Digitization of Financial Markets: Impact and Future

Prateek Rani[1],

Adithya Srinivasan[2]

Abstract
Financial instruments were traditionally traded when stockbrokers and traders met at trading floors and executed transactions. The stockbrokers monopolized the market and their insights and recommendations were the only source of information for investors. Trading was practiced this way globally until the dot-com revolution when communication became affordable and accessible to the common man. Trading as an act transformed from physical floor trading to electronic trading, a method of trading securities (such as stocks, and bonds), foreign exchange or financial derivatives electronically Our research takes us through the initial ways of trading, the types of electronic trading platforms, the impact that digitization has had on financial markets and concludes with the future of electronic trading in financial markets.

Introduction
The New York Stock Exchange(NYSE) was first established in the late 18th century by a group of 24 stock brokers who signed the Buttonwood Agreement to create the New York Stock & Exchange Board and this entity was the hub of stock trading in the United States. Until the rise of technology and algorithm driven stock trading, members of the stock exchange were also known as "specialists". They were members of an exchange, whose chief role was that of a market maker i.e. they would facilitate the trading of stocks and they had a monopoly over the buying and selling of stocks based on the will of the investors. The specialists and their firms also held a huge inventory of a few or a particular set of stocks, especially to smoothen out the price of stocks, should there have been a large shift in the demand or supply curve's, a specialist would sell out of their own inventory and bring about an equilibrium in the demand and supply. They had the opportunity to generate trading profits based on legal "inside information" and also earned a fixed commission per trade, in accordance with the terms of the Buttonwood Agreement, made the stock exchange specialists some of the wealthiest brokers on Wall Street. Another common method of trading in the NYSE, before the rise of modern trading methods was the open outcry method. In the open outcry auction, bids and offers would be made out in the open, which provided all participants, a chance to compete for the best price. Floor trading is the process in which traders and stockbrokers meet at the trading floor or the pit to buy and sell financial securities using the open outcry method.

However, the open outcry system is being replaced by various electronic trading systems, which first started with the formation of The NASDAQ (National Association of Securities Dealers Automated Quotation) market, which was the world's first electronic stock market. The main reason of adoption of electronic trading was that, electronic trading was faster, cheaper, and more efficient for various investors, and manipulation by market makers and broker/dealers would become increasingly difficult. In the thirty years since, stock trading has evolved from a highly centralized to a highly globalized activity that has enabled the linking of major stock exchanges from around the world.

Types of Electronic Trading Platforms
Electronic trading is a means of trading equity and debt, foreign currency or financial derivatives electronically. Information technology has been implemented to unite buyers and sellers through an electronic trading platform and network to bring about virtual market places such as NASDAQ, NYSE Arca and CME Globex commonly know as as electronic communication

networks (ECNs).

Some of the most popular electronic trading platforms are:

Reuters 3000 Xtra : Reuters 3000 Xtra was an electronic trading platform that was first released in the year 1999 by Reuters and it was active until the end of 2013. The trading departments of large financial institutions and their financial analysts to used it as it provided real time market data such as - the prices of socks, bonds, futures, options, treasury bills and many other financial instruments as well as news about economic indicators and other financial data. It subsequently allowed for trading functions, which enabled these large financial institutions to place orders on a number of electronic exchanges across the world. In 2010, Thomson Reuters released the new Eikon platform that slowly replaced the 3000 Xtra.

Thomson Reuters Eikon: The Eikon Software, released in 2010 was the electronic trading platform that superseded the Reuters 3000 Xtra. Like the 3000 Xtra, it is also used by the trading departments of large financial institutions as it provides real time market data such as; the prices of stocks, bonds, futures, options, treasury bills and stock trading. Eikon is a more advanced version of the 3000 Xtra as it can analyze tweets about a particular financial topic and predict a negative or positive trend. It is prominently used in Europe and Asia. Its main competitor is the Bloomberg terminal, which has the same functions as the Thomson Reuters Eikon and both have a 30% market share.

