Option Trading
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Also...

- The types of trading techniques that are legal differ enormously from country to country and market to market.

- What is "smart market making" in one place might be market manipulation in another.

- Always check with your compliance officer before doing anything that could be interpreted as manipulation.

Major Takeaways

- Option trading is about trading, not options.

- Trading is about observation, not models or methods.

- Simple and robust ideas are always best.

- There are no rules but there are general principles.

- Trades won't have predictable results, but all choices have predictable consequences.

Option Trading

Session One: General Principles of Trading

Session One Overview

- General option trading philosophy.

- Trading Principles: edge and risk.

- The Efficient Market Hypothesis (EMH).

- Finding edge.

- Adverse selection and trading costs.

Two (Opposite) Mistakes

- Too naïve: it is easy to come up with ways to make money.

- Too pessimistic: it is impossible to make money.

- Obviously, truth is in the middle.

- The market is a constantly adapting ecosystem, which has little pockets of inefficiency.

- Trading isn't usually about models. It is usually about understanding what others are doing.
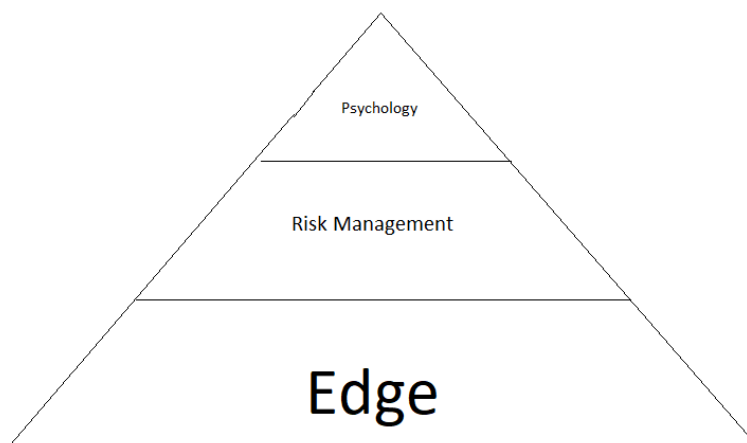
Philosophy on Trading

- You are a trader first, an option trader second. Sometimes options will not be the best way to monetize an idea.

- Remember the goal is to make money. People can sometimes become too focused on one idea, method or problem, particularly if it is interesting to them.

Philosophy on Math

- Quantitative traders can become too in love with the math.

- Math doesn't matter intrinsically; it is just a means to an end.

- All good solutions should be (somewhat) intuitive and robust with respect to the math used to formulate the problem.

- Math (and ML) won't directly find ways to make money.

- Never start with math. Always let the phenomena lead.

- Make money: done though identifying trades where we have an advantage, edge.
- Keep money: done by managing risks.
- Keep going: done by working hard and consistently.

What is a Good Trade?

- A good trade is one that we would repeat no matter the result.

- Requires positive expectation AND an acceptable level of risk.

- EV is risk-agnostic but "acceptable risk" varies between traders and firms.

Edge

- Edge refers to trades with positive expected value.

- Expected value (EV) is the sum of probability weighted outcomes.

$$EV = \sum_i p_i W_i$$

- We have a coin that comes up heads 55% of the time.

- If we win (by calling heads) we get a dollar, and if we lose, we forfeit a dollar.

$$EV = 0.55 \times \$1 - 0.45 \times \$1$$
$$EV = \$0.1$$

- We have positive EV, so this is a potentially attractive trade.

- Note that EV is here not a result that any one trial can have.

Edge Example

- Bet $1 on this coin 1000 times.

- Our average profit will be $100.

- But the variance of profit will be

    n x P x (1-P) = 1000 x 0.55 x 0.45 = 247.5

- So, the standard deviation is $15.73

- If we have another coin that only comes up heads 10% of the time but we win $10 when it does, we still have EV= $0.1.

- These bets are obviously very different. EV doesn't tell you **all** you need.

