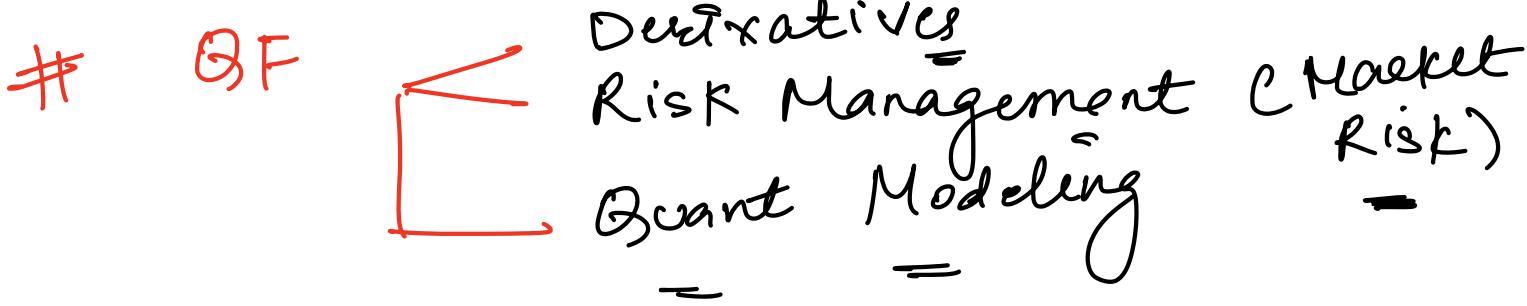
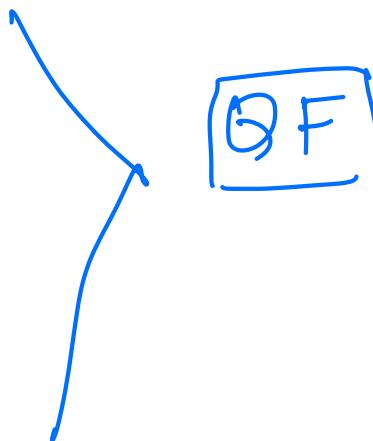


Quant Finance Bootcamp

Quantitative Finance

- 1) Math
- 2) Stat
- 3) Finance
- 4) Economic
- 5) Programming

= BCom X
= BBA ICA
sngi T₂, T₃] X

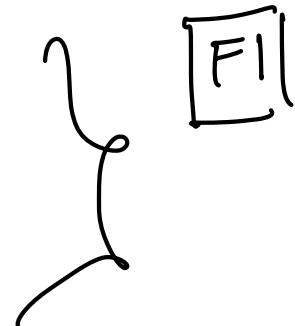


Session 1

Objective:

- Introduction to Derivatives
- Exchange vs Over-the-Counter (OTC)
- Types of Derivatives

- a) Forward
- b) Future
- c) Option



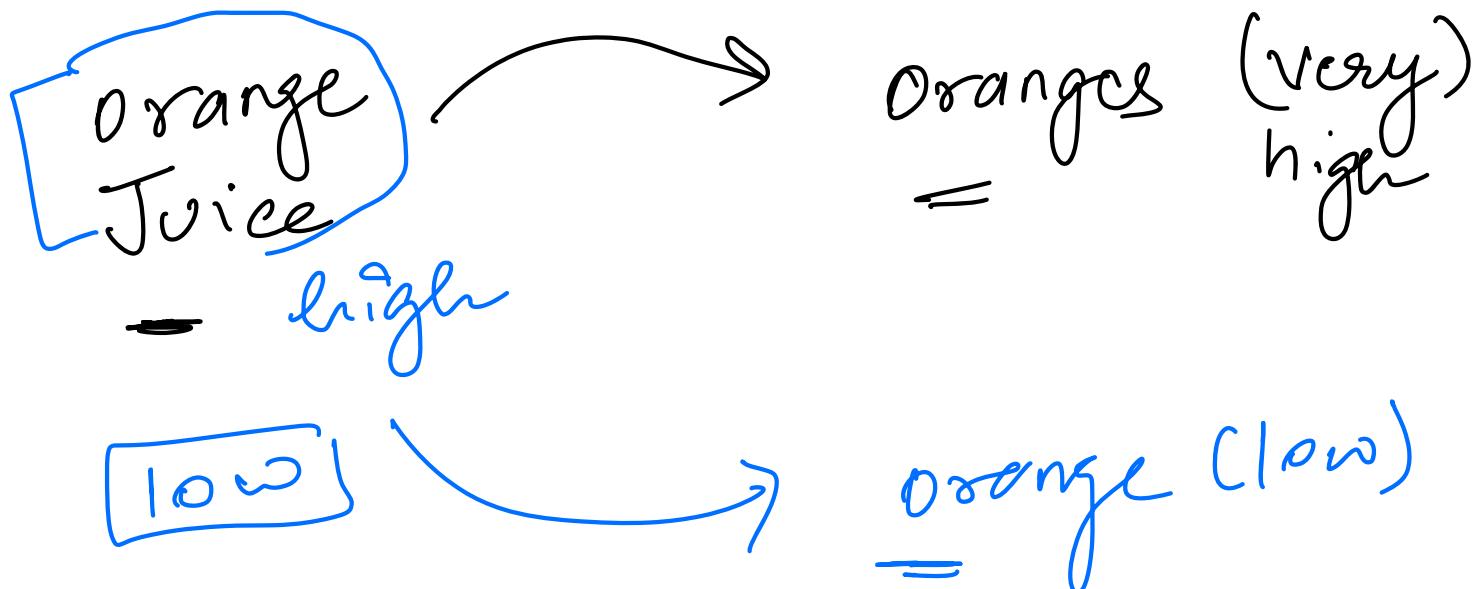
19

= d) Swap

John
C Hull

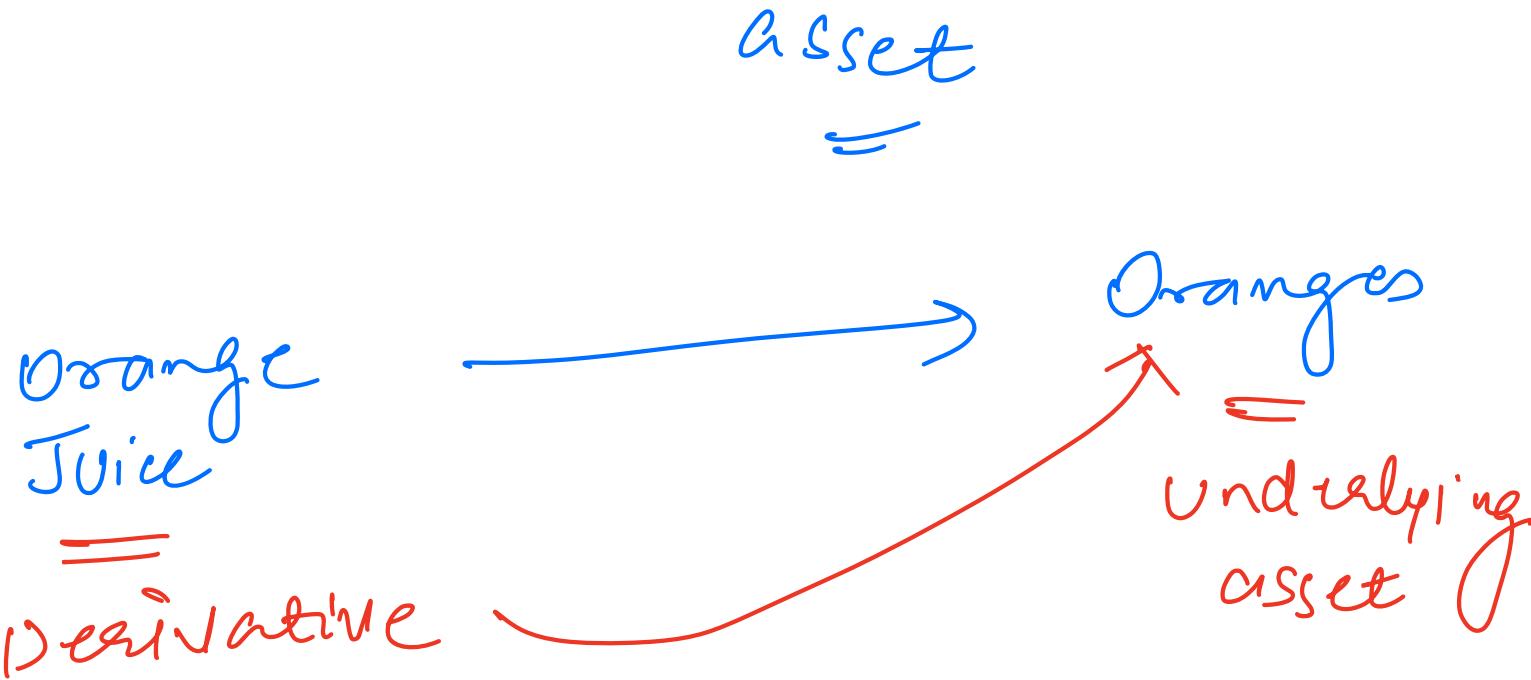
- Payoff Diagram
- Types of Traders
 - Hedgers
 - Speculators
 - Arbitrageurs.

