The Business Model of IEX

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1.0 Introduction

Brad Katsuyama was trading for Royal Bank of Canada when he experienced that fewer and fewer of his trades went through. He would see 10,000 available shares to the price of $10 each, but only being able to buy a fraction of them. Instead, the rest appeared shortly after to a slightly higher price. As this only got worse over the years, he decided to take action, which resulted in the creation of Investors Exchange (hereby denoted as IEX). The IEX aims to solve issues related to High Frequency Trading (hereby denoted as HFT), which is what caused him to not be able to buy more shares at a given price point. IEX is a unique exchange in several ways, which makes it a very interesting topic. *This essay aims to present and discuss the business model of IEX.*

Traditionally, the market structure of equity exchanges has not been thoroughly debated in public. That was until 2014, when author Michael Lewis published the non-fictional book *Flash Boys*, that soon became a best-seller. The debate about IEX and HFT is heated and very complex. There is a lot of secrecy and biased opinions which makes drawing conclusions challenging. However, this paper does not aim to be in favor or disfavor of IEX, but rather provide insight into how the model works and reflections around it. This will make the readers better suited to evaluate the topic on their own.

The paper will start off by providing some background information as this is important in order to understand IEX's business model. One must realize what issues IEX is aiming to solve in the market. Thereafter, the IEX business model will be presented. What differs IEX from other exchanges will be explained step by step, which in turn will make up the business model. Finally, reflections, summary and conclusion will be provided. The reflections aim to discuss questions around the IEX business model that are not obvious at first sight, as well as how future events might affect IEX. This is done to better understand the model and provide originality to the paper.

In order to understand the paper thoroughly, some terms need to be explained. The NBBO is the National Best Bid and Offer, which is the best price derived from the national exchanges in the US. By law, all national exchanges are connected to provide pricing information that is consistent with one another. If the best prices are inside the exchange the order is placed at, it will be executed. If not, it will be routed to the exchange offering the best prices.

The Securities Information Processor (SIP) is used to calculate the NBBO by aggregating the best prices from several exchanges. The SIP is unique to the American market and is, in modern-day trading, considered slow. The SIP adds a few hundred extra microseconds to the processing of data, which we later will see is a significant amount. Also, NASDAQ recently updated their SIP to be turbocharged, which reduced the processing time to 20 microseconds (Bullock & Stafford, 2016). This change will be discussed in section 4.

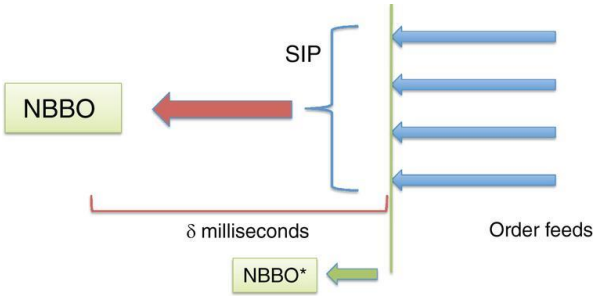


Figure 1: The SIP uses a few extra microseconds in order to process the order feeds, causing it to be considered slow.

The U.S. Securities and Exchange Commission (SEC) is responsible of enforcing laws related to securities in America. SEC is the regulatory body of security exchanges, hence their operations impact IEX greatly.

2.0 Technological advancements and HFT

Over the years, technological innovations have had an immense impact on security trading. In order to understand what kind of issue IEX is aiming resolve, it is appropriate to provide an insight to how the need of such an exchange has emerged. This section will therefore elaborate on how these technological advancements have changed the market and led to the emergence of HFTs in the years prior to IEX.

2.1 Technological advancements

Technological innovations in the trading industry over the last years have made trading faster than ever. Computers of today's modern age are able to process great amounts of data in fractions of a second by the use of complex algorithms.

As an example of advanced technology aiming to reduce time, in 2012 the company Spread Network's developed a fiber optic cable from Chicago to New York, reducing the travel time of data from 17 to 13 milliseconds (Troianovski, 2012). They are selling their services to firms engaged in HFT, allowing them to front-run other traders. A difference of 4 milliseconds might seem of small interest, but is in fact of great importance when trading strategies are formed on the basis of microseconds. Complex algorithms are designed to react

to new data in a timely fashion and as the computer analyzes big data sets instantly, the process of data evaluation and order placing is faster than ever (Shobhit Seth, 2015).

2.2 Introduction to HFT

HFT is a way of security trading in which powerful computers are used to execute orders at high speeds. As of 2016, it makes up about 50% U.S. exchanges' daily volume (Jacob Bunge, 2016). In the last few years, HFT has been a controversial topic, due to computers and algorithms out-competing the claimed skill and trading methods of traditional security traders. As a result, and on the basis of the fact that they profit on others' expense, HFT comes with a negative connotation to many market participants. However, it is important to understand that this new method of trading also has had a positive impact on the market.



