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The Short Put Ladder Strategy and its Application in Trading and Hedging

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SUMMARY

The first aim of this paper is to propose another way of an option strategy formation known as Short Put Ladder, describe the functions of profit in their analytical forms and propose an optimal algorithm for the use of this strategy in trading. The other goal is to propose the application of the Short Put Ladder Strategy in hedging against a price drop of the underlying asset and compare the result with the results of hedging using the known Long Combo option strategy.
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INTRODUCTION

Option strategies formed by the application of the so-called European-style vanilla options can be found in several publications. Probably most option strategies are listed in the work of (Jílek, 2002). The same procedure is used in the analysis of option strategies. There is a description of the way, or ways, of the given option strategy formation and a graph of the function of profit.
A different way was used in the works of (Šoltés V., 2001), (Šoltés V., 2002), (Šoltés V. - Šoltésová, 2003), (Šoltés V. - Amaitiek, 2010). It is based on the search for the functions of profit in analytical form, which enables us to find an optimal algorithm of the option strategy application in the case when the strategy can be formed in several ways. We are going to use this approach in our paper as well. It will enable us to find the optimal algorithm for trading and express exactly the secured position in hedging against a price drop of the underlying asset. Subsequently, we are going to apply hedging using the Short Put Ladder strategy for SPDR Gold Shares stock and compare hedging using this strategy with hedging using the Long Combo option strategy, which the authors dealt with in the paper (Šoltés V. - Šoltés M., 2005).

POSSIBILITIES OF A SHORT PUT LADDER OPTION STRATEGY FORMATION

In order to form it, we need three options for the same underlying asset with the same expiry and different strike prices.
I. Let us form a Short Put Ladder option strategy by purchasing n put options with a strike price X_1 and an option premium $\bar{P}_{1B}$ per option and, at the same time, by purchasing n put options with a higher strike price X_2 and an option premium $\bar{P}_{2B}$ per option and, at the same time, by selling n put options with the highest strike price X_3 and an option premium P_{3S} per option.
The function of profit from the purchase of n put options with the lowest strike price X_1 and an option premium $\bar{P}_{1B}$ per option is as follows:

$$P(S) = \begin{cases} -n(S - X_1 + \bar{P}_{1B}) & \text{if } S < X_1, \\ -n\,\bar{P}_{1B} & \text{if } S \geq X_1. \end{cases} \tag{2.1}$$

The function of profit from the purchase of n put options with the higher strike price X_2 and the option premium $\overline{P}_{2B}$ per option is as follows:

$$P(S)=\begin{cases} -n(S-X_2+\overline{P}_{2B}) & \text{if } S<X_2, \\ -n\overline{P}_{2B} & \text{if } S?\, X_2. \end{cases} \quad (2.2)$$

And the function of profit from the sale of n put options with the highest strike price X_3 and the option premium $\overline{P}_{3S}$ per option is as follows

$$P(S)=\begin{cases} n(S-X_3+\overline{P}_{3S}) & \text{ak } S<X_3, \\ n\overline{P}_{3S} & \text{ak } S\geq X_3. \end{cases} \quad (2.3)$$

The function of profit from the whole Short Put Ladder option strategy in the particular case can be obtained by adding functions (2.1) to (2.3). As $X_1<X_2<X_3$, we get

$$P_I(S)=\begin{cases} -n(S-X_1-X_2+X_3+\overline{P}_{1B}+\overline{P}_{2B}-\overline{P}_{3S}) & \text{if } S<X_1, \\ -n(X_3-X_2+\overline{P}_{1B}+\overline{P}_{2B}-\overline{P}_{3S}) & \text{if } X_1\leq S<X_2, \\ n(S-X_3-\overline{P}_{1B}-\overline{P}_{2B}+\overline{P}_{3S}) & \text{if } X_2\leq S<X_3, \\ n(\overline{P}_{3S}-\overline{P}_{1B}-\overline{P}_{2B}) & \text{if } S\geq X_3. \end{cases} \quad (2.4)$$

If we select the strike prices of the individual options so that the following is true

$$\overline{P}_{3S}-\overline{P}_{1B}-\overline{P}_{2B}>0, \quad (2.5)$$

then there are no expenses needed for its formation, i.e. it is a zero-cost strategy.
The graph of this strategy's function of profit is as follows

