FINANCIAL DERIVATIVES

Financial Option

- Financial Option
  - A contract that gives its owner the right (but not the obligation) to purchase or sell an asset *at a fixed price* in some future date

https://www.youtube.com/watch?v=gWp3op51ZzI

Make a note of

1) What is the strike price of option contract for StoneCurve coffee?

2) Is the call buyer better off when the price of the stock StoneCurve becomes 70$? If so, what is her net profit?

3) Is the call seller better off when the price of the stock StoneCurve becomes 70$? If so, what is his net profit?

Note that even though option premium is a very important concept for option trading, it is not exam-relevant in this course.

Financial Option

- Call Option
  - A financial option that gives its owner the right to buy an asset
- Put Option
  - A financial option that gives its owner the right to sell an asset

Financial Option

- Option Buyer
  - The buyer of an option contract, have the right to buy or sell
- Option Seller
  - The seller of an option contract, have the obligation to buy or sell

A Summary of Financial Option

	Buyer /Long	Seller/Short
Call option	**Right to buy**	**Obligation to sell**
Put option	**Right to sell**	**Obligation to buy**

Understanding Option Contracts (1 of 3)

- **Exercising an Option**
  - When a holder/buyer of an option enforces the agreement and buys or sells a share of stock at the agreed-upon price
- **Strike Price (Exercise Price, denoted as K)**
  - The agreed-upon price at which an option holder buys (call) or sells (put) a share of stock when the option is exercised
  - Another relevant concept is current stock price, denoted as **S**. Buyer decide whether to exercise the option by comparing K and S.
- **Expiration Date**
  - The last date on which an option holder has the right to exercise the option

Understanding Option Contracts (2 of 3)

- **The option buyer (holder)**
  - Holds the right to exercise the option and has a **long position** in the contract
- **The option seller (writer)**
  - Sells (or writes) the option and has a **short position** in the contract
  - Because the long side has ***the option to exercise, the short side has an obligation to fulfill*** the contract if it is exercised.
- **The buyer pays the writer a premium (let us not focus on this for now)**

Example 1

Long Call Options (call option buyer/holder)

It is the afternoon of September 10, 2018, and you have decided to purchase 10 January call contracts on eBay stock with an exercise price of $35.

The above the current stock price is $36.

Will you exercise the option or do nothing? If you exercise, what is the payoff?

Option market

<u>You will exercise the option;</u>
You can buy eBay stock at the contracted/pre-agreed/exercise price of 35$;
And sell it right away at 36$;
You can earn the payoff of 1.00$

Stock spot market

What if the current stock prices falls to 34$. <u>You can do nothing and let option expire</u>
*Hence, you gain 1 dollar when price goes **up**, gain/lose nothing when price goes down.*

Example 2

Long Put Options (put option buyer/holder)

It is the afternoon of September 10, 2018, and you have decided to purchase 10 January put contracts on eBay stock with an exercise price of $35.

The above the current stock price is $34.

Will you exercise the option or do nothing? If you exercise, what is the payoff?

You will exercise the option;
You can buy eBay stock right away at 34$, and SELL eBay stock at the contracted/pre-agreed/exercise price for 35$,
You can earn the payoff of 1.00$.

Stock spot market

Option market

What if the current stock prices goes up to 36$. You can do nothing and let option expire

*Hence, you gain 1 dollar when price goes **down**, gain/lose nothing when price goes up.*

Example 1 & 2 (Buyer/long)

	Long Call	Long Put
Current stock price (S)	36	34
Exercise price (K)	35	35
Payoff	1	1

Positive payoff when S goes up

Bull

Positive payoff when S goes down

Bear

	Long Call	Long Put
Current stock price (S)	34	36
Exercise price (K)	35	35
Payoff	do nothing	do nothing

Back to Example 1

Short Call Options (call option seller)

It is the afternoon of September 10, 2018, and you have decided to purchase 10 January call contracts on eBay stock with an exercise price of $35. The above the current stock price is $36.

You (as a buyer) will exercise the option to buy since S (36$) > K ($35).

The seller of the call option is *obliged to sell it to you* if you decide to exercise.

The seller -> buy the ebay stock (from spot market) at 36 dollars, and sell it to you for only 35$

Suffer a loss of 1 dollar

That is why Seller of the option always charge a Premium

Back to Example 2

Short Put Options (put option seller)

It is the afternoon of September 10, 2018, and you have decided to purchase 10 January put contracts on eBay stock with an exercise price of $35. The above the current stock price is $34.

You will exercise the option to sell since S (34$) < K ($35).

The seller of the put option is obliged to *buy it from you* if you decide to exercise.

The seller must buy eBay stock from you at 35$, and sell it immediately for ONLY 34$,
A loss of 1.00$

Example 1 & 2 (Seller/short)

	Short Call	Short Put
Current stock price (S)	36	34
Exercise price (K)	35	35
Seller Payoff	-1	-1

Loss when S goes up

Loss when S goes down

	Short Call	Short Put
Current stock price (S)	34	36
Exercise price (K)	35	35
Seller Payoff	0 since buyer will do nothing	0 since buyer will do nothing

0 when S goes down

0 when S goes up

Four Positions -> Bull Market

	Long Call	Long Put	Short Call	Short Put
Current stock price of Ebay (S)	36	36	36	36
Exercise price (K)	35	35	35	35
Payoff				
Action				

Payoff: Choose from -1 , 0 and 1.

Action: e.g., option to buy the stock @ 35 strike price from the option market, and sell it @ 36 at the spot market

Do nothing, let option expire

obliged to sell it to the buyer @35 from the option market, need to buy it @36 from the spot market.