Derivatives

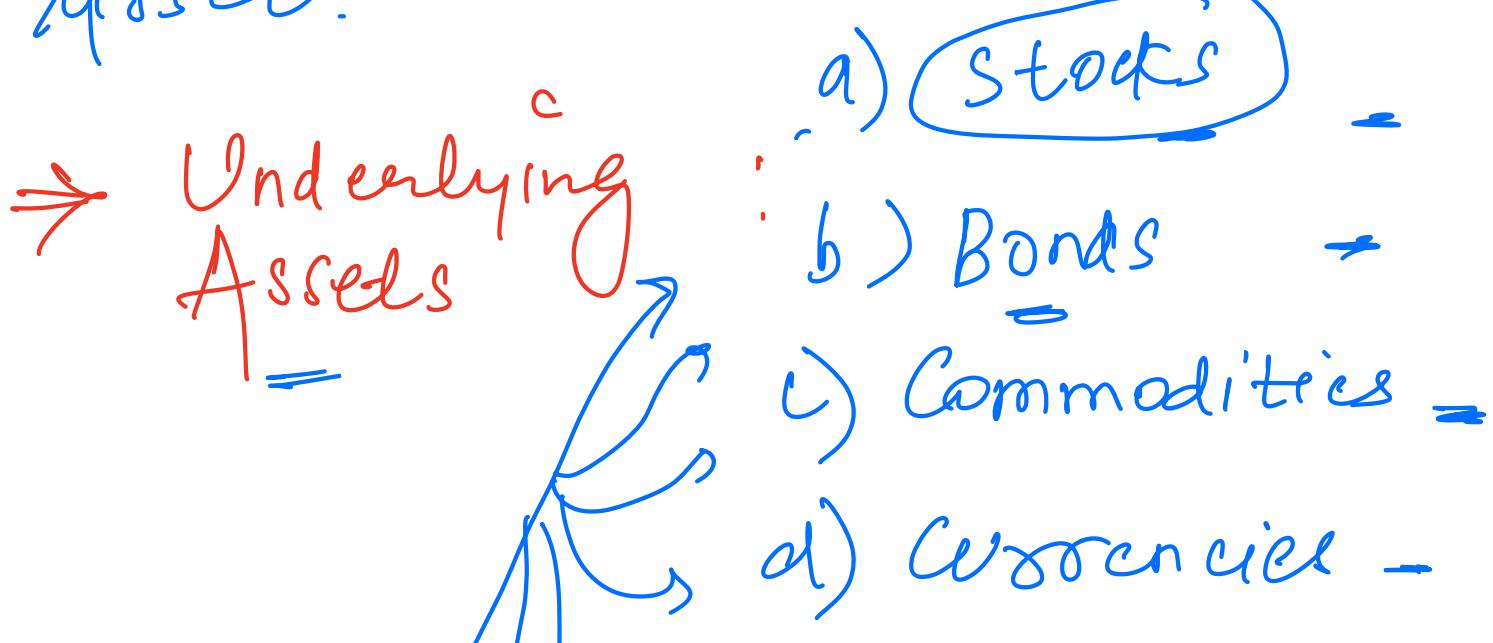


Orange Juice is deriving its value from oranges

Orange Juice → derivative
orange → Underlying



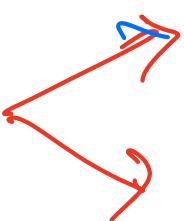
Definition of Derivative → A derivative can be defined as a financial instrument whose value can be derived from the value of underlying asset.





- c) Interest Rate.
- d) Market Indices

Traded



- a) Exchange
- b) Over the Counter (OTC)

Exchange

→ An exchange refers to a marketplace or platform where various financial instruments are traded.

BSE, NYSE

→ Stocks, Bonds, Currencies, Commodities, Derivative

Key Features of the Exchange

a) standardization:

Contract are standardized
in terms of size, expiration
date & other specification.



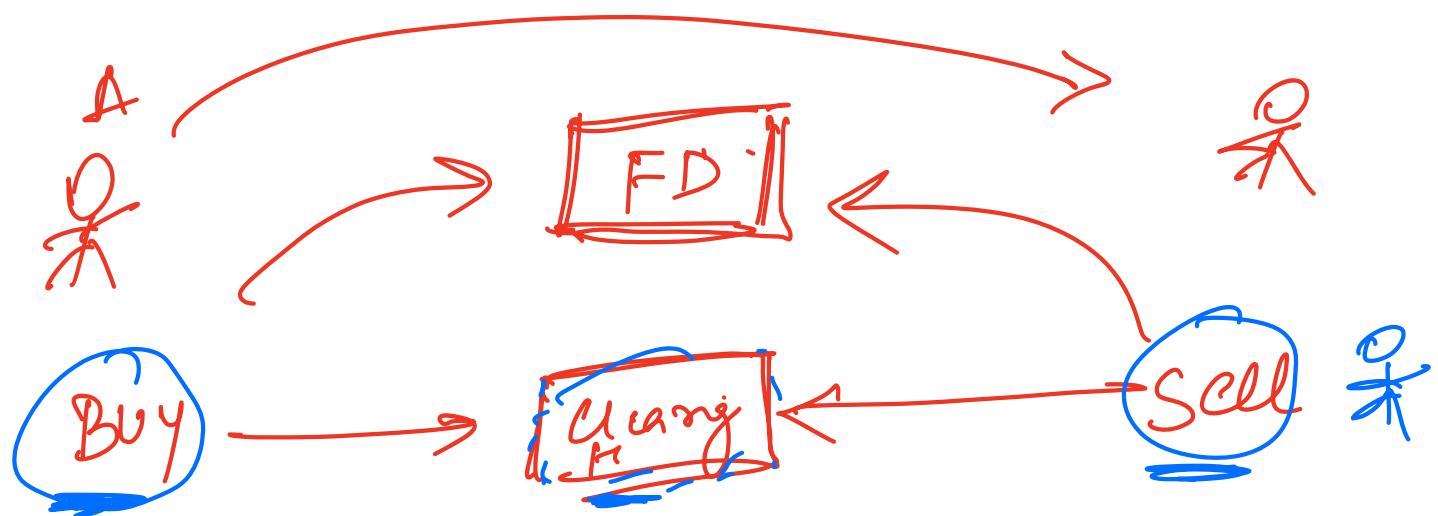
102.5

107.8

OTC → customized

b) Regulation: The exchange market are heavily regulated providing greater transparency b/w the market players.

c) Cleaning House → A clearing house act as an intermediary
=
b/w buyer & seller,
guaranteeing that both the
parties obligate the contract
& there is less default risk



d) liquidity → Highly liquid
instrument
=

Contract → Traded in high
volume

a) Standardization

b) Regulation

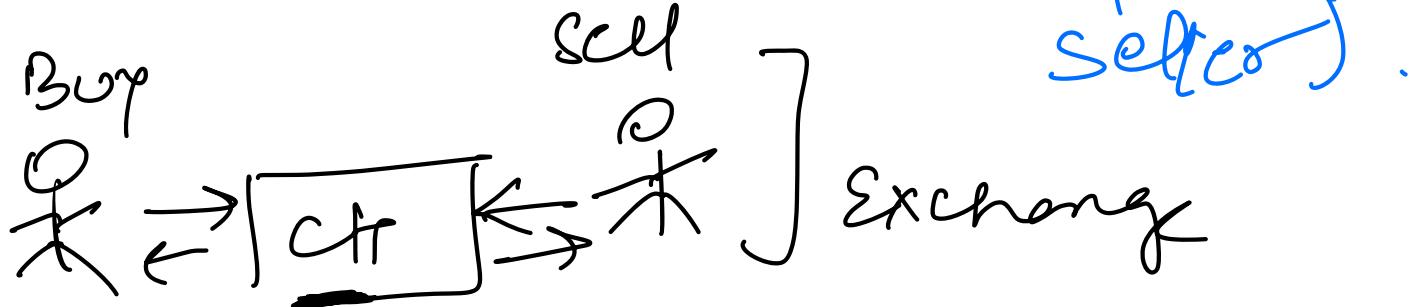
c) Clearing house $\xrightarrow{\text{CFT}}$

d) Liquidity.

Over the Counter (OTC)

→ The OTC market refers to a decentralized market place where financial instruments are traded

btw 2 parties (Buyer & Seller).

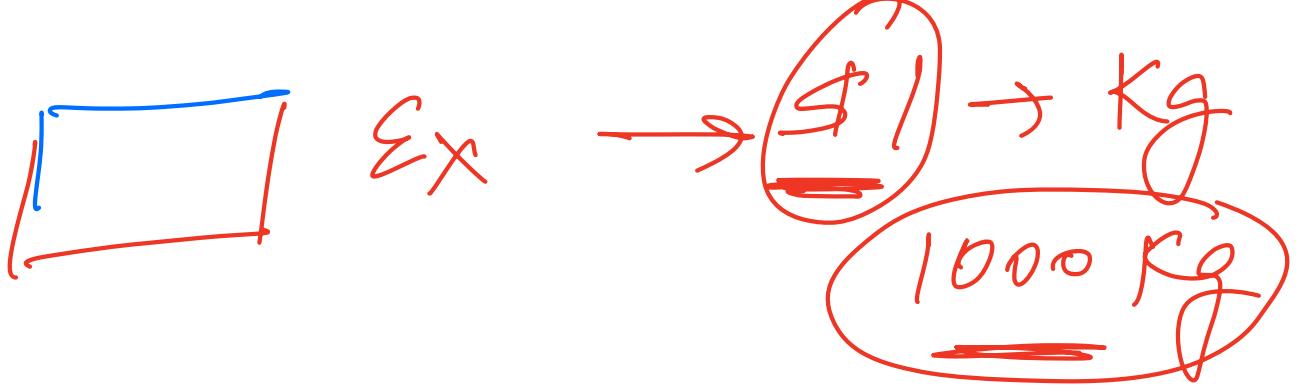


~~OTC~~ \Leftrightarrow ~~OTC~~] OTC, No

~~#~~ Key Features of OTC

a) Customization

↳ Contracts can be customized based on specific needs of the parties (buyers & sellers) including size, maturity, underlying asset.



OTC →

b) Regulation:

These are less regulated.

