

CHAPTER 15 Options Markets

15.1 THE OPTION CONTRACT

Option Terminology

- Buy - Long
- Sell - Short
- Call—the right to buy
- Put—the right to sell
- Key Elements
 - Exercise or Strike Price
 - Premium or Price of the option
 - Maturity or Expiration

Market and Exercise Price Relationships

In the Money - exercise of the option would be profitable

Call: market price > exercise price

Put: exercise price > market price

Out of the Money - exercise of the option would not be profitable

Call: market price < exercise price

Put: exercise price < market price

At the Money - exercise price and asset price are equal

Options Trading

- Some options trade on over-the-counter (OTC) markets
- Option contracts traded on exchanges are standardized
- Most options trading in the U.S. take place on:
 - Chicago Board Options Exchange
 - International Securities Exchange in New York

Figure 15.1 Options on IBM
March 2, 2007

IBM (IBM)		Underlying stock price: 90.90					
Expiration	Strike	Call			Put		
		Last	Volume	Open Interest	Last	Volume	Open Interest
Mar 2007	85	7.50	172	1437	0.20	431	1487
Apr 2007	85	8.10	235	7167	0.70	455	10367
Jul 2007	85	9.40	27	1051	1.55	165	9914
Oct 2007	85	11.20	1	21	2.10	2	405
Mar 2007	90	2.20	3875	3088	1.05	8315	4649
Apr 2007	90	3.78	3779	7016	2.10	5499	11885
Jul 2007	90	5.50	108	1625	3.20	1067	2795
Oct 2007	90	7.70	114	159	1003
Mar 2007	95	0.35	1605	28920	4.00	2365	27969
Apr 2007	95	1.35	691	10348	4.90	3502	16796
Jul 2007	95	3.00	234	2805	5.20	3334	2780
Oct 2007	95	4.70	61	421	5.90	1	788

FIGURE 15.1
Options on IBM,
March 2, 2007
Source: *The Wall Street*
Journal Online,
March 3, 2007

American vs. European Options

American - the option can be exercised at any time before expiration or maturity

European - the option can only be exercised on the expiration or maturity date

The Option Clearing Corporation

- Jointly owned by the exchanges on which options are traded
- The OCC places itself between options traders
- OCC guarantees contract performance
 - Thus option writers are required to post margin

Different Types of Options

- Stock Options
- Index Options
- Futures Options
- Foreign Currency Options
- Interest Rate Options

15.2 VALUES OF OPTIONS AT EXPIRATION

Payoffs and Profits on Options at Expiration - Calls

Notation

Stock Price = S_T Exercise Price = X

Payoff to Call Holder

$(S_T - X)$ if $S_T > X$
0 if $S_T \leq X$

Profit to Call Holder

Payoff - Purchase Price

Payoffs and Profits on Options at Expiration - Calls

Payoff to Call Writer

$-(S_T - X)$ if $S_T > X$
0 if $S_T \leq X$

Profit to Call Writer

Payoff + Premium

Figure 15.2 Payoff and Profit to Call at Expiration

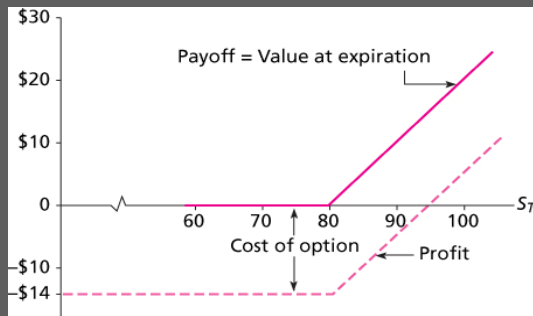
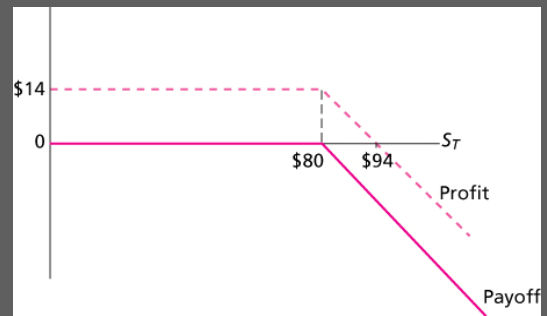