Four Positions -> Bear market

	Long Call	Long Put	Short Call	Short Put
Current stock price (S)	34	34	34	34
Exercise price (K)	35	35	35	35
Payoff				
Action				

Payoff of Call and Put

	Call	**Put**
Long	Exercise when price goes up S>K Payoff : **S – K when S>K** **0 when S<K**	Exercise when price goes down S<K Payoff : **K – S when S<K** **0 when S>K**
Short	Payoff : **– (S –K) when S>K** **0 when S<K**	Payoff : **– (K – S) when S<K** **0 when S>K**

S -> Current stock price at the spot market

K-> Strike price (exercise price)

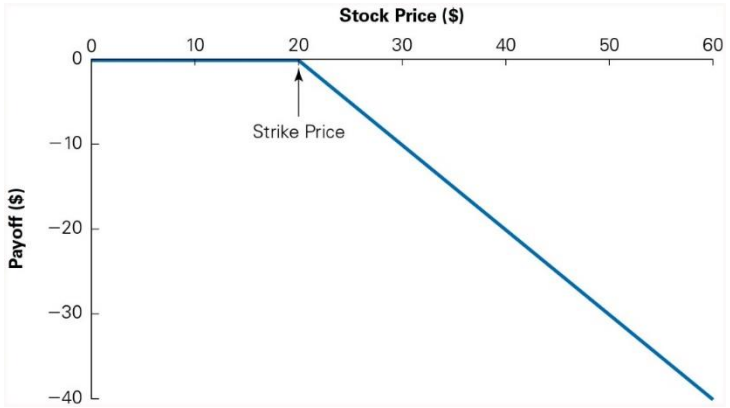
Graphical Presentation of Payoff

Long Position in a Call Option

Exercise when price goes up S>K
Payoff
S –K when S>K
0 when S<K

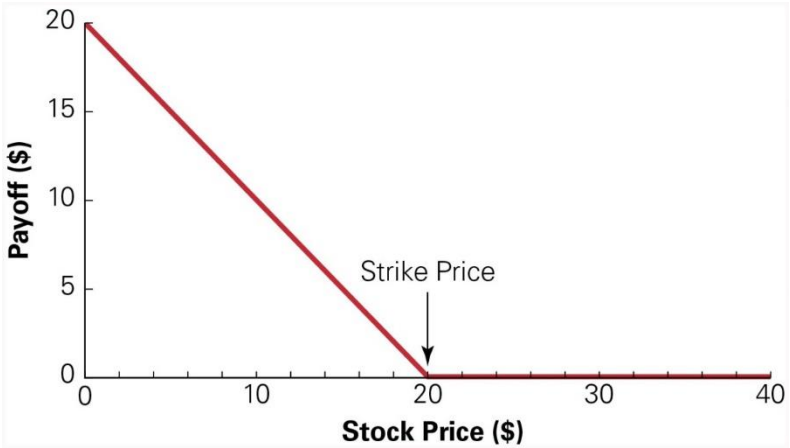
Payoff
– (S –K) when S>K
0 when S<K

Short Position in a Call Option



Graphical Presentation of Payoff

Long Position in a Put Option



Exercise when price goes down S<K

Payoff

K – S when S<K

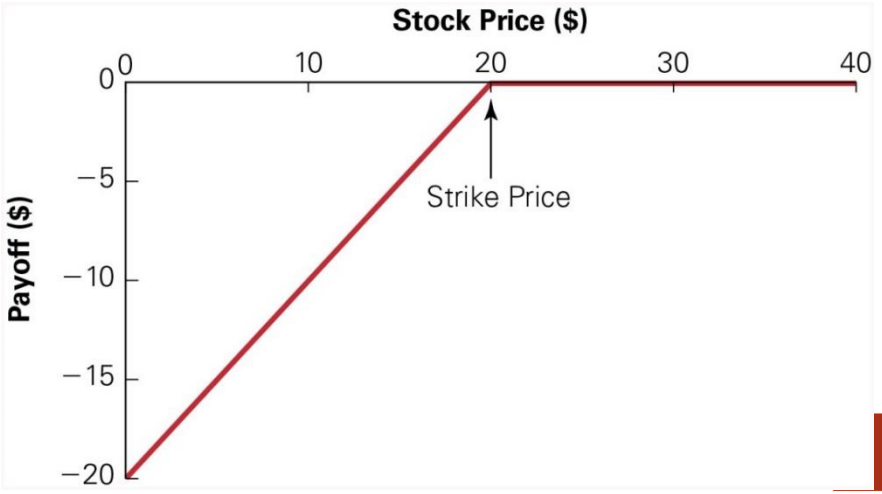
0 when S>K

Short Position in a Put Option

Payoff

– (K – S) when S<K

0 when S>K



Understanding Option Contracts (3 of 3)

- American Option
  - Options that allow their holders to exercise the option on any date up to, and including, the expiration date
- European Option
  - Options that allow their holders to exercise the option only on the expiration date

Interpreting Stock Option Quotations

- At-the-money
  - Describes an option whose exercise price is equal to the current stock price
- In-the-money
  - Describes an option whose value, if immediately exercised, would be positive
- Out-of-the-money
  - Describes an option whose value, if immediately exercised, would be negative

Exercise

You buy/long a call option on Dellibar with a strike price of $15. What is the payoff of your call option if the current share price of Dellibar is

1) 13

2) 15

3) 17

You sell a call option on Dellibar with a strike price of $15. What is the payoff of your short call option if the current share price of Dellibar is

1) 13

2) 15

3) 17

Exercise

You buy/long a put option on Dellibar with a strike price of $15. What is the payoff of your long put option if the current share price of Dellibar is

1) 13

2) 15

3) 17

You sell a put option on Dellibar with a strike price of $15. What is the payoff of your short put option if the current share price of Dellibar is

1) 13

2) 15

3) 17