Figure 2: How HFT activity narrows the spread by making prices less volatile.

Just a few years ago, the spreads were significantly wider, whereas now they are more narrow than ever. Narrow spreads in this sense is beneficial because it lowers the cost of trading (Intertrader, 2016). Individuals and institutions that are in favor of HFT, claim it is a great source of liquidity supply, and that they act as market makers (The Great HFT Debate, 2014). However, it has been the opinion of some that liquidity is not the same as volume, and that one does not act as a market maker unless one is prone to risk (The Great HFT Debate, 2014). HFTs work best in markets that already are highly liquid, and in the case of crisis, when the need of liquidity is at its peak, they tend to flee the market. In essence they act as market makers, but only in times of prosperity. Therefore, even though they narrow the spread and they provide some sort of liquidity to the market, whether they are a good addition to the market or not, is a heated debate without any clear conclusion.

HFTs are criticized for profiting at the expense of institutional and retail investors. As decisions happen in a fraction of a second, big movements in the market can be caused for no apparent reason. An example is the "Flash Crash" of 2010, when the big



Figure 3: The Flash Crash caused the Dow Jones Industrial Average to collapse.

indexes experienced a major drop before rebounding about thirty minutes later (The Economist Online, 2010). Some HFTs trade on spread and actual fundamental news. An example could be news about a potential upward movement in the price of oil causing an incentive to quickly attain a long position in Shell-stocks. However, other HFTs are actively trading on data latency and try to front-run institutional and retail investors. As a result, they are deconstructive and are referred to as predatory or parasitic traders. As IEX aims to solve the issue of this type of HFT, we will focus exclusively on this kind of HFT in our paper. An insight in these predatory traders' strategies will be provided in section 2.3.

HFTs key to success is speed, and the importance of co-locations and advanced technology that aims to reduce the time it takes to receive data has greatly increased. Co-locating is the action of locating a firm's computers at the same or near the location of exchanges' servers in an effort to minimize delay of the information flow of that particular exchange (Financial Times, 2016). This is very costly, and it is mostly HFT firms that find it cost-effective to pay for this advantage. As a result, HFTs receive price information before other traders and are able to arbitrage on this information asymmetry. Traders willing to invest in technology that reduces the travel- and process time of data are able to react quicker to orders and price movements, and consequently there is an inherent race to be the first to obtain information.

In essence, firms engaged in HFT combine the advantages of co-location and advanced technology to be able to react faster than other investors, but also compete with other HFTs. Profits per trade are minimal, but being done numerous times in total, amounts to significant returns. There is no end to the ingenuity of firms engaging in this type of trading when developing strategies for attaining their profits. Given the competition in the market and HFT being a controversial topic, they are naturally reluctant to share information on their strategies. However, some main lines can be drawn in order to understand how they profit.

2.3 HFT strategies

When trying to understand why IEX was founded and how it differs from other exchanges, an understanding of some main strategies is beneficial. Therefore, this section will explain the concept of front-running, and describe one specific strategy. Front-running is a form of latency arbitrage (FX Intelligence, 2016), meaning that HFTs front-run the market by taking

advantage of the fact that traders receive data at different times. The concept is to act on an order before the order is executed.

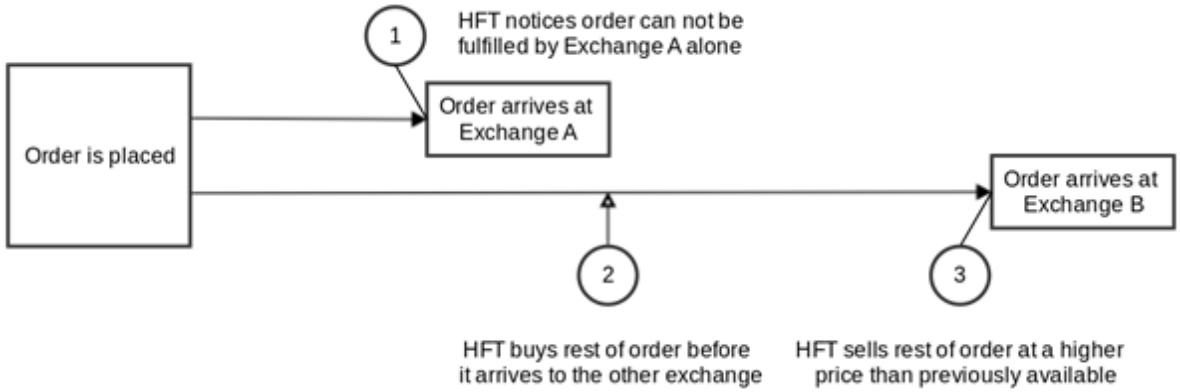


Figure 4: Describing the basics of how HFTs front-run by taking advantage latency arbitrage.

