

**Unit 09.**

# **An Introduction to Options**

Reading: Chapter 17

# An Option

- In the security market, an option gives the holder the right to buy or sell a stock (or index of stocks) at a specified price (“strike” price) within a specified time period.
- The value of an option depends in part on the value of the underlying security, so options are often referred to as derivative securities.
- Two types of options
  - Call options: Options to buy a stock at the strike price within a specified time period.
  - Put options: Options to sell a stock at the strike price within a specified time period.
- Option is not an obligation. One does not have to exercise the option. If the option is not exercised the original purchase price of the option is lost.

# Chap. 17. An Introduction to Options

1. Call options
2. Leverage
3. Writing calls
4. Puts
5. The Chicago Board Options Exchanges
6. Stock Index options
7. Currency and interest rate options
8. Warrants

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**“If we really want to make money, we need to  
come up with some options.”**

# 1. Call Options

- An example of call option:
  - You pay \$15 for an option that gives you the right to buy one share of GM stock for \$50 a share by Dec. 31, 200X (one year from today). The current market price of a share of GM stock is \$60.
- Definitions:
  - Expiration date: The date by which the option must be exercised or it is no longer valid. In the example Dec. 31, 200X is the expiration date.
  - Strike price: the price at which the investor may buy the stock through the option. In the example the strike price is \$50. Strike price is also called the exercise price.
  - Premium: The market price of the option. In the example the premium is \$15.
  - Intrinsic value: The minimum price that a call option will command, which is the difference between the stock market price and the strike price. In the example the intrinsic value of this option is \$10 ( $\$60 - \$50$ ) at the time of the option purchase. Note intrinsic value changes over time as market price changes.

# In, Out, & At the Money Call Options

- An "in" the money call option: The option has a positive intrinsic value.
  - Market price  $>$  Strike price.
  - E.g. On Dec. 31, 200X market price of GM stock is \$70 a share. Intrinsic value of the option is \$20 ( $\$70 - \$50$ ).
- An "out" of the money call option: The option has a negative intrinsic value.
  - Market price  $<$  Strike price.
  - E.g., On Dec, 31, 200X market price of GM stock is \$40 a share. Intrinsic value is  $-\$10$  ( $\$40 - \$50$ ). But it is actually zero because one does not have to exercise the option.
- An "at" the money call option: The option has zero intrinsic value
  - Market price = Strike price
  - E.g., On Dec. 31, 200X market price of GM stock is \$50 a share.

# Intrinsic Value of Call Options

- Intrinsic value of a call option changes as market price of the stock changes. Note that if the market price is below the strike price, the intrinsic value is zero because one does not have to exercise the option and lose more money.

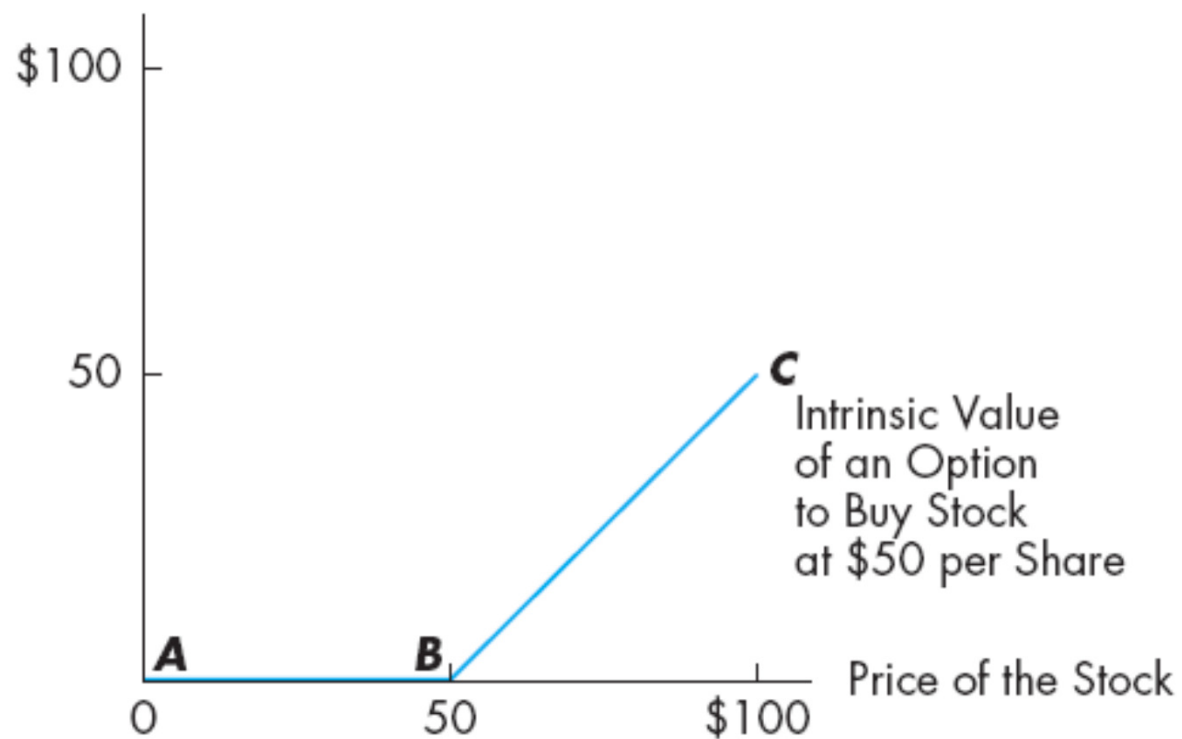
**EXHIBIT 19.1** The Price of a Stock and the Intrinsic Value of a Call to Buy the Stock at \$50 per Share

Price of the Stock	<i>minus</i>	Per-Share Strike Price of the Option	<i>equals</i>	Intrinsic Value of the Option
\$ 0		\$50		\$ 0
10		50		0
20		50		0
30		50		0
40		50		0
50		50		0
60		50		10
70		50		20
80		50		30
90		50		40

# Intrinsic Value of Call Options

- One can use a graph to show the relationship depicted in the table on previous slide.