Figure 15.3 Payoff and Profit to Call Writers at Expiration



Payoffs and Profits at Expiration - Puts

Payoffs to Put Holder

$$0 \quad \text{if } S_T \geq X$$

$$(X - S_T) \quad \text{if } S_T < X$$

Profit to Put Holder

$$\text{Payoff} - \text{Premium}$$

Payoffs and Profits at Expiration - Puts

Payoffs to Put Writer

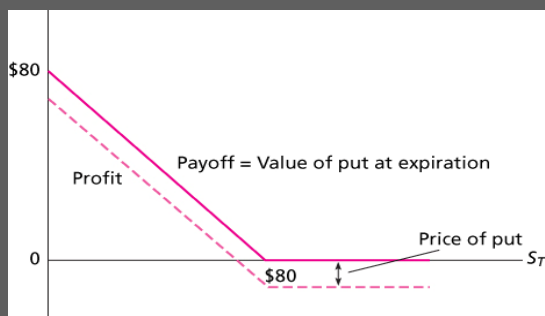
$$0 \quad \text{if } S_T \geq X$$

$$-(X - S_T) \quad \text{if } S_T < X$$

Profits to Put Writer

$$\text{Payoff} + \text{Premium}$$

Figure 15.4 Payoff and Profit to Put Option at Expiration



Equity, Options & Options Plus T-Bills - Text Example

Investment	Strategy		Investment
Equity only	Buy stock @ 90	100 shares	\$9,000
Options only	Buy calls @ 10	9 Contracts (900 calls)	\$9,000
Calls Plus T-Bills	Buy calls @ 10 Buy T-bills @ 2% Yield	1 Contract	\$1,000 \$8,000

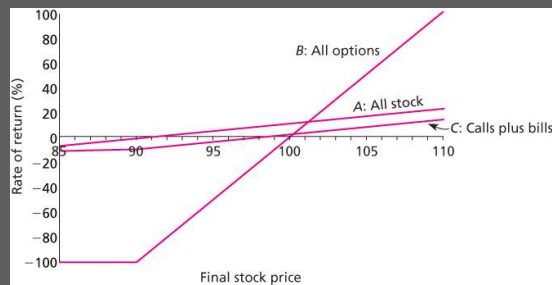
Equity, Options & Options Plus T-Bills - Text Example

	IBM Stock Price		
	\$85	\$100	\$110
All Stock	\$8,500	\$10,000	\$11,000
All Options	\$0	\$9,000	\$18,000
Lev Equity	\$8,160	\$9,160	\$10,160

Equity, Options & Options Plus T-Bills - Text Example

	IBM Stock Price		
	\$85	\$100	\$110
All Stock	-5.56%	11.11%	22.22%
All Options	-100%	0%	100%
Lev Equity	-9.93%	1.78%	12.89%

Figure 15.5 Rate of Return to Three Strategies



Option Strategies

Protective Put

Long Stock
Long Put

Straddle

Long Call
Long Put

Covered Call

Long Stock
Short Call

Bullish Spread

Long Call Low Ex.
Short Call High Ex.

Table 15.1 Payoff to Protective Put Strategy

TABLE 15.1 Payoff to protective put strategy	Stock Put Total	$S_T \leq X$	$S_T > X$
		S_T $X - S_T$ X	S_T 0 S_T

Figure 15.6 Value of Protective Put Position at Expiration

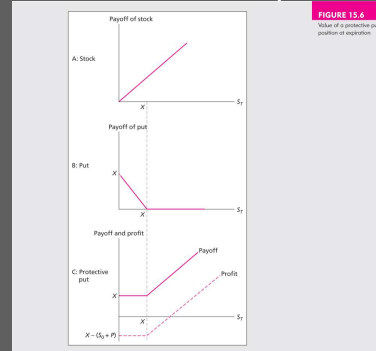


Figure 15.7 Protective Put Versus Stock Investment (at-the-money put)

FIGURE 15.7
Protective put versus stock investment (at-the-money put option)

