

# **MGST 451**

## **Corporate Governance and Ethical Decision-Making**

**Lecture 11 – Winter 2019 L01-L03**

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1. Protective Puts
2. Straddles
3. Put-Call Parity
4. Option Pricing Summary
5. On-line tutorial for options
6. Canadian Taxation of Capital Gains
7. Further examples

- A 'protective put' results from being long a put and long in the underlying stock, in matching quantities.
- These are two positions which have independent lives from one another through time, for example:
  - An initial long position gives rise to a protective put as soon as the investor buys a put (e.g. to lock-in gains to date or to cap losses to date);
  - Only holding a put gives rise to a protected put as soon as the investor establishes a corresponding long position (e.g. reacting to an increased probability that the market price of the underlying stock will decrease).
- It is a form of 'portfolio insurance', at a cost... (the premium)
- A protective put still has unlimited upside (profit) potential.

# One Example of a Protective Put

	Stock price	Cash in account	Positions		
			Long Put	Long Stock	Combined
Start of day #1	\$50	\$6,000	-	-	-
Buy 100 shares <b>and</b> Buy 1 put option @ \$10/share; Strike \$45	\$50	\$6,000 - \$5,000 - \$1,000 = \$0	1 option V = \$1,000	100 shares V = \$5,000	V = \$6,000
Start of day #2	\$40	\$0			
Market \$40 < Strike \$45 Option price = \$15/share	\$40	\$0	1 option V = \$1,500	100 shares V = \$4,000	V = \$5,500
Start of day #3	\$70	\$0			
Market \$70 > Strike \$45 Option expires worthless	\$70	\$0	-	100 shares V = \$7,000	V = \$7,000
Long position is closed (sell 100 shares @ \$70)	\$70	\$0 + \$7,000 = \$7,000	-	-	-
Gain		\$1,000			

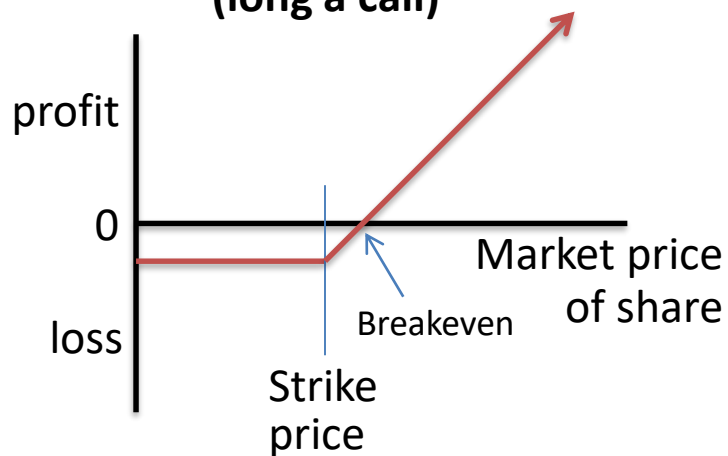
# Another Example of a Protective Put

	Stock price	Cash in account	Positions		
			Long Put	Long Stock	Combined
Start of day #1	\$50	\$6,000	-	-	-
Buy 1 put option @ \$10/share; Strike \$45	\$50	\$6,000 - \$1,000 = \$5,000	1 option V = \$1,000	-	V = \$6,000
Start of day #2	\$40	\$5,000			
Market \$40 < Strike \$45 Option price = \$15/share Buy 100 shares	\$40	\$5,000 - \$4,000 = \$1,000	1 option V = \$1,500	100 shares V = \$4,000	V = \$5,500
Start of day #3	\$70	\$1,000			
Market \$70 > Strike \$45 Option expires worthless	\$70	\$1,000	-	100 shares V = \$7,000	V = \$7,000
Long position is closed (sell 100 shares @ \$70)	\$70	\$1,000 + \$7,000 = \$8,000	-	-	-
Gain		\$2,000			

