Introduction to Financial Markets and Electronic Exchanges

Disclaimer

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Outline

- Overview of financial markets.
- Types of trading instruments.
- Electronic exchanges
- Order types
- Market Microstructure and Limit Order Book.
- Journey of an order

History of Financial Markets

Amsterdam Stock Exchange
17th Century

Source: moaf.org

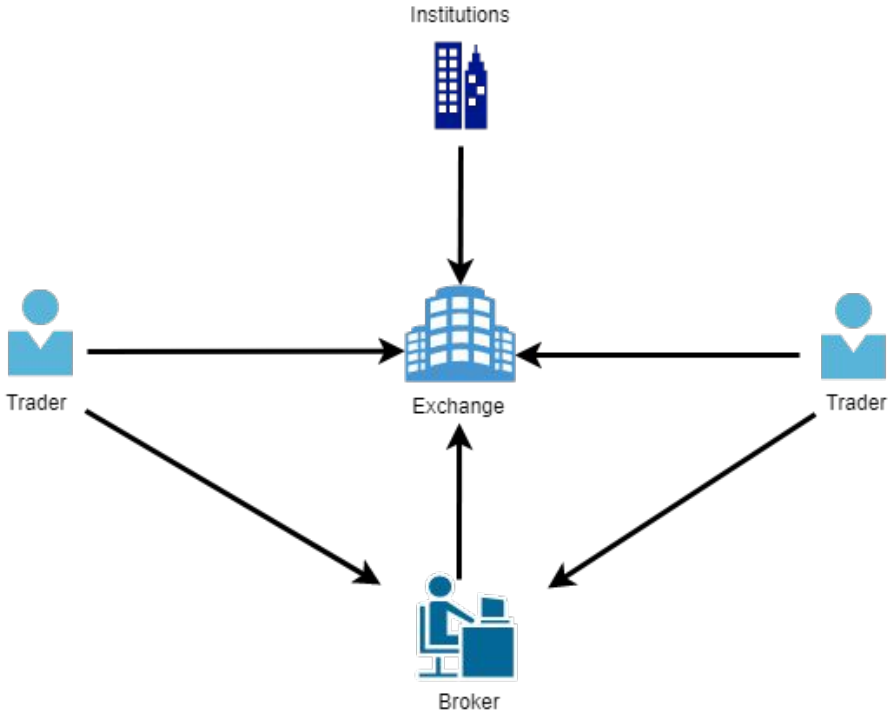
Chicago Board of Trade
1980's

Source: Wall Street Journal

New York Stock Exchange
21st Century

Source: Yahoo Finance

Stock Exchange



- Buyers must find sellers and sellers must find buyers.
- Buy side and sell side
- Brokers
- Market Makers

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Trading Instruments

- Equities: Stocks, Equity Indices, IPOs
- Fixed Income: Fixed Deposit, Bonds, Credit products
- Commodity: Bullion, Crude Oil, Agri Commodity
- Property: Real estate, Mortgage (MBS)
- Derivatives: Futures, Options, Swaps, Forward Contracts
- Currencies: Forex, Crypto
- ETF’s, Mutual Funds

Market Participants

Buy Side

- Retail Traders/ Investors
- Asset Managers, Hedge Funds, Private Equity
- Proprietary Trading firms

