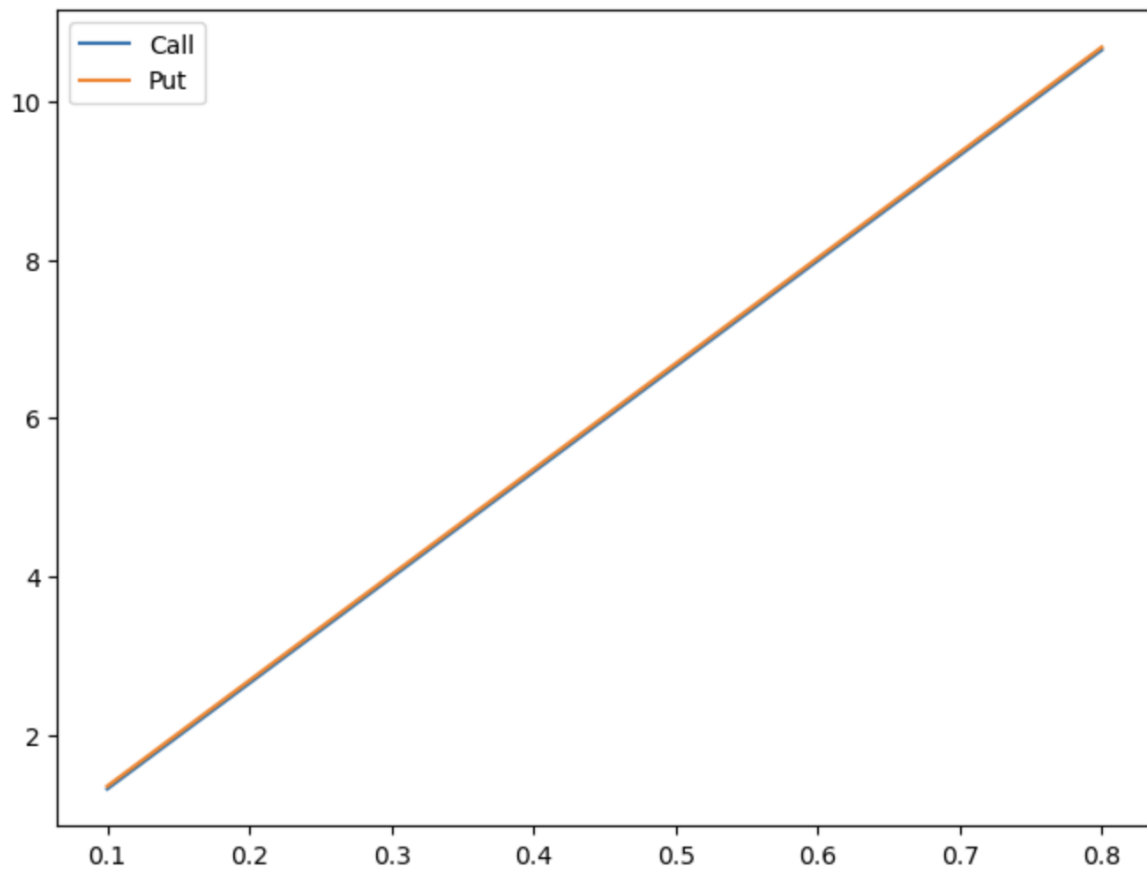


Week6 Project

Hongbo Feng

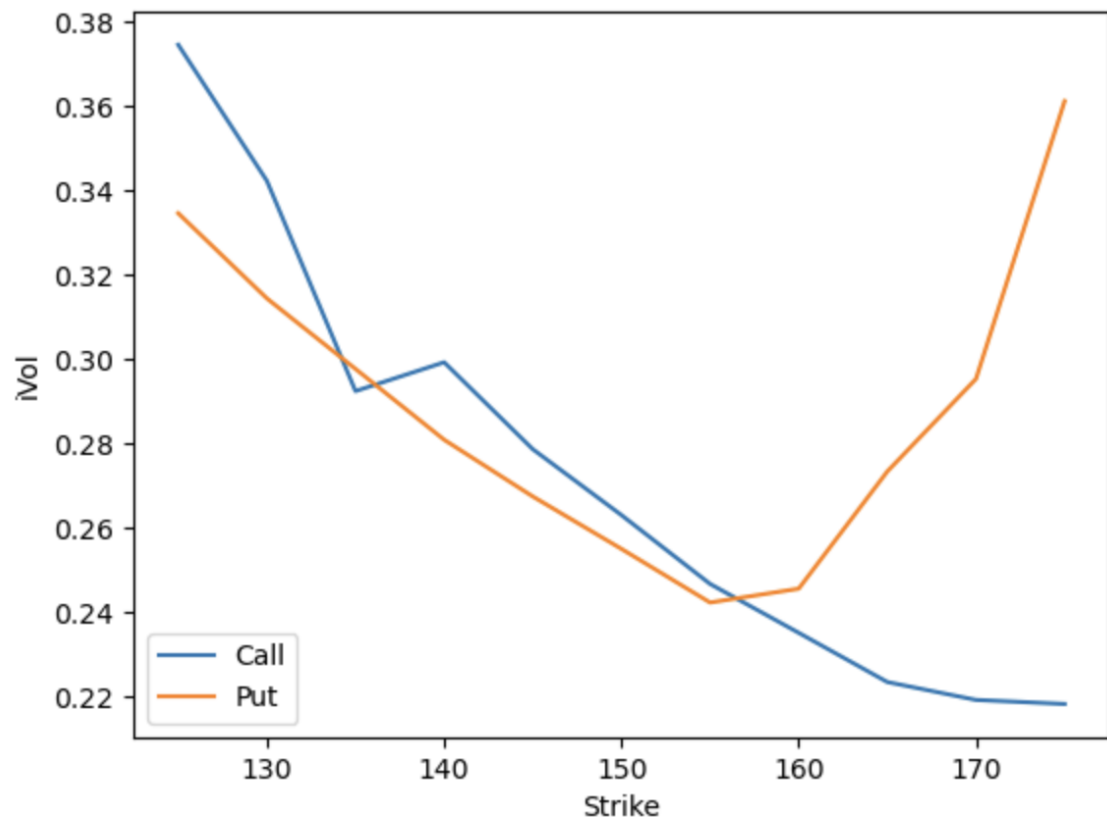
Q1

Using the current price as strike price, I plot option values under different implied volatility. As we can see, The lower the volatility, the closer the value is to zero. As the volatility increases, the value increases.