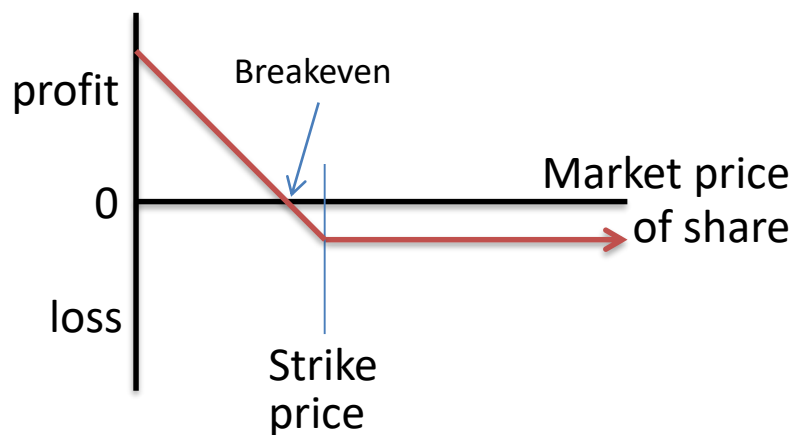
- A 'straddle' results from being simultaneously long a call and long a put, in the same underlying stock and in matching quantities.
- Buy a straddle when you expect the market price of the stock to either go up or go down, but not remain the same!
  - i.e. considerable uncertainty exists for the firm, but this will be resolved one way or the other by a given deadline, hopefully prior to the expiry date of the options!
- To breakeven, the total cost of both the call and the put options has to be recovered, which will likely require the expected price movement either up or down to be significant.
- Maximum loss is the cost of the options.
- Maximum gain on the downside versus on the upside?

# Profits and Losses of Straddles

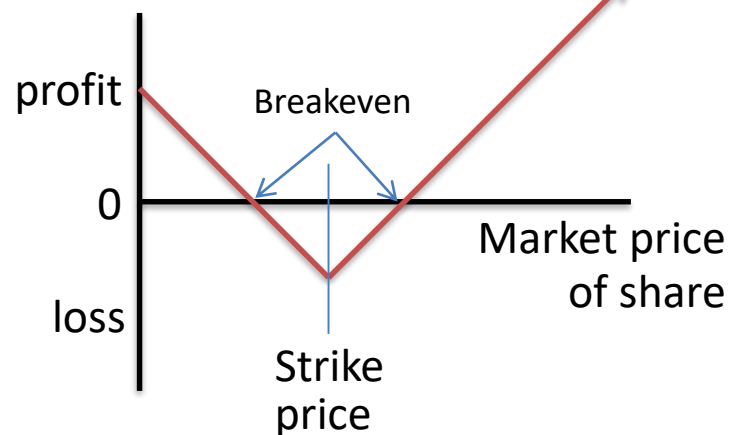
**Call Buyer  
(long a call)**



**Put Buyer  
(long a put)**



**Straddle**



# Example of a Straddle

	Stock price	Cash in account	Positions		
			Long Call	Long Put	Combined
Start of day #1	\$50	\$5,000	-	-	-
Buy 1 call option @ \$10/share; Strike \$50	\$50	\$5,000	1 option V = \$1,000	1 option V = \$1,000	V = \$2,000
Buy 1 put option @ \$10/share; Strike \$50		- \$1,000			
		- \$1,000 = \$3,000			
Start of day #2	\$40	\$3,000			
Call price = \$5/share Put price = \$20/share	\$40	\$3,000	1 option V = \$500	1 option V = \$2,000	V = \$2,500
Start of day #3	\$70	\$3,000			
Exercise call option → buy 100 shares @ \$50 and sell @ \$70	\$70	\$3,000	-	-	-
Put expires worthless		- \$5,000 +\$7,000 = \$5,000			
No gain / no loss		\$0			

- Is there a relationship between the market value of put and call European options? Yes, and it is called the put-call parity:

$$Put = Call - S + Ee^{-rt} \text{ or } Ee^{-rt} = Put - Call + S$$

- Assumptions
  - Identical underlying asset (' $S$ ');
  - Same exercise (strike) price (' $E$ ') and time to expiry (' $t$ ');
  - Continuous compounding at risk-free rate (' $r$ ').
- Core idea (why it works, but for same strike price and expiry)
  - Simultaneously buy a call and write a put;
  - At expiry you will buy at the strike since either the call or the put will be in-the-money (i.e. equivalent to a forward).