CME Globex: The CME Globex is an electronic trading platform that is owned by the Chicago Mercantile Exchange and is used to trade derivatives, futures, options and commodity contracts on the exchange. It was developed by Reuters for the CME group in 1992 and was the first such electronic trading platform for futures and options trading from across the world. The CME globex can be accessed from anywhere around the world, and futures, options and derivatives can be traded at all times on the exchange.

Bloomberg Terminal: It was developed by Bloomberg LP and like the Thomson Reuters Eikon, it provides real time market data such as; the prices of stocks, bonds, futures, options, treasury bills and many other financial instruments as well as news about economic indicators and other financial data and also includes the ability to place trades for stocks on the electronic trading platform across different exchanges in the world. Its main competitor is the Thomson Reuters Eikon, which has the same functions as the Bloomberg Terminal, and both have a 30% market share.

Impact Of Digitization

Electronic trading has revolutionized trading in different stock markets across the world as it has enabled individuals who weren't a part of a brokerage or an investment bank to directly trade in different markets across the world. One of the biggest advantages of electronic trading is the consolidation of global stock markets. Electronic trading has created linkages that combine different sources of liquidity from across the world which contribute to consolidation. Liquidity is the degree to which a security can be purchased or relinquished in the financial market without effecting the asset's value.

Liquidity can also be described as the ease at which an asset or a security can be converted into money. Different brokers from across the world, can trade securities in different markets worldwide due to the wave of consolidation brought across by the rise of electronic trading. Another barrier that has been eliminated with the rise of electronic trading is market access. Electronic Trading widens the access to trading to different individuals who can now trade different securities at minimal cost, which eliminates the need to limit access to the markets through membership, something reserved only for the rich. It also facilitates remote linkages,

thereby eliminating geographic limitations to allow individuals or brokerages or investment banks to trade in different markets across the world and multilateral interaction is promoted. For an issuer of securities, this removal of geographic limitation can allow the issuer to access a wider pool of potential investors.

One of the commonly cited benefits of electronic trading is that it can facilitate greater trade transparency. This transparency greatly increases the degree of information in the order flow, price discovery and liquidity. A potential for a high degree of transparency arises with respect to electronic trading. As it cuts down the barriers to entry, information about a particular stock or a particular company is available to all the participants in the market and doesn't reside only with a certain set of individuals such as the brokers or traders. According to Domowitz and Steil (2001b). in a recent study of the wider implications of trading costs conducted by them, they found a reduction associated with a lower cost of equity capital, which has macroeconomic significance. They also suggest that total cost savings in the United States of around 30% from using automated systems. Implicit cost conducted through a study of over half a million institutional equity trades by Domowitz et al (2001) suggests that the implicit costs have been decreasing over time and that they tend to be lower in markets where automated trading dominates. Electronic trading systems involve lower cost setup than trading floors, especially a huge opportunity cost associated with the trading floor system, which is significantly lowered in the electronic trading system.

Like any system, there are also some ill effects of the electronic trading system. One such defect is the formation of dark pools. Dark pools initially began in the 1980s when some investors got together to trade in places where they could avoid the investigation by public exchanges or brokers. They wanted to essentially be able to buy or sell massive quantities of equity without affecting the financial market and thus get better execution prices. Dark pools are private exchanges or forums for trading securities. They primarily arose due to block trading by institutional investors who wished to obtain high prices for their orders, without impacting the markets.

Another ill effect is the rise of High Frequency Trading. This involves the use of powerful computers by trader to transact a large number of orders at high speeds to gain a competitive advantage of higher stock prices over the slower traders. There has been speculation about another ill effect of electronic trading, particularly High Frequency Trading. Between the time an investor places the order through a broker and the broker executes executes it, another computer in the brokerage would conduct a trade by executing a high frequency algorithm, so as to increase the price of the stock, which meant that, the investor would have to spend a higher amount of money to purchase the stock, which would result in a higher commission to the broker. These are the effects of electronic trading on markets.