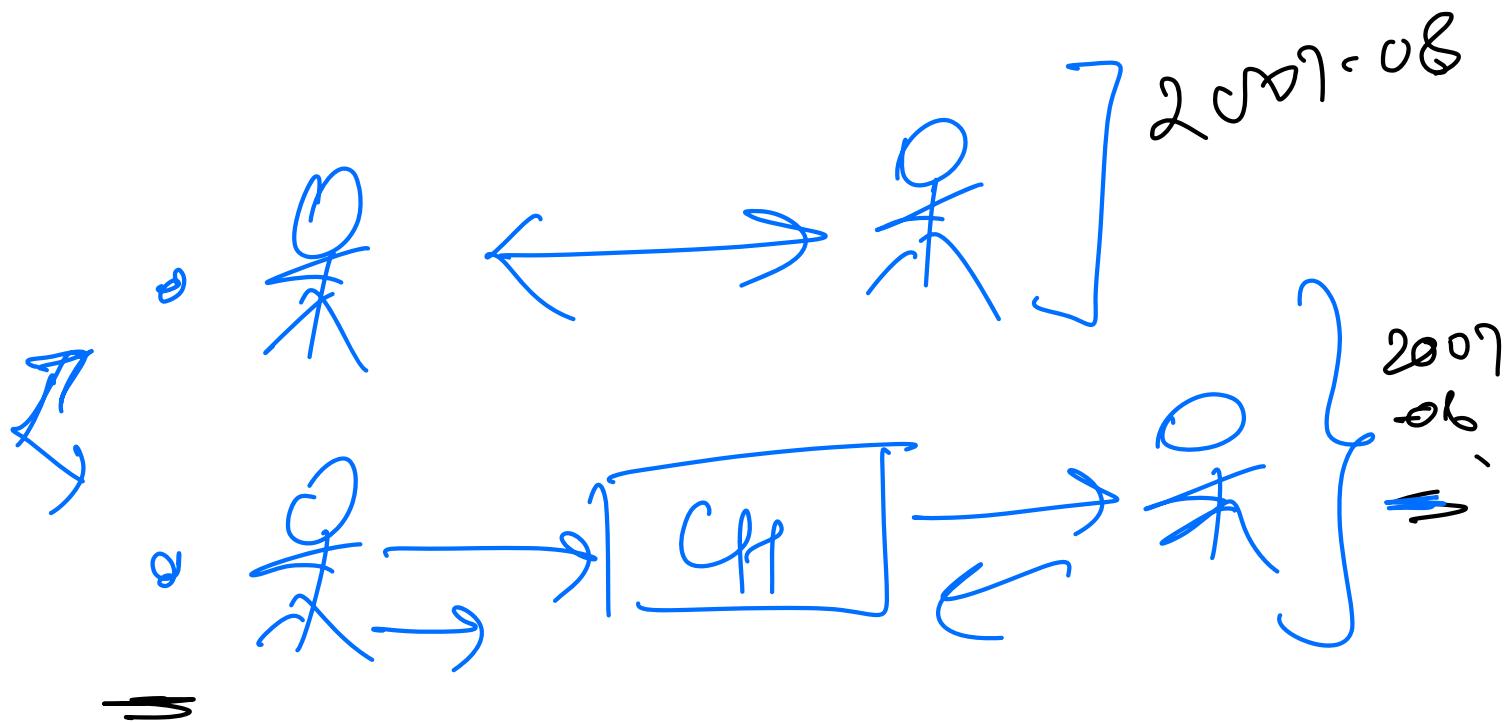
It can lead to lack of transparency.

c) Clearing house:

In OTC, there was no clearing house.

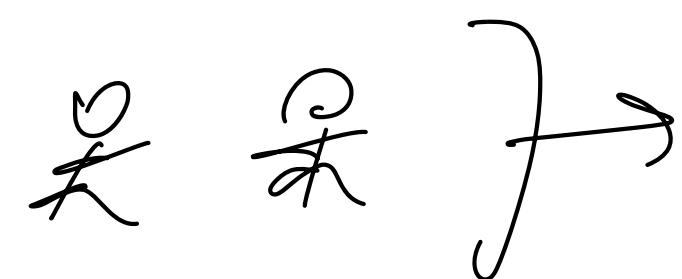
After 2007-08 (USA)

=



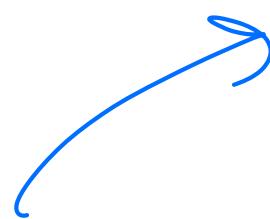
4) liquidity:

customized
in nature



customized

↳
illiquid



=

(ISO stock)

100 stock → Exchange

Swap ← = Eg → OTC
• IRS
• CS

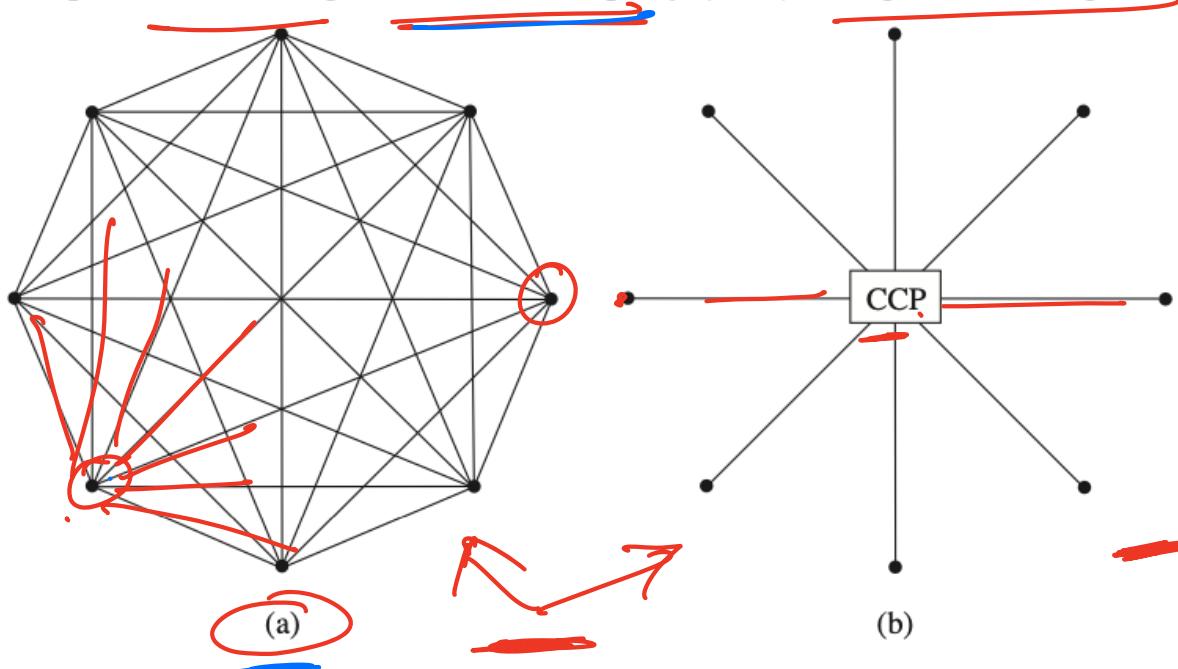
→ :
Commercial Bank → Cash

Market → Volume Traded

H | Low | Close | Add | Volume

3
3

Figure 2.2 (a) The traditional way in which OTC markets have operated: a series of bilateral agreements between market participants; (b) how OTC markets would operate with a single central counterparty (CCP) acting as a clearing house.

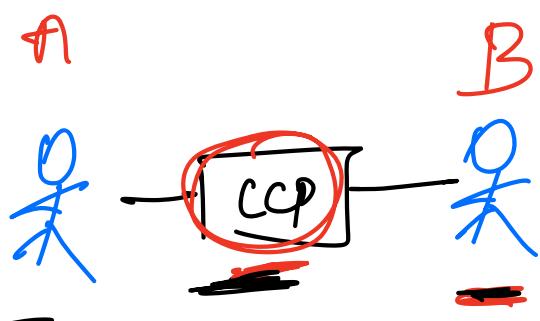


2007-08
=

right
now

72007-08

~~Types~~

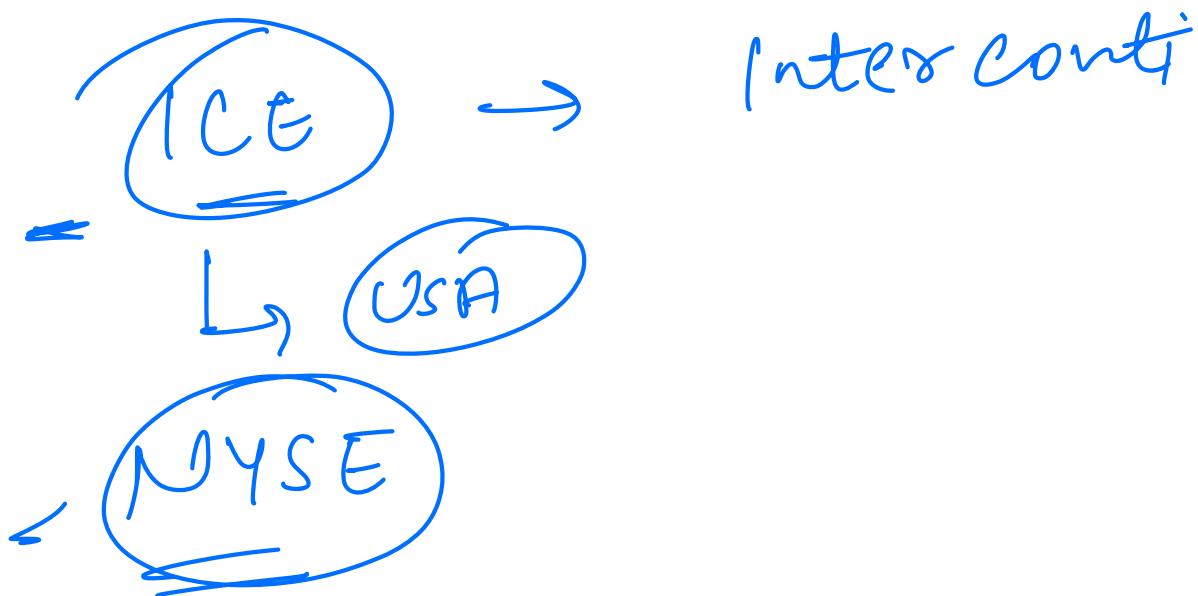
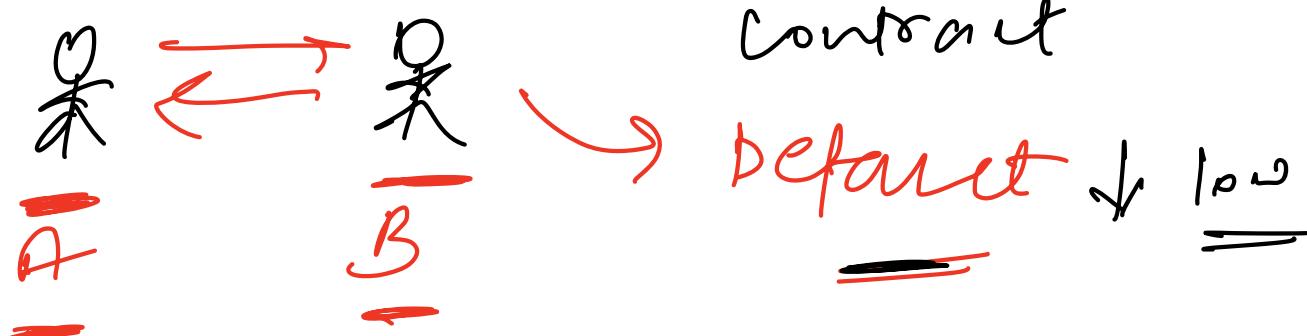