# Usefulness of the Put-Call Parity Theorem

- The put-call parity theorem could be used to value a put using the price of the call:

$$Put = Call - S + Ee^{-rt} \quad n.b.: e^{-rt} \cong (1 + EAR)^{-t}$$

- Example

- $Call = \$2.85$ ;  $S = \$21.87$ ;  $E = \$25$ ;  $t = 1$  year;  $R = 5.5\%$

$$Put = 2.85 - 21.87 + \frac{25}{(1 + 0.055)^1} = 4.68$$

$$Put = 2.85 - 21.87 + 25e^{-0.055 \times 1} = 4.64$$

- With some algebra, you can also value a call:

$$Call = Put + S - Ee^{-rt}$$

# Usefulness of the Put-Call Parity Theorem

- By combining positions relying on put-call parity, one can create a 'synthetic option' (i.e. same payoff).
- Lets say, you want to buy a put, but none is available, then put-call parity would suggest:

$$Put = Call - S + Ee^{-rt}$$

- Buy a call;
- Short the underlying stock;
- Invest the present value of the exercise price;
- Hold positions to expiry.
- Works nicely with European options, less so with American options since they can be exercised prior to expiry making the cash flow at maturity uncertain (but still work OK, why?).

# Example of a Synthetic Put

	Stock price	Put	Positions			
			Cash	Long Call	Short Sh.	Combined
Start of day #1	\$21.87	-	-	-	-	-
Buy 1 put option @ \$4.68/share; E=\$25.00						
Buy 1 call option @ \$2.85/share; E=\$25.00	\$21.87	1 option V = \$468	\$2,370	1 option V = \$285	-100 shares V = -\$2,187	V = \$468
Short 100 shares Get \$2,370 @5.5%/year						
End of year – Scenario 1	\$20.00					
Exercise put →buy \$20/sh. & sell \$25/sh.	\$20.00	\$500	\$2,500	-	-100 shares V = -\$2,000	V = \$500
Call expires worthless	\$20.00	\$500	\$500	-	-	
End of year – Scenario 2	\$30.00					
Put expires worthless						
Exercise call →buy \$25/sh. & close short	\$30.00	\$0	\$2,500	\$500	-100 shares V = -\$3,000	V = \$0
	\$30.00	\$0	\$0			11-12

# Usefulness of the Put-Call Parity Theorem

- Lets say, you want to short a put, but none is available, then put-call parity would suggest:

$$-Put = -Call + S - Ee^{-rt}$$

- Short a call;
- Buy the underlying stock;
- Borrow the present value of the exercise price;
- Hold positions to expiry.

# Example of a Synthetic Put (short)

	Stock price	Short Put	Positions			
			Cash	Short Call	Long Sh.	Combined
Start of day #1	\$21.87	-	-	-	-	-
Buy 1 put option @ \$4.68/share; E=\$25.00						
Buy 1 call option @ \$2.85/share; E=\$25.00	\$21.87	-1 option V = -\$468	-\$2,370	-1 option V = -\$285	100 shares V = \$2,187	V = -\$468
Short 100 shares Get \$2,370 @5.5%/year						
End of year – Scenario 1	\$20.00					
Put is exercised →buy \$20/sh. & sell \$25/sh.	\$20.00	-\$500	-\$2,500	-	100 shares V = \$2,000	V = -\$500
Call expires worthless	\$20.00	-\$500	-\$500	-	-	
End of year – Scenario 2	\$30.00					
Put expires worthless						
Call is being exercised →sell \$25/sh. → close long	\$30.00	\$0	-\$2,500	-\$500	100 shares V = \$3,000	V = \$0
	\$30.00	\$0	\$0			

Factor		Call Price	Put Price
Share Price ( $S$ )	↑	↑	↓
Exercise Price ( $E$ )	↑	↓	↑
Interest Rate ( $r$ )	↑	↑	↓
Expiry Date ( $t$ )	↑	↑	↑
Volatility ( $\sigma$ )	↑	↑	↑

## On-line videos explaining options

- Kahn Academy has a series of well-made short videos.
- Each video is typically between 3 and 4 minutes.
- Go to [www.khanacademy.org/economics-finance-domain/core-finance/derivative-securities](http://www.khanacademy.org/economics-finance-domain/core-finance/derivative-securities)
- I suggested that you watch videos 8-9-10-16 carefully.