Sell Side

- Investment Banks
- Broker-Dealers
- Insurance companies
- Market Makers

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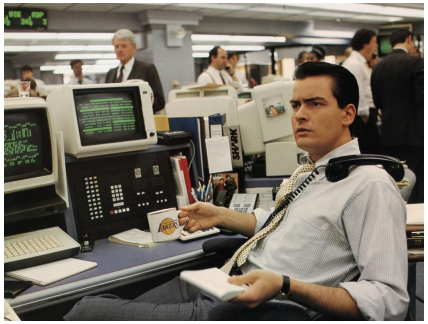
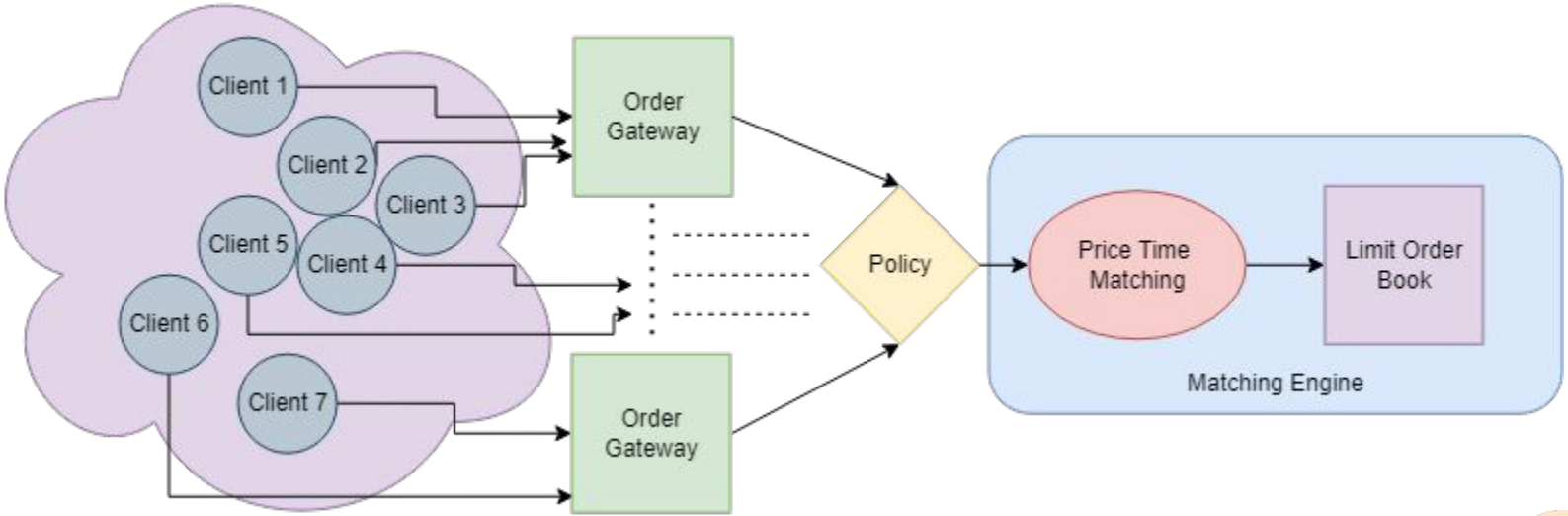
Electronic Exchange

- The first electronic exchange was started on 1971.
- By 1992 electronic trading accounted for 42% of the trading volume in U.S.
- Faster execution
- Decimalization
- API trading



