**Camilo Echeverri**: Structured Notes MD.

He was at Citi before in the same business and he was in interest rates before.

4 PODS: QIS, Structured Notes, Insurance, light exo/arbitrage/risk recycling

We can also divide in two parts, the part with Exo and Structured Notes and the part with QIS and Insurance

He is alone in Structured Notes now, it’s individual clients.

He wants to build the platform to increase the market share.

**YuanYuan(Stephanie) Yue**: She joined in 2019 (Columbia before and Goldman Sachs before. She is more on the linear part, in QIS with Florian.

She asked me questions about my Timer option project and then coding questions.

First question was:

You have n cities, and you want to go from A to B with the minimum cost and a limit on the numbers of cities you want to use, write an algorithm

You have a word and want to check whether it’s symmetric or not ? (e.g. abba, aaa, dfjnjfd …)

Dynamic programming,

You create a matrix with line j and column i, from the position i to j in the word, it tells you if it’s symmetric

M[i-1][j+1] = True if M[i][j] and s[i-1]=s[j+1]

**Augustin Laruelle**: il m’a demande les parametres de BS (r, sigma, F, T, K)

Ensuite le prix forward: S\_0 exp((r-q)T) and justify it.

Create a portfolio long stock and borrow S0 at r, and short a forward

Talked about Brownian motions, why (dW\_t)^2 = dt (comes from the first order expansion).

dW\_t = W\_t – W\_t-dt ~ N(0, dt)

Then he asked about Black Scholes: dS/S = mu dt + sigma dWt

Ito on ln gives d ln(S) = (mu -1/2 sigma^2) dt + sigma dW\_t

S\_t = S\_0 exp((mu-1/2 sigma^2)t + sigma dW\_t)

For a forward:

0 = exp(-rT) E[f(S\_T)] with f = x-K

Giving K = E[S\_T] giving K = S\_0 exp(mu – ½ sigma^2 t) E[exp(sigma W\_t)]

Giving K = S\_0 exp(mu t)

Using the previous formula: mu=r-q

**Yohan F.**: did X and then MIT, finished in May 2022, he is in QIS.

**Dima Akraa**: a lot of question about greeks

Delta of a call spread: if we note epsilon\_B the difference in delta between K-epsilon and K+epsilon strike, we get delta = epsilon\_B \* 2 / epsilon

Vega of a call with maturity T1 vs maturity T2: maturity T2 is higher. Explain it to a sale. With a short maturity, the vol doesn’t have time to have an effect, that’s why the sensi to vol is smaller with short maturity. Mathematically, you can see that sigma appears with the square root of T.

Gamma of a call with maturity T1 vs maturity T2: it is what happens to the delta when S moves by 1% and the delta is the probability to end up in the money. Therefore, for short maturity, a move of spot has a big impact on this proba. On the other hand, long maturity options are less impacted because there is still a lot of time.

We talked about how delta moves if we increase vol (vanna).

The trickiest question was about how vega move if we increase vol (**vomma/volga**) and why it has this “chameau” form.

When you are at the money, your probability to be in the money or out of the money is ~50%, if you increase the vol by 1%, it’s still the same sensitivity to vol (vega).

If you are in the money, your proba to end up in the money is >50%.

Vega and vomma are both positive for long positions and negative for short positions, no matter if it is a [call or put](https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/options-calls-and-puts/). For long positions, vega is always positive, and the closer the option is at-the-money (ATM), the higher the vega. For short positions, vega is always negative and is lowest when the option is ATM.

A non-ATM option is more like an ATM option when it has higher implied volatility. Hence, the greater the implied volatility, the higher the vega is for long positions, which indicates a positive vomma.

It is the same for short positions, that an increase in implied volatility leads to a lower vega, which indicates a negative vomma. A vega approaches its highest or lowest level at a decelerating rate, keeping other characteristics constant, the non-ATM options have higher vomma than the at-the-money ones.

<https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/vomma/>

Elle fait du flux hedge funds (ce que Raphael m’a dit).

On a parlé de la sensitivite d’un call/put aux taux. Pour les puts, c’est simple, a la fois le drift et le discount font que augmente r Reduit la Valeur du put. Pour un call, les 2 ont des effets differents.

<https://www.merrilledge.com/investment-products/options/learn-understand-rho-options#:~:text=Rho%20is%20positive%20for%20purchased,into%20an%20interest%20bearing%20account>.

**Come Cavillot**: we talked about my background and the team.

Il a fait les Mines de Nantes puis Natixis en projet puis ensuite la finance l’a interessé donc middle office a SG 3Y puis bougé en structu QIS (les debuts de QIS) puis QIS New York SG puis UBS puis BAML.

**Amine Rajafillah**:

What is polymorphism ? <https://www.programiz.com/python-programming/polymorphism>

What is a virtual function ? A virtual function is a member function of base class which can be redefined by derived class. A pure virtual function is a member function of base class whose only declaration is provided in base class and should be defined in derived class otherwise derived class also becomes abstract.

If you write 2 and 3 (or 2&3) in a shell, what happens ? Don’t know

How to create a class in python ? def \_\_init\_\_ (self, …) is called a constructor.