Video	Lecture	Video	Lecture
1. American call options	8	8. Put as insurance	11
2. Basic shorting	7	9. Put-call parity	11
3. American put options	8	10. Long straddle	11
4. Call options as leverage	9	11. Put writer payoff diagram	8
5. Put vs. short and leverage	9	12. Call writer payoff diagram	8
6. Call payoff diagram	8	16. Put-call parity clarification	11
7. Put payoff diagram	8	18. Option expiration & price	9

## Disclaimer

- Taxation is generally a complex topic best left to specialists.
- The above is true in Canada and in almost all other countries.
- **No tax-related information provided in this course shall be relied upon**, for the simple reasons that the circumstances of a given taxpayer play a significant role in tax issues while tax legislation, tax rulings, precedents, etc. and how all of this is interpreted and implemented by tax authorities varies from year to year, or even from taxpayer to taxpayer.

Rationale to develop a (somewhat) basic understanding of some tax issues in a Corporate Governance course

- Employee compensation, and Executive compensation in particular, is heavily influenced by tax considerations.

- The Canadian Revenue Agency (CRA) considers gains or losses when trading in securities as income.
- But a taxpayer can elect to have its transactions in Canadian securities treated as capital transactions (using form T123).
- The election applies to all transactions in Canadian securities in the year of election or future years (cannot be rescinded).
- The election is not available for:
  - Traders or dealers in securities (including day-traders);
  - Non-resident or financial institutions;
  - A firm which principal business is lending money and/or purchasing debt obligations.
- Canadian Securities: share of the capital stock of a firm resident in Canada, unit of mutual fund, bond, etc.

- In many tax jurisdictions, taxation of capital gains benefits from a preferential treatment in comparison to income.
- CRA classifies a security transaction as income or capital gain based on facts and intent. Income classification might result from one or several of the following facts being observable:
  - Extensive buying and selling leading to frequent transactions, of securities and short period of ownership;
  - Knowledge and experience of trading securities;
  - Time spent in transacting securities, notably researching markets and investigating investment opportunities;
  - Securities purchased are speculative in nature and/or financed using debt or bought on margin.

- For most Canadian taxpayers, gains and losses arising from transactions in Canadian securities are capital gains or losses.
  - Including short sales (as long as T123 on file)
- A capital gain is not income as it is a change in wealth (or a windfall) accruing to the owner because property or possessions have increased in value.
- A capital gain is often defined for tax purposes as the difference between the original cost (the 'Adjusted Cost Base' or 'ACB') and the Fair Market Value ('FMV').
- The taxable capital gain is often a portion of the capital gain.
  - For example, if the taxable portion is 50% it means that only half of the capital gain is taxable while the other half is received tax-free (a favorable tax treatment).

# Calculating Capital Gains for Tax Reporting

- The adjusted cost base of an asset (ACB) is the original price paid plus the cost of acquisition and/or disposition.
- The proceed from selling the asset minus the ACB equals the capital gain (or loss).
- For tax purposes, on a calendar year basis, capital losses registered during the year must (i.e. not optional) be subtracted from the capital gains registered during the year, to get the net capital gain (or loss) for the year.
- The net capital gain (or loss) for the year is then multiplied by the capital gains inclusion rate (lets say 50%) to arrive at the net taxable capital gains (or net allowable capital losses).

## Net taxable capital gains

- Reported on the General Income Tax and Benefit Return (T1, scheduled 3, line 127) they are included into Total Income (line 150) and taxed accordingly.

## Net allowable capital losses

- May be carried back three years or forward forever.
- Can only be used as offsets against net taxable capital gains.
- Generally, cannot be used to reduce other type of income.

