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Teaching Options with Examples – Primary Trading Strategy Demonstration through Price Simulation

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Abstract

In this paper, we first review literatures which examine how the formation of an options market impacts on the US stock market in the 70's, and then discuss potential advantages for Taiwan to develop its domestic options market. For demonstration purpose, option prices of a Taiwanese stock are simulated with the Black-Scholes model. Various examples of trading strategies are introduced step by step. It is hoped that the presentation in this paper will help investors and business school students to be acquainted with the fundamentals of options.

Keywords: **Taiwan; Warrants; Options; the Black-Scholes Model; Financial Education**

1.Background

In recent years, the goal of internationalization liberalized trading activities in Taiwan. After passing a law for legalizing futures trading in 1992,[1] Taiwan recently announced the standards and rules for warrant trading. On August, 1997, three warrant contracts were formally listed and began the age of derivatives in Taiwan.[2] To help investors and

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business school students to be more acquainted with derivatives, this paper consolidates key issues regarding options. The organization of this paper is as follows. Section I briefly describes the background and structure of this study. Section II reviews literatures and reports the impacts of options market on the US stock market in the 70's. Section III discusses potential advantages for Taiwan to develop its domestic options market. Section IV is a teaching section. It explains the characteristics of options, presents simulated options prices, and illustrates examples of various trading strategies. The final section concludes.

2.Experience from the US

The options market has boomed in the United States since 1973 when trading on the first 16 stocks was announced. It is now the fastest growing segment among various types of securities. As a matter of fact, it took only eight years for the annual volume of contract trading to pass the 100 million mark. The trading volume is about 150 million contracts a year currently. [see Gitman and Joehnk (1996)]

There are substantial empirical studies examining the impacts of option trading on the stock market. Basically, two major concerns are discussed. The first concern is whether listed options change the price volatility of underlying securities. The second concern is whether the trading volume of the underlying securities is influenced negatively by options.

Some papers published by Securities and Exchange Commission propose that listed options may either increase the volatility of the underlying securities or divert investment funds away from equities. However, academic empirical studies show the opposite results. Trennepohl and Dukes (1979) analyze the changes in the volatility between the optioned and non-optioned stocks and conclude that there is "no adverse effect of options on stock volatility." Hayes and Tennenbaum (1979) find that option trading decreases the price volatility of common shares. Market investors should benefit from options because listed options enhance price continuity and reduce price volatility of underlying securities.

Market traders and investors in the 70's expressed different opinions. They argued that the listed options would accentuate price movement of underlying securities during the last two weeks of an option's life. [see Lenzner (1976)] Officer and Trennepohl (1981) investigate this argument and find that optioned stocks may experience downward price pressure two days before expiration. This phenomenon can be resulted from arbitrage activities and position adjustment by market makers and option investors. However, they point out that the increased volatility is so small, and any abnormal stock price activities induced by options will not threaten the market efficiency. In addition, Whiteside, Dukes and Dunne (1983) find a decreasing trend in the price volatility of the underlying security, and conclude that "there is no clear evidence that option trading has an effect on volatility."

Regarding whether option trading would divert investment funds away from underlying equities, Hayes and Tennenbaum (1979) find that the existence of options actually increases the trading volume of underlying common shares. Therefore, the interests of investors/market makers won't be impaired by the activity of option trading.

3.Potential Advantages to Develop Options Market in Taiwan

The evidence observed from the US stock market suggests that the establishment of a domestic options market in Taiwan is beneficial. One reasonable expectation is that investors may benefit from reduced price volatility and increased trading volume. Taiwan is often criticized by its thin market characteristic. The lack of diversified instruments in this market limits both speculators and hedgers in making efficient investment decisions. Setting up different financial instruments such as options could be a possible solution. The advantages for an options market include the followings:

(a).Options can be used to reduce risks. Risks associated with single side investments can be covered by hedge opportunity provided by options.

(b).The increased trading volume of underlying security caused by options trading, as reported by previous studies, may strengthen the share transferability and enhance market efficiency in a long run.