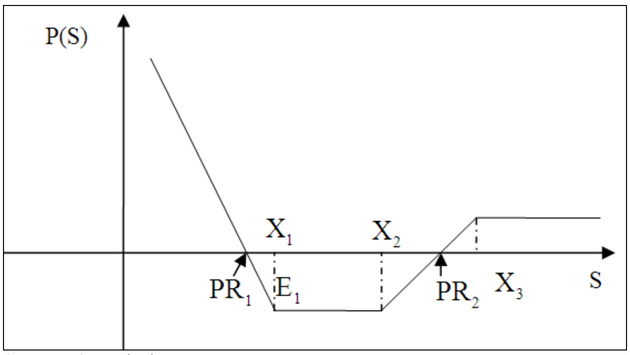

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Figure 1: Profit Function of the Short Put Ladder Option Strategy

By analyzing the profit function we get:

- There is always one profitability threshold PR_1 and it can be calculated from the equation $PR_1=X_1+X_2-X_3-\overline{P}_{1B}-\overline{P}_{2B}+\overline{P}_{3S}$.
  The strategy is definitely profitable, if $S<PR_1$, where the profit grows linearly with the spot price S drop.
- If the condition (2.5) is met, then the strategy has one more profitability threshold, PR_2 = $X_3+\overline{P}_{1B}+\overline{P}_{2B}-\overline{P}_{3S}$.
- The strategy is loss-making, if $S\in(PR_1,PR_2)$, where the maximum loss is $P_{max}=n(X_3-X_2+\overline{P}_{1B}+\overline{P}_{2B}-\overline{P}_{3S})$, if $S\in\langle X_1,X_2\rangle$ at time of the options expiry.

II. Now let us form a Short Put Ladder strategy by purchasing n put options with a strike price X_1 and an option premium $\overline{P}_{1B}$ per option; at the same time by purchasing n call options with a higher strike price X_2 and an option premium P_{2B} per option; and, at the same time, by selling n call options with the highest strike price X_3 and an option premium P_{3S} per option.
The function of profit from the purchase of n call options with a higher strike price X_2 and an option premium P_{2B} per option is as follows

$$P(S)=\begin{cases} -nP_{2B} & \text{if } S<X_2, \\ n(S-X_2-P_{2B}) & \text{if } S\geq X_2, \end{cases} \quad (2.6)$$

and the function of profit from the sale of n call options with the highest strike price X_3 and the option premium P_{3S} per option is as follows:

$$P(S)=\begin{cases} nP_{3S} & \text{if } S<X_3, \\ -n(S-X_3+P_{3S}) & \text{if } S\geq X_3. \end{cases} \quad (2.7)$$

By adding the functions (2.1), (2.6) and (2.7) we get the function of profit from the whole strategy

$$P_{II}(S)=\begin{cases} -n(S-X_1+\overline{P}_{1B}+P_{2B}-P_{3S}) & \text{if } S<X_1, \\ -n(\overline{P}_{1B}+P_{2B}-P_{3S}) & \text{if } X_1\leq S<X_2, \\ n(S-X_2-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } X_2\leq S<X_3, \\ n(X_3-X_2-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } S\geq X_3. \end{cases} \quad (2.8)$$

From the relation (2.8) it is obvious that it is a profit function similar to the profit function expressed by the relation (2.4).Thus, it is a different way proposed by us to form a Short Put Ladder strategy, which means that the first aim of this paper has been reached.

Optimal Algorithm of the Short Put Ladder Strategy Application in Trading

As there are two ways to form a Short Put Ladder strategy, naturally a question arises which way is better. The answer to this question depends on the decision-making criterion.

If the decision is based on the size of the profit (or loss) at any given value S of the underlying asset at time of the options expiry, then the way proposed by us would be better in case the following condition is met $P_{II}(S) > P_I(S)$ for any given S.

Using the analytical expressions of the profit functions, i.e. the relations (2.4) and (2.8) we can easily find out that the following statements are true:

- If $X_3 - X_2 + \overline{P}_{2B} + P_{3S} - P_{2B} - \overline{P}_{3S} > 0$, (3.1)

  then the second way proposed by us is better than the first way, which has been known so far.
- If $X_3 - X_2 + \overline{P}_{2B} + P_{3S} - P_{2B} - \overline{P}_{3S} < 0$, (3.2)

  then a better result can be achieved the first way.
- If $X_3 - X_2 + \overline{P}_{2B} + P_{3S} - P_{2B} - \overline{P}_{3S} = 0$, (3.3)

  then the profit functions in both cases are the same. In this case we will use the 1st way (I.) as its advantage is that if the condition (2.5) is met, we do not need any start-up costs to form this strategy. Unfortunately, this is not true if the Short Put Ladder strategy is formed the other way (II.).