Future of Financial Markets

Electronic trading is becoming more detailed and more personalized through time. Exchanges nowadays are becoming more consolidated in their operations and exchanges fight for volume of stocks traded, customers are increasingly striving to lower transactional and operational costs for trading on a particular exchange to maximize returns on their investments. The industry has entered a new phase characterized by fully automated algorithmic systems that operate on a streamlined ultra-low latency network and hence, the cost of human interaction is greatly minimized. All current and emerging trends in the industry show that, traders are focused on speed of execution competing for the fastest trade execution and greatest volumes. A theory regarding the future, talks about the elimination of the trading floor on stock markets. The rise of algorithmic trading has paved the way for an end to exclusivity that once characterized the trading floor as the brokers and traders had all the power and information. Important financial releases are now instantly made available through various sources on the

Internet like Bloomberg, Reuters, Twitter and other networking outlets. However, some have argued that a trading floor is an important nexus of information about demand for trades, and that it would be difficult to replicate this information in an electronic system. Hence some claim that the market for financial trading would split into a two-tier market where an electronic market will cater to the trading by retail investors and the floor specifically for institutional investors as information available on the trading floor is extremely useful to institutional investors. The future is based on transaction cost competitiveness, that is, low cost and zero fee structures that has been emerging across different markets.

A key highlight in the future of electronic trading is greater transparency in algorithmic trading. In an interview by Ingrid Tierens, head of the electronic trading strategy group at Goldman Sachs, says that,"Goldman is becoming more open about how their algorithms function in the market. It is even going as far as providing analysis for specific clients so that they can better understand how things work together. The examination of execution quality is becoming far more detailed." A flash crash of the Dow Jones Industrial Average that occurred on May 6th, 2010 has brought about the demand for greater transparency in high frequency trading and the removal of dark pools. However, despite this, algorithmic trading is a major factor in the world of electronic trading and will continuously to expand into various asset classes and product areas in the future.

Acknowledgement
This work of research and analysis is fully performed independently. We would like to acknowledge the immense knowledge we gained from Nobel Laureate Dr. Robert Shiller's course on Financial Markets at Yale University delivered through MOOC Coursera without which, this research would not have been possible.

References
Angel, James J. "Fairness in Financial Markets: The Case of High Frequency Trading." Journal of Business Ethics 112.4, Special Issue: The 17th Annual International Vincentian Business Ethics Conference (2010) (2013): 585-95. JSTOR. Web.

"Bloomberg Terminal." Bloomberg.com. Bloomberg, n.d. Web.

Domowitz, Ian, Jack Glen, and Ananth Madhavan. "Liquidity, Volatility and Equity Trading Costs Across Countries and Over Time." International Finance Int Finance 4.2 (2001): 221-55.

"Electronic Trading: CME Globex." Electronic Trading: CME Globex. N.p., n.d. Web.

"Financial Analysis Desktop and Mobile Solution." Eikon Financial Analysis. N.p., n.d. Web.

"Goldman Sachs on the Future of Electronic Trading." Goldman Sachs on the Future of Electronic Trading Comments. N.p., 14 July 2011.

Hahn, Arthur W. "Twenty-four Hour Trading." Proceedings of the Annual Meeting (American Society of International Law) 83 (1989): 47-54. JSTOR. Web.

Litzenberger, Robert, Jeff Castura, and Richard Gorelick. "The Impacts of Automation and High Frequency Trading on Market Quality." Annu. Rev. Fin. Econ. Annual Review of Financial Economics 4.1 (2012): 59-98. Web.

Massimb, Marcel N. "Electronic Trading, Market Structure and Liquidity." Financial Analysts Journal 50.1 (1994): 39-50. JSTOR. Web.

"Reuters 3000 Xtra." Wikipedia. Wikimedia Foundation, n.d. Web. 28 June 2015.

Sato, Setsuya, Helen Allen, and John Hawkins. "Electronic Trading and Its Implications for Financial Systems." Routledge International Studies in Money and Banking Challenges for Financial Markets, Business Strategies and Policy Makers Technology and Finance (2002).

Stoll, H. (2006). “Electronic Trading in Stock Markets”. The Journal of Economic Perspectives, Vol. 20(No. 1), 153-176. 2006