CCP



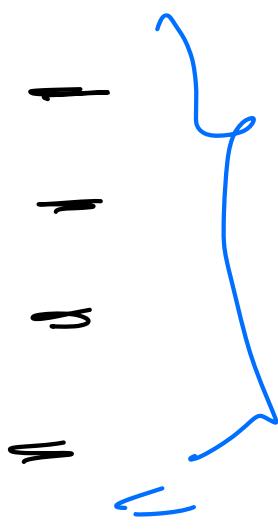
Central
Counter
Party

- Both the parties obligate the



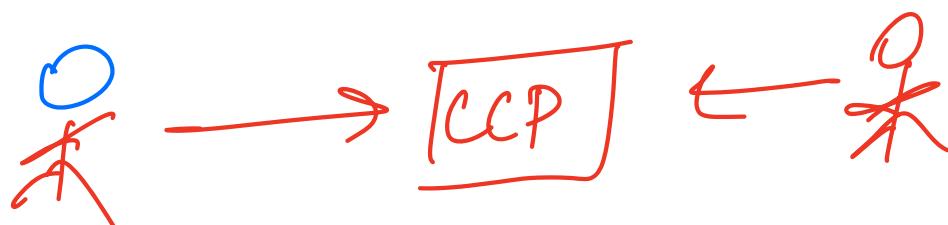
Types of Derivatives

- a) Forward
- b) Future
- c) Option
- d) Swaps



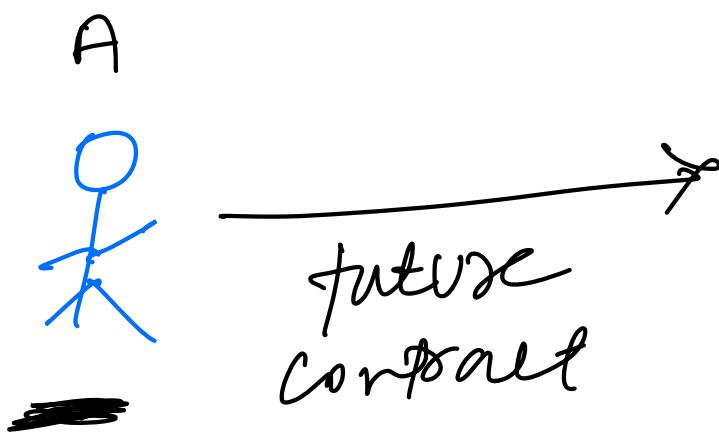
Future Contract → Exchange

→ A future contract is a standardized financial derivative
that obligates the buyer
to purchase and the seller
to sell the asset
@ predetermined future date
@ predetermined price



Eg Imagine an investor
who enters into a future
contract to buy 100 barrels
of oil @ 70\$ per barrel
with a contract expiration

date 3 months from now.

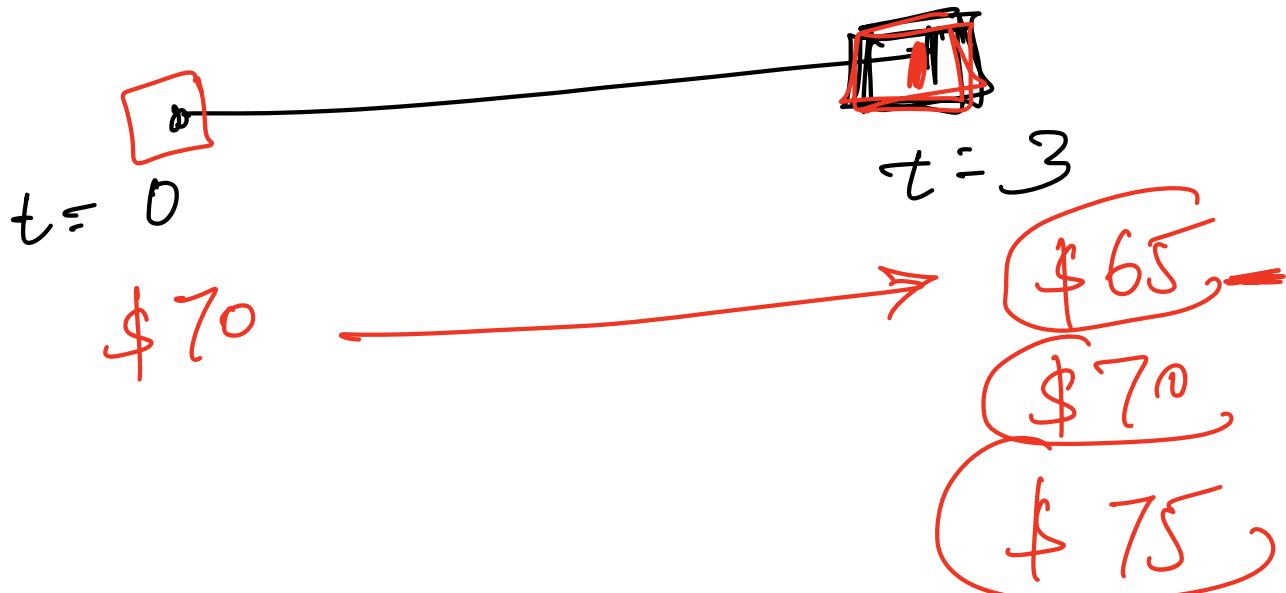


B

sell 100 barrel
of oil @ \$70.

Buy 100 barrel
of oil @ \$70

= A buy @ \$70 from B



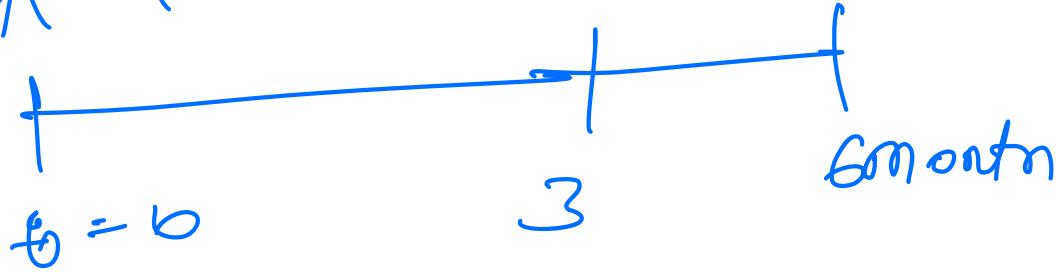
A \$65 → \$70 → L

B \$70 → No P No L

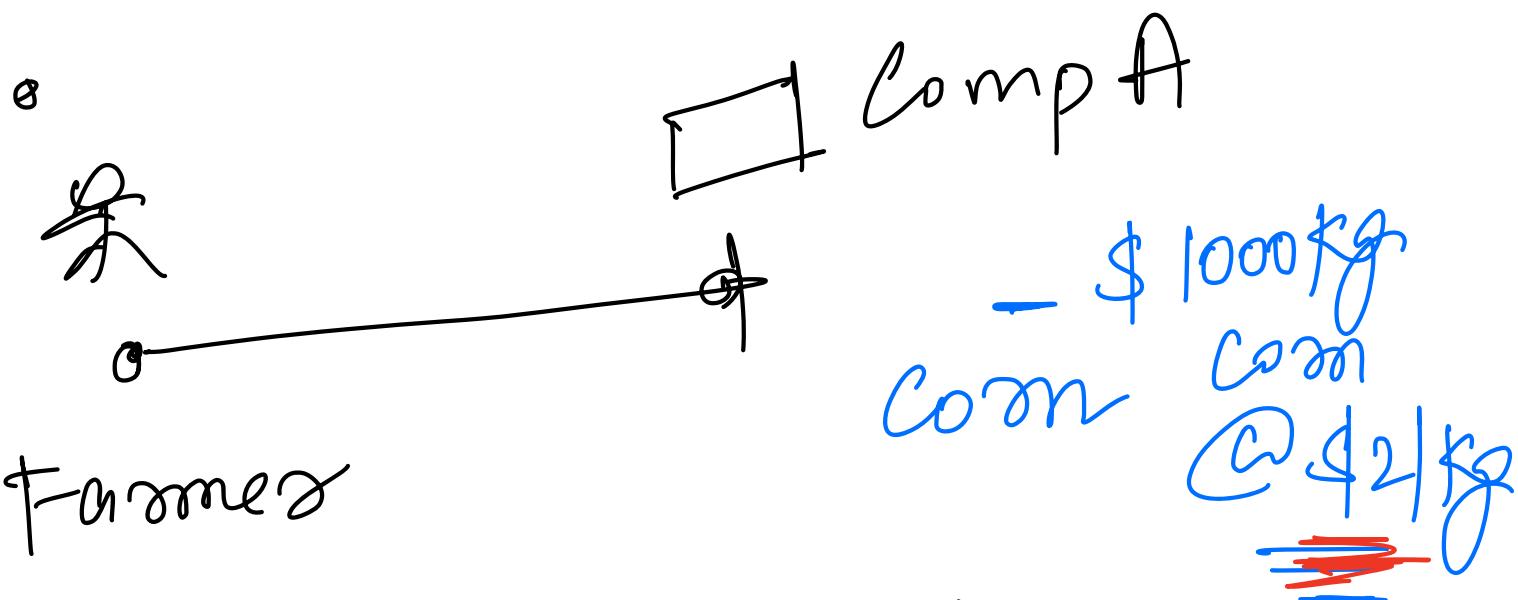
C \$75 → \$70 → P

吳

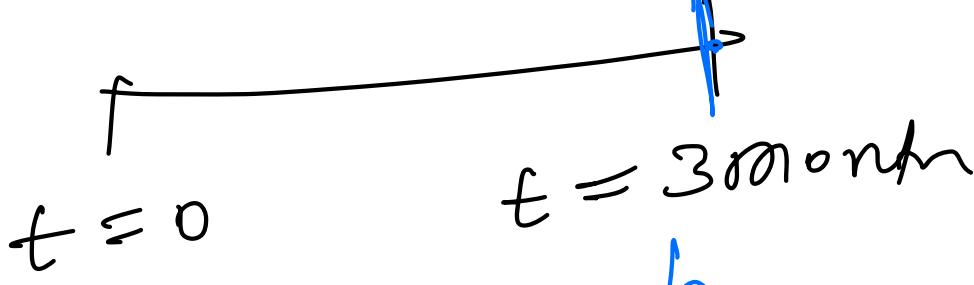
@ price



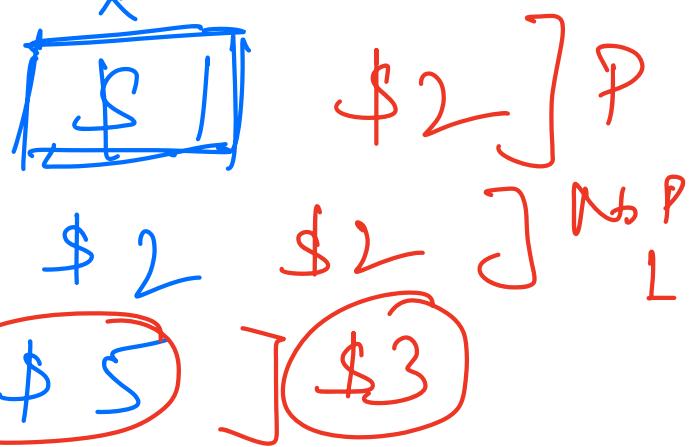
- o Individuel (Farmer)
- o Financial Institution



