Option Spreads

BUSI 722: Data-Driven Finance II

Kerry Back, Rice University

Hedging Short Positions

Protective call

- If you are short an asset, you can protect against the price spiking by buying a call.
- Your liability cannot exceed the call strike, because the call option can be exercised at the strike, and the asset you acquire can be used to cover the short.
- Usually use an out-of-the-money call.

Collaring a short position

- Buy an out-of-the-money call for protection
- Sell an out-of-the-money put to help pay for it
- Example: short a stock trading at 60, buy an 80 call, sell a 40 put
- Giving up some potential gain to limit your maximum loss

Spreads for investing/speculating

Basics

- Buy a call to speculate on price rising
- Buy a put to speculate on price falling
- Out-of-the-money options provide higher potential returns

Bull spread

- Buy a call to speculate on price rising
- Sell a further-out-of-the-money call to help pay for the first call
- Reduces potential gain but risk less money

Bear spread

- Buy a put to speculate on price falling
- Sell a further-out-of-the-money put to help pay for the first put
- Reduces potential gain but risk less money

Straddles and strangles

- Straddle = call and put with the same strike
- Win if underlying moves enough in either direction
- Betting on volatility instead of making a directional bet
- Strangle = make the put strike lower and the call strike higher
    - Less effective bet but cheaper

Butterflies and condors

- Empirically, selling straddles and strangles is profitable on average, but there is a lot of risk
- Can buy insurance against the risk by buying options
- A short straddle or strangle has both upside and downside risk
    - Insure the downside by buying a put (with a lower strike)
    - Insure the upside by buying a call (with a higher strike)
- Straddle (strangle) w/ insurance = butterfly (condor)

Put-Call Parity and its Implications

Underlying + Put = Cash + Call

- Protective put portfolio is same as call with cash, for European options
- Cash = PV of strike
- Stock ends up $\Rightarrow$
    - With put, keep underlying
    - With call, exercise to get underlying
- Stock ends down $\Rightarrow$
    - With put, exercise to get cash
    - With call, keep cash

Implication 1: Prices of puts and calls

- Put-call parity implies that underlying price + put premium should equal PV of strike plus call premium
- Equivalently, put premium = call premium + PV of strike - underlying price
- Equivalently, call premium = put premium - PV of strike + underlying price
- Actually, this is true only for European options on stocks that don't pay dividends before the option maturity.

Implication 2: Calls are better alive than dead

- Never optimal to exercise American calls on non-dividend paying stocks prior to maturity
- If you exercise, you get underlying price - strike
- If you hold, value is
    - underlying price + put value - PV of strike
    - $>$ underlying price - PV of strike
    - $>$ underlying price - strike

Can be optimal to exercise American puts early

- Exercise when underlying is very low
- When it becomes clear that exercise will be optimal, might as well exercise early to get strike and earn a return on it.
- Still better to close position by selling rather than exercising.
- Optimality of exercise means that put premium can fall to strike - underlying price.

Implication 3: Two ways to make bets

- Anything you can do with a call, you can also do with a put and the underlying and cash
- And vice versa
- Example: bear spread with cash = collared long position
- Example: make a butterfly spread entirely with calls