Financial Risk Management – Notes:

REVISIONS NOTES:

- **2-hour exam**
- **2 x sections in the exam (section A and B)**
  - **Section A = answer 4 out of 6 10-mark Q's**
  - **Section B = answer 2 out of 3 30-mark Q's**
- **USE DIAGRAMS WHEN YOU CAN!!**
- **NUMBERS FOR CALCULATION QUESTION WILL BE DIFFERENT FOR EVERYONE!!!**
- **3 decimal places for calculation**
- **Include formulas + explain steps**

…

Revise:

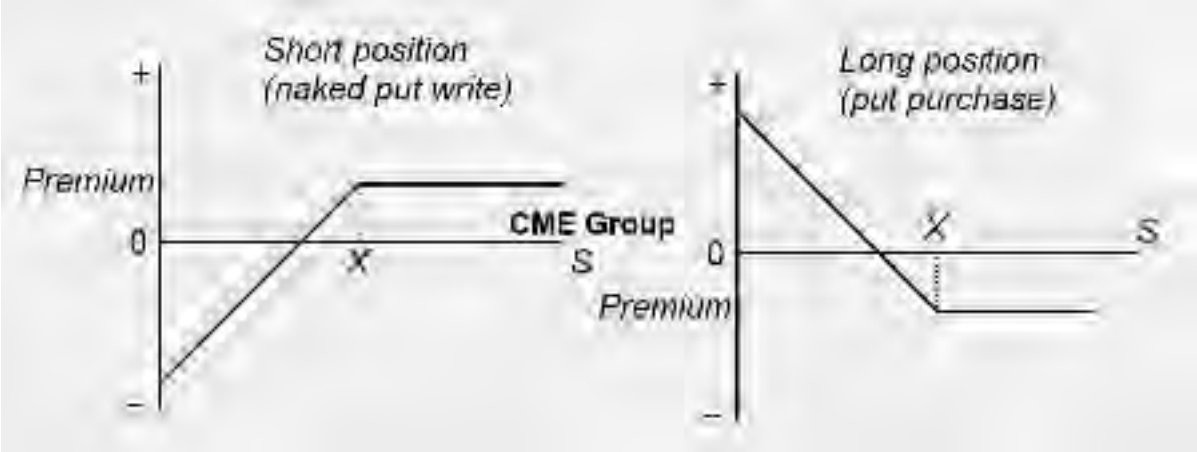
SECTION A:

- **Remember pay-off diagrams (i.e., how to draw them + explain) → both short and long positions of options for call / put, forwards and futures (i.e., 6 x potential diagrams)**
  … give explanation why investors would use these types of derivative contracts, and give an example why they would use it
- **There will be a question on Greeks (be critical here… and give an example why we would use it)**
- **Put-call parity (will be in section A) → explain how this relationship works (look at American options for the dividend)**

SECTION B:

- **1 x calculation Q → on BOPM**
  … look on learn page in the assessment information, submission and feedback page → for calculation video run-through
  … look on learn page in the week 3-6. Option Pricing Models → for Excel spreadsheet including example Q's

Profit and loss at maturity: put option (very similar to above)



- We have profits and losses in the contract
- X again is the exercise price
- The short position accepts the premium, and if the prices are below the exercise price – the short position has to buy an asset from the long position investor at the price specified in the contract – the investor loses the profit
- Same in the long position (opposite trade) → so if the long position – if the prices go below the exercise price the long position will exercise their option (which means that they gain the difference between the exercise price and the spot price)
- Profit/loss is a zero-sum. → everything that the short position gains, the long position loses, and the other way around!

Exercise of a European call option:

- At maturity a call option will be exercised if the spot price for the asset is greater than the exercise price

  Exercise if S > X

  (if the spot price is higher than the exercise price – i.e. want to buy it because the exercise price is cheaper than the market price)
- If the spot price is less than the exercise price it is cheaper to buy spot than to exercise the option

  Do not exercise if S ≥ X

  (i.e. don't want to be buying it when it is cheaper in the market)

Notes:

until 20th December → so, you've got a two months option contract, and your prices can change again, so the prices can go up or the prices can go down

… the starting point for this second period on the 20th November is either uS or dS depending on whether the price increases or decreased in the first period… and these prices can go up or down in this second period during December

… S is the current price of the stock → and in reality, we have no knowledge of what the exact price will be in the future (i.e. at point 'uS' for example) what we do know is that there is some probability of prices going up, and there is some probability of prices going down

***… e.g. if the prices go up and then go down – the price on the 2th December will be 'duS'* – so that is what will happen to your price of the stock**

…… THIS IS OUR STOCK PRICE TREE (the first tree seen in the above diagram)

…

WHAT WILL HAPPEN TO THE OPTION??