Working of a Electronic Exchange

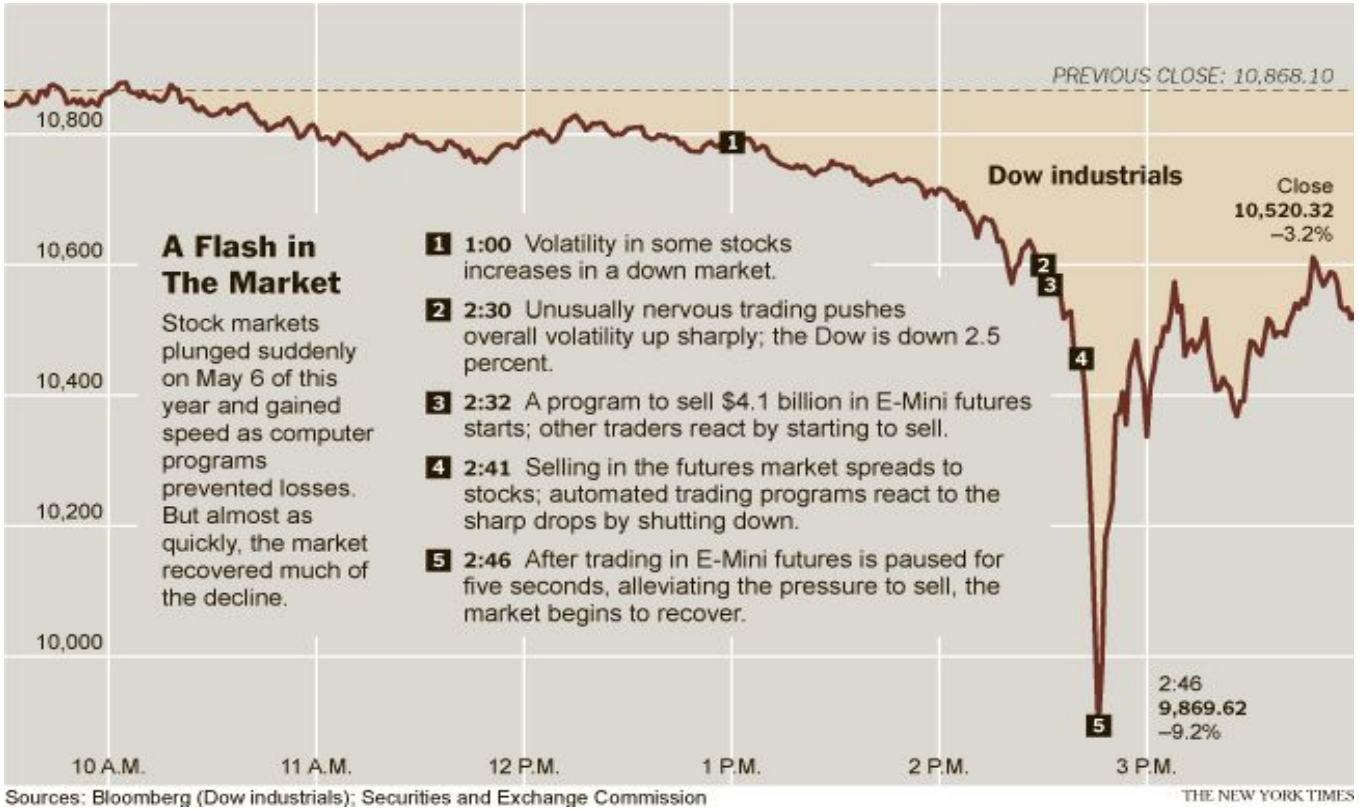


Algorithmic Trading

- Development of electronic trading platforms lead to automate execution, which lowered the bar of algorithmic trading.
- Technologies like DMA (Direct Market Access) and FIX (Financial Information eXchange) gave access to real-time information. This also increased the quality and granularity of historical data.
- Lower latency and increased data granularity gave birth to a subset of algorithmic trading know as High Frequency Trading or HFT.
- High Frequency Trading involves buying and selling securities in a very small duration of time usually a HFT position lasts for less than a second. And this is repeated multiple times during a normal trading session.
- High Frequency Trading can be only executed using a computer algorithm. Analyzing the markets at nanosecond level and sending multiple orders in a fraction of second is not possible manually.

May 6, 2010 ?

Flash Crash of 2010



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Basic Order Types

Market Order

- Gets executed at market price.
- Price is not guaranteed due to slippage.
- Execution is fast.
- Consume liquidity.
- Larger orders may significantly move the market.

Limit Order

- Execution happens against the ask or bid price.
- Price is certainly guaranteed
- Execution is slow. Partial fill can happen or may not even happen.
- Usually provides liquidity.
- Larger orders can be executed without affecting the market.

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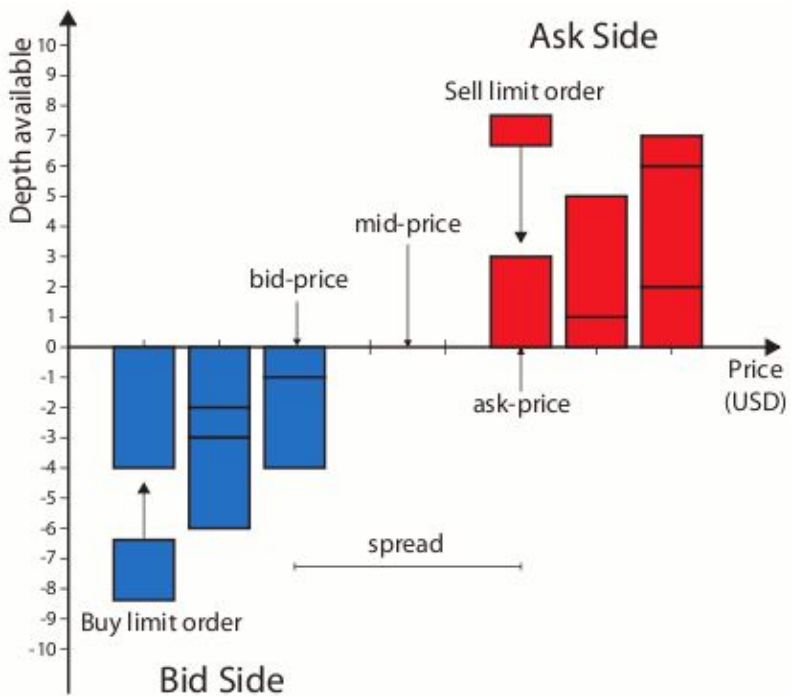
Limit Order Book



