Q1 ZZ

Q2 LW

Q3 ZL

Q4 YZ

Q5 WH

Discuss: CS, SZ

**Project 1 – P&L Attribution**

**On Thu, 8-Oct-2020: EDZ0, the Dec 2020 Eurodollar futures contract settling on Mon, 14-Dec-2020, is the “1st White, ED1” contract and is trading at 99.65. The “stub rate” (from 8-Oct-2019 to 14-Dec-2020) is 0.30% (Act/360 basis). You buy a “95 Put” (strike = 99.50) for 5 ticks. Expiration date of the put is the same as ED1’s settlement date (14-Dec-2020).**

**The next day, Fri, 9-Oct-2020, the market has sold off by 5 bp and EDZ0 is now trading at**

**99.60. The stub rate (from 9-Oct-2020 to 14-Dec-2020) is now 0.35%. Your “95 Put” is now**

**trading at 6.25 ticks.**

**Nice job: 1-day return of 25%! Who needs Tesla?**

**1) Can you explain your one-day P&L?**

My P&L is 25%. It is composed of the contribution of 5 Greeks, in which Delta contributes the most. What’s more, compared with other parameters, stub rate and forward rate have the biggest change. However, the stub rate has such a small weight that its change doesn’t influence the option price a lot. Hence, at that time, forward rate and delta dominate the P&L. So it shows that an increase of fwd rate generates a 25% P&L.

**2) On Thu, what was your break-even daily volatility? Was it realized?**

**3) Over the one-day horizon what was your Gamma P&L vs. Theta P&L?**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Delta | Gamma | Theta | Vega | Rho | Sum |
| 1bp | 7.436321 | 0.320187 | -1.749 | 3.680614 | -0.00229 | NA |
| contribution to price | 37.181605 | 1.600935 | -1.749 | -6.77232976 | -0.01145 | 30.25 |
| percentage change | 14.29% | (the same with delta) | 0.27% | -2.89% | 16.67% | NA |

**4) If you had delta-hedged, what would have been the hedge? What would have been your P&L?**

|  |  |  |  |
| --- | --- | --- | --- |
| time | asset | position | aggregated P&L |
| 8th | EDZ0 | -7.436321 |  |
| option | 1 |

When we hedge our option with EDZ0, our new portfolio will be delta-neutral. In other words, after hedging, St+1 to St on more contributes to P&L, but other Greeks (Gamma, realized vol and estimated vol) still do. (The formula ignores terms over third order, so calculated P&L is not the same with actual P&L.)

**5) Why do we need to pay attention to the stub rate?**

**Hint: A put on a Eurodollar contract is a call on its implied rate. Calculate the implied Normal volatility on Oct 8th (= 63.8 bp, second hint!). Calculate the option Greeks (Delta, Gamma, Vega, and Theta) using “bump and reval” on the same day. Solve for the implied Normal vol on Oct 9th, and relate the realized 1-day P&L to the expected P&L.**

**Discuss: Let’s assume that you like your position and think it has more to give, but want to take some profit. What would you do?**

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6) CS: dynamic hedge(reduce the position on futures as things go better)

7) SZ: Straddle

Questions:

1. Realized volatility, break even volatility? Do we need more data to calculate realized vol?(Question 2)

Absolute change. 35 -> 40

Break even :vol \* sqrt(t)

Devay vs long gamma : break even; implied volatility

1. Expected pnl (Oct. 9) (If we have known the op price and fwd rate, then we can calculate the realized pnl. So why do we still need to estimate pnl?) (hint, last sentence)

Third: expetect using the greeks to estimate the next day’s P&L

Friday: realized

1. What does it mean by “it has more to give”?(“discuss”)

What I want is happening, rates move to the direction that I want. What will I do

Reduce hedge?

Looking for arbitrage? Buy a call to create a straddle

Theta, vega, delta(Gamma)