→ WE'VE GOT A TWO PERIOD BINOMIAL TREE AND WE ARE LOOKING AT OPTIONS

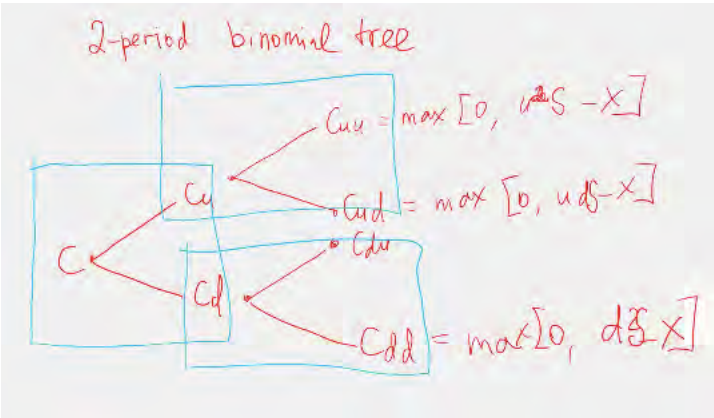
HERE WE STAR WITH OUR OPTION AT 'C'… AND AGAIN THE PRICES CAN GO UP (Cu) OR DOWN (Cd) – and then they can go up or down again

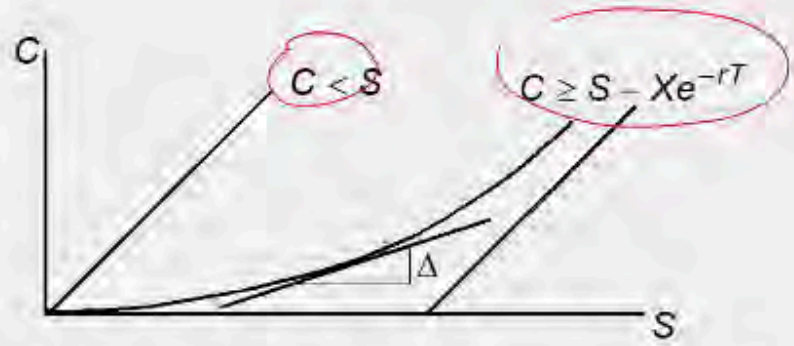
… e.g. if prices go up and then down we are left with the value 'Cud' → which is equal to the maximum of 0 and 'udS-X'

… SEE SEOND TREE DIAGRAM ABOVE → this is our two-period binomial option pricing tree

…

… if you look at this model you've got 3 x 1 period trees





- Delta-neutral hedging maintains the value of the hedged **portfolio** against **small** changes in *S*.
- Delta changes with both the underlying asset price and time.
- The portfolio will require **re-balancing** to retain delta-neutrality.

… so, these are your bounds for the option contracts → so, the value of your call-option will be in between those two values

- So, the delta shows you the angle of the tangent of your contract → and that delta gives you a value of number of contracts that will keep your portfolio delta-neutral… so, your delta neutral portfolio takes small risk into account – so, it protects you only from small risks / small changes in the spot price … because it is for the small changes in the spot price → your delta changes as time goes on… as the price of the underlying asset changes, your delta changes as well → so, if you were to keep your portfolio delta-neutral – you have to keep calculating what is the new delta for your portfolio is … so, the slope of the line in the above diagram changes with the changes in the spot price → so, to keep your portfolio delta-neutral – you have to keep checking what the new delta is and rebalance your portfolio accordingly (because delta is only for small changes in the spot price

…

So, what you do if you are expecting big changes in the spot price (because delta will not capture those) – so, for larger changes / for non-linearity of your delta – we