Figure 4 describes the process of how HFTs front-run. By analyzing an incoming order, the HFTs jump in line because they are faster. Thereafter, they can sell the same shares for a slightly more favorable price, and receive a small profit. This is called scalping the market, and many are of the opinion that this type of HFT activity does not improve market liquidity, because they aim to sell the shares back immediately. The HFTs will often be able to sell it to the same trader they ran in front of. The orders are often market orders and will execute the best offer available. Hence, they want to set the price as high as possible, but still offer the best price. With a narrow spread, the price increase they are able to set is small. Nevertheless, these small profits add up to a lot when executed repeatedly.

The figure shows the principle of how HFTs front-run. One specific strategy is the iceberg. The concept of this strategy is to detect hidden block trades that could cause a price movement. If the algorithms detect a block buy coming in, it is going to act on it and buy before all trades of the block buy are executed. That way, it can sell right after at a slightly higher price, due to block trades moving the price.

2.4 HFT – A source of revenue

It is evident that firms involved in HFT are able to benefit on behalf of other traders. Therefore, it has been widely discussed whether HFT is a fair practice or not. To reduce the activity, exchanges could adjust their structure. However, the incentives to facilitate the process of firms practicing HFT are present as they offer streams of revenue.

HFTs are a source of great profit for the main exchanges. An example is BATS, which was introduced in 2005 and allowed more order types, that aid in facilitating HFT. BATS and other exchanges receive payments from firms buying co-locations and subscriptions on direct data feeds. The firms willing to pay for these advantages are engaged in HFT, because their business model is based on speed. When HFT firms contribute to a larger part of the exchange's revenue stream, there will be a lack of incentives to provide an exchange where these streams are eliminated. Of course, BATS are not explicitly stating that they deliberately provide a market in which HFTs can benefit, and claiming so is controversial. Even though HFTs earn great profits on NYSE, NASDAQ and BATS, one cannot conclude that it means that the market is structured to benefit HFTs, because a traditional market does not hinder the possibility of HFTs to profit. However, deliberately or not, exchanges profit from facilitating HFT. Therefore, they have incentives to neglect the internal discussion of whether they are providing a fair market or not.

2.5 Sub-conclusion

As a result of new and advanced technology, markets have changed and made room for HFTs. The impacts of these are widely discussed, however, long-term investors are clearly hurt by the activity. The HFTs are dependent on speed to profit. Hence, a structure which reduces the possibility of latency arbitrage would be an innovation much appreciated by certain parts of the market. However, HFTs are an important source of profit for the main exchanges. This has led to the founding of IEX.

3.0 IEX Business Model

Founded in 2012 by a group of former employees from Royal Bank of Canada, IEX has already achieved a market share of just short of 2%. It is located in New York, with Brad Katsuyama as the CEO. IEX is exclusively owned by buy-side investors like Bain Capital Ventures, Greenlight Capital and Pershing Square. The vision of IEX is to provide a fair, simple and transparent exchange (IEX Trading, 2016).

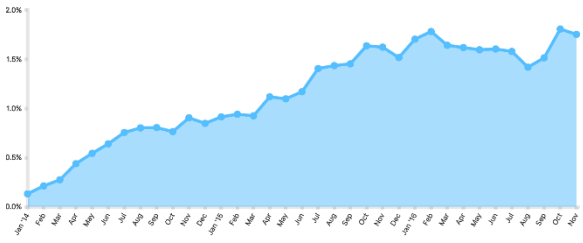


Figure 5: IEX market share from January 2014 to present. As of today, it is just short of 2%.

3.1 Exchange application

IEX applied to The Securities and Exchange Commision (SEC) to become an official US exchange in September of 2015 and was later approved in June of the following year. For IEX, that meant being matched and put in direct competition with all twelve other national exchanges in the US like The New York Stock Exchange(NYSE) and NASDAQ. IEX had previously been operating as an alternative trading system, also known as a dark pool. Dark pools are alternative trading systems where investors are able to trade without publicly revealing their intentions before the trades have been executed (Investopedia, 2016). During the application process, IEX received a lot of support by parties recognizing the need for their services. Nonetheless, there were also parties arguing that IEX´s application of becoming an official exchange should be denied.

3.2 How does IEX prevent predatory traders?

An issue with HFT is that firms engaging in that particular type of trading is that they profit on behalf of institutional and retail investors. By doing so, exchanges where HFT can occur, make the market place as Katsuyama puts it "*systematically disadvantaging to certain people"* (The Great HFT Debate, 2014). How IEX aims to address this issue will be the elaborated in the following sections.