**FIGURE 19.1** The Relationship Between the Price of a Stock and the Intrinsic Value of a Call to Buy the Stock at \$50 per Share





## 2. Leverage

- Options offer investors leverage: the potential return on an investment in a call may exceed the potential return on an investment in the underlying the stock.
- Using options is similar to using margin in regular investment.
- Example: Suppose the price of the GM stock rose from \$60 to \$70. The intrinsic value of the option rose from \$10 to \$20.
  - % gain in stock:  $(70/60)-1=16.67\%$
  - % gain in intrinsic value:  $(20/10)-1=100\%$
- Example: Suppose the price of the stock declines from \$60 to 55. The intrinsic value of the option declines from \$10 to \$ 5.
  - % loss in stock:  $(55/60)-1= -8.33\%$
  - % loss in intrinsic value:  $(5/10)-1= -50\%$

# Purchasing Calls – Potential Profits and Losses

- Example: You pay \$15 per share for an option that gives you the right to buy one share of GM stock for \$50 by Dec. 31, 200X (one year from today). The current market price of a share of GM stock is \$60. What are the profits/losses on the option at expiration date if the market price of a share of GM stock is
  - (1) \$80
  - (2) \$60
  - (3) \$40
  - What are the max. profit/loss of purchasing this call?
- Suppose the unit of trade is 100 shares so you invest a total of \$1,500 to buy 100 such options.

# Purchasing Calls – Potential Profits and Losses Cont'd

- Answer to (1):
  - If market price of stock is \$80, the investor can exercise the option and purchase the stock at \$50, then sell it immediately at \$80. The gain is \$30 (\$80-\$50) per share. However the investor paid \$15 per share for this option. So the net profit is \$15 per share.
  - \$ profit/loss =  $(80-50)*100 - 15*100 = \$1500$
  - % profit/loss =  $1500/1500 = 100\%$  - The investor doubles his/her money.
- Answer to (2):
  - If market price of stock is \$60, the investor could exercise the option and purchase the stock at \$50, then sell it immediately at \$60. The gain is \$10 (\$60-\$50) per share. However the investor paid \$15 per share for this option. So the investor actually suffers a loss of \$5 per share.
  - \$ profit/loss =  $(60-50)*100 - 15*100 = -\$500$
  - % profit/loss =  $-\$500/1500 = -33.33\%$ .

# Purchasing Calls – Potential Profits and Losses Cont'd

- Answer to (3)
  - If market price of stock is \$40, the investor will not exercise the option. No point to buy the stock at \$50 if the current market price is only \$40. So the loss is the price paid for the option, which is \$1500.
  - \$ profit/loss = -\$1,500
  - % profit/loss =  $-1500/1500 = -100\%$  - The investor lost all initial investment.
- Answer to (4):
  - The max. profit is theoretically unlimited. For example, if the stock price goes up to \$1000, profit =  $(1000-50)*100 - 15*100 = 93,500$ 
    - Max. profit on a call = unlimited
  - The max. loss is the price paid for the call. In this case it would be \$15 per share for a total of \$1,500.
    - Max. loss on a call = Price of the call.

# Purchasing a Call vs. Purchasing a Stock

- Suppose in the previous example, the investor instead purchases the underlying stock. With \$1500 he can buy 25 ( $\$1500/\$60$ ) shares of GM stocks. What are the profits/losses if he sells the stocks on Dec. 31, 200X if (1) market price of stock is
  - (1) \$80
  - (2) \$60
  - (3) \$40

# Purchasing a Call vs. Purchasing a Stock – Cont'd

- Answer to (1):
  - \$ profit/loss =  $(80-60)*25 = \$500$
  - % profit/loss =  $500/1500=33.33\%$
- Answer to (2):
  - \$ profit/loss =  $(60-60)*25 = \$0$
  - % profit/loss =  $0/1500=0\%$
- Answer to (3):
  - \$ profit/loss =  $(40-60)*25 = -\$500$
  - % profit/loss =  $-500/1500=-33.33\%$
- Note here that purchasing the option magnified both profits and losses compared to directly purchasing the underlying stock.

Stock Price at Expiration	Gain/Loss with Option	Gain/loss with Stock Purchase
\$80	\$1,500 / 100%	\$500 / 33.33%
\$60	-\$500 / -33.33%	\$0 / 0%
\$40	-\$1,500 / -100%	-\$500 / -33.33%

# The Time Premium of an Option

- Often investors are willing to pay a time premium for the potential leverage the option offers.
- This time premium lifts the option value above its intrinsic value so the option price is typically a little higher than its intrinsic value.
- The table on next slide show a hypothetical example of market price of a call.
  - Market price of a call = intrinsic value + time premium

# Time Premium of an Option

- In the graph below the last column “Hypothetical market price” refers to the market price of the option. Note it is often somewhat higher than the intrinsic value. That is because of the time premium.

**EXHIBIT 19.3** The Relationship Between the Price of a Stock, the Value of a Call, and the Hypothetical Market Price of the Option

Price of the Common Stock	Per-Share Strike Price	Option	
		Intrinsic Value	Hypothetical Market Price
\$ 10	\$50	\$ 0	\$ 0
20	50	0	0.02
30	50	0	0.25
40	50	0	1
50	50	0	6
60	50	10	15
70	50	20	23
80	50	30	32
90	50	40	41
100	50	50	50





# Characteristics of Time Premium

- As the intrinsic value of a call rises, the time premium declines.
  - This is because the leverage is reduced when the intrinsic value of a call rises.
- As the expiration date of a call approaches, the time premium declines until reaching zero on expiration date.
  - At expiration date there is no time premium. A call's price must equal to its intrinsic value.
- Time premium differs for different stocks.

# 3. Writing Options

- While there are investors who buy options, there are also investors who sell options.
- The act of issuing and selling an option is called “writing an option”. There are two ways to write options:
  - (1) Covered option writing – The option seller owns the underlying stock
  - (2) Naked option writing – The option seller does not own the underlying stock.

# Covered Call

- To write a covered call: buy the stock and sell the option.
- Combines a long position in the stock and a short position in the option.
- Covered call takes advantage of the disappearing time premium.
- Profit is limited to the time premium.