(c).When a person shorts options, she/he has the obligation to buy or sell the underlying common stock at the expiration date. This function may smooth price movement in the stock market. For example, if the market price plumps, the put writer is obligated to buy the underlying stocks. This will provide an additional support to the market and avoid unexpected crisis.

(d).Comparing to 'large' investors such as financial institutions, the 'small' individual investors are usually the losers who are not well informed. [see Lee, Lin and Liu (1996)] These individual investors buy few stocks at a time and are not able to diversify their idiosyncratic risks away. Through index options, individual investors can invest their money in the entire market and benefit from diversification.

(e).Foreign currency options allow investors to speculate on exchange rates, or to hedge international investments against changes in currency values. The availability of foreign currency options will provide Taiwanese enterprises the opportunities in hedging exchange rate fluctuation.

4. To Know about Options

For most investors and business students, derivative-type securities are complicated and difficult to understand. Because there is no domestic options market in Taiwan, the concept of options becomes more abstract. In this section, we first introduce some basics about options. Then, we simulated option prices of one Taiwanese stock through the Black-Scholes model. Concrete examples of speculation, hedging and some major trading strategies are given step by step to help readers comprehend the exercises of options.

4.1 Basics about Options

Option investors may take either long or short positions. A long position of an option gives the buyer a right to buy (if long a call) or to sell (if long a put) a specified quantity of an underlying asset at a given price on or before a stipulated date. The given price referred to in the option contract is called the exercise price or striking price. The last date that an option can be used to purchase the underlying asset is called the expiration date. A purchased option can be considered as a limited-risk instrument. The maximum loss is restricted to the premium paid to purchase the option. Under most circumstances, a long position offers the possibility of large gains with very limited premium payment.

For a short position, the seller or writer assumes the obligation to sell (if short a call) or to buy (if short a put) the security to the option buyer at a given price, on or before a specified date. There might be potential unlimited losses associated with the position. In general, option writers gain from premiums when the price movement does not in favor of the long position investors.

Options also can be used to hedge risks when the prices of underlying securities move in an unexpected direction. For example, if an investor holds a common stock, she/he may buy puts of this underlying asset to hedge. If the market is bullish and the price of this stock increases, she/he earns the capital gains from this stock but just lose premiums. If the market is bearish and the price of this stock decreases, the profits from the puts offset the capital loss of the stock.

4.2 The Black-Scholes Pricing Model

There is no options market in Taiwan. For demonstration purpose, we simulate option prices of one local stock with the Black-Scholes model. The model is expressed as:

$$C = S\,N(d_1) - e^{-rT} X\,N(d_2) \qquad (1)$$

where

$$d_1 = (\ln(S/X) + rT)/s\sqrt{T} + (s\sqrt{T})/2 \qquad (2)$$

$$d_2 = d_1 - s\sqrt{T} \qquad (3)$$

in which,

C = the theoretical price of a call option

S = the current price of the stock

X = the exercise price of the option

r = the risk-free rate

T = the duration of the option, i.e., time to expiration

s = the standard deviation of the underlying stock.[3]

Also, from the put-call parity formula, the theoretical price for a put option can be described as:

$$P = C + e^{-rT} X - S \quad (4)$$

in which P is the theoretical price of a put option.

4.3 Examples

In this case, we assume that all option contracts expire on 12/24. Table One reports the simulated option prices of a local stock on the following dates: 03/26, 05/28, 08/27, 09/24 and 11/26. Without considering any transaction cost, the first subsection of this part shows how a speculator profits from the leverage effect. The second subsection illustrates how to use options to hedge a long position in stocks. The third subsection demonstrates some other major trading strategies of options.

4.3.1 Speculation

As the word indicates itself, speculators make their investment decisions based on their expectations about price movement. If an up market is expected, a speculator buys call options. On the other hand, a put buyer expects a down market in the future. If price movement is expected to be relative stable, option speculators take short positions and receive premiums. Usually, long position investors benefit from the leverage effect when market moves the way they speculate.