Source: ResearchGate

Orderbook		Grouping None	
	↓ 39,044		
Bid Size (BTC)	Bid Price (USD)	Ask Price (USD)	Ask Size (BTC)
1.9276	39,044	39,045	10.3346
0.0730	39,043	39,046	1.0893
0.0003	39,041	39,047	1.8026
0.1824	39,038	39,048	0.8836
1.0271	39,037	39,049	0.0500
1.1904	39,036	39,050	1.4033
1.5173	39,035	39,051	2.4483
1.5739	39,034	39,052	1.1360
1.3663	39,033	39,053	0.7263
10.0284	39,032	39,054	0.6204
0.3807	39,031	39,055	1.3119

Ticker: BTCUSD Date: 2022-04-18 Time: 17:01 *Source: FTX*

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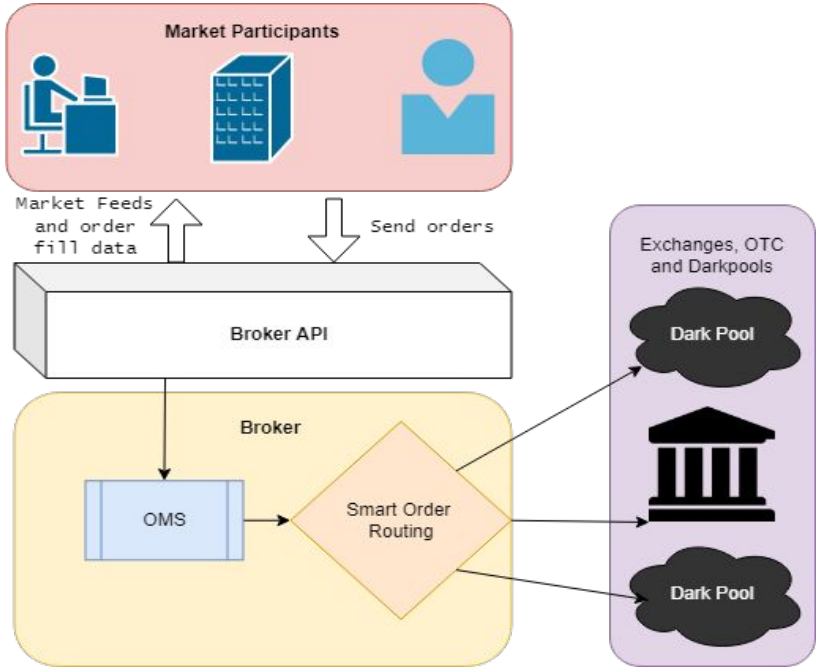
How an order gets executed ?

- Brokers arrange trades for clients, by representing the client at the exchange.
- Most of the orders get matched at the broker and don't even reach the exchange.
- Brokers order routing systems sends a order to a optimal execution venue which includes exchanges and dark pools.
- Dark pool provides anonymity for executing large blocks of trades at market price.