Sell



3 months

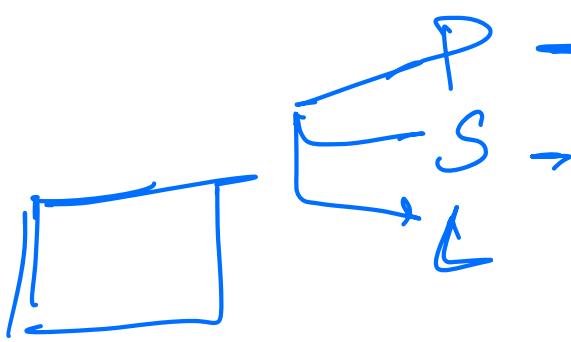


Characteristics of Future Contract

→ Exchange →

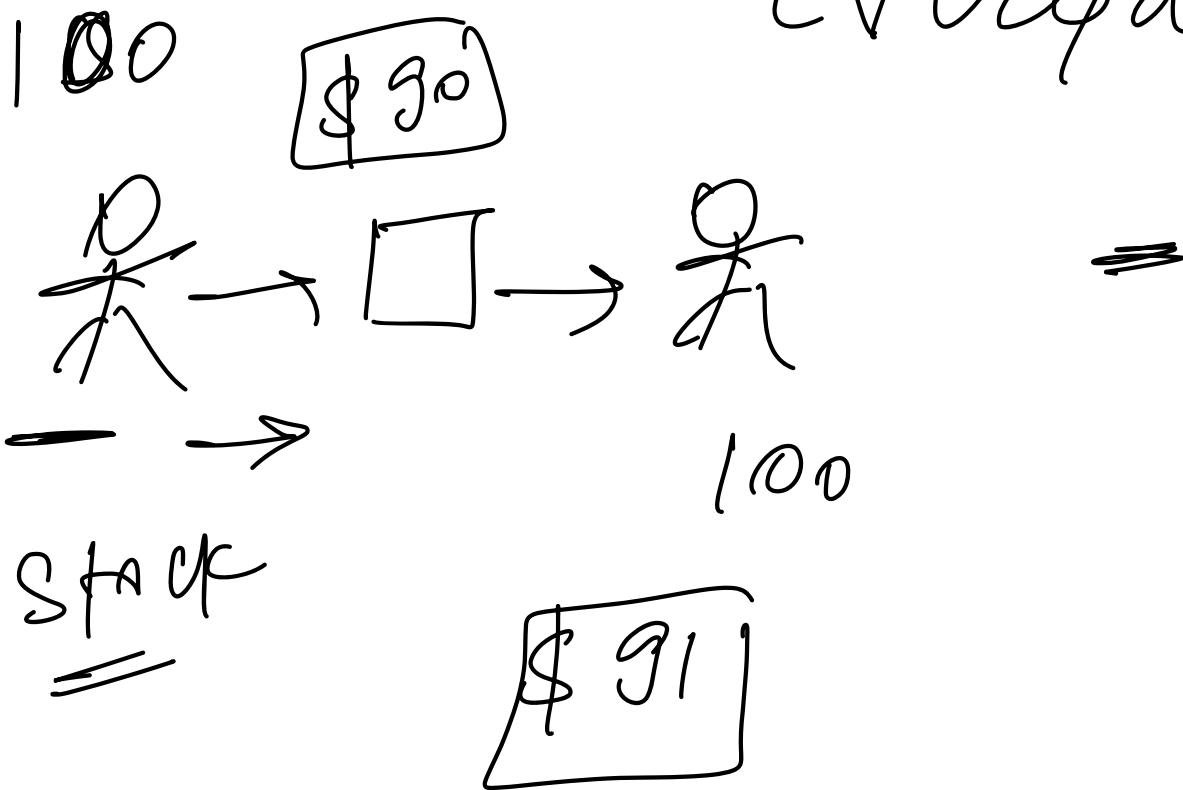
- a) Future contracts are standardized agreement
 - ↳ in terms of size,
 - { expiration date,
 - underlying asset,
 - = quantity,

quality



- b) Clearing house act as a intermediary b/w the buyer & seller, making sure that the contract is obligated
- c) Future contract are mark to market daily \rightarrow gain | loss
that occurs in the contract

Settle them
every day



d) Futures \rightarrow liquid instrument/
contract

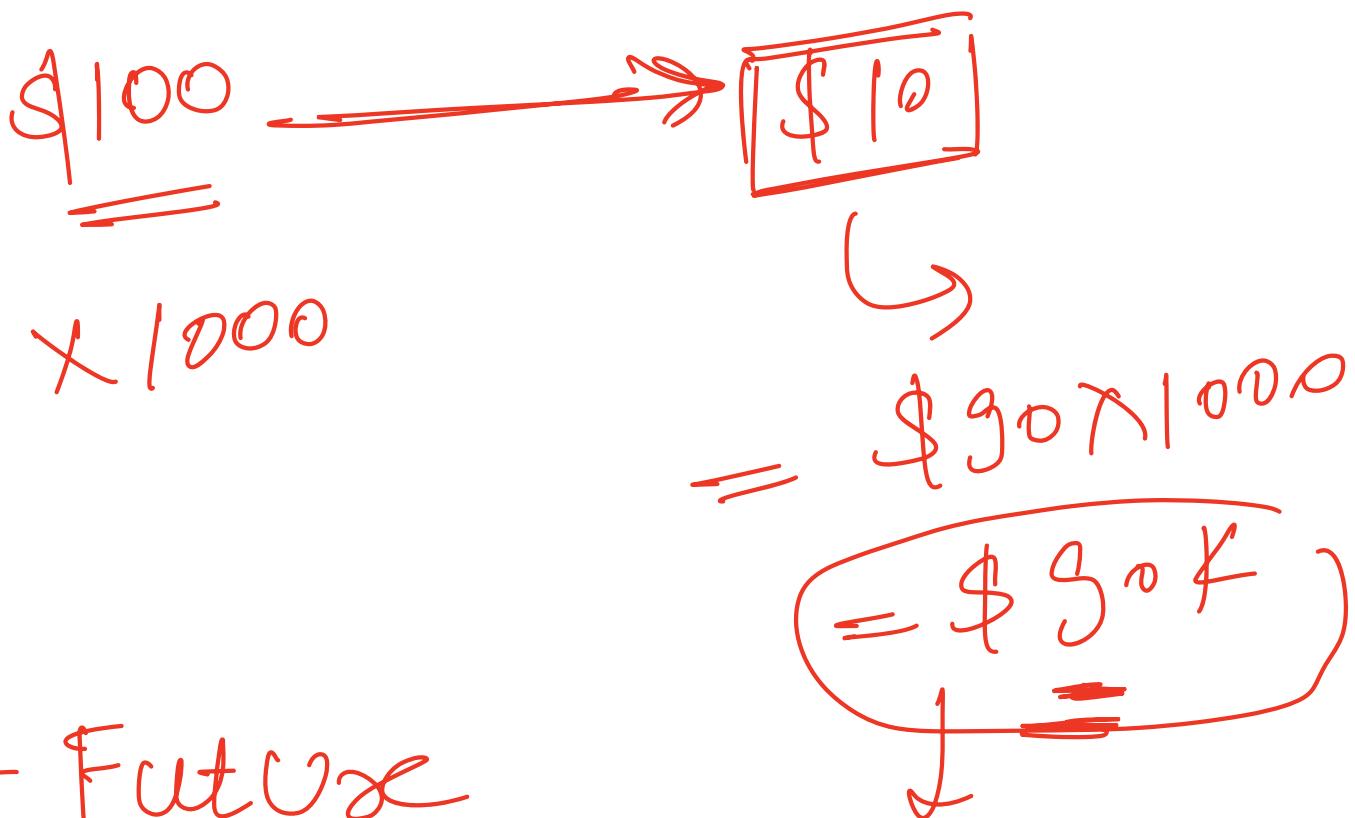
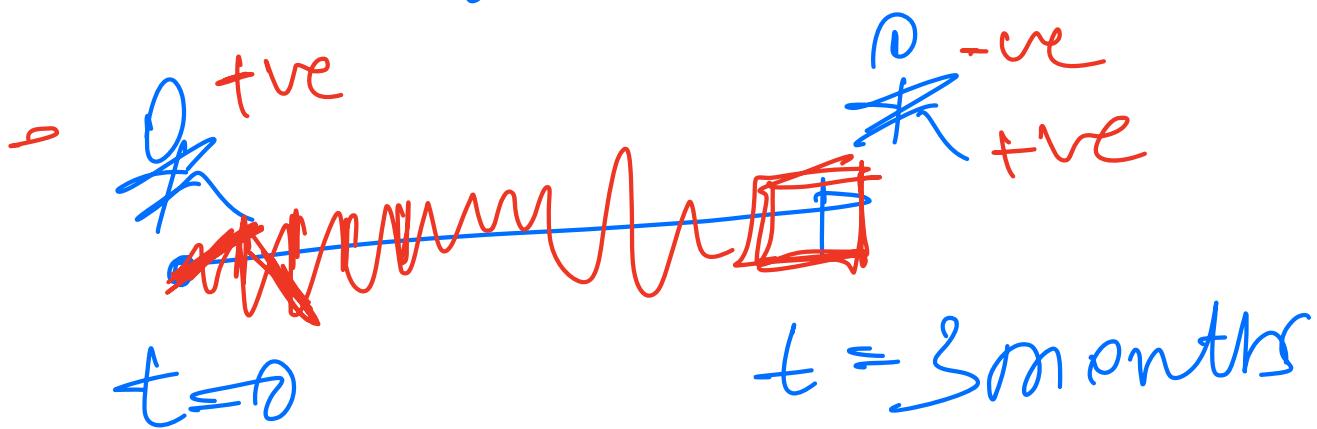
e) CCP in b/w \rightarrow less counterparty
risk

the chance of other
party getting defaulted
is very less.