For example, if an investor buys one share of stock on 3/26 at \$67.5 and sells it on 8/27 at \$147.5, the return for holding this stock is (\$147.5 - \$67.5)/\$67.5 = 1.1852, which is 118.52%. But if she/he buys a September 90 (exercise price) call on 3/26 at the price of $3.8 and sell it at $57.91 on 8/27, the return for holding this call option is: ($57.91 - $3.8)/$3.8 = 14.2395, which is 1423.95%. This is about 12 times the profit of holding the stock. In this case, the option buyer levers limited payments, i.e. the premiums, to generate potential higher returns.

4.3.2 Hedging

Options also provide functions for investors to hedge their investment positions when adverse price movement occurs. In this subsection, we show how a stock owner hedges her/his holding position through options.

On 8/27, if an investor buys 5,000 shares of stocks at $147.5 and does not use any options for hedge, the potential profits and losses she/he may have are as follows:

*On 9/24, the stock price surges to $168. The profit of owning the stock is:

($168 - $147.5) * 5,000 = $102,500

*On 11/26, the stock price becomes as $118. The loss of owning the stock is:

($118 - $147.5) * 5,000 = $(147,500)

*On 12/24, the stock price is $90. The loss of owning the stock is:

($90 - $147.5) * 5,000 = $(287,500)

We may find that if an investor does not take any hedge position when she/he holds stocks, the profits/losses totally depend on the fluctuation of the stock itself. Followings give examples and illustrate how an investor can hedge her/his long position in stocks.

(a).Owning Stocks plus Selling Calls - Without Using the Hedge Ratio

On 8/27, an investor buys 5,000 shares of stocks at $147.5 and shorts an equivalent amount on December 150 calls with the exercise price of $150 at $22.34.

On 9/24, the stock price (S) is $168, the December 150 call (C_{150}) is $32.17:

Profit from owning stock: ($168 - $147.5) * 5,000 =	$102,500
Loss from selling call: ($22.34 - $32.17) * 5,000 =	$ (49,150)
Net Profit:	$ 53,350

On 11/26, S=$118, C_{150}=$1.32:

Loss from owning stock: ($118 - $147.5) * 5,000 =	$(147,500)

Profit from selling call: ($22.34 - $1.32) * 5,000 = $ 105,100

Net Loss: $ (42,400)

On 12/24 the expiration date, S=$90, C_{150}=$0:

Loss from owning stock: ($90 - $147.5) * 5,000 = $(287,500)

Profit from selling call: ($22.34 - $0) * 5,000 = $ 111,700

Net Loss: $ (175,800)

(b).Owning Stocks plus Selling Calls - Using the Hedge Ratio

In this case, the hedge ratio is 0.58.[4] That is, for every share of stock, we sell 1/0.58 = 1.7241 call shares to hedge. Thus, 5,000*1.7241 = 8,260 calls are used to hedge.

On 9/24, S=$168, C_{150}=$32.17:

Profit from owning stock: ($168 - $147.5) * 5,000 = $ 102,500

Loss from selling call: ($22.34 - $32.17) * 8,620 = $ (84,734.6)

Net Profit: $ 17,765.4

On 11/26, S=$118, C_{150}=$1.32:

Loss from owning stock: ($118 - $147.5) * 5,000 = $ (147,500)

Profit from selling call: ($22.34 - $1.32) * 8,620 = $ 181,192.4

Net Profit: $ 33,692.4

On 12/24, the expiration date, S=$90, C_{150}=$0:

Loss from owning stock: ($90 - $147.5) * 5,000 = $(287,500)

Profit from selling call: ($22.34 - $0) * 8,620 = $ 192,570.8

Net Loss: $ (94,929.2)

(c).Owning Stocks plus Buying Puts - Without Using the Hedge Ratio

On 8/27, an investor buys 5,000 shares of stocks at $147.5 and December 150 puts (P_{150}) at $22.30.