## Realization/crystallization of capital gains for tax purposes

- A capital gain (or loss) is only recognized for tax purposes once it has been realized (i.e. actual transaction with third party).
- It occurs on the settlement date, not on the transaction date, e.g. equities are settled in Canada at T+3 (three trading days).

	Option			Share Price		Buyer or Writer	Profit or Loss
	Type	Premium	Exercise Price	Option's Issue	Option's Expiry		Per share
1	Call	3.50	34.00	35.00	36.00	B	(1.50)
2	Put	2.75	34.00	35.00	32.25	W	1.00
3	Call	4.25	38.00	39.00	30.00	B	(4.25)
4	Call	1.25	38.00	36.00	34.00	W	1.25
5	Put	3.00	50.00	51.00	49.00	B	(2.00)
6	Put	4.00	28.00	26.00	36.25	W	4.00
7	Put	0.75	18.00	19.00	19.25	B	(0.75)
8	Put	0.75	18.00	18.50	16.50	W	(0.75)
9	Call	0.75	18.00	17.00	16.50	B	(0.75)
10	Call	0.75	18.00	18.00	18.50	W	0.25
11	Covered Call	2.50	25.00	26.00	31.25	W	1.50
12	Covered Call	2.50	25.00	24.00	25.00	W	3.50
13	Covered Put	5.00	52.50	54.00	55.00	W	4.00
14	Covered Put	5.00	52.50	51.50	51.00	W	4.00
15	Covered Call	3.50	34.00	33.00	36.00	W	4.50
16	Covered Call	3.50	34.00	35.00	30.50	W	(1.00)
17	Covered Put	2.75	34.00	33.00	32.25	W	1.75
18	Covered Put	2.75	34.00	35.00	36.75	W	1.00

- You are long a call option with a premium of \$3.50 per share and an exercise price of \$34.00.
- The share price at the option's expiry is \$36.00
- Because the call option is in-the-money (share price > exercise price) you exercise the call option.
- You buy at the exercise price of \$34.00 and sell at the market price of \$36.00.
- You make a payoff of \$2.00 per share.
- But you paid a premium of \$3.50 per share to buy the call option, you therefore register a loss of \$1.50 per share.
- Assuming the contract is written on 100 shares you lost \$150.00.

- You are long a put option with a premium of \$0.75 per share and an exercise price of \$18.00.
- The share price at the option's expiry is \$19.25.
- If you let the option expire without exercising it since the put option is out-of-the-money (share price > exercise price).
- Since you have the right but not the obligation to exercise the option, there is no reason to buy at the market price of \$19.25 and sell at the exercise price of \$18.00, since it would result in a negative payoff.
- On a bearish outlook, you went long a put option hoping the share price would fall. But the price did not fall it increased, and, as a result, you lost the premium of \$0.75 per share.

- You are short (wrote, sold) a call option with a premium of \$2.50 per share and an exercise price of \$25.00.
- This is a covered call position, so you also went long and covered the option at the time the option was issued by buying the share at a price of \$26.00. Your covered call is two positions: short a call option and long the share.
- The share price at the option's expiry is \$31.25.
- The option is in-the-money (share price > exercise price) so the buyer exercises the option. The payoff for the writer is negative \$1.00 (deliver and receive the exercise price of \$25.00 while having bought at \$26.00 per share).
- As writer, your profit is \$1.50/share (i.e. a premium received of \$2.50 per share minus a payoff of \$1.50 per share).

- You are short (wrote, sold) a put option with a premium of \$2.75 per share and an exercise price of \$34.00.
- This is a covered put position, so you also went short and covered the option at the time the option was issued by shorting the share at a price of \$35.00. Your covered put is two positions: short a put option and short the share.
- The share price at the option's expiry is \$36.75.
- The option is out-of-the-money (share price > exercise price) so the buyer does not exercise the option.
- You close the short position by buying at the market price of \$36.75 at a loss of \$1.75 per share (having shorted at \$35.00)
- As writer, your profit is \$1.00/share (i.e. a premium received of \$2.75 per share minus a loss of the short of \$1.75 per share).