big), & K_1 < S_T \leq K_2, \\ n\big((p_1 - p_2) + (S_T - S_0)\big), & S_T > K_2. \end{cases} \quad (15)$$

Figure 6 presents the portfolio value of the bear put spread strategy for $n = 1$, compared against the unsecured position.

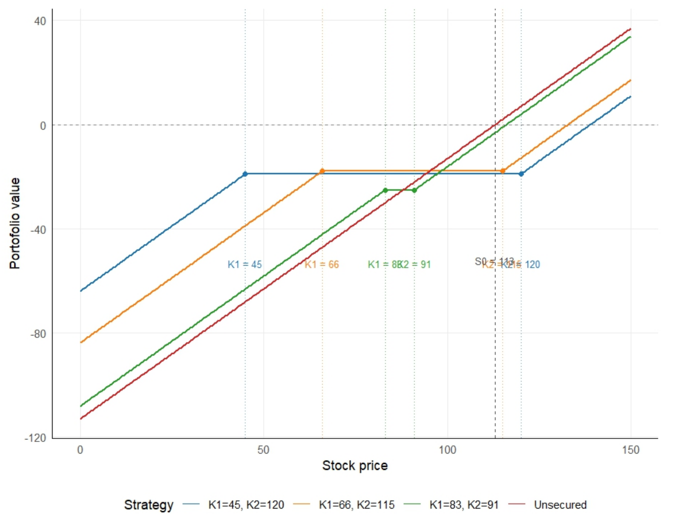

Figure 6. Portfolio value of the bear put spread strategy

Based on Figure 6, the bear put spread strategy provides optimal protection during stock price declines, with distinct characteristics depending on the price level. When $S_T \leq K_1$ for example, $S_T \leq 45$ in the strategy with $K_1 = 45$, $K_2 = 120$, the profit reaches its maximum level (49.08), serving as a safeguard against sharp downturns. Within the range $K_1 < S_T \leq K_2$, such as $K_1 = 45$, $K_2 = 120$, the profit increases linearly as the price declines. When $S_T > K_2$, the loss is limited to the net premium paid, example 25.92 for the $K_1 = 45$, $K_2 = 120$ com-

Table 4. Profit of the long strangle strategy

Strike Price		Max Profit	Bear Put Spread Strategy Profit		
K_1	K_2		$S_T \leq K_1$	$K_1 \leq S_T < K_2$	$S_T \geq K_2$
45	120	17.32634	17.3263358	-27.6736642	-147.6736642
66	115	33.1834	33.1834043	-32.8165957	-147.8165957
83	91	34.28199	34.2819857	-48.7180143	-139.7180143

bination, offering protection against upward price movements. Compared to the unsecured position, this strategy significantly reduces losses below the break-even point, with a trade-off in the form of premium cost. The wider the spread between K_1 and K_2, the stronger the protection, but at the expense of a higher premium.

3.6. Profit Calculation and Portfolio Value of the Long Strangle Strategy

The long strangle strategy is constructed by taking a long position in nn put options with strike price K_1, and a long position in nn call options with strike price K_2, where $K_1 < K_2$. Let p denote the price of the put option with strike priceK_1, and c denote the price of the call option with strike price K_2. Using eq. (9), the profit function of the long strangle strategy ($P_L\,(S_T)$) can be expressed as follows:

$$P_L(S_T) = \begin{cases} n\big(K_1 - S_T - (p+c)\big), & S_T < K_1, \\ n(-p-c), & K_1 \leq S_T < K_2, \\ n\big(S_T - K_2 - (p+c)\big), & S_T \geq K_2. \end{cases} \quad (16)$$

The profit calculation for the long strangle strategy, constructed by taking a long position in one put option using three variations of strike prices below the spot price (as K_1), and a long position in one call option using three variations of strike prices above the spot price (as K_2), is presented in Table 4.

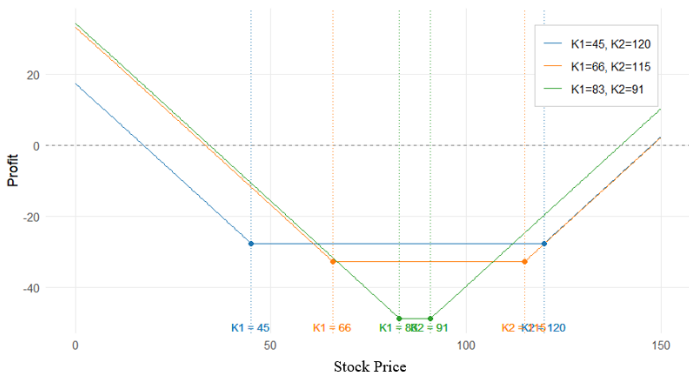

Figure 7. Profit of the long strangle strategy

Based on Figure 7 and Table 4, the long strangle strategy becomes profitable when the stock price (S_T), moves significantly either upward or downward, beyond the established strike prices. If the stock price falls below K_1 or rises above K_2, the trader may realize a profit. On the other hand, should the stock price fail to move beyond either strike, the most an investor can lose is the net debit paid to enter the position.

The portfolio value function for a secured position in the long strangle strategy can be expressed as follows:

$$S_L(S_T) = \begin{cases} n\big((K_1 - S_T - (p+c)) + (S_T - S_0)\big), & S_T < K_1, \\ n\big((-p-c) + (S_T - S_0)\big), & K_1 \leq S_T < K_2, \\ n\big((S_T - K_2 - (p+c)) + (S_T - S_0)\big), & S_T \geq K_2. \end{cases} \quad (17)$$

Figure 8 presents the portfolio value of the long strangle strategy for $n = 1$, compared to the unsecured position.