- Having an edge does not necessarily mean you win more *often* than you lose. It means you win more than you lose on *average*.
- Consider a (six-sided) die. Outcomes of one through four occur 2/3rds of the time. But knowing this is the most likely occurrence doesn't give you an edge.
- If you only get 40c for landing on 1,2,3 or 4 and lose $1 if you don't, then you have negative edge.
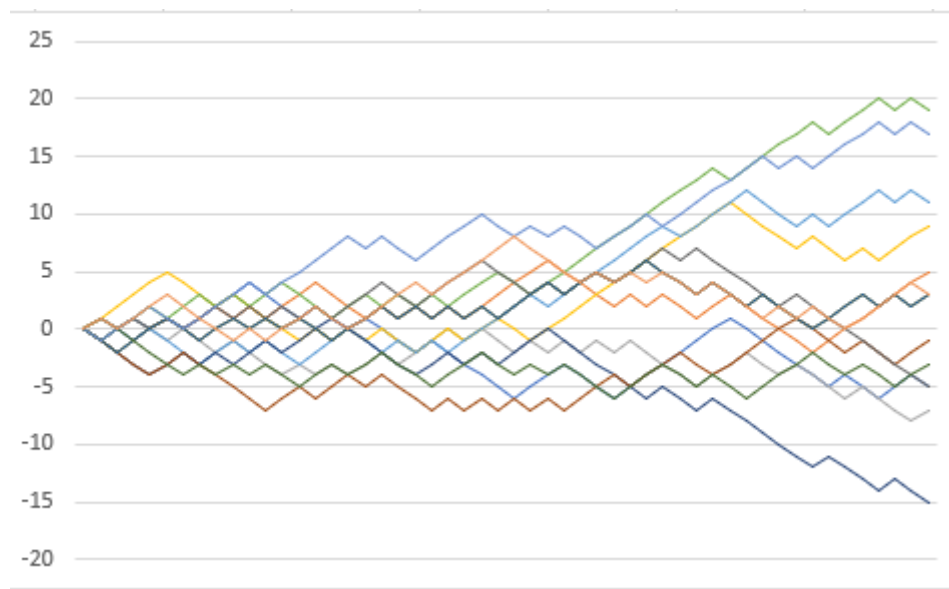- People often confuse winning percentage with edge. Betting on favorites is often a long-term loser.

- **Risk is everything that isn't edge**.
- Model risk: we are just wrong.
- Variability of results (luck).
- Stuff we aren't trying to predict, but others might be.
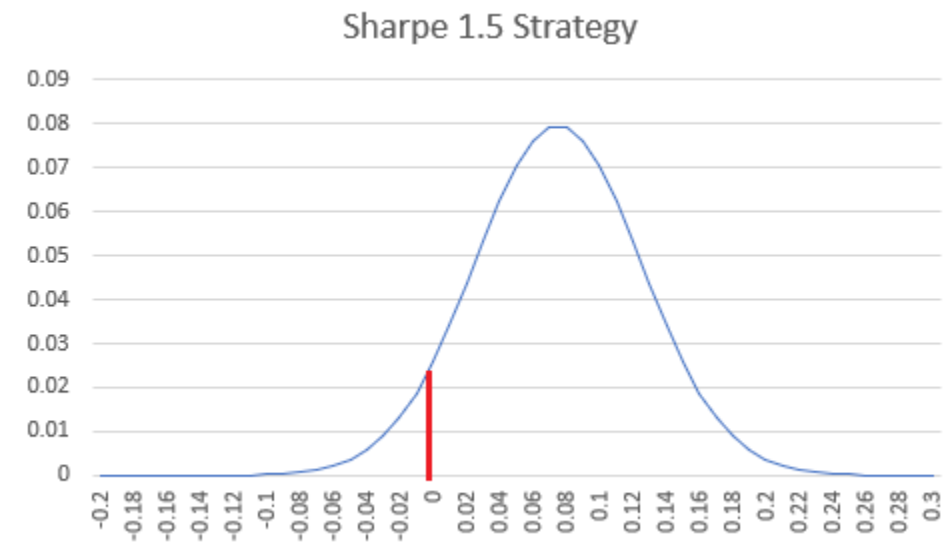- Meta-risks.
- Black swans.

- Even when we have edge, we can have bad results.
- Example: 12 instances of a 52% wining strategy over 52 trades.

