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FE670

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**FE670 – Lecture #1 Notes**

*Background*

* Worked from FTC, SEC
* Featured in book “Flash Crash: A Trading Savant, a Global Manhunt, and the Most Mysterious Market Crash in History” by Liam Vaughan
* FinBERT = NLP model to analyze financial text/statements

*Investment Theory in Economics*

* **STATEMENT**: “Although most would agree that finance, micro investment theory and much of the economics of uncertainty are within the sphere of modern financial economics, the boundaries of this sphere, like those of other specialties, are both permeable and flexible.” (Robert Merton – A tribute to Paul Samuelson, 2009).
* Financial economics theorists have been divided into two camps:
  + 1. Those who believe that economics is a science and can thus be described by mathematics.
  + 2. Those who believe that economic phenomena are intrinsically different than physical phenomena which cannot be described by mathematics.
* Financial markets are different than objective sciences.
  + Physics: observe phenomena 🡪 model it with mathematical models
    - After you model them, they won’t change; they will remain that forever
  + Financial phenomena is unlike the physical world as it’s moving, changing, and evolving
* In reality, **markets are not efficient**.
  + Evidence of market inefficiency

*Finance Economic Theory – A Mathematical Science?*

* Financial markets are driven by unpredictable unique events and, consequently, attempts to use mathematics to describe and predict financial phenomena are futile.
* Financial phenomena are driven by forces and events that cannot be quantified, though we can use intuition and judgement to form a meaningful financial discourse.
* Although we can indeed quantify financial phenomena, we cannot predict or even describe financial phenomena with realistic mathematical expressions and/or computational procedures because the laws themselves change continuously.

*Algorithmic Trading*

* **Algorithmic Trading**: is commonly defined as the use of computer algorithms to automatically make trading decisions, submit orders, and manage those orders after submission.
* **Goal**: the main objective of algo trading is not necessarily to maximize profits but rather to control execution costs and market risk.
* Different strategies may target at different frequencies, and the profitability of a trading strategy is often measured by certain return metric.

*The Market in Numbers*

* Algorithms started as tools for institutional investors in the beginning 1990s. Decimalization, **direct market access** (**DMA**), 100% electronic exchanges, reduction of commissions and exchange fees, rebates, the creation of new markets aside from NYSE and NASDAQ, and Reg NMS (National Market System) led to an explosion of algorithmic trading and the beginning of the decade.
  + Should receive the **National Best Bid and Offer (NBBO)** from Reg NMS
  + Algo traders took advantage of this due to time arbitrage
* Algorithmic trading and HFT have resulted in a dramatic change of the market microstructure and in the complexity and uncertainty of the market macrodynamic (Hibert and Damon 2020), particularly in the way liquidity is provided.
* AI may help traders to analyze market movements with patterns. According to 2020 JPM study, over **60% of trades > $10M were executed using algorithms**. The algorithmic trading market size is expected to grow by **$4 billion by 2024**, bringing the total volume to **$19 billion**.

*Dragonfly Distribution*

* All markets have the **dragonfly distribution** of volume and net positions
  + Left = Fundamental Sellers (Sell-Side)
  + Right = Fundamental Buyers (Buy-Side)
  + Middle = Opportunistic Traders & Market Makers
  + Tip = High Frequency Traders

*Why Algorithms?*

* **Efficiency**: has been one of the key drivers for the sell-side; a skilled trader is a valuable commodity, anything that helps make them more productive is clearly beneficial. Once an algorithm is chosen, the smaller orders need to be executed electronically.
  + **Capacity, Speed**
* **Usability**: is obviously a major issue for most users. A convulted trading method is unlikely to be popular, even if it gets good results.
  + **Control,** **Transparency, Anonymity, Market Conditions, Asset Knowledge**
* **Performance**: may be measured by comparing the average execution price to a specific benchmark. Note that it is also important to consider the variability, or volatility, of these averages.
  + **Performance, Commission, Risk/Cost Control**

*Ancient Brokerage Model*

* Client (Phone or Internet Portal) 🡪 Broker 🡪 Market (Order Communicated to the Floor)
  + Brokers are professionals who execute orders **on behalf of clients**

*Electronic Market*

* A diagram of a market

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*Electronic Execution Market With API*

* A diagram of a market

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*Direct Market Access*

* A diagram of a market

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*ECNs, Dark Pools, Multiple Execution Venues*

* A diagram of a company

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  + Major investment banks have their own dark pools

*Market Access Definitions*

* **Direct Market Access** – extends the principle of remote access to broker’s clients. The client can take advantage of the broker’s infrastructure to send their orders to the exchange, much like the broker’s own orders.
* **Sponsored Access** – caters for buy-side clients with high-frequency trading strategies. This allows the client to connect to the market using their broker’s unique market identifier (**MPID**), but without having to go through their entire infrastructure.
* **Crossing Network/Dark Pool** – crossing network systems provide an electronic mechanism allowing investors to carry out their own block trading anonymously. The focus is on achieving a better price and minimizing information leakage.
* **Direct Liquidity Access** – incorporates DMA and Crossing, as well as features such as liquidity aggregation.
* **Direct Strategic Access** – clients can have direct access to algorithms, much as orders via DMA

*Market Risk Measurement*

* **Market Risk Measurement** – there are several possible causes of financial losses (Jorion 2000).
  + **Market risk** results from unexpected changes in the market prices, interest rates, or foreign exchange rates.
  + **Liquidity risk** is determined by a finite amount of assets available at a given price, and another form of liquidity risk refers to the inability to pay off debt on time.
  + **Credit risk** arises when one of the counterparts involved in a financial transaction does not fulfill its obligation.
  + **Operational risk** is a generic notion for unforeseen human and technical problems, such as fraud, accidents, and so on.

*Trading Process*

**A diagram of a market

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*Trading Types*

**A diagram of trading and trading

Description automatically generated***Trading Types*

* **Block trading** is trading in which an order or trade submitted for sale or purchase of an large quantity of securities. A block trade involves a significantly large number of shares or bonds being traded at an arranged price between parties, outside of the open markets, in order to lessen the impact of such a large trade hitting the tape.
* **Principal trading** occurs when a brokerage buys securities in the secondary market (inventory), holds these securities for a period of time, and then sells them. The purpose behind principal trading is for firms (also referred to as dealers) to create profits for their own portfolios through price appreciations.
  + Dealer has the role to make the market 🡪 different than *prop trading* as banks are not allowed to prop trade due to **Frank Dodd Act**