

optiverΔ



ALGORITHMIC TRADING INTRODUCTION



WHAT THIS TALK IS ABOUT

PART 1

Basics of financial markets and algorithmic trading

PART 2

Discuss the challenge

PART 3

Demo Optibook (our virtual exchange)



PART 1: MARKETS & ALGORITHMIC TRADING

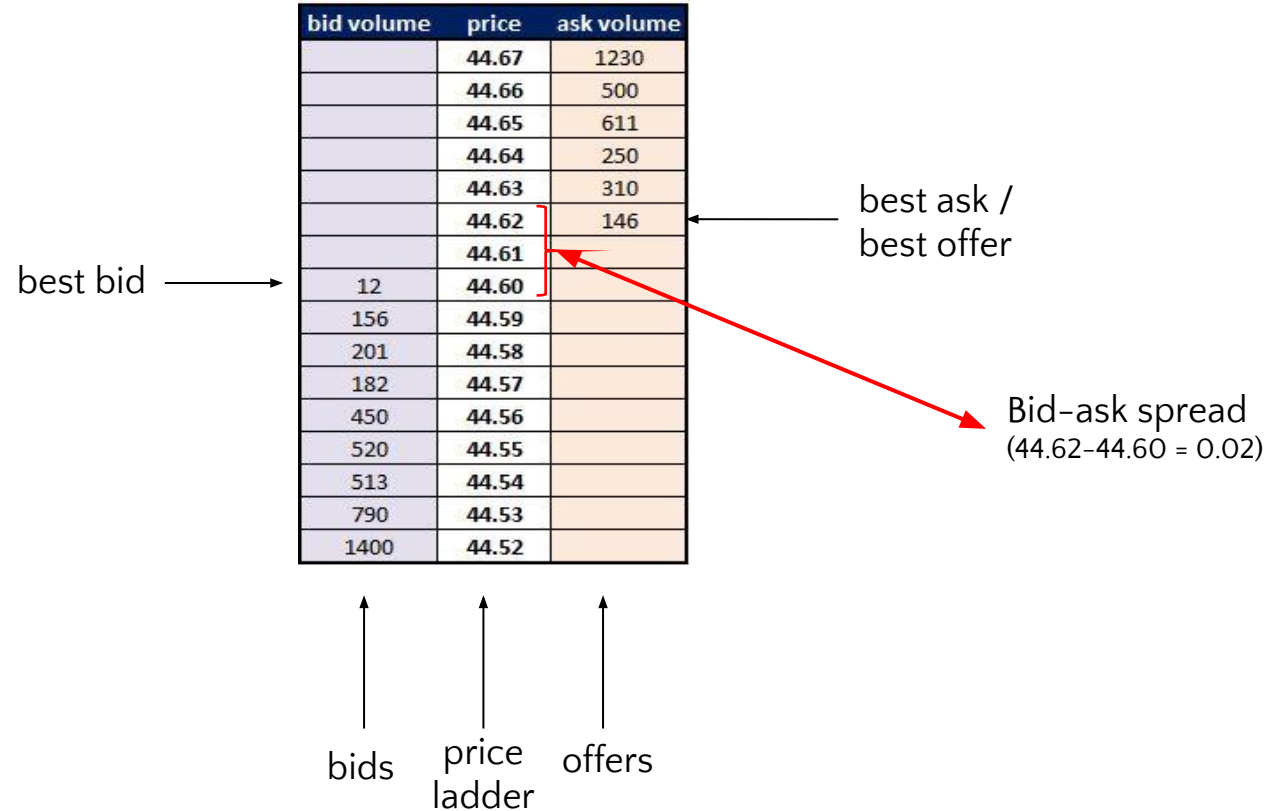
FINANCIAL INSTRUMENTS

Any object that is traded on an exchange, e.g.:

- a stock
- a future
- an option
- an ETF
- a bond
- more...

Today we are only trading stocks.