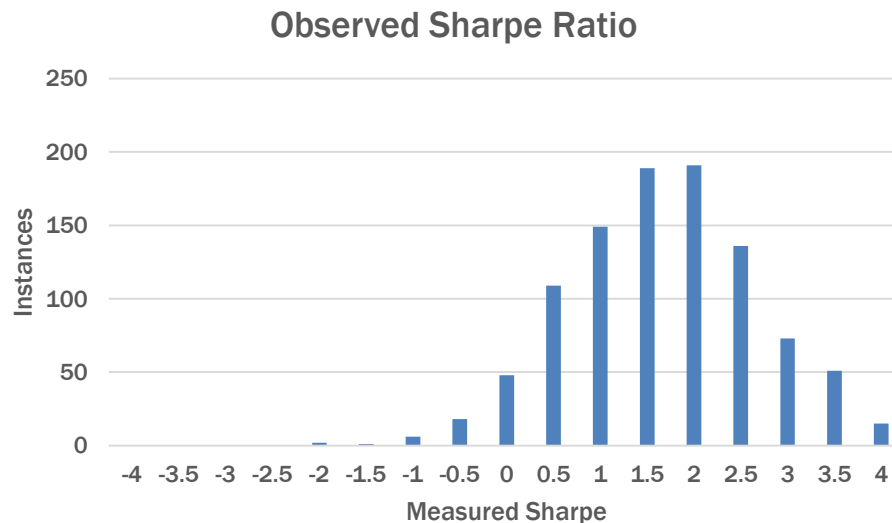- A true Sharpe ratio of 1.5 is good.
- But this means 7% of the time you will be a loser after a year.

Sharpe 1.5 Strategy

Variance or Luck

- 17% of the time you will have a Sharpe ratio less than 0.5.

Observed Sharpe Ratio

Stuff we Don't Predict

- No one can predict all the things that drive a market.
- We will be trying to predict volatility, but options also depend on currency, interest rates, dividends and stock movement.
- Try to hedge as much as this as we can.

Meta-Risks

- Unlike sports or casinos, we are exposed to stuff outside the direct confines of our market.

- Bankruptcies.

- Inflation.

- Fraud.

- Global economic events.

Black Swans

- Events so unpredictable that they are beyond imagining.
- No one would ask "what is the chance of there being a black swan?", because the question would never occur to anyone.
- Somewhat personal (depends on imagination).
- Mine include:
  - ETF restructuring.
  - Index restructuring.
  - Covid.

Efficient Market Hypothesis

- Formally, a market is efficient with respect to some information, if excess profits can't be derived from that information.

- Informally it means making money is hard.

- EMH is a very good approximation, but it isn't totally true. It is neither impossible nor easy to make money.

No-Arbitrage Pricing

- An arbitrage is a risk-free profit. EMH says they don't exist (In real life they are very rare.).

- Sometimes useful to assume we have found one and see where that leads us.

- This is the basis of futures pricing, option pricing and many other ideas.

Exceptions to EMH

- Exceptions are either inefficiencies or risk premia.

- Exceptions require some of:

1. A market constrained by costs, barriers to entry or capital constraints.

2. Information asymmetries.

3. Participants with different goals.

Inefficiencies

- Wrinkles or inconsistencies.

- Examples:

- Products that can be replicated at better prices. A convertible bond is a bond and an option. An inefficiency would arise if the bond and option could be bought more cheaply than the convertible.

- On the run bonds are more desirable than off the run bonds and trade richer even though they have the same risks.

- Inefficiencies are often transient and not scalable.

Risk Premia

- People pay to avoid certain risks. For example, we buy house insurance.

- Trading Examples:

- Equity premium: stocks go up.

- Volatility premium: options are over-priced.

- Skew premium: puts are over-priced relative to calls.

- Risk premia are time varying, but persistent. They can form the foundation of a trading business.

- Easy to find but hard to manage.

- "Feel" or intuition. You need to be able to test and quantify.
- Classic technical analysis: trend lines, chart patterns etc.
- Casual analysis of public information (newspapers etc).
- Risk management.
- Intuition.
- Mathematical techniques or ML.

Think Like a Businessperson

- If your idea can't be reduced to a compelling elevator pitch, it is probably not worth pursuing. "I supply liquidity by looking to buy extreme dips and sell extreme spikes" summarizes an idea that might work.

- Would you invest in your idea if someone else proposed it?

- Is your idea a service to the world, doing something hard that counterparties want?

Psychology

- Psychological traits like discipline, control and perseverance are not the primary drivers of success.

- Trading is a performance-based activity and, like any other, psychological attributes are not sufficient.

- No matter how disciplined you are, you won't be playing cricket for India.

- Conversely, many successful traders are lunatics.

Finding Trades with Edge: Books

- The edges found in books will be evergreen ones: risk-premia and various forms of carry.

- Even if not directly actionable, it is vital to know the tides you might be swimming with or against.

- "Expected Returns" by Antti Ilmanen.

- "The Handbook of Equity Market Anomalies" by Leonard Zacks.

- "Positional Option Trading" by me.

Finding Trades with Edge

- Being taught by another trader (the method used by banks and trading firms).

- Twitter follows.

- 3rd party courses (like this one).