What is the most efficient way to code Fibonacci ? what is the complexity ?

f(0)=0 and f(1)=1 and f(n)=f(n-1)+f(n-2)

<https://www.geeksforgeeks.org/program-for-nth-fibonacci-number/>

Calculate the power of a number ? (e.g. 2^5 without numpy or \*\* in python) What is the most efficient way and the complexity ? the complexity is ln(power).

Write put call parity with forward: C-P=e^-rT \* (Fexp(-qT) – K)

He also asked questions about vasicek model, what is the form ? can you solve it ? What is the expectation and the variance ?

I just got the form r\_t = lambda(r\_t – theta)dt + sigma \* dW\_t

**Faysal Haouas**: he is the boss of the structuring team. He asked me question about an American option, why it’s more expensive and also why if no div, it’s the same price as European. It’s because if you exercise, you pay K and instead you could have placed that K in a bank account and earn money on it. The only reason to exercise is if there is a dividend bigger than what you can earn by just placing the money in a bank account.

**Raphael Cyna**: Il est a Bank of America depuis fin 2013 en structu. 6 ans aux US (il vient de rentrer). Grande équipe.

Il fait de la structuration Classique (pas QIS, un peu desfois quand meme sur options vol target) -> pricing / produits exos / solutions

Augustin est avec lui meme s’il fait du pricing d’options sur strategies systematiques.

Il m’a demande ce qu’etait la CVA et la FVA.

CVA: meme si on a un CSA Classique, on poste du cash tous les jours, on a toujours un risque de contrepartie, si la contrepartie arrete de poster pendant + de 10 jours, on close la position (regulation dit comme ca) donc on a un gap risk de 10 jours.

FVA: est-ce qu’il y a tjrs de la FVA. Non si c’est exactement le meme CSA sur deal client et hedge de marché.

e.g. j’ai une option americaine sur Apple avec client qui poste en euros et mon hedge je poste en dollars. Il y a une FVA similaire a quand des actifs illiquides sont postes. En effet, si je transfere les dollars en euros direct et que le lendemain la pos ne bouge pas mais que le taux bouge, j’ai deja echange et je perds car je dois poster. Il faut donc des swaps …

Comment calculer une FVA avec un deal ou je poste cash mais je recois des bonds ou un autre asset. Je recois des bonds que je ne peux pas vendre donc pour placer du margin dans mon hedge de marche je dois faire un emprunt avec les bonds en collat, la diff entre ce taux et le risk-free rate va engendrer de la FVA. De plus, meme si les expected exposure sont 0 (forward flat …), il faut regarder chemin par chemin car dans un cas je poste du cash et dans l’autre je recois des bonds, il y a donc une assymetrie a prendre en compte.

**Corentin Gatellier**: We talked about the background and then greeks: the Cega which is the sensitivity to correlation.

For an option on a basket, it has a positive sensitivity to correlation.

A Call versus Call is you buy single stocks calls and sell a call on a basket so you are short correl.

Usually, desks are long worst off put, so short correl so they sell call versus call.

Correlation skew because when there is a crash, everything has correlation.

Question about a digit, the delta form is a gaussian.

Approximation of the delta of a deep in the money digit.

When deep in the money, the $ delta is around 1$ as you owe 1$ at the end. And we have S\* delta % = dollar delta = 1$ giving:

delta % = 1 / (S-K)

brainteaser: tu as 5 boite et le chat est dans une. A chaque tour, tu choisis une boite et si tu trouves pas le chat, il bouge soit a gauche soit a droite. Trouves une strat pour le coincer.

Answer: fais une hypothese: il commence dans une boite paire ou impaire, tu le chasses d’un cote puis sit u le trouves pas il a commence en impair et donc tu chasses dans l’autre sens. (a chaque tour, il passe de pair a impair.

Si on choisit pair en premier et choisis 4. Ensuite il est soit a 3 soit a 1, on choisit 3 puis il est forcement en 2 s’il n’etait pas en 3.

Si on le trouve pas, c’est qu’il a commence en impair donc il est en pair maintenant, on choisit donc 2, s’il n’y est pas il est soit en 3 soit en 5, on choisit 3, s’il n’y est pas, il es ten 4.

Cela se generalise en 2\*(n-2) coups.

1 2 3 4 5

X

X

X

X

X

X

**Elior Illouz**: Il a fait X Columbia, avant Columbia il a fait des stages en structu et en trading a la SG. Apres Columbia, il a commence en Quant a Bofa (electronic trading) puis il a bouge en QIS vol.

Question: de code sur python avec des classes:

Super.\_\_init\_\_() et si j’override une function de ma classe mere mais je veux quand meme y acceder, je peux faire super.mafunction(), super permet de recup tout ce qui vient de la mere.

Question de DataFrame aussi juste pour voir si je sais comment ca marche, rien de specifique.

Question sur les options:

Strategy A: sell call 105% -> delta hedge

Strategy B: sell a put 95% -> delta hedge

Both with same implied vol. What happens if nothing moves

Only theta -> theta of 105% is higher because 105/100 < 100/95 so the 105% is closer to the money.

S’il y a un move +10% in one day, quelle strat perd le + ? C’est le call car on passe dans la partie high gamma alors qu’on s’en eloigne pour le put. A l’ordre 1, on peut dire qu’on prend le gamma de depart qui est le meme mais c’est faux a ordre superieur (c’est plutot une integrale) donc le short call delta hedge qui est short gamma (comme le short put) perd +.