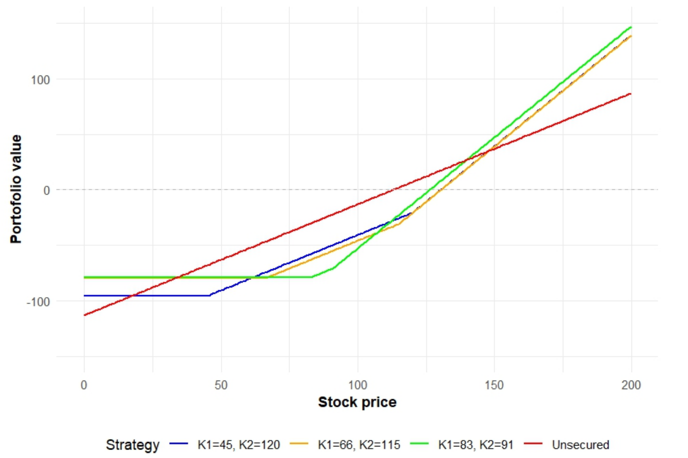

Figure 8. Portfolio value of the long strangle strategy

Figure 8 illustrates the portfolio value comparison between a long strangle strategy and an unsecured position. In the unsecured position (red line), the portfolio value moves directly with the underlying stock price, offering high profit potential during price increases but exposing the investor to substantial losses during sharp declines. In contrast, the long strangle strategy (blue, yellow, green lines) involves purchasing both call and put options at different strike prices ($K_1 < K_2$). This structure limits the maximum loss to the total option premium paid, while allowing for significant gains if the stock price moves well below K_1 or above K_2. The long strangle strategy is particularly advantageous in highly volatile market conditions. Essentially, a long strangle is utilized to establish a defined maximum loss, while simultaneously positioning an investor for substantial gains should the stock price experience high volatility and move sharply upwards or downwards [16].

3.7. Discussion

The simulation results indicate that the effectiveness of the collar, bear put spread, and long strangle strategies is significantly influenced by market direction and volatility levels. The collar strategy proves to be the most defensive, as it effectively limits losses during sharp price declines, although it constrains upside potential. This finding aligns with previous research that identifies the collar as a suitable strategy for volatile assets with bearish tendencies [5]. In the context of GOTO, this strategy is particularly relevant for defensive and institutional investors seeking to protect their portfolios without liquidating their holdings. Based on the comparative analysis of the three strategies, the collar is recommended as the most optimal option for risk-averse investors in declining market conditions.

The bear put spread strategy provides moderate protection with a lower premium compared to a long put, while still allowing for profit opportunities during gradual price declines. This aligns with prior findings that classify it as an appropriate strategy for investors with medium risk tolerance [11, 17], because bear put spreads are designed to protect against volatility [20]. For retail investors or experienced traders in the Indonesian market, this strategy presents a more cost-effective alternative without compromising its hedging function.

Conversely, the long strangle strategy is effective only under conditions of extreme price movement. While it offers high profit potential, it also carries the risk of total loss if prices remain within a mid-range. Therefore, this strategy is best employed selectively, such as prior to earnings announcements, corporate actions, or during periods of heightened volatility in the technology sector. It is more suitable for aggressive investors or volatility speculators.

Overall, the GOTO data suggest that the collar and bear put spread strategies consistently provide portfolio protection during downward trends, whereas the long strangle is opportunistic and highly sensitive to extreme volatility. The practical implication is that hedging strategies should be tailored to individual risk profiles, investment objectives, and market expectations, rather than applied uniformly. Conservative investors are better served by the collar strategy, moderate investors may opt for the bear put spread, and aggressive investors can utilize the long strangle during favorable market conditions.

This study has several limitations. The use of the Black-Scholes model assumes a frictionless market, constant volatility, the absence of dividends, and no transaction costs, which may render the simulation results more idealized than real-world conditions. Additionally, the observation period of 54 weeks limits the generalizability of the findings to other market phases such as bullish or sideways trends. Future research could incorporate longer time horizons, alternative pricing models, and additional risk evaluation metrics such as Value at Risk (VaR) or the Sharpe Ratio.

These findings are also relevant to the development of Indonesia's capital market. Simple strategies such as the collar and bear put spread have the potential to reduce panic selling and strengthen risk management, particularly among domestic investors. Therefore, derivative education and the development of more accessible option instruments are essential to ensure that hedging strategies can be widely adopted rather than confined to a limited group of market participants.

4. Conclusion

This study demonstrates that each hedging strategy offers distinct advantages for GOTO stock investors. The collar strategy provides optimal protection for risk-averse investors during bearish conditions, effectively limiting downside risk while sacrificing some upside potential. The bear put spread serves as a cost-efficient alternative for moderate declines, balancing risk and return. Meanwhile, the long strangle suits speculative investors anticipating extreme volatility, though it proves less effective during stable periods. The collar strategy is recommended as the primary choice for most GOTO investors, given its reliable protection in typically volatile market conditions. Future research should explore longer timeframes, alternative pricing models, and risk-adjusted metrics to further refine strategy selection for emerging market stocks.

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