- Reading academic papers: www.ssrn.com, arxiv.org, scholar.google.com.

- Published papers won't tell you entire strategies. But they will give you ideas and parts of strategies.

Backtesting

- Backtesting usually has a poor ROI.

- Testing option strategies has technical challenges, particularly cleaning data, huge data sets, interpolating between different options and calculating derived variables.

- More prone to data mining than delta-one products.

- Nothing is really out of sample; you can't go back to a state of zero knowledge.

- Options also depend on counter-factual history, the things that didn't happen.

- Life is too short, so test to confirm, not to explore.

The Automation Trap

- Automate because of needs not wants.
- Automating means less active interaction.
- You learn from interaction.

Finding Trades with Edge

- These are the two types of trades with edge.

- <u>Model driven</u>: Always have a fair value based on a particular model.

- <u>Event driven</u>: Based on special situations, not values.

Examples

- Blackjack: Card counting v/s ace tracking
- Sports: Simulations v/s over-reaction
- Options: Black Scholes v/s variance premium

Pros and Cons of Model-driven

- Model driven needs to have a good model. Sometimes the model fails but still looks good because the market is pricing in something you aren't.
- Can always be trading.
- Easy to estimate whether a trade is good or bad.
- Often scales well.

- The reason we trade options is because volatility is predictable.

- So, we should make an effort to predict it.

- But there comes a point where good enough is enough.

- A simple model, consistently calculated and applied will get you in the right ballpark.

- A complex model will often create more issues than it solves:

  - HF data needs to be cleaned and filtered to remove bid/ask bounce effects.

  - The opening price for many instruments is meaningless.

  - Online estimators need data pipes and computing power.

Pros and Cons of Situation Driven

- If you don't know why a trade exists, it can be hard to know when it will stop.
- Often based on psychological reasons and we can talk ourselves into belief.
- Need to wait for situations to arise.
- Hard to estimate edge and hence size.
- It may not scale.

Embracing Ambiguity

- We should usually look not for situations where we are 100% confident, but instead for cases that we have several *reasons* to believe but no real *proof*.

- Academics look for a t-statistic of 2.

- Traders should look for a t-statistic of around 1, together with other types of evidence.

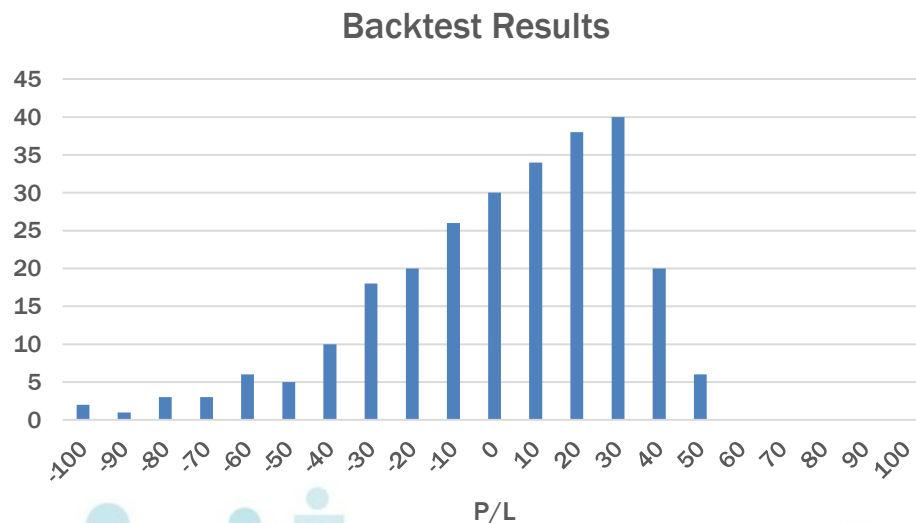- If a trade is totally proven, it will soon cease to exist.

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- It can be anxiety inducing to trade like this. These thoughts may help (or not, I don't know you and I'm not a psychiatrist).

- Use "mental accounting".

- Tell yourself you've already lost the money, then any other result is upside.

- Remember that in ten years, the bad day you are having won't even be one you remember.

- Even if your idea is bad, remember it is as hard to negative edge as positive edge, so you are most likely just losing costs, not finding negative alpha.