References

- Harris Larry, 2002. Trading and Exchanges: Market Microstructure for Practitioners.
- Barry Johnson, 2009. Algorithmic Trading and DMA: An Introduction to Direct Access Trading Strategies
- Edward Leshik, Jane Cralle, 2011. An Introduction to Algorithmic Trading: Basic to Advanced Strategies
- Álvaro Cartea, Sebastian Jaimungal, José Penalva, 2015. Algorithmic and High-Frequency Trading

Activity

Mystery with the Casino games

Consider a casino that offers three dice games, where you roll a fair die on the table and the payouts are described as -

- Game A: If you roll a even number you will get $12 and if you roll and odd you loss $10.
- Game B: If you roll 6 you will get $50 and otherwise you loss $10.
- Game C: If you roll 1 or 6 you will get $40 and otherwise you loss $10.

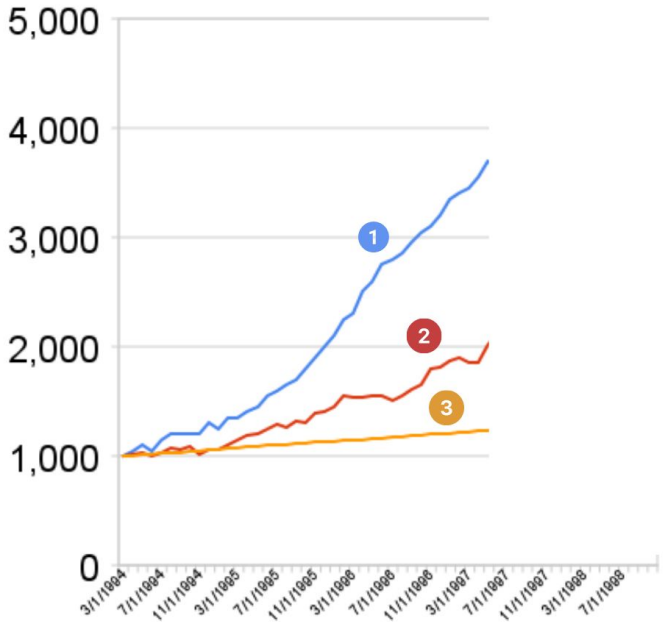
Risk Aversion

A investment advisor gives you three opportunities.

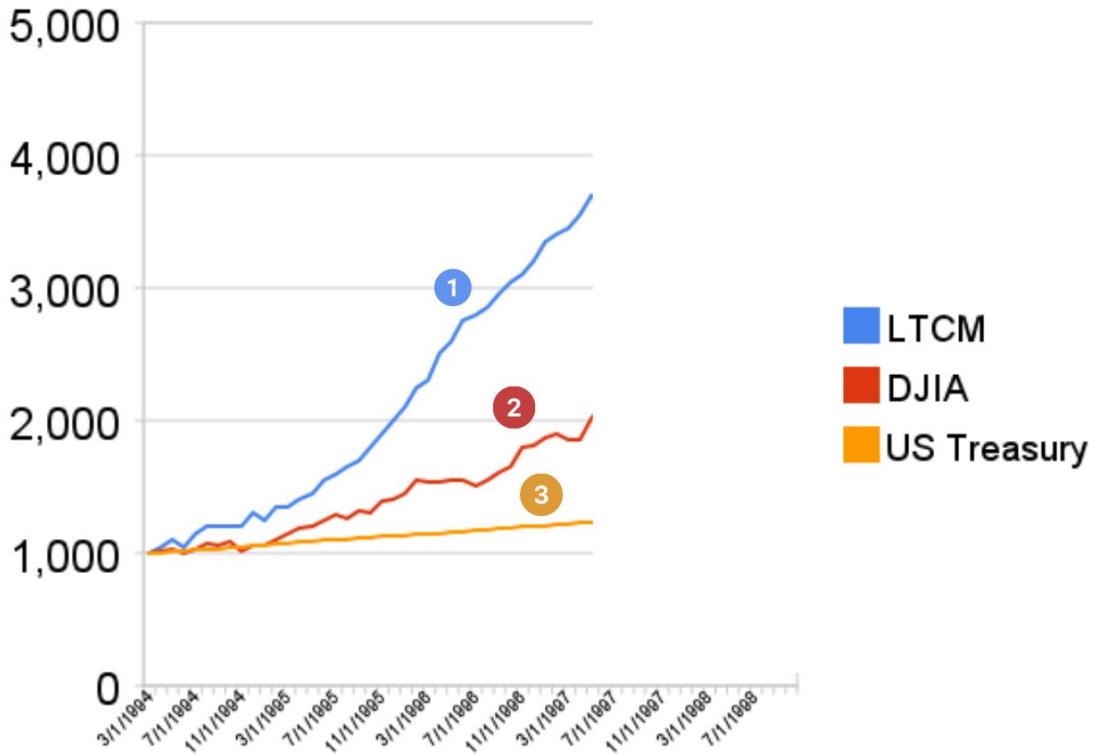
- Option A: 80% chance of winning $300 and 20% chance of losing $500.
- Option B: 100% chance of winning $100.
- Option C: 80% chance of losing $500 and 20% chance of winning $1500.