# An Example of Writing a Covered Call

- Example: Mary sells a call at \$15 per share that gives the buyer the right to buy one share of GM stock for \$50 a share by Dec. 31, 200X (one year from today). The current market price of a share of GM stock is \$60 so Mary bought 100 shares at \$60 per share to cover her call. What are the profits/losses on the option at expiration date for Mary if the market price of a share of GM stock is
  - (1) \$80?
  - (2) \$60 ?
  - (3) \$40?
  - (4) What is the maximum profit and maximum loss for this covered call?
- Suppose the trading unit is 100 shares.

# An Example of Writing a Covered Call Cont'd

- Answer to (1):
  - If the market price of the stock at expiration is \$80/share, the buyer will exercise the option. Mary will have to sell the 100 share of GM stocks she purchased at \$60/share at strike price of \$50/share. On the other hand Mary profited \$1500 for selling the call.
  - \$ profit/loss for Mary =  $(50-60)*100 + 1500 = -1000+1500=\$ 500$
  - % profit/loss for Mary =  $500/(60*100-1500)= 11.11\%$
- Answer to (2):
  - If the market price of the stock at expiration is \$60/share, the buyer will exercise the option. Mary will have to sell the 100 share of GM stocks she purchased at \$60/share.
  - \$ profit/loss for Mary =  $(50-60)*100 + 1500 = -1000+1500=\$ 500$
  - % profit/loss for Mary =  $500/(60*100-1500)= 11.11\%$

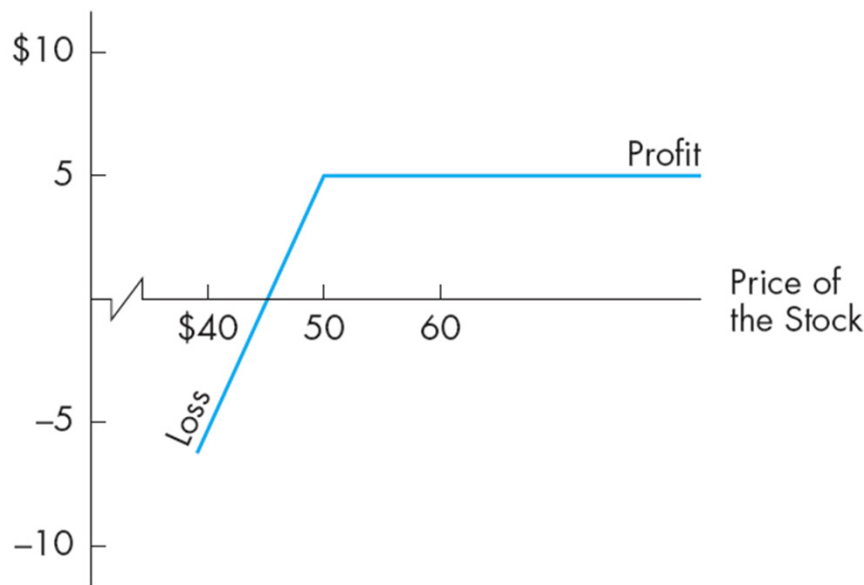
# An Example of Writing a Covered Call Cont'd

- Answer to (3):
  - If the market price of the stock at expiration is \$40/share, the buyer will not exercise the option. Mary will pocket the \$1,500 option price to offset some of the stock price loss.
  - \$ loss for Mary =  $(40-60)*100+1,500 = -2,000+1500=-500$
  - % loss for Mary =  $-500/(60*100-1500)=-11.11\%$
  - Note: In reality, Mary may not sell the stocks at \$40 at expiration. If she believes prices will go up again she can hold the stocks; Or if she believes the prices will go down she can write another call on the stock. But the loss is real at the time even if it's just paper loss.

# An Example of A Covered Call – Cont'd

- Answer to (4)
  - The maximum profit Mary can generate is \$500. Note also that the \$500 is the time premium of the call (Call price is \$15 per share where the intrinsic value is \$10 per share). That means the maximum profit a seller of a covered call can make is the time premium.
    - Max. profit of covered call = Time premium
  - The maximum loss on a covered call is the original purchasing price of the stock, minus the price of the call. In this example, the maximum loss of the covered call is  $(\$60 - \$15) * 100 = \$4,500$ .
    - Max. loss of covered call = Purchase price of the stock – Price of the call

# An Illustration of Profit or Loss on Selling a Covered Call (at Expiration of the Call)



- Pay attention to the pattern of the graph instead of the numbers per se.
- Maximum \$ profit on a covered call is the time premium.
- Maximum \$ loss on a covered call is the original purchase price of the stock, minus the price of the call.



# Naked Call

- Option writers can sell a call without owning the underlying stocks. Such a call is called a **naked call**.
- The maximum possible profit is the sale price.
- Since the writer does not own the stock, there is unlimited risk of loss if the price of the stock rises.

# An Example of Writing a Naked Call

- Example: Mary sells a call at \$15 per share that gives the buyer the right to buy one share of GM stock for \$50 a share by Dec. 31, 200X (one year from today). Mary does not own any GM stocks at the time of the option sale. What are the profits/losses on the option at expiration date for Mary if the market price of a share of GM stock is
  - (1) \$80?
  - (2) \$60 ?
  - (3) \$40?
  - (4) What are the max. profit and max. loss on this naked call?
- Suppose the trading unit is 100 shares.