On 9/24, S=$168, P_{150}=$12.26:

Profit from owning stock: ($168 - $147.5) * 5,000 = $102,500

Loss from buying put: ($12.26 - $22.30) * 5,000 = $ (50,200)

Net Profit: $ 52,300

On 11/26, S=$118, P_{150}=$32.68:

Loss from owning stock: ($118 - $147.5) * 5,000 =	$(147,500)
Profit from buying put: ($32.68 - $22.30) * 5,000 =	$ 51,900
Net Loss:	$ (95,600)

On 12/24, the expiration date, S=$90 and P_{150}=$60:

Loss from owning stock: ($90 - $147.5) * 5,000 =	$(287,500)
Profit from buying put: ($60-$22.30) * 5,000 =	$ 188,500
Net Loss:	$ (99,000)

(d).Owning Stocks plus Buying Puts - Using the Hedge Ratio:

Here, the hedge ratio for the P_{150} is 0.42; that is, for every share of stock, we buy 1/0.42 = 2.381 put shares to hedge. Thus, 5,000*2.381 = 11,900 put shares are used to hedge.

On 9/24, S= $168, P150=$12.26:

Profit from owning stock: ($168 - $147.5) * 5,000 =	$ 102,500
Loss from buying put: ($12.26 - $22.30) * 11,900 =	$(119,476)
Net Loss:	$ (16,976)

On 11/26, S=$118, P150=$32.68:

Loss from owning stock: ($118 - $147.5) * 5,000 =	$(147,500)
Profit from buying put: ($32.68 - $22.30) * 11,900 =	$ 123,522
Net Loss:	$ (23,978)

On 12/24 the expiration date, S=$90, P=$60:

Loss from owning stock: ($90 - $147.5) * 5,000 =	$(287,500)
Profit from buying put: ($60-$22.30) * 11,900 =	$ 448,630
Net Profit:	$ 161,130

(e).Owning Stocks plus Selling Calls (50%) and Buying Puts (50%):

On 9/24, S=$168, C_{150}=$32.17, P_{150}=$12.26:

Profit from stock: ($168 - $147.5) * 5,000 =	$102,500
Loss from selling call: ($22.34 - $32.17) * 2,500 =	$ (24,575)
Loss from buying put: ($12.26 - $22.30) * 2,500 =	$ (25,100)
Net Profit:	$ 52,825

On 11/26, S=$118, C_{150}=$1.32, P_{150}=$32.68:

Loss from stock: ($118 - $147.5) * 5,000 =	$ (147,500)
Profit from selling call: ($22.34 - $1.32) * 2,500 =	$ 52,550
Profit from buying put: ($32.68 - $22.30) * 2,500 =	$ 25,950
Net Loss:	$ (69,000)

On 12/24(the expiration date), S=$90, C_{150}=$0, P_{150}=$60:

Loss from stock: ($90 - $147.5) * 5,000 =	$ (287,500)
Profit from selling call: ($22.34 - $0) * 2,500 =	$ 55,850
Profit from buying put: ($60-$22.30) * 2,500 =	$ 94,250
Net Loss:	$ (137,400)

(f).Owning Stocks plus Selling Calls (100%) and Buying Puts(100%):

On 9/24, S=$168, C_{150}=$32.17, P_{150}=$12.26:

Profit from stock: ($168 - $147.5) * 5,000 =	$102,500
Loss from selling call: ($22.34 - $32.17) * 5,000 =	$ (49,150)
Loss from buying put: ($12.26 - $22.30) * 5,000 =	$ (50,200)
Net Profit:	$ 3,150

On 11/26, S=$118, C_{150}=$1.32, P_{150}=$32.68:

Loss from stock: ($118 - $147.5) * 5,000 =	$(147,500)
Profit from selling call: ($22.34 - $1.32) * 5,000 =	$ 105,100
Profit from buying put: ($32.68 - $22.30) * 5,000 =	$ 51,900
Net Profit:	$ 9,500