Investment Dilemma

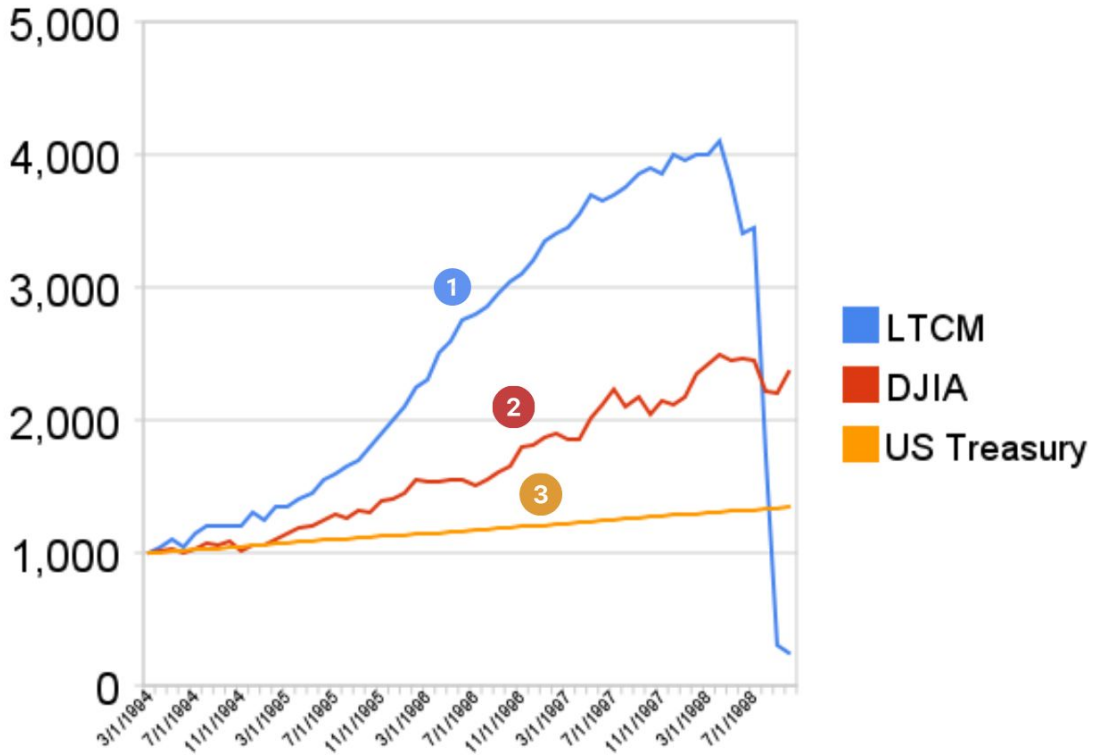
You want to invest $1000 in any one given three investment which one would you choose ?



Investment Dilemma



Investment Dilemma



QNA

Task for Day 1

Executing a large order

- You have to sell $1 million dollar worth of Apple Inc. (AAPL) shares that your firm is holding for past 3 months.
- Explain an optimal strategy to execute this trade without significantly impacting the price.
- Explain your approach in a Google Doc and make sure to include visualization (if any) and mention references.
- Last date for submission : 30-04-2022
- Reference book - An Introduction to Algorithmic Trading: Basic to Advanced Strategies
- Submission Form : https://forms.gle/UR91AGoAnXqiE7sC6