The table below shows the prices of the selected call and put options for the SPDR Gold Shares stock, which were on offer on 22/9/2010 with expiry on 17/12/2010. The spot price of the SPDR Gold Shares stock was 126.11 on 22/9/2010.

Table 1. Call and put options for the spdr gold shares stock with expiry on 17/12/2010

Strike Price	Call Option		Put Option	
	Bid	Ask	Bid	Ask
100	26,35	26,50	0,16	0,22
112	14,70	15,20	0,79	0,86
123	6,20	6,30	3,00	3,05
128	3,65	3,80	5,45	5,55
144	0,62	0,66	18,35	18,55
150	0,37	0,39	24,05	24,30

Source: www.finance.yahoo.com

Example 1. Let us form a Short Put Ladder strategy in both way I and way II. By using options from Table 1, where n=100, X_1=100, X_2=112, X_3=123, $\overline{P}_{1B}$=0.22, P_{2B}=15.20, $\overline{P}_{2B}$=0.86, P_{3S}=6.20, $\overline{P}_{3S}$=3.00.

Solution:

In this case $X_3 - X_2 + \overline{P}_{2B} + P_{3S} - P_{2B} - \overline{P}_{3S}$ = 123-112+0.86+6.20-15.20-3.00 = -0.14 <0. The condition (3.2) is met; therefore a better result can be reached when applying the first way.

The functions of profit from this strategy are as follows

$$P_I(S) = \begin{cases} -100(S-90{,}92) & \text{if } S<100, \\ -908 & \text{if } 100 \le S < 112, \\ 100(S-121{,}08) & \text{if } 112 \le S < 123, \\ 192 & \text{if } S \ge 123, \end{cases} \quad (3.4)$$

$$(S) = \begin{cases} -100(S-90{,}78) & \text{if } S<100, \\ -922 & \text{if } 100 \le S < 112, \\ 100(S-121{,}22) & \text{if } 112 \le S < 123, \\ 178 & \text{if } S \ge 123. \end{cases} \quad (3.5)$$

Figure 2 depicts the function of profit from this strategy, formed in way I (red color) and also the function of profit from this strategy, formed in way II. (blue color). We can see that the formation of the Short Put Ladder strategy using way I really is more profitable as it has a better function of profit at any given spot price S.

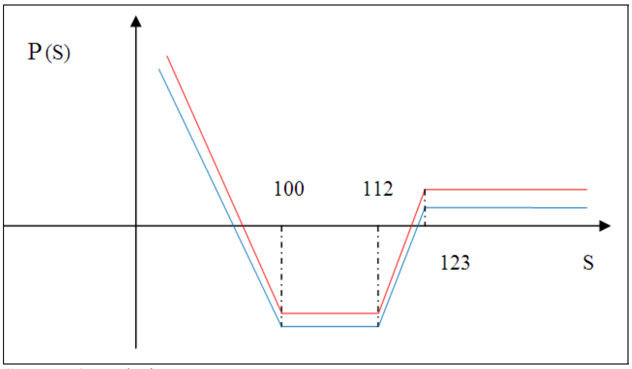

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Figure 2 Graph of the Short Put Ladder Strategy Profit Function (ways I. and II.)

Example 2. Let us form a Short Put Ladder strategy in ways I and II. Using options from Table 1, where n=100, X_1=100, X_2=128, X_3=150, $\overline{P}_{1B}$=0,22, P_{2B}=3.80, $\overline{P}_{2B}$=5.55, P_{3S}=0.37, $\overline{P}_{3S}$=24.05.

Solution:

In this case $X_3 - X_2 + \overline{P}_{2B} + P_{3S} - P_{2B} - \overline{P}_{3S}$ = 150-128+5.55+0.37-3.80-24.05 = 0.07>0, where the condition (3.1) is met and therefore a better result can be achieved using way II.