# An Example of Writing a Naked Call

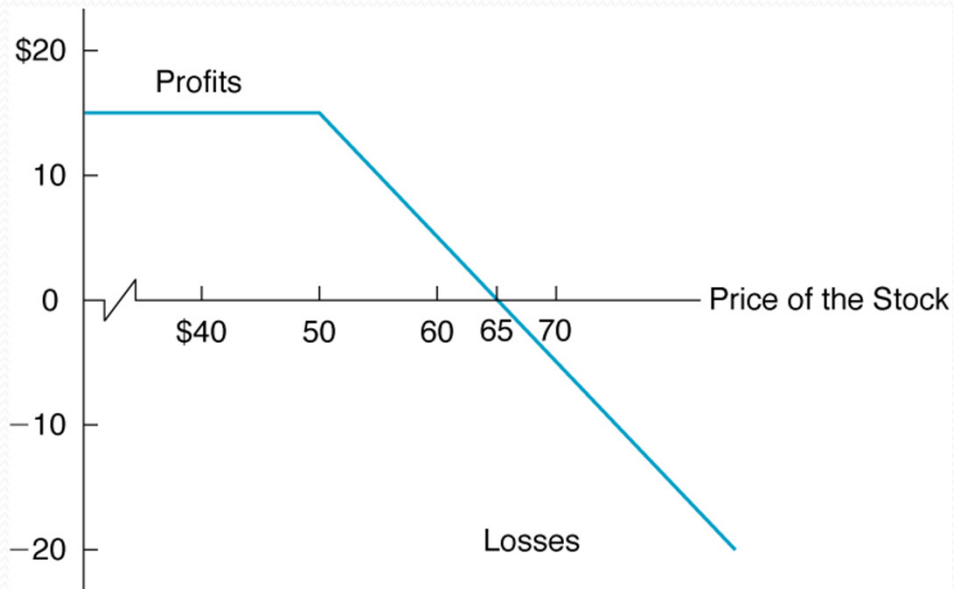
## Cont'd

- Answer to (1):
  - If the market price of the stock at expiration is \$80/share, the buyer will exercise the option. Mary will have to buy 100 shares of GM at \$80 a share and sell them to the option buyer at \$50 per share.
  - \$ loss for Mary =  $(50-80)*100 + 1500 = -3000+1500 = -\$1,500$
  - % loss for Mary =  $-1500/(80*100-1500) = -23.08\%$
- Answer to (2):
  - If the market price of the stock at expiration is \$60/share, the buyer will exercise the option. Mary will have to buy 100 shares of GM at \$60 a share and sell them to the option buyer at \$50 per share.
  - \$ loss for Mary =  $(50-60)*100 + 1500 = -1000+1500 = \$500$
  - % loss for Mary =  $500/(60*100-1500) = 11.11\%$
- Answer to (3):
  - If the market price of the stock at expiration is \$40/share, the buyer will not exercise the option. Mary will pocket the \$1,500 option price.
  - \$ gain for Mary = \$1,500
  - % gain for Mary =  $\infty$

# An Example of Writing a Covered Call Cont'd

- Answer to (4):
  - The maximum \$ profit Mary can get is the option price of the call at \$1,500. However the % gain can be infinite because Mary did not have to pay anything to get the \$1500 profit. In the real world there are transaction costs involved so infinite % gain is not likely.
    - Max. profit of naked call = Price of the call
  - The potential loss for selling a naked call can be theoretically infinite if the market prices skyrocket. For example, if the price of the stock is \$1000 a share at exercising time, the \$ loss for Mary would be  $(50-1000)*100 + 1500 = -95000 + 1500 = -\$80,000$ .
    - Max. loss of naked call = unlimited

# Profits and Losses at Expiration for a Naked Call Writer

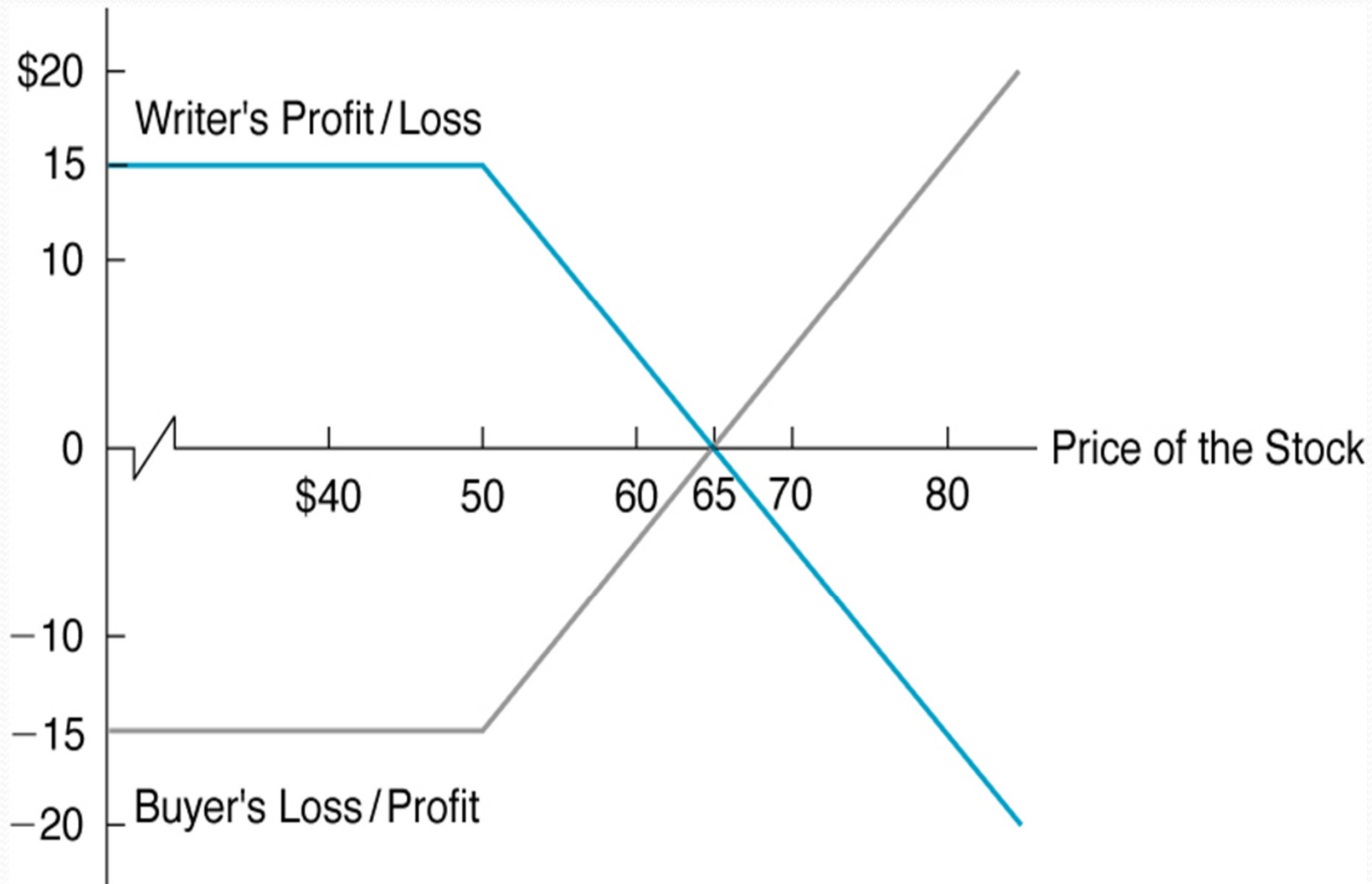


- The maximum \$ profit a naked call writer can make is the price of the option.
- The \$ loss is technically unlimited.