- Secondary securitisation
- Credit derivatives (e.g. CDO → collateralised debt obligations)
- Insurance derivatives (e.g. CDS → credit default swaps)

Price v. credit derivatives:

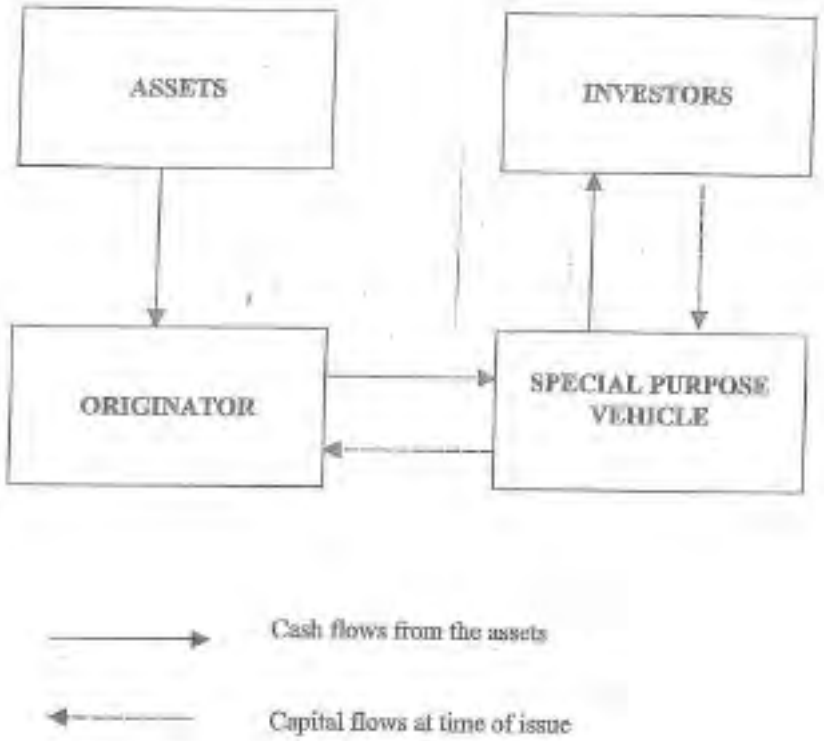
- Options, futures and forward contracts are price derivatives… because we sign a contract, set a certain price within the contracts, and for these contracts risk is exogenous – so, we cannot influence the risk of our contract because we cannot influence the price of the underlying asset
- Credit derivatives are slightly different to price derivatives
  … risk here is partly endogenous because banks make loans, so they can (depending on who they will be giving these loans to) influence part of this risk
  … and because they can make these loans, there is a problem of moral hazard → because they can give out loans to good borrowers, but equally they may make loans to borrowers who have high default risk… so, there is a potential moral hazard issue with credit derivatives

SO, WHAT HAPPENS IF BANKS DECIDE TO SECURITISE THEIR LOANS?

…

The old story: (our traditional view on the entire banking industry (banking intimidation))

- Banks v. capital market → banks tend to make loans – so, they collect the deposits, and they transform these funds into loans / or the investors could go directly to the market, and borrow through the market… so, banking borrowing was different from the borrowing from the capital market
- Then, once banks make loans – they are stuck with those loans on their balance sheet, and they can't sell these loans because there are problems like:
  … asymmetric information → so, the bank knew more about those loans than the market
  … adverse selection → banks choose who to make the loans to



… so, what the customers see is the asset (which are loans), and they are made to the originator (usually a bank) – so, you've got a special purpose vehicle which buys those loans form the originator, and then the special purpose vehicle will sell it on to the investors…… and then it goes back through the investors to the special purpose vehicle, back to the bank

… so, you can see how the securitisation just adds an additional layer of investors into the process of the banking loans (or credits)

MORE DETAIL ON:

The synthetic collateralised debt obligations:

- The buyers pay premiums to sellers → so, again this works a little bit like an insurance
- Then the collateral debt obligations are incorporated into credit default swap contracts (insurance contract) by tranches, or the tranches of all those different types of those contracts into different types of portfolios
- Then the payment and the stream of payments goes from the synthetic collateralised debt obligations to the credit default swap buyers