The functions of profit from this strategy are as follows

$$P_I(S)=\begin{cases} -100(S-96{,}28) & \text{if } S<100, \\ -372 & \text{if } 100\le S<128, \\ 100(S-131{,}72) & \text{if } 128\le S<150, \\ 1\,828 & \text{if } S\ge 150, \end{cases} \quad (3.6)$$

$$P_{II}(S)=\begin{cases} -100(S-96{,}35) & \text{if } S<100, \\ -365 & \text{if } 100\le S<128, \\ 100(S-131{,}65) & \text{if } 128\le S<150, \\ 1\,835 & \text{if } S\ge 150. \end{cases} \quad (3.7)$$

Figure 3 depicts the function of profit from this strategy formed in way I (red color) and also the function of profit from the strategy formed in way II (blue color). We can see that the formation of a Short Put Ladder strategy in way II really is more profitable.

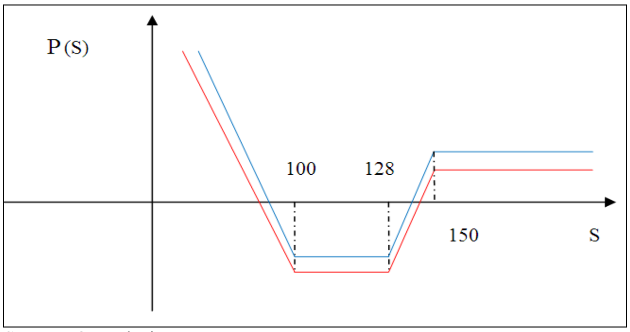

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Figure 3 Graph of the Function of Profit from the Short Put Ladder Strategy (ways I. and II.)

Example 2 proves that the Short Put Ladder strategy formed by us in way II is of practical use and can be applied in investment practice.

Hedging Against the Underlying Asset Price Drop Using the Short Put Ladder Strategy

Let us suppose that at time T in the future we want to sell n items of an underlying asset but we are afraid its price might drop.

The function of profit from an unsecured position is as follows

$$P(S) = nS, \quad (4.1)$$

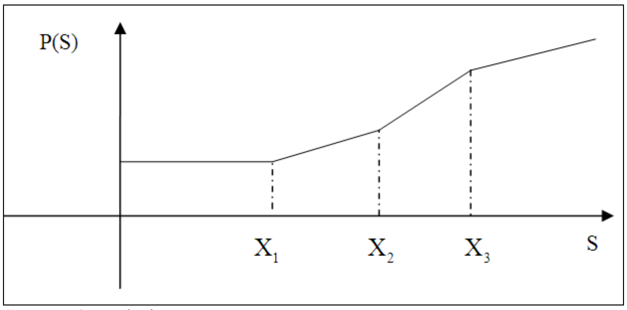
where S is the spot price of the underlying asset at time T. The lower the S is, the lower the profit which we will get from the sale of the given underlying asset. Therefore, we will decide to hedge against a price drop using the other way of a Short Put Ladder strategy formation proposed by us.

We will buy n put options with a strike price X_1 and an option premium $\overline{P}_{1B}$ per option; at the same time we will buy n call options with a higher strike price X_2 and an option premium P_{2B} per option; and, at the same time, we will sell n call options with the highest strike price X_3 and an option premium P_{3S} per option.

The function of profit from this secured position can be obtained by adding the function of profit from the Short Put Ladder strategy (2.8) and the function of profit from the unsecured position (4.1). We will get

$$ZP(S)=\begin{cases} n(X_1-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } S<X_1, \\ n(S-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } X_1\le S<X_2, \\ n(2S-X_2-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } X_2\le S<X_3, \\ n(S+X_3-X_2-\overline{P}_{1B}-P_{2B}+P_{3S}) & \text{if } S\ge X_3. \end{cases} \quad (4.2)$$

The function of profit from the unsecured position is as follows



Source: Own design

Figure 4 Graph of the Function of Profit from a Secured Position Using the Short Put Ladder Strategy

By analyzing the function of profit (4.2) from the secured position we will get the following statements:

- If at time of the options expiry $S<X_1$, then the hedging proposed by us secures a constant price of $X_1-\overline{P}_{1B}-P_{2B}+P_{3S}$ i.e. a price equal at least to the lowest strike price lowered by the sum of the option premia necessary for the formation of this strategy. The lowest strike price is of key importance to the value of the secured price.
- The secured position yields a better result Z, if $S<X_1-\overline{P}_{1B}-P_{2B}+P_{3S}$, but also if $S\ge X_2+\overline{P}_{1B}+P_{2B}-P_{3S}$.
- The great advantage of hedging using the Short Put Ladder strategy is that in the case of a potential, but not anticipated, increase in S above $X_2+\overline{P}_{1B}+P_{2B}-P_{3S}$, the profit from the secured position grows linearly. It is not limited from above and it is even higher than with an unsecured position.