# Profit / Loss Compared

- When the buyer profits, the naked writer sustains a loss.
- When the naked writer profits, the buyer sustains a loss.
- The profit/loss on buying a call or writing a naked call are mirror images, as show in the graph on next slide.

# Profit or Loss on the Purchases of a Call and on the Sale of a Naked Call



## 4. Put Options

- An Example:
  - You pay \$8 for an option that gives you the right to sell one share of AGM stock for \$30 a share by Dec. 31, 200X. The current market price of a share of AGM stock is \$25.
- Definitions:
  - Expiration date: The date by which the option must be exercised or it is no longer valid. In the example Dec. 31, 200X is the expiration date
  - Strike price: the price at which the investor may sell the stock through the option. In the example the strike price is \$30. It is also called the exercise price.
  - Premium: The market price of the option. In the example the premium is \$8.
  - Intrinsic value: The minimum price that a put option will command, which is the difference between the strike price and stock market price. In the example the intrinsic value of this option is \$5 ( $\$30 - \$25$ ) at the time of option purchase. Note intrinsic value changes over time as market price changes.



# Buying a Put

- The investor who buys a put expects that the price of the stock will fall
- Just like a call option, puts have a time premium over its intrinsic value.
  - Time value of a put = Price of the put – Intrinsic value of the put.
    - E.g. If the price of the put is \$6, and the intrinsic value of the put is 0, what is the time premium?
      - Answer: Time premium =  $6 - 0 = \$6$
    - E.g. If the price of the put is \$15.25, and the intrinsic value of the put is \$15, what is the time premium?
      - Answer: Time premium =  $15.25 - 15 = \$0.25$

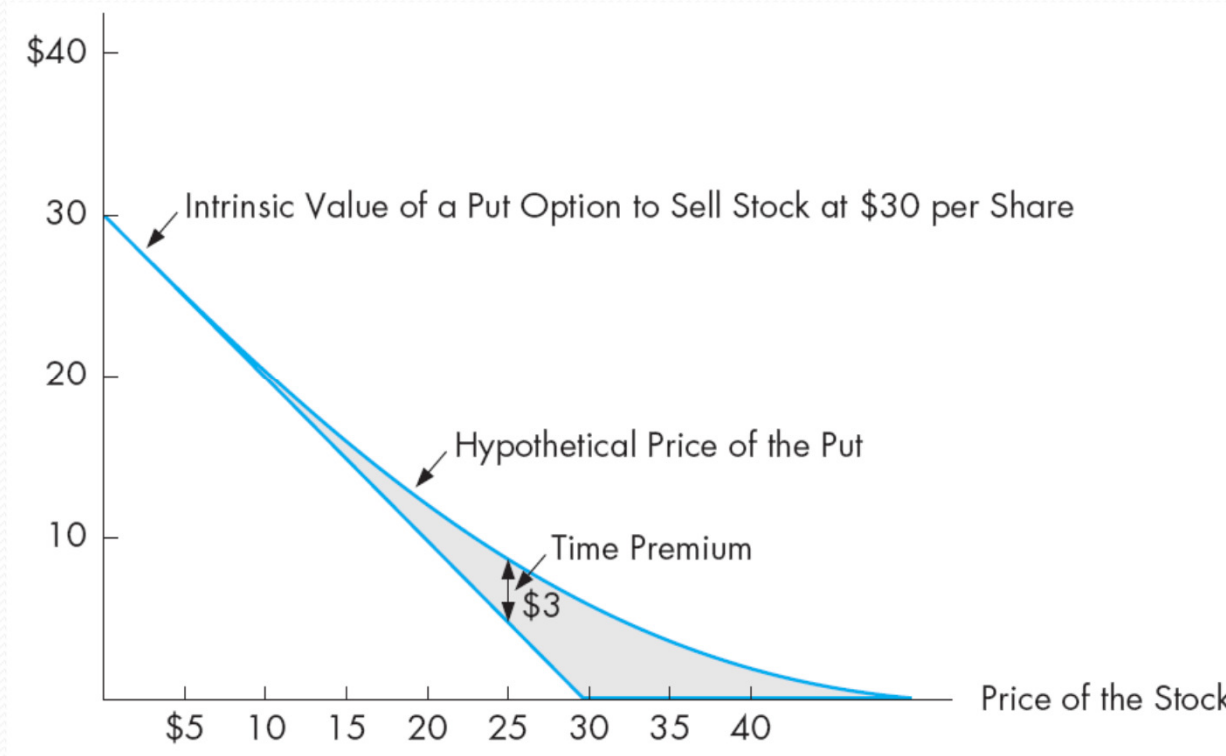
# Put Values: Strike Price, Stock Price, Intrinsic Value, and Time Premium

**EXHIBIT 196** Relationships Among the Price of the Stock, the Strike Price of the Put, and the Hypothetical Price of the Put

Strike Price of the Put	Price of the Stock	Intrinsic Value of the Put	Hypothetical Price of the Put
\$30	\$15	\$15	\$15.25
30	20	10	12
30	25	5	8
30	30	0	6
30	35	0	3.50
30	40	0	1
30	50	0	—

Note time premium is \$0.25 for the first row, \$2 for the second row, \$3 for the third row, \$6 for the fourth row, 3.50 for the fifth row, etc.

# The Relationships Among the Price of the Stock, the Intrinsic Value of a Put Option, and the Hypothetical Price of the Option



- Note time premium first increases with intrinsic value, then decreases to zero.

# An Example of Profits/Losses in Purchasing a Put

- You pay \$8 for a put option that gives you the right to sell AGM stock for \$30 a share by Dec. 31, 200X. The current market price of a share of AGM stock is \$25. Trading unit is 100 shares. What are your profits/losses if on the day of expiration the market price of the stock is
  - (1) \$15
  - (2) \$25
  - (3) \$35
  - (4) What the max. profit/loss for purchasing this put?