Summary

- a) Standardized → Exchange
- b) CCP in b/w (buy & sell)
 - ↓ Obligate the contract
- c) Liquid contract

d) Mark to Market
daily



Future
Contract

= M.T.
market

default
happening

Initial margin

margin

call

A hand-drawn diagram consisting of two overlapping circles. The top circle contains the text "TOM" and "OTOM". The bottom circle contains the word "option" with an arrow pointing towards it.

~~= x = x = x =~~

Buy
=
long
position

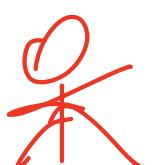
Sell
=

$$\# \text{ Long Position} = S_T - K$$

$$\# \text{ Short Position} = K - S_T$$

$S_T \rightarrow$ stock price at maturity

$\underline{K} \rightarrow$ strike price | pre decision, need



g_0
 g_1
 g_2

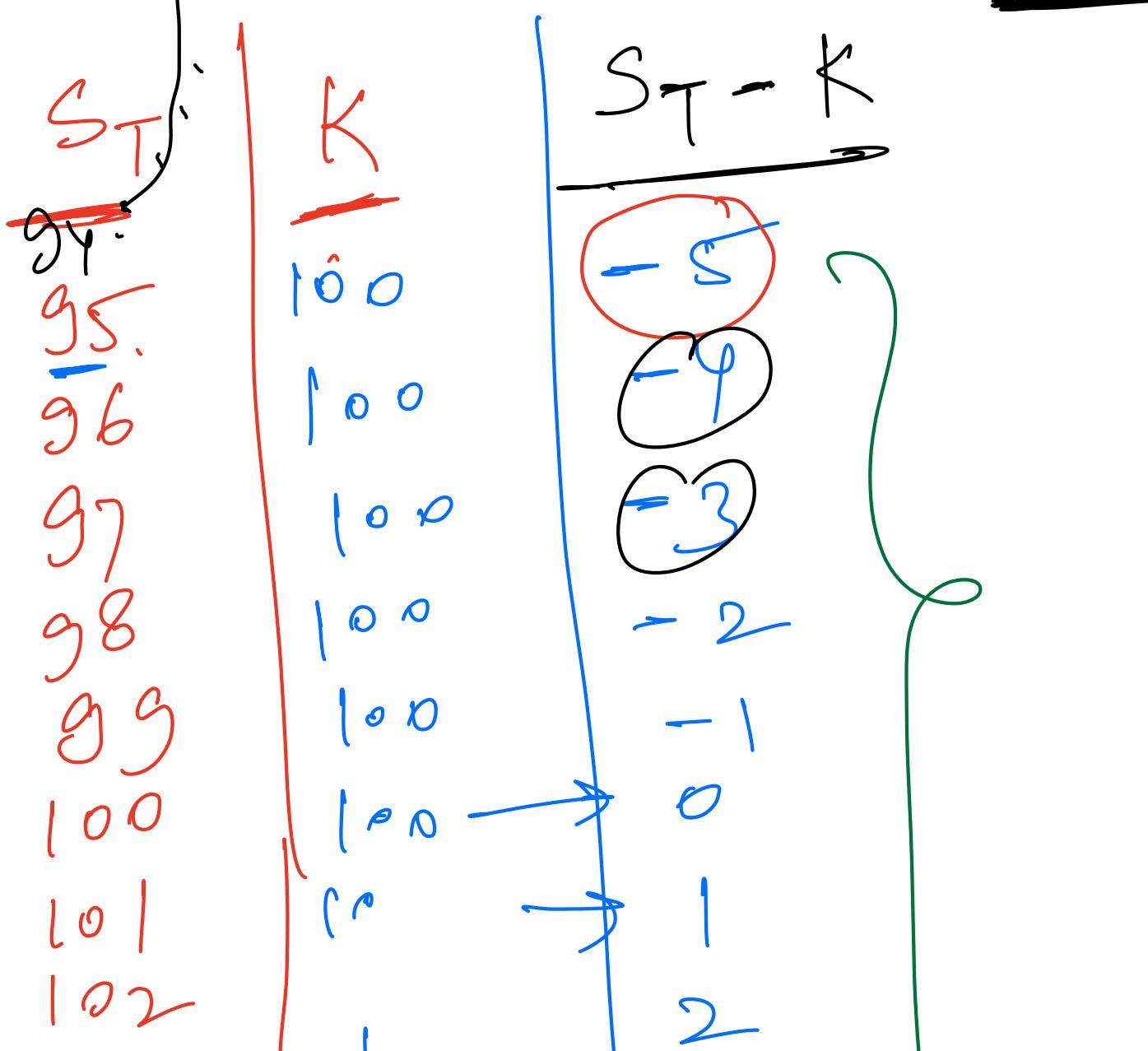
\$100

$t=0$

$t=6$

\$105

A \rightarrow B: stock XYZ
@ \$100 \rightarrow 6 months from now



103

104

105

100

3

4

5

payoff

St

-0

-1

-2

-3

-4

-5

-6

95 96 97 ...