APPLICATION OF HEDGING USING SHORT PUT LADDER STRATEGIES FOR SPDR GOLD SHARES STOCK

Let us suppose that we have a portfolio made of 100 shares of SPDR Gold Shares and we are afraid their prices might drop. We will decide to hedge using way II. of the Short Put Ladder option strategy formation. We will show 3 possibilities of this strategy formation using selected options from Table 1.

1. We will purchase 100 put options with a strike price X_1 =100 and an option premium $\overline{P}_{1B}$ =0.22 per option, at the same time we will buy 100 call options with a higher strike price X_2 =112 and an option premium P_{2B} =15.20 per option; and, at the same time, we will sell 100 call options with the highest strike price X_3 =123 and an option premium P_{3S} =6.20 per option. When we insert the data into the function of profit from the secured position (4.2), we get

$$ZP_1(S) = \begin{cases} 9\,078 & \text{if } S<100, \\ 100(S-9{,}22) & \text{if } 100 \le S<112, \\ 100(2S-121{,}22) & \text{if } 112 \le S<123, \\ 100(S+1{,}78) & \text{if } S \ge 123. \end{cases} \tag{5.1}$$

2. If we form the Short Put Ladder strategy by purchasing 100 put options with a strike price X_1 = 128 and an option premium $\overline{P}_{1B}$ = 5.55 per option, at the same time by purchasing 100 call options with a higher strike price X_2 = 144 and an option premium P_{2B} = 0.66 per option and, at the same time, by selling 100 call options with the highest strike price X_3 = 150 and an option premium P_{3S} = 0.37 per option, then the function of profit from the secured position will be as follows

$$ZP_2(S) = \begin{cases} 12\,216 & \text{if } S<128, \\ 100(S-5{,}84) & \text{if } 128 \le S<144, \\ 100(2S-149{,}84) & \text{if } 144 \le S<150, \\ 100(S+0{,}16) & \text{if } S \ge 150. \end{cases} \tag{5.2}$$

3. Let us form a Short Put Ladder strategy also by purchasing 100 put options with a strike price X_1 = 100 and an option premium $\overline{P}_{1B}$ = 0.22 per option, at the same time by purchasing 100 call options with a higher strike price X_2 = 128 and an option premium P_{2B} = 3.80 per option and at the same time by selling 100 call options with the highest strike price X_3 = 150 and an option premium P_{3S} = 0.37 per option. In this case, the function of profit from the secured position will be as follows

$$ZP_3(S) = \begin{cases} 9\,635 & \text{if } S<100, \\ 100(S-3{,}65) & \text{if } 100 \le S<128, \\ 100(2S-131{,}65) & \text{if } 128 \le S<150, \\ 100(S+18{,}35) & \text{if } S \ge 150. \end{cases} \tag{5.3}$$

By comparing the profit functions (5.1) and (5.3) and solving the relevant unequations, we get the following statements:

- If the spot price of shares at the options expiry fell below 121.69, then it is best to hedge using the second way. In which case, at any given price S<128 we get a secured price of 122.16 per option.
- If the spot price of shares at the options expiry was within the interval (121.69; 133.43), then the best result can be achieved using the first way. In this case, the secured position is not constant, it is even higher than without hedging.
- If, despite the anticipated drop, the spot price of shares at the options expiry rose above 133.43, then the best result will be achieved using the third way. The secured price in this case grows linearly, and it is higher than without hedging.

It can be concluded form the above statements that if the investor anticipates a more significant price drop of SPDR Gold Shares stock, the he will use the second option to hedge. The secured minimum price of 122.16 is only lower by 3.11 % than its current price. The profit from hedging would grow linearly with the stock price drop.

If the investor anticipates only a moderate drop, then he will use the first option. It is a combination of hedging with a speculation, as at a moderate change in price the secured price is higher than without hedging.

The third option is basically a speculation on a significant increase, where at a significant drop (more than 23 %) the loss is limited.

