

## The New US Equity Markets -- Electronic Trading

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We imagine our orders being sent to an exchange and executed by humans on noisy floors. While the market floor has always been an iconic image, it is as archaic as an 8-track tape. Today trading is electronic, low cost and done in millionths of a second. Even with an undergraduate degree or an MBA in finance, it doesn't prepare you for the realities of how our equity markets work today. The vast majority of equity trading in the US is done electronically by automated market makers, with algorithms, and high frequency quant models. Most retail order flow and 37% of all equity trading is done off exchange "in the dark". Regulatory changes, technology and competitive responses have dramatically changed our markets and trading practices. We have over 12+ exchanges, 50+ market places, Alternative Trading Systems (ATs), internalized markets as well as an electronic NASDAQ and Designated Market Maker (DMM) based NYSE. What is the mysterious dark liquidity and co-location? What may have caused the flash crash? Institutions need to understand how to trade blocks in a complex environment using Transaction Cost Analysis (TCA), algorithmic techniques, new order types to achieve the sought after best execution.

This seminar will describe the equity trading markets and the issues faced by the pension and mutual funds and other institutional asset managers, as well as sell side firms. It will start with an historical perspective and continue to describe the current issues facing market participants.

1. Review – What is a Market?
  - a. Price discovery
  - b. Continuous vs. call markets
  - c. Order books – *the basis for our electronic markets*
2. Earlier Market Models
  - a. NYSE — Seats and specialists
  - b. NASDAQ — competing market makers
3. New Market Models
  - a. ECNs – electronic matching engines
  - b. Reserve, Sweep and Inter-market Sweep (ISO) order types
  - c. Maker Taker Model
  - d. New competing exchanges — BATS and Direct Edge

4. New Market Structure — Driven by Regulation, Technology & Competition
  - a. NYSE
    - i. Merges with Archipelago Exchange
    - ii. Trading licenses replace seats
    - iii. DMMs (and SLPs) replace Specialists
    - iv. Acquired by the Intercontinental Exchange (ICE)
  - b. NASDAQ
    - i. Establishes Trade Reporting Facility
    - ii. Acquires BRUT and INET ECNs
    - iii. Establishes open / close call
    - iv. Becomes an exchange and a listed company
5. Institutional Trading – the Search for Liquidity
  - a. Market impact of blocks – trading costs, seen and unseen
  - b. Market liquidity
  - c. Transaction Cost Analysis (TCA) – pre and post trade
  - d. Achieving best execution – setting trade benchmarks
6. Dark Liquidity and Alternative Trading Systems (ATSs)
  - a. What is dark liquidity?
  - b. Dark orders on public exchanges
  - c. Dark pools – Alternative Trading Systems and internalization
  - d. Institutional dark markets – POSIT, Liquidnet, BIDS, Luminex, etc.
7. Algorithmic Trading – automating the large block position trader
  - a. VWAP, TWAP, Implementation Shortfall, etc.
  - a. Almgren and Chriss Efficient Trading Frontier
8. Low Latency Trading - HFT
  - a. Defining High Frequency Trading (HFT)
  - b. Direct Market Access (DMA), Smart Order Routers (SOR) and Co-location
  - c. Market Data and latency arbitrage
  - d. The IEX exchange and its built in delay
  - e. Automated market making
  - f. Quant trading models
  - g. Stat Arb, Pairs, Momentum
  - b. Alpha, risk, cost, execution models and back testing
9. Final Thoughts
  - a. Do we need 50+ markets?
  - b. Are dark pools trading 37% of US equity volume desirable?
  - c. Results: fragmented markets, but low cost, high speed, narrow spreads
  - d. Studies from the UK and Australia on HFT models
  - e. Regulatory responses and possible future actions
10. Wrap up
  - a. Books, articles and websites, sources for further information