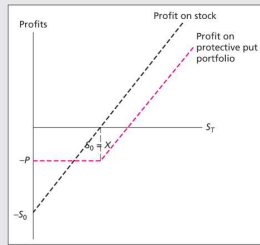


Table 15.2 Payoff to a Covered Call

	$S_T \leq X$	$S_T > X$
Payoff to a covered call		
Payoff of stock	S_T	S_T
- Payoff of call	0	$-(S_T - X)$
Total	S_T	X

Figure 15.8 Value of a Covered Call Position at Expiration

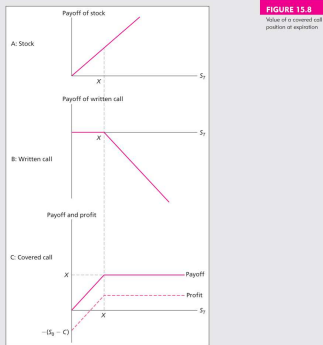


Table 15.3 Payoff to a Straddle

	$S_T \leq X$	$S_T > X$
Payoff to a straddle		
Payoff of call	0	$S_T - X$
+ Payoff of put	$+(X - S_T)$	+0
Total	$X - S_T$	$S_T - X$

Figure 15.9 Payoff and Profit to a Straddle Position at Expiration

FIGURE 15.9
Payoff and profit to a straddle at expiration.

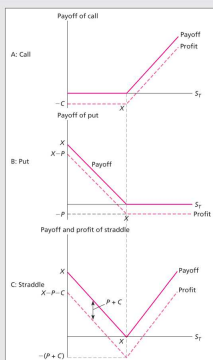
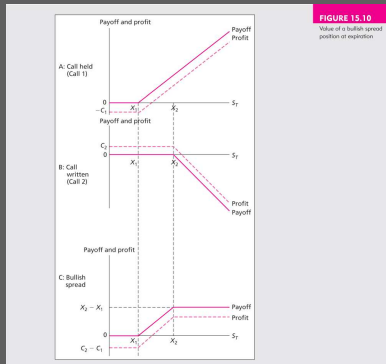


Table 15.4 Payoff to a Bullish Spread

	$S_T \leq X_1$	$X_1 < S_T \leq X_2$	$S_T > X_2$
Payoff to a bullish spread			
Payoff of first call, exercise price = X_1	0	$S_T - X_1$	$S_T - X_1$
- Payoff of second call, exercise price = X_2	-0	-0	$-(S_T - X_2)$
Total	0	$S_T - X_1$	$X_2 - X_1$

Figure 15.10 Value of a Bullish Spread Position at Expiration



Collars

- A collar is an options strategy that brackets the value of a portfolio between two bounds
- Appropriate for an investor who has a target wealth goal but is unwilling to risk losses beyond a certain level!

15.3 OPTIONLIKE SECURITIES

Optionlike Securities

- Callable Bonds
- Convertible Securities
- Warrants
- Collateralized Loans
- Levered Equity and Risky Debt

Figure 15.11 Value of Callable Bonds Compared with Straight Bonds

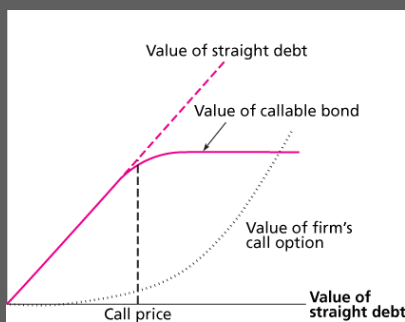


Figure 15.12 Value of a Convertible Bond as a Function of Stock Price

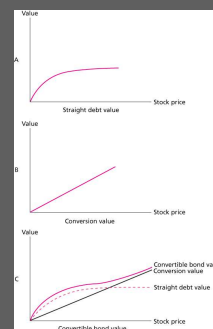
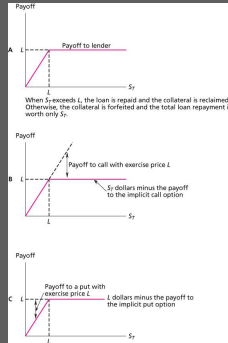


Figure 15.13 Collateralized Loan



15.4 EXOTIC OPTIONS

Exotic Options

- Asian Options
- Barrier Options
- Lookback Options
- Currency-Translated Options
- Binary Options