Table 2 indicates the results of hedging for some of the anticipated spot prices at expiry, which we got from the functions of profit from the secured positions (5.1) through (5.3). They confirm the above mentioned statements.

Table 2. Results of hedging using the short put ladder strategy with some of the anticipated spot prices

Option	Anticipated Spot Prices										
	S<100	112	121,69	122	128	130	133,43	134	144	150	158
1.	9 078	10 278	12 216	12 278	12 978	13 178	13 521	13 578	14 578	15 178	15 978
2.	12 216	12 216	12 216	12 216	12 216	12 416	12 759	12 816	13 816	15 016	15 816
3.	9 635	10 835	11 804	11 835	12 435	12 835	13 521	13 635	15 635	16 835	17 635

Source: Own design

Comparison of the Results of Hedging Using the Short Put Ladder Strategy with The Results of Hedging Using the Long Combo Strategy

In this section we are going to compare the results of hedging proposed by us using the Short Put Ladder strategy with the results of the Long Combo strategy.

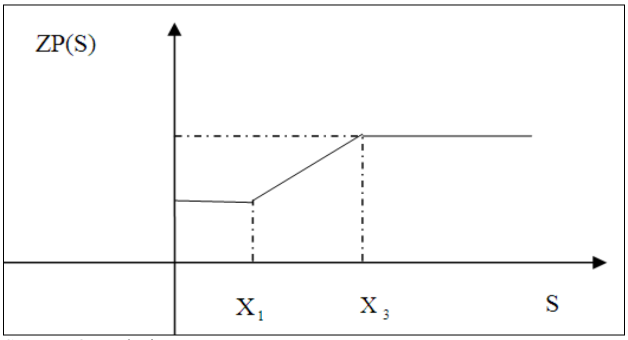
The Long Combo strategy is formed when buying n put options with X_1 and a premium $\overline{P}_{1B}$ and selling n call options with X_3 and a premium P_{3S}, where the options are for the same underlying asset and have the same expiry date.

The advantage of this strategy is that if ($P_{3S} - \overline{P}_{1B}$) is positive, or at least it equals zero, from the option premium, which he will get from the sale of a call option, he will pay the option premium when buying a put option. In this case it is a zero-cost strategy.

The function of profit from a secured position using the Long Combo strategy (see Šoltés V. - Šoltés M., 2005) is as follows

$$ZP(S)=\begin{cases} n(X_1 - \overline{P}_{1B} + P_{3S}) & \text{if } S< X_1, \\ n(S - \overline{P}_{1B} + P_{3S}) & \text{if } X_1 \leq S < X_3, \\ n(X_3 - \overline{P}_{1B} + P_{3S}) & \text{if } S \geq X_3. \end{cases} \qquad (6.1)$$

Figure 5 depicts the function of profit from a secured position, if ($P_{3S} - \overline{P}_{1B}$)>0.



Source: Own design

Figure 5. Graph of the Function of Profit from a secured position Using the Long Combo Strategy

By comparing the function of profit from a secured position using the Short Put Ladder strategy expressed by the relation (4.2) and the functions of profit from a secured position using the Long Combo strategy expressed by the relation (6.1) we will get the following statements:

- If $S< X_2 + P_{2B}$, then the price secured using the Long Combo strategy is higher than the price secured using the Short Put Ladder strategy, i.e. by a premium P_{2B}.
- If $S \geq X_2 + P_{2B}$, then hedging using the Short Put Ladder strategy yields a better result (even much better when the increase is big).

Let us assume again that we have 100 shares of SPDR Gold Shares and we are concerned that their prices might drop. We will now use the Long Combo strategy to hedge and the options from Table 1.

1. First we will hedge by buying 100 put options with X_1 = 100 and a premium $\overline{P}_{1B}$ = 0.22 per option and, at the same time, by selling 100 call options with X_3 = 123 and a premium P_{3S} = 6.20 per option. The function of profit from the secured position in this case is as follows

$$ZP_1(S)=\begin{cases} 10\ 598 & \text{if } S<100, \\ 100(S+5{,}98) & \text{if } 100 \leq S<123, \\ 12\ 898 & \text{if } S \geq 123. \end{cases} \qquad 6.2)$$