100

101

102

103

104

105

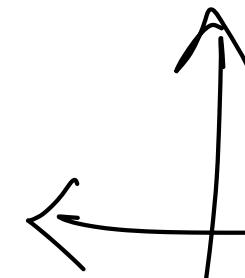
ST

Long
Posn

payoff

long
Posn

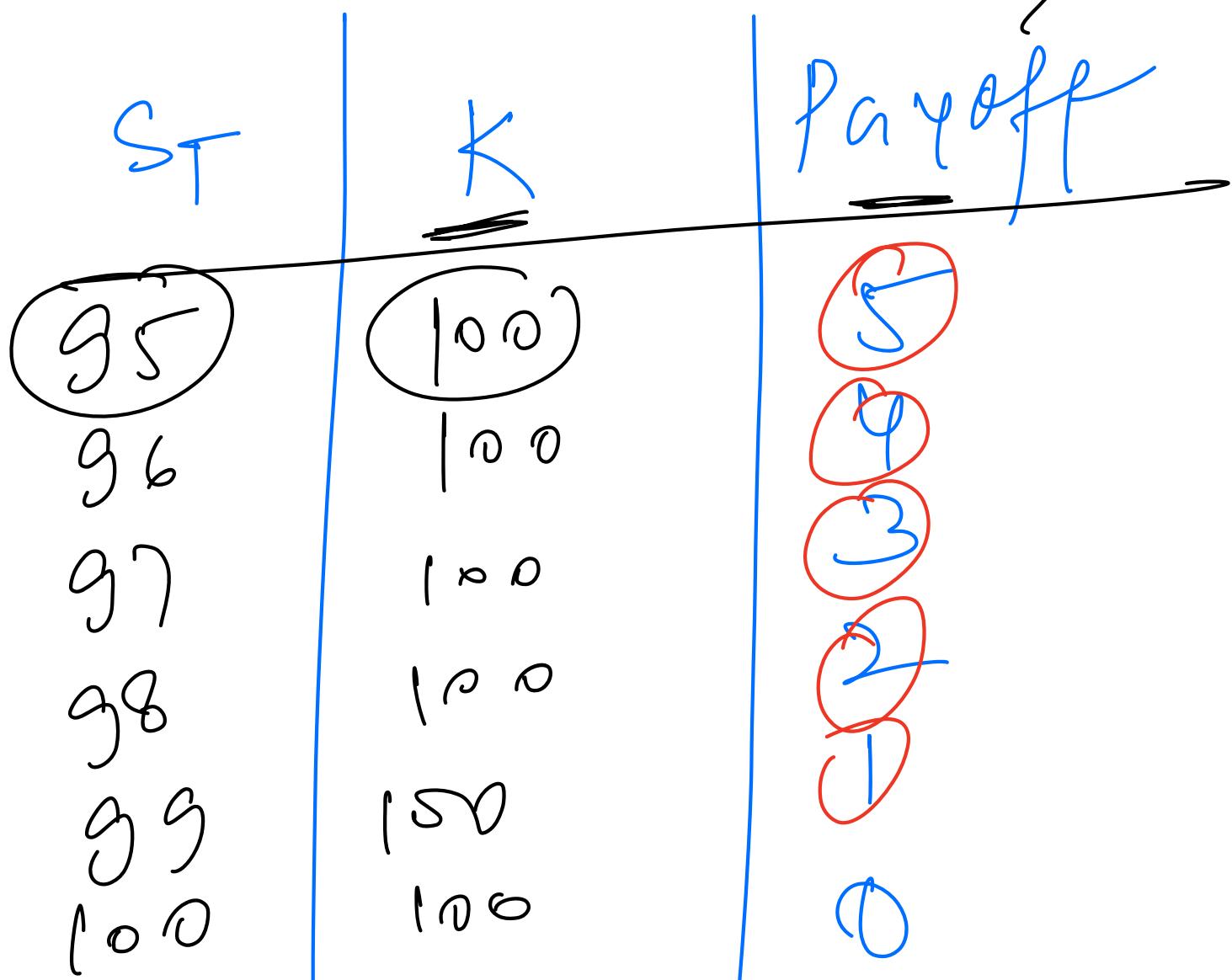
Downside
Limited

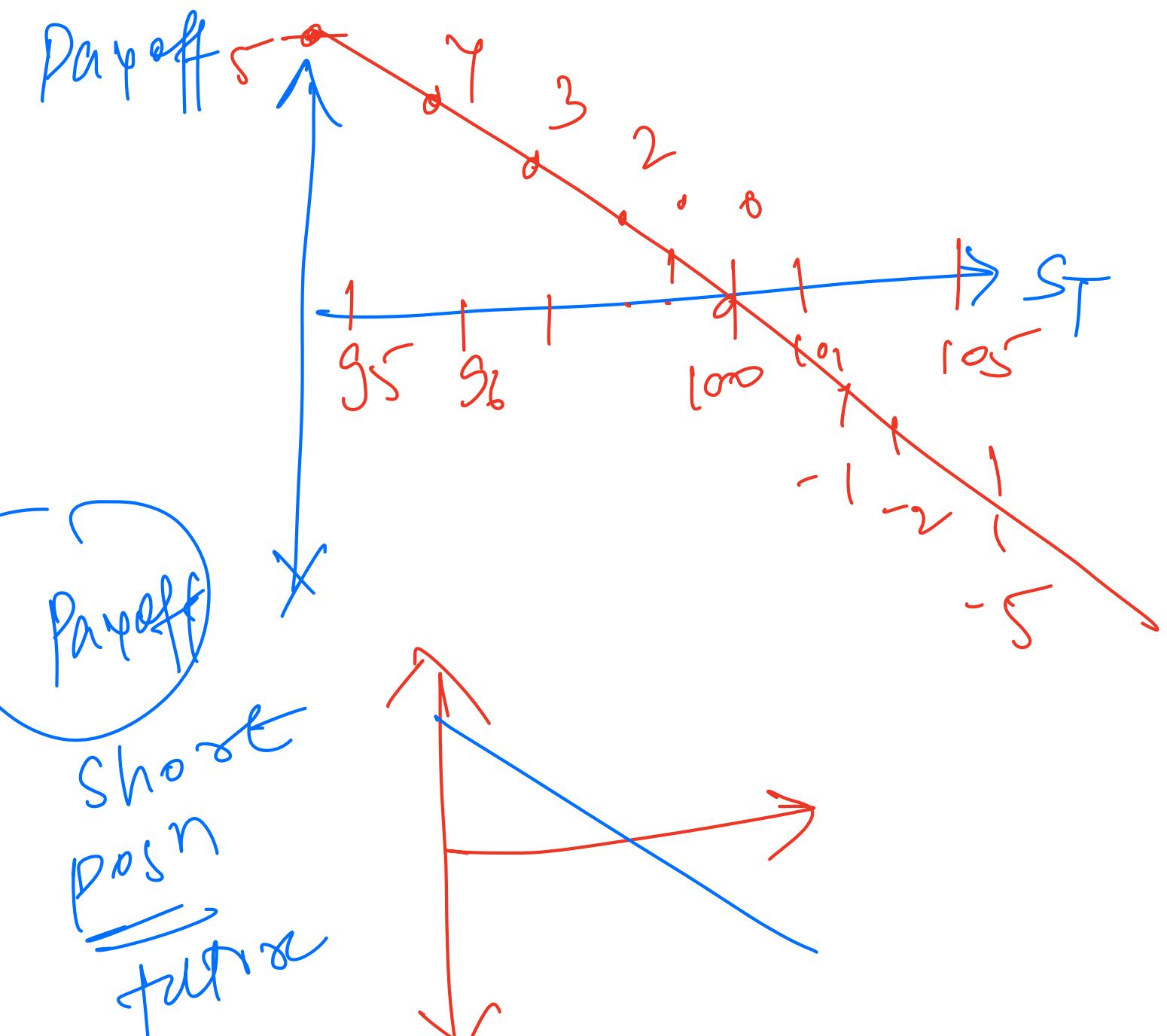
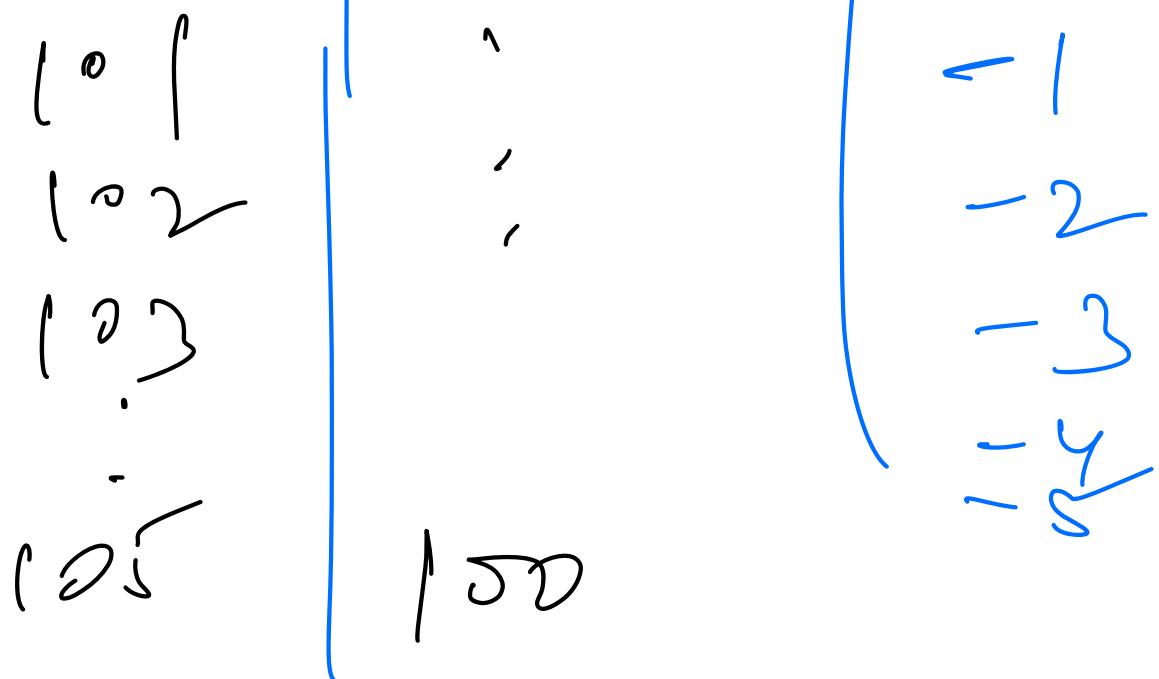


St

~~#~~ Payoff = Shoot
posn

$$\text{Payoff} \equiv K - S_T$$





(60)

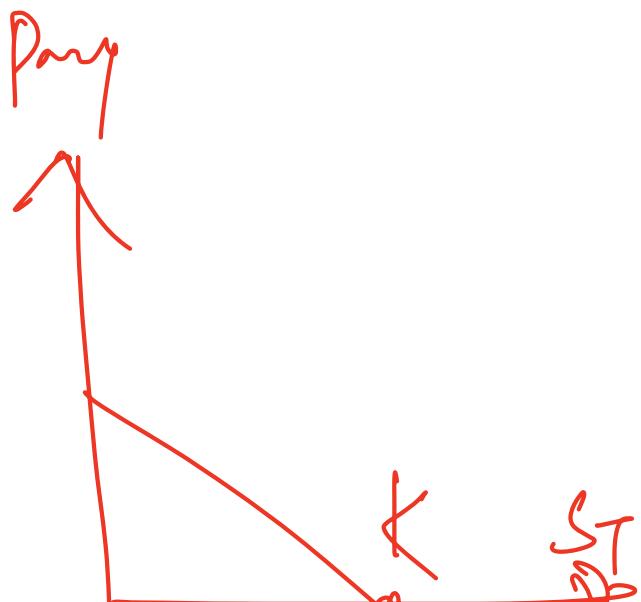
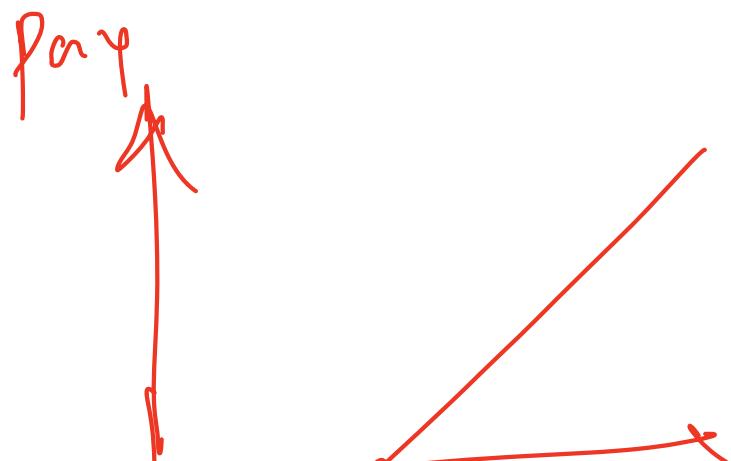
$\pm 5\%$, $\pm 10\%$

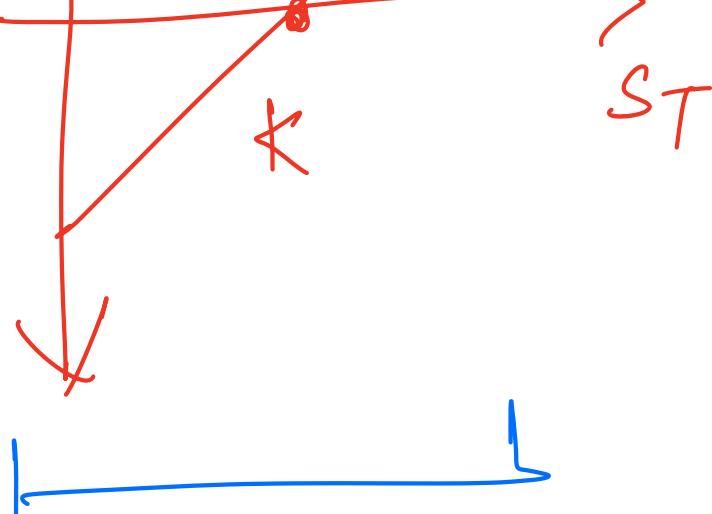
95
105

90
100

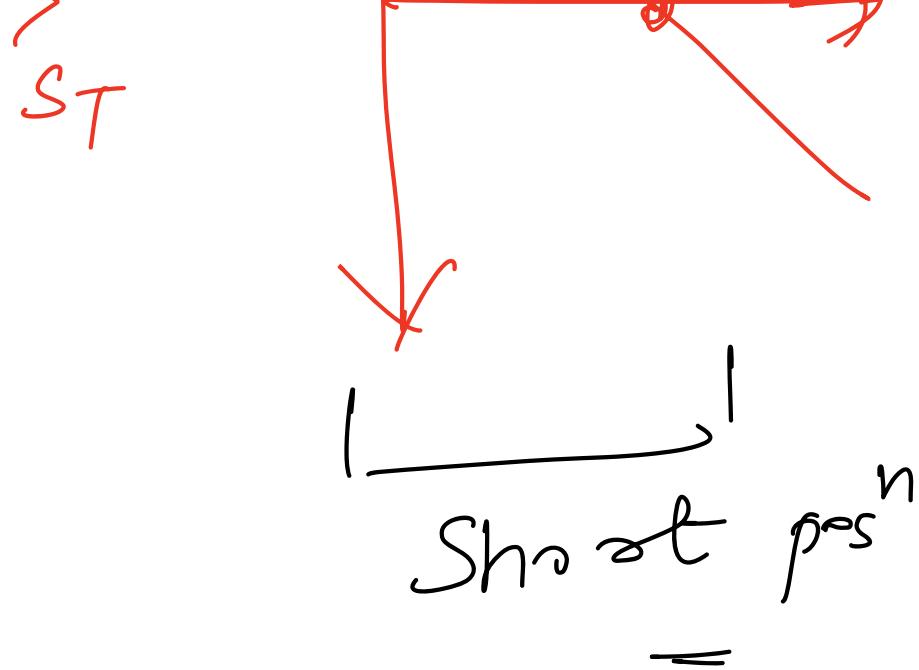
$\pm 20\%$

Conclude





Long posn



Short posn

Forward Contract

→ A forward contract is a customized agreement b/w 2 parties to buy or sell an asset

