

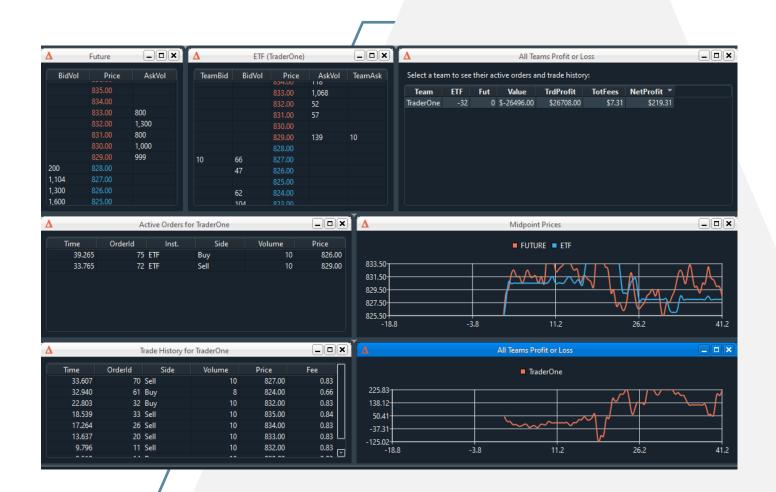
MELBOURNE HACK 2022

BUILDING A TRADING BOT WITH OPTIVER



AGENDA

- Trading Basics
 - → The Pillars of HFT
 - → What is Market Making?
 - → What is a Theo? How can we calculate one?
 - → Risk Basics
 - → Execution Basics
- Making a Basic Autotrader
 - → Explaining the UI (Future vs ETF, Profits)
 - \rightarrow Building a trader using what we just learnt
 - \rightarrow Further reading to make a better auto-trader





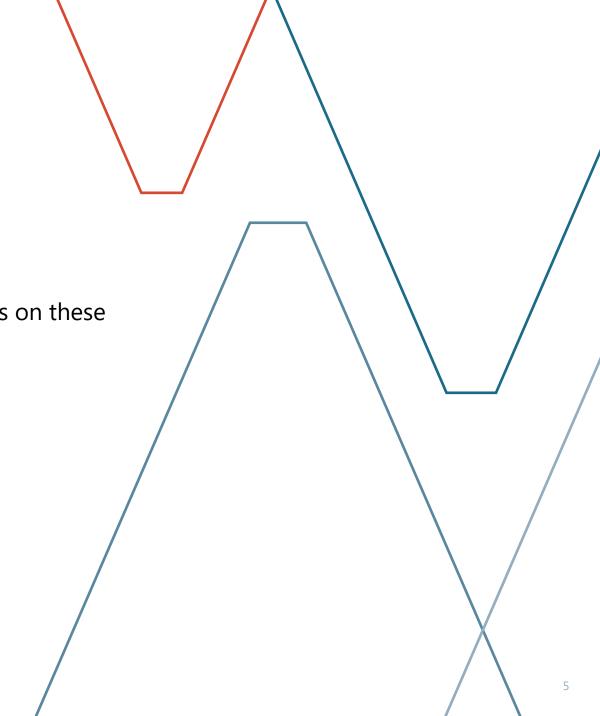
THE BASICS

PILLARS OF TRADING

THE HEART OF OPTIVER'S BUSINESS

- Pricing
- Execution
- Risk
- Market Making

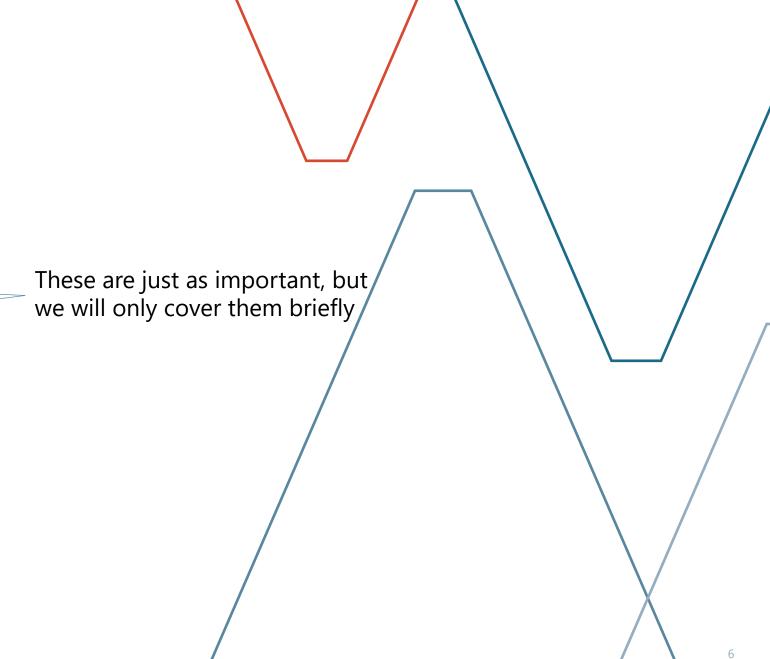
We will focus on these today



PILLARS OF TRADING

THE HEART OF OPTIVER'S BUSINESS

- Pricing
- Execution-
- Risk •
- Market Making







MARKET MAKING – THE BASICS

PRETEND YOU WISH TO SELL A HOUSE...