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- The biggest problem in trading is that you might be the dumb one.
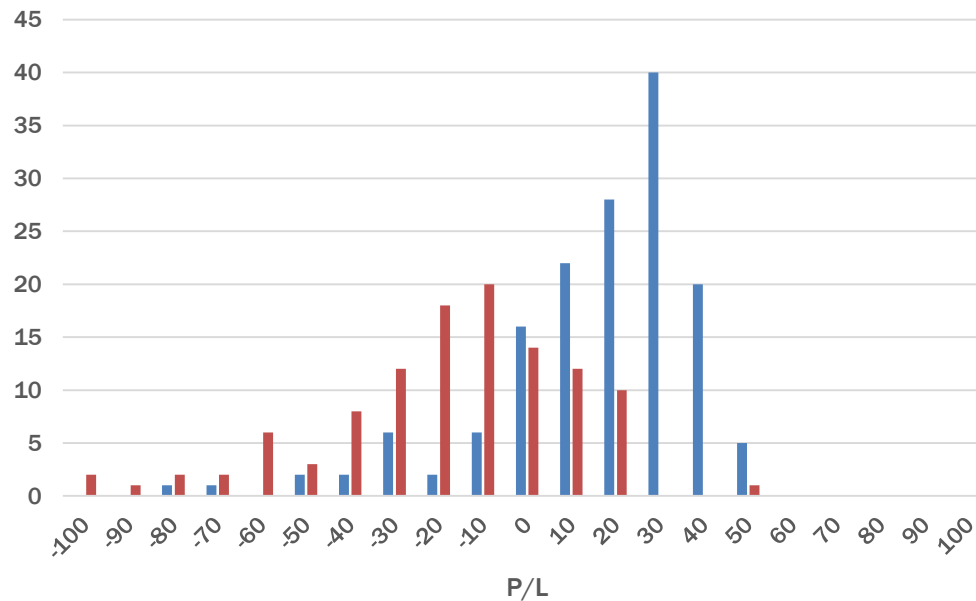- The counterparty is doing the trade for a reason as well.

Backtest Results

Adverse Selection

- It isn't as simple as saying "we have positive EV so we can just do all the trades and ride out the variance involved".
- We have implicitly assumed all of our trades are from the same true distribution.
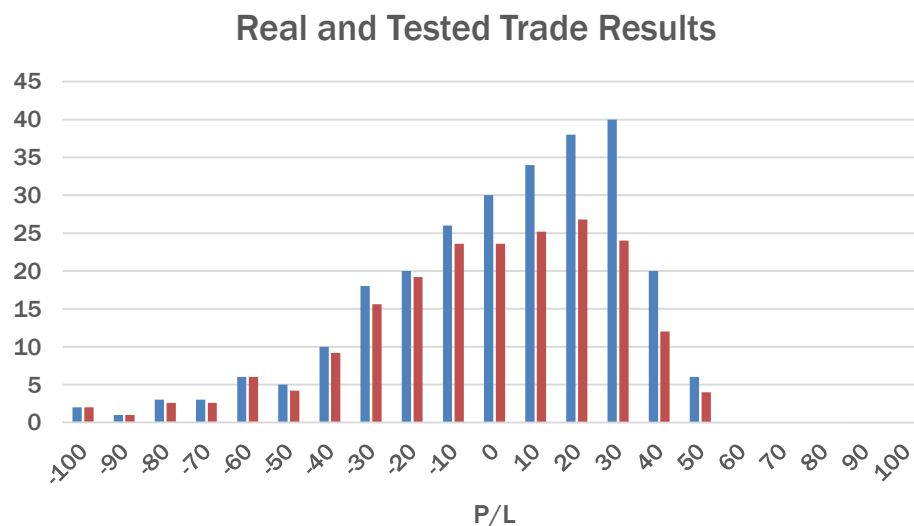- More likely that there is a "good" set of trades and a "bad" set of trades.

"Good" and "Bad" Trades

Adverse Selection

- In reality, we are much more likely to get the "bad" trades.
- The "good" trades are much more competitive.

Real and Tested Trade Results

Transaction Costs

- Transaction costs include: the bid/ask spread, clearing fees, exchange fees and brokerage fees.
- Every time you trade there are costs.
- Insidious, because each cost is small. But they add up.
- It is easily possible to pay 20% of expected profit in fees.
- They have an infinite, negative Sharpe ratio.
- The best way (by far) to improve a winning strategy is to reduce costs.

Adverse Selection and Costs

- To avoid adverse selection, we should take all trades.
- To reduce costs, we should try to not cross bid/ask spread.
- These are contradictory (no-one said this this was easy).
- Be aggressive when entering and conservative when rebalancing or hedging.
- Avoid things with wide spreads or low volumes.
- Look for lower rates.