# An Example of Profits/Losses in Purchasing a Put – Cont'd

- Answer to (1):
  - At the stock price of \$15 a share, the put has an intrinsic value of \$15 a share. You can buy 100 shares of the stock at \$15/share on the market, and immediately exercise the option and sell the stocks at \$30/share.
  - \$ profit/loss =  $(30-15)*100 - 8*100 = \$700$
  - % profit/loss =  $700/(30*100+8*100) = 18.42\%$
- Answer to (2):
  - At the stock price of \$25 a share, the put has an intrinsic value of \$5 a share. You can buy 100 shares of the stock at \$25/share on the market, and immediately exercise the option and sell the stocks at \$30/share. You still lose money due to the time premium you paid for the put.
  - \$ profit/loss =  $(30-25)*100 - 8*100 = -\$300$
  - % profit/loss =  $-300/(25*100+8*100) = -9.09\%$

# An Example of Profits/Losses in Purchasing a Put – Cont'd

- Answer to (3):
  - At the stock price of \$35 a share, the put has no intrinsic value. You will not exercise the option. Your total loss will be the premium you paid for the put.
  - \$ profit/loss = -\$800
  - % profit/loss =  $-800/\$800 = -100\%$
- Answer to (4):
  - The max. profit happens when the stock price is 0. When the stock price is 0, the put holder can still sell the stocks at the strike price of \$30. Subtracting the price of the put from this profit, the total profit is \$22 per share ( $\$30-\$8$ ). In this case it is \$2,200.
    - Max. profit of a put = Strike price of the stock – Price of the put
  - The max. loss is \$8 per share. When the market price is higher than the strike price, you will not exercise the put option. You lose the price you paid for the option, which is \$8 a share. In this case the total loss is \$800.
    - Max. loss of a put = Price of the put

# Profits and Losses at Expiration from Purchasing a Put

Price of the Stock	Intrinsic Value of the Put	Net Profit (Loss) on the Purchase
\$15	\$15	\$ 7
20	10	2
25	5	-3
30	0	-8
35	0	-8
40	0	-8

- The above table shows profits and losses at expiration from purchasing a put described in the example. Depending on the price of the stock at expiration, the net profit range from \$7 per share to a loss of \$8 per share (option price).
- If the stock price is even lower, the profit becomes higher.

# Profit and Loss at Expiration from Purchasing a Put



- This graph shows the same relationship in a graphic format.
- Maximum loss is \$8 per share.
- When stock price is 0, maximum profit is \$22 per share ( $\$30 - \$8$ ).



# Writing a Put

- The investor who writes a put believes that the stock price will NOT fall.
- Just like a call option, an investor can write a put either covered or naked.
  - If the writer only sells the put, the writer is naked
  - If the writer sells the put, and simultaneously shorts the stock, the writer is covered. If the put is exercised and the writer buys the stock, the writer could then use the stock to cover the short position. However covered put options are rare. We will only discuss naked put options.

# An Example of Profits/Losses in Writing a Naked Put

- Mary sells at \$8 for a put option that gives the buyer the right to sell AGM stock for \$30 a share by Dec. 31, 200X. The current market price of a share of AGM stock is \$25. Trading unit is 100 shares. What are Mary's profits/losses if on the day of expiration the market price of the stock is
  - (1) \$15
  - (2) \$25
  - (3) \$35
  - (4) What are the max. \$ profit/loss for writing a naked put?

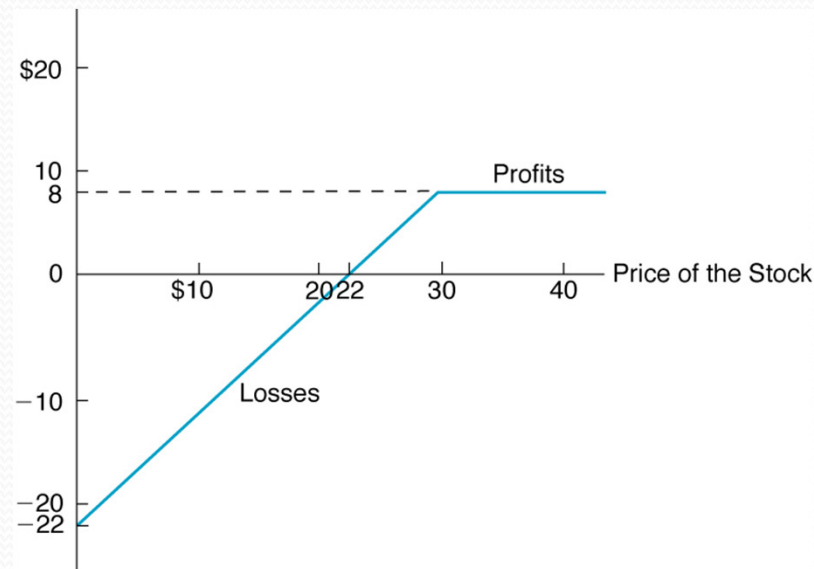
# An Example of Profits/Losses in Writing a Naked Put – Cont'd

- Answer to (1):
  - At the stock price of \$15 a share, the put has an intrinsic value of \$15 a share. The buyer will exercise the put and sell 100 shares of the stock at \$30/share. Mary now owns 100 shares with a market value of only \$15 per share. She lost \$15 per share.
  - \$ profit/loss =  $(15-30)*100 + 8*100 = -1500+800 = - \$700$
  - % profit/loss =  $-700/(30*100+8*100) = -18.42\%$
- Answer to (2):
  - At the stock price of \$25 a share, the put has an intrinsic value of \$5 a share. The buyer will exercise the put and sell 100 shares of the stock at \$30/share to Mary. Mary now owns 100 shares of AGM stock with a market value of only \$25 per share. However she did gain \$800 initially selling the put. She still made \$300.
  - \$ profit/loss =  $(25-30)*100 + 8*100 = -\$500+\$800=\$300$
  - % profit/loss =  $300/(25*100+8*100) = 9.09\%$