ORDER BOOKS



LIQUIDITY

liquid

bid volume	price	ask volume
	44.67	8539
	44.66	10551
	44.65	3677
	44.64	6800
	44.63	9061
	44.62	6693
	44.61	6573
2049	44.60	
5176	44.59	
1080	44.58	
5000	44.57	
16776	44.56	
2000	44.55	
15349	44.54	
7800	44.53	
11327	44.52	

illiquid

bid volume	price	ask volume
	44.67	745
	44.66	496
	44.65	
	44.64	400
	44.63	14
	44.62	
	44.61	
	44.60	
	44.59	
	44.58	
	44.57	
	44.56	
202	44.55	
	44.54	
421	44.53	
846	44.52	

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- Volume
- Bid-ask spread

illiquid

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MARKET MAKING

PRIMARY ROLE

Provide Liquidity

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HOW?

- Quote best bid and best ask
- Capture spread as profit

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quote here →	2049	44.60	← quote here
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→ Bid-ask spread becomes profit for a market-maker

ORDER TYPES

Define how your order is executed on exchanges



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OPTIBOOK ORDER TYPES

- Limit Order
- Immediate or Cancel

ORDER TYPES ON EXCHANGES

- Market Order
- Quote
- Fill or Kill
- Stop (Limit) Order
- Iceberg Order

ORDER TYPES

Sending a buy order for 20 lots:

- Limit order ("passive")
- Immediate or cancel, or IOC order ("active")

Limit order @ 151

bid #	price	ask #
	155	54
	154	60
	153	53
	152	37
2	151	
	150	
1	149	
13	148	
24	147	
47	146	
64	145	
56	144	

Start situation

bid #	price	ask #
	155	54
	154	60
	153	53
	152	37
	151	15
	150	3
1	149	
13	148	
24	147	
47	146	
64	145	
56	144	

IOC order @ 151

bid #	price	ask #
	155	54
	154	60
	153	53
	152	37
	151	
	150	
1	149	
13	148	
24	147	
47	146	
64	145	
56	144	

PART 2: THE CHALLENGE



DUAL LISTING PROBLEM

One stock is trading on two different exchanges (i.e. in two different order books).

Since both order books concern the same stock, the value of the stocks should be the same. A difference in their price triggers a trading opportunity.

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Stock ABC on exchange 1		
bid volume	price	ask volume
	44.63	1000
	44.62	1000
	44.61	1000
1000	44.60	
1000	44.59	
1000	44.58	

Stock ABC on exchange 2		
bid volume	price	ask volume
	44.63	200
100	44.62	
300	44.61	
500	44.60	
600	44.59	
700	44.58	



HEDGING

A dual listing is “market neutral”: we do not care whether the price of the stock goes up or down.

We ensure this “hedging” our trades. For each trade in one order book, we do the opposite trade in the other order book to ensure that our overall position remains 0 or close to 0.



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TL;DR: Make sure that your net position across all instruments is close to 0.

SHORT SELLING

In Optibook, you can sell something you do not have - you can have a negative position.

This is more complicated in real life, but in Optibook we kept it simple.

DUAL LISTING PROBLEM

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Since both order books concern the same stock, the value of the stocks should be the same. A difference in their price triggers a trading opportunity.

What trade would we do here?

Stock ABC on exchange 1		
bid volume	price	ask volume
	44.63	1000
	44.62	1000
	44.61	1000
1000	44.60	
1000	44.59	
1000	44.58	

Stock ABC on exchange 2		
bid volume	price	ask volume
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DUAL LISTING PROBLEM

Buy 100 shares for 44.61 on **exchange 1**

Sell 100 shares for 44.62 on **exchange 2**

Profit: $100 \times 44.62 - 100 \times 44.61 = 1.00$

Net Position: **+100** on **exchange 1**, **-100** on **exchange 2**

Note: Here, the shares on **exchange 1** do not cancel out with the shares on **exchange 2**, so what do you do now?

Stock ABC on exchange 1		
bid volume	price	ask volume
	44.63	1000
	44.62	1000
	44.61	1000
1000	44.60	
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bid volume	price	ask volume
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OPTIBOOK