2. If we buy 100 put options with E_1 = 128 and a premium $\overline{P}_{1B}$ = 5.55 per option and, at the same time, we will sell 100 call options with X_3 = 150 and a premium P_{3S} = 0.37 per option, the function of profit from the secured position is as follows

$$ZP_2(S)=\begin{cases} 12\ 282 & \text{if } S<128, \\ 100(S-5{,}18) & \text{if } 128 \leq S<150, \\ 14\ 482 & \text{if } S \geq 150. \end{cases} \qquad (6.3)$$

3. Let us form a Long Combo strategy by buying 100 put options with E_1 = 100 and a premium $\overline{P}_{1B}$ = 0.22 per option and, at the same time, by selling 100 call options with X_3 = 150 and a premium P_{3S} = 0.37 per option.

The function of profit from the secured position in this case is as follows

$$ZP_3(S) = \begin{cases} 10\,015 & \text{if } S<100, \\ 100(S+0{,}15) & \text{if } 100 \leq S < 150, \\ 15\,015 & \text{if } S \geq 150. \end{cases} \quad (6.4)$$

Table 3 depicts the results of hedging which we got by inserting selected spot prices at expiry T into the functions of profit from the secured positions using the Long Combo strategy (6.2) through (6.4).

Table 3. Results of hedging using the long combo strategy at some of the anticipated prices

Option	Anticipated Spot Prices										
	S<100	112	115	116,84	127,2	128	128,83	131,8	134,13	140	144,66	S≥150
1.	10 598	11 798	12 098	12 282	12 898	12 898	12 898	12 898	12 898	12 898	12 898	12 898
2.	12 282	12 282	12 282	12 282	12 282	12 282	12 365	12 662	12 895	13 482	13 948	14 482
3.	10 015	11 215	11 515	11 699	12 753	12 815	12 898	13 195	13 428	14 015	14 481	15 015

Source: Own design

Table 3 clearly indicates that the second option is again the best one when anticipating a bigger drop; when the price oscillates moderately, the first option is the best; and only in case of a big increase, the third one is the best.

Table 4 summarizes the results of hedging using the Short Put Ladder (SPL) strategy and the Long Combo strategy (LC).

Table 4. Comparison of the results of hedging when using the short put ladder strategy and when using the long combo one

Option	Anticipated Spot Prices											
	S<100	112	116,84	127,2	128	128,83	131,8	134,13	140	144,66	150	158
1. SPL	9 078	10 278	11 246	12 898	12 978	13 061	13 358	13 591	14 178	14 644	15 178	15 978
1. LC	10 598	11 798	12 282	12 898	12 898	12 898	12 898	12 898	12 898	12 898	12 898	12 898
2. SPL	12 216	12 216	12 216	12 216	12 216	12 299	12 596	12 829	13 416	13 948	15 016	15 816
2. LC	12 282	12 282	12 282	12 282	12 282	12 365	12 662	12 895	13 482	13 948	14 482	14 482
3. SPL	9 635	10 835	11 319	12 355	12 435	12 601	13 195	13 661	14 835	15 767	16 835	17 635
3. LC	10 015	11 215	11 699	12 753	12 815	12 898	13 195	13 428	14 015	14 481	15 015	15 015

Source: Own design

Table 4 shows that if the investor anticipates a big drop, then the second option using the Long Combo strategy, is most suitable for hedging.

If the investor anticipates a moderate price fluctuation, in any direction, then the most suitable is the first option using the Short Put Ladder strategy.

If the investor speculates on a higher increase, while at the same time he wants to secure a minimum price of at least 96 at any given drop, then the most suitable is the third option using the Short Put Ladder strategy.

CONCLUSION

The presented paper represents two main theoretical benefits. The first one is the creation of a different way of the Short Put Ladder option strategy formation, the analytical expression of the function of profit from this approach and the proposal of an optimal algorithm for the use of this strategy in trading. The other one is the proposal of this strategy application in hedging against the underlying asset price drop and its comparison to hedging using the Long Combo strategy, which can also be used in practice as a priceless aid in deciding which hedging strategy is the most suitable.

The practical benefit is the application of hedging using the Short Put Ladder strategy and the Long Combo strategy for the SPDR Gold Shares stock, where we focused on 3 real options of the three strategies formation and on their comparison. Also, we compared these real options of the Short Put Ladder strategy formation with the Long Combo strategy, whereby we have proven the statements which we concluded on the basis of the comparison of the individual functions of profit from secured positions.

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