# An Example of Profits/Losses in Writing a Naked Put – Cont'd

- Answer to (3):
  - At the stock price of \$35 a share, the put has no intrinsic value. The buyer will not exercise the option. Mary made \$800.
  - \$ profit/loss = \$800
  - % profit/loss =  $800/\$0 = \text{infinity}$
- Answer to (4):
  - The max. profit for writing a naked put is the price of the put, which is \$8 per share for a total of \$800 in this case.
    - Max. profit for a naked put = Price of the put
  - The max. loss for writing a naked put happens when stock price goes down to zero. In that case the writer has to purchase the stock at the strike price. In this case the strike price is \$30 a share. However Mary receives \$8 per share for selling the put. So the total loss is \$22 ( $30-8$ ) per share for a total loss of \$2,200.
    - Max. loss for a naked put = Strike price – Price of the put

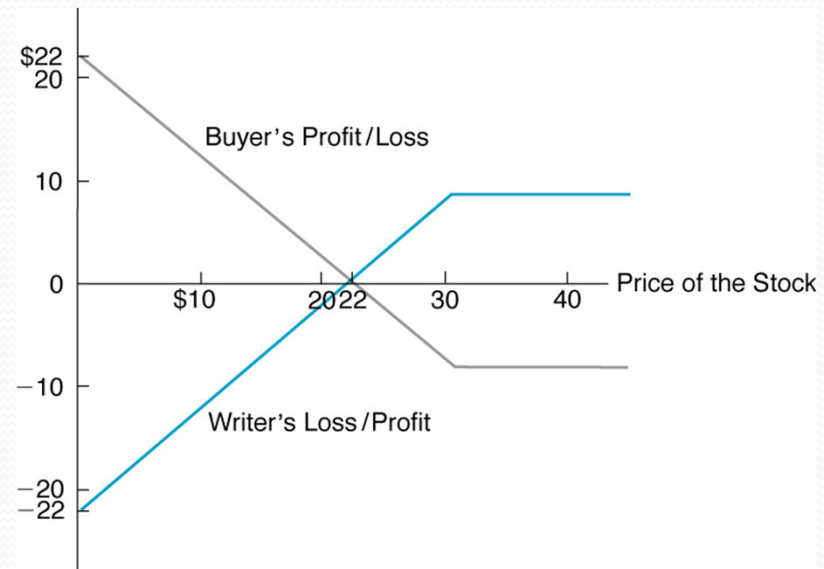
# Profit and Loss: Writing a Put



- This figure shows that the maximum \$ profit Mary can make is \$8/share, which is the put price.
- The maximum loss Mary can sustain is \$22. That happens if the stock price goes down to zero at expiration.

# Profit and Loss to Buyer and Seller of a Put

- You probably noticed that the profits/losses for the buyer and the seller of a naked put are mirror images of each other.
- This is just like the profit/losses relationship for buyers and sellers of a naked call.



# Puts Compared to Short Sales

- When investors believe that the price of a stock will fall, the investor can profit from this by either
  - Short sale the stock
  - Buy a put option
- Advantages of a put option over short sale
  - The amount of potential loss is less – limited to the option price.
  - Puts may offer a greater return on the investor's capital because of their leverage.
- Advantages of a short sale over a put option
  - Puts expire, but a short position can be maintained indefinitely.

# Protective Put

- While purchases of puts by themselves may be quite speculative, when used in conjunction with the purchase of stock, puts actually reduce the individual's risk exposure. Such a strategy is called a “protective put”.
- The protective put combines:
  - the purchase of a put,
  - with the purchase of a stock.
- If the price of the stock declines:
  - the value of the put rises, and
  - offsets the loss on the stock.



# An Example of A Protective Put

- An investor buys a stock for \$36. At the same time a six-month put option to sell the stock for \$35 is selling for \$2.
- (1) What is the profit or loss from purchasing the stock if the price of the stock is \$30?
- (2) If the investor also purchases the put (i.e., constructs a protective put), what is the combined cash outflow?
- (3) If the investor constructs the protective put, what is the profit or loss if the price of the stock is \$30 at the put's expiration? At what price does the investor break even?
- (4) What is the maximum potential loss and the maximum potential profit from this protective put?
- (5) If, after six months, the price of the stock is \$37, what is the investor's maximum possible loss?

# An Example of Protective Put – Cont'd

- Answer to (1):
  - Profit/loss = Expiration price – purchasing price
  - =  $30 - 36 = -\$6$ .
- Answer to (2):
  - Combined cash outflow = Purchase price of stock + Purchase price of put =  $\$36 + \$2 = \$38$ .
- Answer to (3):
  - With the put the investor can exercise the put and sell the option at \$35 if the market price of the stock falls below \$35.
  - Total profit/loss =  $(35 - 36) - 2 = -\$3$
  - For the position to break even, the stock must be selling for \$38 ( $\$36 + \$2$ )

# An Example of Protective Put – Cont'd

- Answer to (4):
  - With the protective put, the max. loss = -\$3 because the investor can exercise the put and sell the stock at strike price.
    - Max. loss with protective put = (strike price of the stock – purchase price of the stock) – price of the put
  - However there is no theoretical limit to max. profit. For example, if the stock price is \$1000 a share, the profit per share =  $\$1000 - \$36 - 2 = \$962$  per share. The higher the stock price, the more the profit.
    - Max. profit with protective put = unlimited.
- Answer to (5):
  - If the price of the stock is \$37, the investor gains \$1 on the stock but loses \$2 on the put for a net loss of \$1. This illustrates that the protective put can sustain a loss even though the price of the stock rises. In this case the price increase was insufficient to offset the cost of the put.