On 12/24 the expiration date, S=$90, C_{150}=$0, P_{150}=$60:

Loss from stock: ($90 - $147.5) * 5,000 =	$(287,500)
Profit from selling call: ($22.34 - $0) * 5,000 =	$ 111,700
Profit from buying put: ($60-$22.30) * 5,000 =	$ 188,500
Net Profit:	$ 12,700

Table Two summarizes all hedge strategies above. As we may notice, optioned portfolios generate hedge effect. Strategy (a) and (b) are known as covered call positions. Strategy (c) and (d) are known as protective put positions. Strategy (e) and (f) are the combinations of covered calls and protective puts with various weights. Every strategy here reduces the downside risk for stockholders. In general, the protective put position provides better downside protection when the market slumps. Buying puts is preferable to selling calls when a bearish market is expected.

4.3.3 More Trading Strategies

There are numerous strategies in trading options. In this subsection, we introduce some other major trading strategies which are favorable for investors who trade in volatile markets such as Taiwan. These strategies include: long a straddle, long a strip, long a strangle, short a butterfly, and short a condor.

(a).Long a Straddle:

A straddle consists of a call and a put on the same underlying stock. Both the call and the put have the same exercise price and expire at the same time. Longing a straddle can be an effective strategy if investors expect a big change in the price of an underlying stock, but are unable to predict the direction of the change. For example, an investor buys 5,000 shares of December 150 calls (C_{150}) and 5,000 shares of December 150 puts (P_{150}) simultaneously (where, S=\$147.5, C_{150}=\$22.34, and P_{150}=\$22.30) on 8/27. On 12/24, when the stock price slumps to \$90, C_{150} is worth nothing but P_{150} becomes as valuable as \$60. Thus, the net profit for this investor is: \$(60- 22.34- 22.30) * 5000= \$76,800.

(b).Long a Strip:

A strip consists of one call and two puts on the same underlying stock. All of the options have the same exercise price and expiration date. An investor who longs a strip will also profit from large price movement. However, the buyer of a strip expects more chances on downside movement than upside. When the price of the underlying stock slumps, strip buyers will profit more and quicker than straddle buyers. Here is an example:

On 8/27: Stock Price (S) = \$147.5

Long one December 150 call (C_{150}) = \$22.34

Long two December 150 puts (P_{150}) = \$22.30 * 2 = \$44.60

Total Premium paid is: \$22.34 + \$44.60= \$66.94

On 12/24: S = \$90

The value of C_{150}= \$0,

The value of two P_{150}= \$60 * 2 = \$120

The net profit from buying a strip is:

(\$120- \$66.94) * 5000 = \$265,300

(c).Long a Strangle:

A strangle consists of one call and one put with equally "out-of-the-money" exercise prices.[5] That is, the call has an exercise price above the stock price and the put has an exercise below the stock price. Here, if an investor buys a call with an exercise price of \$160 and simultaneously buys a put with an exercise price of \$140, she/he longs a strangle. Here is one example:

On 8/27: S = \$147.5

Long one December C_{160} = \$18.49,

Long one December P_{140} = \$16.99,

Total premium paid = \$18.49+ \$16.99= \$35.48.

On 12/24: S = \$90

The value of one C_{160}= \$0, the value of one P_{140}= \$50

The net profit = (\$50- \$35.48) * 5000= \$72,600

(d).Short a Butterfly:

A butterfly consists of a position in a call with a low exercise price, a position in two calls with a higher exercise price, and a position in a call with an even higher exercise price. To short a butterfly, an investor sells a call with a low exercise price, buys two calls with a higher exercise price, and sells a call with an even higher exercise price. The following is an example:

On 8/27: S =\$147.5

Short one December C_{140} = \$26.86

Long two December C_{150} = \$22.34 *2 = \$44.68

Short one December C_{160} = \$18.49

The premium paid from the long position is: \$44.68

The premium received from the short position is:

\$26.86+ \$18.49= \$45.35

On 12/24: S = $90,

The value of all calls are zero.