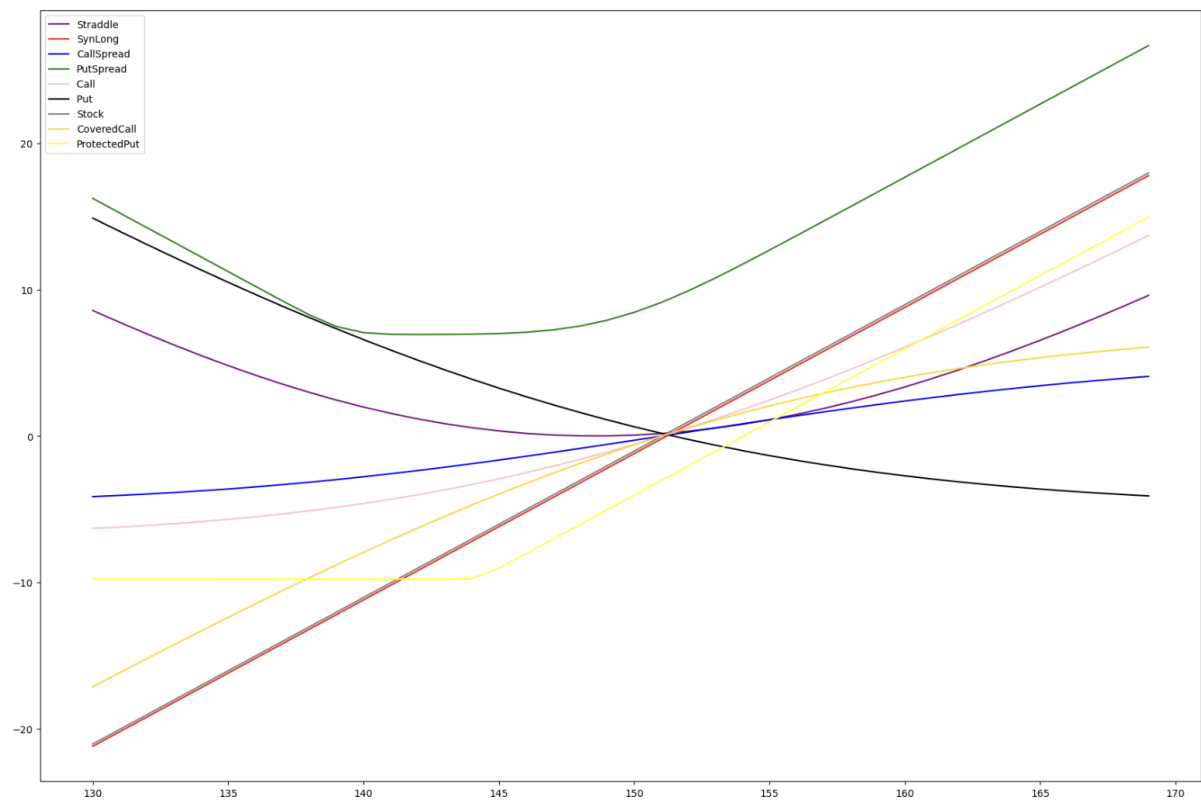


Q2

As we can see, the IVol curve for puts is like a volatility smile. But the curve for calls is not. The main reason implied can be that the market considers call options to be more stable than put options. This could mean that the market is more worried about the risk of puts or more optimistic about the risk of calls.



Q3



- (a) Straddle has the advantage of being able to invest in situations where market volatility is uncertain, as it is possible to profit from one of the options whether the market goes up or down.
- (b) Synlong and the stock curve are very similar.
- (c) The main advantage of call spread is the balance of protection and profitability in a bull market. Call spreads are less risky than buying call options, but also less profitable. The pink line floats more.
- (d) Put spread is with limited downside, and risk is low and returns are relatively limited.
- (e) Covered call enables the investor to gain some protection because the call option sold reduces the investor's potential loss.
- (f) Protected put is like a mirror curve for put.

3.2

Mean, VaR,ES respectively.

```
Straddle (7.410185932549264, 6.656724763474972, 10.230287590027842)
SynLong (-0.29012820997584565, 31.171506736113198, 39.01662274761265)
CallSpread (0.07944240181435154, 5.358651597574774, 6.7401468656871755)
PutSpread (18.4626678163342, 0.17426292084389416, 4.9087952088923)
Call (3.5600288612867104, 14.29223597096361, 18.827431462916067)
Put (3.8501570712625552, 12.183102062845133, 16.256196722238275)
Stock (-0.11617529764306991, 31.019533954697636, 38.87023380620758)
CoveredCall (-3.822808939620148, 22.32990095706245, 27.03144897213711)
ProtectedPut (1.5269432249229706, 20.088922685552337, 25.580224688575512)
```

As we can see, the highest risk portfolio is Synlong, and the second highest risk portfolio is Stock. The graph above depicts the same, they almost coincide exactly. The best performance portfolio is put spread. In times of high downside risk, put spread not only has a stable return, but also has a very low VaR.