# Summary Table of Max. Potential Gains and Losses for the Basic Positions Using Options

<b>Bullish Market</b>	<b>Max. Potential Gain</b>	<b>Max. Potential Loss</b>
Buy the stock	Unlimited	Cost of the stock
Buy the call	Unlimited	Cost of the call
Sell the put	Price of the put	Strike price of the put – the cost of the put
<b>Bearish Market</b>	<b>Max. Potential Gain</b>	<b>Max. Potential Loss</b>
Short the stock	Price of the stock	Unlimited
Buy the put	Strike price of the put minus the cost of the put	Cost of the put
Sell the call	Price of the call	Unlimited
<b>Neutral Market</b>	<b>Max. Potential Gain</b>	<b>Max. Potential Loss</b>
Covered call	Time premium of the call	Price of the stock minus the price of the call

# 5. The Chicago Board Options Exchange

- It is the largest U.S. options exchange with annual trading volume that hovered around one billion contracts at the end of 2007. CBOE offers options on over 2,200 companies, 22 stock indexes, and 140 exchange-traded funds (ETFs).
- <http://www.cboe.com/>

## 6. Stock Index Options

- While options were initially created for individual stocks, stock index options have developed over time.
- The advantages of stock index options:
  - Avoid the risk of selecting individual securities.
  - Capture movements in the market as a whole.
- One major difference between stock index options and options on specific stocks:
  - Specific option owners can exercise the option by selling or buying the stock at strike price.
  - Index options owners cannot buy or sell these indexes. Instead these options are settled in cash.

# 7. Currency and Interest Rate Options

- Options are not limited to stocks.
- There are also options to buy and sell currencies, which trade on the Philadelphia Exchange.
- There are options on debt instruments (interest rate options), which trade on the Chicago Board Option Exchange.
- Again, all these options are in anticipation of price movements: up, down, or flat.
- Currency options can be used to manage exchange rate risk if the investors own stocks in a foreign currency.

# 8. Warrants

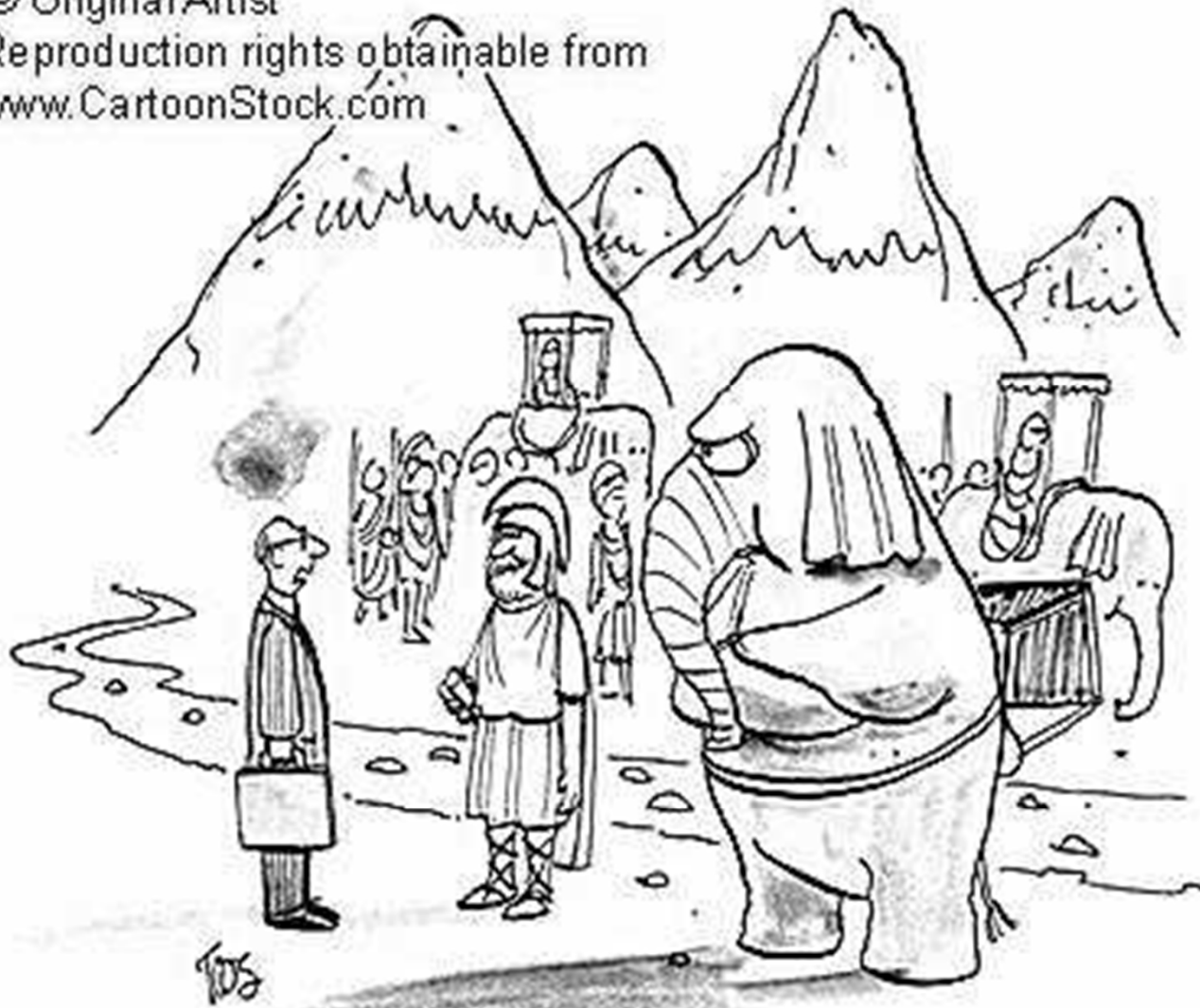
- A warrant is an option issued by a company (instead of an investor) to buy its stock at a specified price within a specified time period.
- While the definition is essentially the same as a call, there are some subtle differences.
  - Warrants are issued by firms whereas calls are issued by investors.
  - The specified warrant exercise price may rise at a predetermined interval (e.g., every five years increase by \$10 per share).
  - The firm may have the right to extend the expiration date or to call the warrant.
  - Warrants tend to have longer terms than calls but they do have a finite life.
  - When a warrant is exercised, the firm issues new shares. When a call is exercised, no new shares are added.
- Warrants are usually issued by firms in conjunction with other financing, such as bonds or preferred stock. The warrants are added inducement to purchase the securities.



# Rights Offerings

- Rights offerings are an option given to stockholders to buy additional shares at a specified price during a specified time period before the offer is made to the general public.
- It gives existing stockholders the preemptive right to buy additional shares in order to maintain stockholders' proportionate ownership.
- Rights may be sold by the expiration date of the right.

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**"Alright, I'll get you over the Alps,  
but I want stock options and cash bonus."**