Thus, the net profit

= ($45.35-$44.68) * 5000

= (0.67) * 5000 = $3,350

(e).Short a Condor:

A condor is a position involving four options on the same underlying security and with the same expiration date. These options have different exercise prices. To short a condor, an investor sells a call with a low exercise price, buys a call with a somewhat higher exercise price, buys a call with a yet higher exercise price, and sells a call with the highest exercise price. Usually, a condor seller earns positive return when the stock price surges or slumps. The following is one example:

On 8/27: S =$147.5

Short one December C_{130} = $32.11

Long one December C_{140} = $26.86

Long one December C_{150} = $22.34

Short one December C_{160} = $18.49

The premium paid from the long position is:

$26.86+ $22.34= $49.2

The premium received from the short position is:

$32.11+ $18.49= $50.6

On 12/24: S = $90,

The value of all calls are zero.

Thus, the net profit

= ($50.6-$49.2) * 5000

= (1.4) * 5000 = $7,000

5.Conclusion

On the way towards a diversified market, the Taiwan Stock Exchange recently opens its market for warrant trading. The warrant trading began the age of derivatives in Taiwan. In this paper, we review literatures which examine how the formation of an options market impacts on the US stock market in the 70's, and discuss potential advantages for Taiwan to develop its domestic options market. For demonstration purpose, option prices of a Taiwanese stock are simulated with the Black-Scholes model. Various examples of trading strategies are introduced step by step. It is hoped that the concrete examples presented in this paper will help investors and business school students to understand the fundamentals of options.[6]

Endnotes

1.These contracts, however, are foreign futures contracts only.

2.Up to March 24, 1998, there are seventeen warrant contracts listed and traded in the Taiwan Stock Exchange.

3.The Black-Scholes model postulates a relationship between the option price and the following factors: the stock price, the exercise price, the risk-free interest rate, the underlying asset's volatility and the time to expiration. In this study, the stock prices are randomly picked up from a listed company traded in the Taiwan Stock Exchange. The annualized risk-free rate, r, is set at 5.25%. The volatility is calculated using historical returns of the underlying stock. It is assumed that no dividend is paid by the underlying stock.

4.Which is, the $N(d_1)$ of Equation (1).

5.For a call option, when S (stock price) > X (exercise price), it is in the money. When S = X, it is at the money. When S < X, it is out of the money. For a put option, when S < X, it is in the money. When S = X, it is at the money. When S > X, it is out of the money.

6.The authors would like to thank two anonymous referees. They point out that the warrants in Taiwan are American options but not European options and the Black-Scholes model may not be the best one to simulate option/warrant prices of Taiwan stocks. As mentioned in the texts, this paper emphasizes the fundamentals of options, some dynamic or exotic cases are reserved for future presentation.

Table 1 The Simulated Option Prices

Panel A: On 03/26 when Stock Price is closed at $67.5

	Call			Put		
Strike Price	June	Sep.	Dec.	June	Sep.	Dec.
40	28.10	29.03	30.10	0.09	0.52	1.09
50	18.93	20.84	22.59	0.79	2.07	3.20
60	11.41	14.26	16.54	3.15	5.24	6.78
70	6.19	9.40	11.91	7.80	10.13	11.78
80	3.08	6.03	8.49	14.56	16.51	17.98
90	1.43	3.80	6.02	22.79	24.02	25.13
100	0.63	2.36	4.25	31.86	32.34	32.98
110	0.27	1.46	3.00	41.37	41.18	41.36
120	0.11	0.90	2.12	51.09	50.17	0.10

Panel B On 05/28 when Stock Price is closed at $90

	Call			Put		
Strike Price	June	Sep.	Dec.	June	Sep.	Dec.
70	20.57	23.88	26.87	0.28	2.70	4.81
80	12.02	17.18	20.86	1.68	5.83	8.51
90	5.84	11.95	16.01	5.45	10.43	13.36
100	2.35	8.09	12.17	11.92	16.40	19.22
110	0.80	5.36	9.19	20.33	23.50	25.95
120	0.23	3.49	6.91	29.72	31.46	33.38
130	0.06	2.24	5.18	39.51	40.04	41.36