- Selling a house is painful
 - → You need to find buyers
 - \rightarrow You need to negotiate with them all on a fair price
 - ightarrow You close the deal months after listing
 - → Houses, are **illiquid** (majority of cases)







MARKET MAKING – THE BASICS

NOW THINK STOCKS

- Imagine the same was for stocks
 - → How on earth would we have a functioning and efficient global market?
 - → Market makers like Optiver are always in the market to buy and sell stocks at a fair price
 - → They profit on the **bid-ask spread** (and the exchange also pays them)
 - → With the help of market makers, stocks are **liquid**
 - → You don't care what direction the market moves, you care about volatility
 - → As a market maker, you want a relatively **flat** position, or to **hedge** out your positional risk.



Spread: 50 cents

TeamBid	BidVol	Price	AskVol	TeamAsk
		020,00	1,049	
		837.00		
		836.00	108	
		835.00	49	
		834.00	47	
		833.00	97	10
	3	832.00		
		831.00		
	10	830.00		
10		829.00		
		828.00		

The key to any auto-trader... THEO The fair price **we** think the instrument should trade at

optiver Δ



PRICING – THE BASICS

HOW DO WE FIND THIS MYSTERIOUS THEO?

- How can we extract a fair price from current market conditions?
- VWAP (Volume Weighted Average Price)
 - → A more indicative indicator of the fair price, taking volume (demand for a specific price) into account
 - \rightarrow Calculated as $(\frac{bid_{price} \times ask_{volume} + ask_{price} \times bid_{volume}}{bid_{volume} + ask_{volume}})$ (all prices and volumes are the 'best')
- We can use prices from other instruments similar to ours
 - → We could use the performance of Google stock to predict the price of a technology index
 - → A more advanced technique is Future signalling, which we will cover briefly later
- More advanced techniques include moving average, signalling (future, return), retreating
 - → Ask me after the workshop if you're curious on any of these (we will cover some briefly)



Don't even ask the question. The answer is yes, it's priced in. Think Amazon will beat the next earnings? That's already been priced in. You work at the drive thru for Mickey D's and found out that the burgers are made of human meat? Priced in. You think insiders don't already know that? The





QUICK LOOK AT: RISK

WHY CARE ABOUT RISK?

- Exchanges like most things in life have rules
 - → You can't just rock up and manipulate the price to what you want
 - → Exchanges have the right to ban you if you do anything considered unfair
 - → It's important to make your trading strategy compliant
- You also got to be careful with your money
 - → Losing money isn't fun
 - → Decide on a risk appetite, and work off that
 - → Hedge out risks you don't want to take (hedging is like insurance for your position)



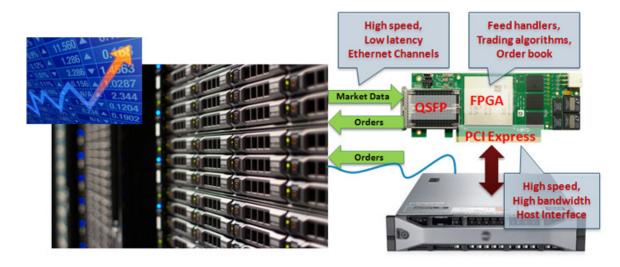




QUICK LOOK AT: EXECUTION

IT'S A GAME OF SPEED

- There are a lot of other participants all trying to get rich just like you
 - \rightarrow Opportunities are plentiful, but its first come first serve
 - \rightarrow You need to be fast, or you miss out
 - → In the real market, Python won't cut it, since it's too slow
 - → Optiver, and many other HFT firms use **FPGAs** to perform trades at breakneck speeds.
 - → On some of Optiver's servers, trade decisions happen in nanoseconds. The limiting factor is the speed of light across the board.



LET'S GET CODING!

THANK YOU

GOOD LUCK AT MELBOURNE HACK!

• If you apply to work at Optiver because of this workshop, don't forget to put HackMelbourne and me as your source.

• It helps Optiver recognise these workshops provide value!

• I'll be around to answer any questions doing the hackathon ©

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https://www.optiver.com/working-at-optiver/career-opportunities



Ryan Samarakoon