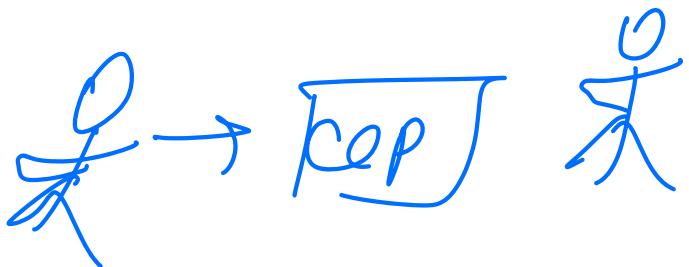
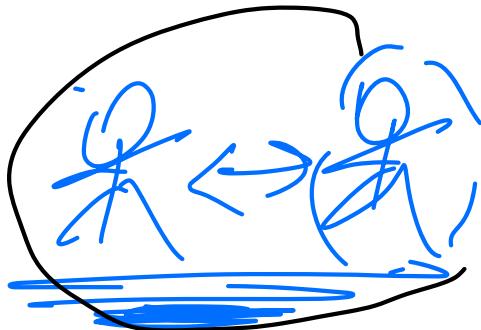
- ② Predetermined price
- ③ Predetermined date -

→ Forward Cont. are traded BTC

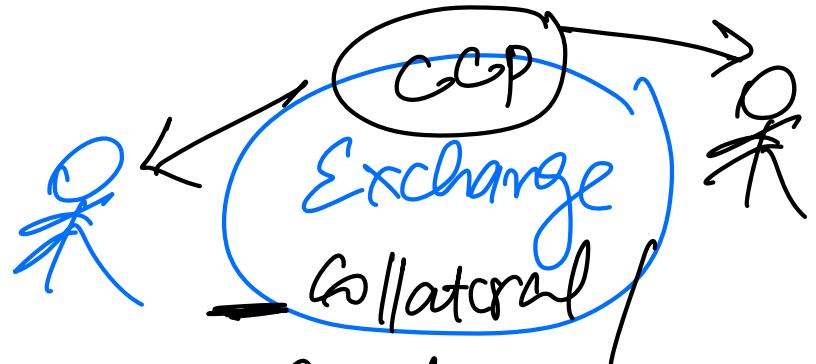
→ A forward contract is also an obligation

Q2. Customized agreement

- Quality can be changed
- Quantity can be change
- Price can be negotiated



Key Characteristic

- a) Customizable agreement b/w 2 parties.
- b) Traded : ~~OTC~~ (only)
- c) less liquid
- d) Higher counterparty risk
- e) There are no margin requirement → cash
- so there is no CCP in b/w
- f) Priced only at the Maturity

Interest
Rate

+

Derivatives

- Stock
- Interest
- Currency

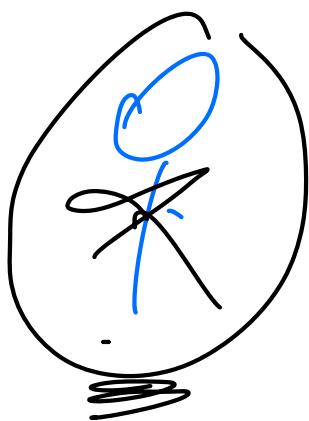
forex market

\$ 11 \rightarrow £ 8.5

↓

t o m a r k e t

\$ | \rightarrow £ 8.5



\$2 /kg

Future

X vs Forward

Future

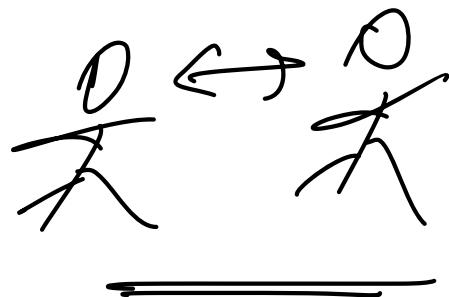
Forward

- a) standardized agreement
- b) Exchange
- c) CCP in b/w

- a) customized agreement
- b) OTC
- c) Nb(CCP)
Sometimes these can

- c) Highly liquid
- e) mark to market daily

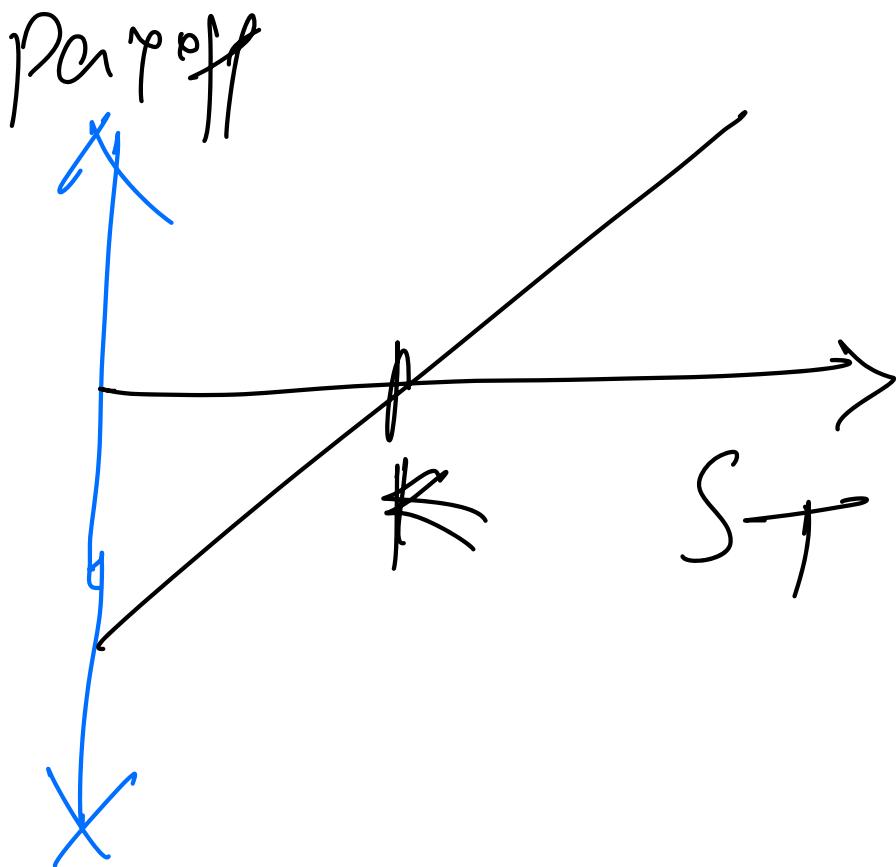
- be CCP
- d) less liquid
- e) Priced at the Maturity



Pay off (Forward Contract)

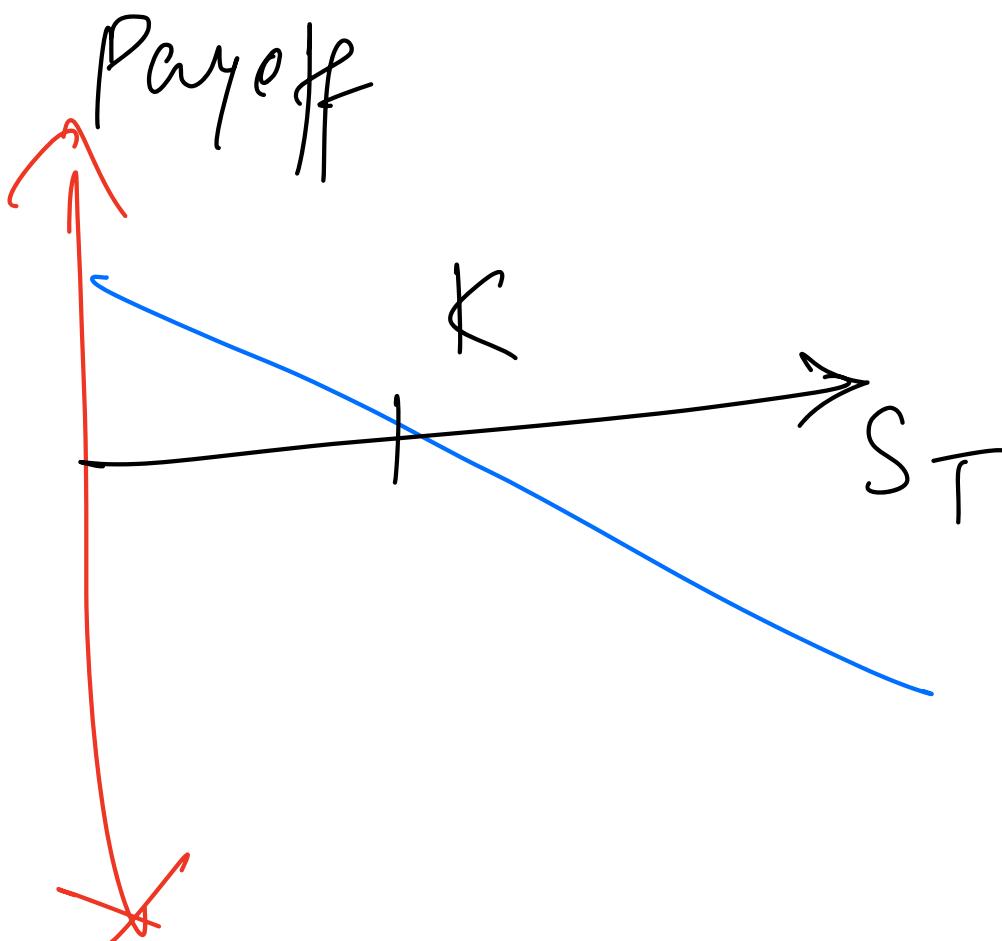
Dong: $S_T - K$

Short : $K - S_T$



Long pos^v

$$S_T - K$$



Short posn

$$K - S_T$$