Panel C On 08/27 when Stock Price is closed at $147.5

	Call		Put	
Strike Price	Sep.	Dec.	Sep.	Dec.
80	67.84	69.69	0.00	0.84
90	57.91	60.82	0.03	1.80
100	48.09	52.54	0.17	3.35
110	38.59	44.96	0.62	5.60
120	29.73	38.14	1.72	8.61
130	21.91	32.11	3.86	12.41
140	15.42	26.86	7.33	16.99
150	10.38	22.34	12.24	22.30
160	6.69	18.49	18.50	28.28
170	4.14	15.24	25.92	34.86

Panel D On 09/24 when Stock Price is closed at $168

	Call	Put
Strike Price	Dec.	Dec.
100	70.23	0.96
110	61.33	1.93
120	52.98	3.45
130	45.29	5.64
140	38.35	8.57
150	32.17	12.26
160	26.77	16.74
170	22.12	21.96
180	18.15	27.86

Panel E On 11/26 when Stock Price is closed at $118

Strike Price	Call Dec.	Put Dec.
90	29.04	0.65
100	20.54	2.11
110	13.53	5.06
120	8.30	9.79
130	4.76	16.21
140	2.57	23.98
150	1.32	32.68
160	0.64	41.96

Table 2 Summary of Hedging Strategies*

Date	Original Condition	Strategy (a)	Strategy (b)	Strategy (c)	Strategy (d)	Strategy (e)	Strategy (f)
On 8/27	Owning Stocks Only	Owning Stocks; Sell Calls w/o HR	Owning Stocks; Sell Calls w/ HR	Owning Stocks; Buy Puts w/o HR	Owning Stocks; Buy Puts w/HR	Owning Stocks; Sell 1/2 C Buy 1/2 P	Owning Stocks; Sell 100% C Buy 100% P
On 9/24	Net Profit $102,500 ROR 13.90%	Net Profit $53,350 ROR 7.23%	Net Profit $17,765.4 ROR 2.41%	Net Profit $52,300 ROR 7.1%	Net Profit $(16,976) ROR -2.3%	Net Profit $52,825 ROR 7.16%	Net Profit $3,150 ROR 0.43%
On 11/26	Net Loss: $(147,500) ROR -20%	Net Loss: $(42,400) ROR -5.75%	Net Loss: $33,692.4 ROR 4.57%	Net Loss: $(95,600) ROR -12.96%	Net Loss: $(23,978) ROR -3.25%	Net Loss: $(69,000) ROR -9.36%	Net Loss: $9,500 ROR 1.29%
On 12/24	Net Loss: $(287,500) ROR -38.98%	Net Loss: $(175,800) ROR -23.84%	Net Loss: $(94,929) ROR -12.87%	Net Loss: $(99,000) ROR -13.42%	Net Loss: $161,130 ROR 21.84%	Net Loss: $(137,400) ROR -18.63	Net Loss: $12,700 ROR 1.72%

* HR: Hedge Ratio. ROR: Rate of Return. C: Calls. P: Puts.

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以實例教授選擇權

一透過價格模擬演示主要交易策略

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摘 要

在本文中，我們首先回顧美國選擇權市場於七十年代設立後，對股市影響的相關文獻，進而討論台灣未來發展本土型選擇權市場所可能產生之優點。為達逐步演示的教學目的，我們以 Black-Scholes 評價模型，模擬出台灣股市中某一上市股的選擇權價格，並將選擇權的各式主要交易策略，以實例循序地加以介紹。盼望藉由本文之綜合性整理與實例呈現，台灣的投資人和商管學院學生，能對選擇權此一衍生性金融商品，有較實際的認識與了解。

關鍵詞：台灣；認購權證；選擇權；Black-Scholes 評價模型；財金教育。

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