3.2.1 Speed bump

First and foremost, the most distinct feature of IEX is known as the speed bump. The speed bump is a fiber optic cable that causes all transmitted data to be delayed by 350 microseconds

(Levine, 2015). This implies that all market participants on IEX will receive information a fraction of a second later than what they would at other exchanges. The delay is small in absolute size, but is of quite significance when we view it in terms of electronic trading where microseconds are essential to a profitable trade. Nevertheless, the question of whether or not slowing down every participant in fact hinders HFT to occur, arises.

If we were to consider a 100-meter sprint where all runners were slowed down by 350 microseconds, the fastest runner would still cross the finish line first. Therefore, IEX must approach the problem in a different manner. By differentiating what in fact is slowed down, IEX is able to offer what they believe is an exchange that does not systematically put some participants at a disadvantage.

The conclusion to how one can affect the outcome of a 100-meter sprint implies choosing which contestants to slow down. If we imagine the delay already being implemented, eliminating the difference in speed means deciding what actions to in fact not slow down. There are two types of actions that IEX has subjected to *not* slow down, mainly the *update on pegged orders* and the *update on routable orders* (Levine, 2015).

Routable orders in this sense means that if the best available price of a given security is displayed on another exchange, an order for that particular security will be routed away from IEX to that exchange, whereas pegged orders will be thoroughly explained in section 3.2.2. the speed bump works the same way in both cases. If there is a change in the NBBO, HFTs will typically receive the information prior to other participants, thus creating an asymmetry of information that they can profit on. Seeing as orders are now prone to the delay whereas the information update of the NBBO is not, potential orders from HFTs will not be executed at their time of arrival.

3.2.2 Order design

As a part of their business model, IEX offers three different pegged orders as well as limit- and market orders (IEX Trading, 2016). A pegged-to-market order is an order with the intent of maintaining a sale price relative to the NBB or a buy price relative to the NBO. An order is created when a trader enters a limit price which reflects his or her worst price that they are

willing to accept. Thereafter, the trader adds an offset amount which will result in an active limit price derived as following:

- **Sell order price=** Bid price + offset amount
- **Buy order price=** ask price- offset amount

Today, IEX offers primary peg, midpoint peg as well as Discretionary peg (hereby denoted D-peg), all of which are non-displayed orders that are pegged to a reference price relative to the NBBO. As a result, prices of the orders are continuously adjusted in response to the constant changes in the NBBO (IEX trading, 2016).

A primary peg is an order that follows the best offer when a trader is selling the security whereas the order follows the best bid if the trader is buying the security. Evidently, this enables traders to obtain the best prices available.

A midpoint peg is a non-displayed order that is priced as an average between the national best offer and national best bid. Figure 6 depicts a midpoint peg priced at 10.02 derived from an NBO and NBB being respectively 10.04 and 10.00.

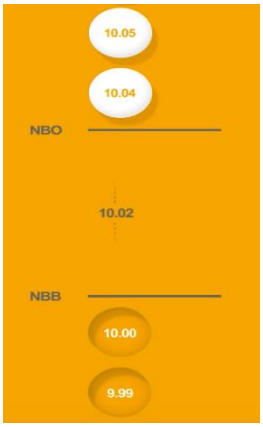


Figure 6: Midpoint peg.

As for the D-peg that IEX offers, it is a combination of midpoint – and pegged orders. It is worth noting that this is a patent pending order type developed by IEX itself (IEX Trading, 2016). D-peg orders aim to access liquidity at the midpoint at entry and as aggressive as the midpoint while on the book. These orders are also pegged to the quotes of the NBB for buys and NBO for sells and are ranked in time priority. As clearly shown, the D-peg makes use of elements from both Midpoint Pegs as well as Primary Pegs. An important feature of the D-peg is that it provides instructions to stop seeking access to liquidity at a more aggressive price until the quote returns to a stable price level. In order to do so, IEX utilizes systems to obtain information about predictable and slow changes in the NBBO. an example is perhaps the best way to offer basic insight of the functionality of D-peg.

A D-peg buy order is booked on the NBBO bid with a limit of 10.20 during a period of stability in the quotes. At the same time there is a sell order with a 10.16 limit. Naturally, the

sell order crosses the spread and executes with the D-peg order at 10.17. In this case, both the seller and buyer have achieved better prices.

Initially, when applying to become an exchange, NYSE and many different parties were invited to comment on the application. NYSE made numerous comments suggesting that certain order types offered by IEX were complex and therefore not in line with IEX´s statements of it offering a "simple, fair and transparent market". (SEC,2016). To this IEX responded "IEX provides the same basic order types that are offered by all markets, along with the standard modifiers that are sought by investors and their brokers. What IEX does not offer are any of the dizzying array of specialized order types that are designed to cater exclusively to a subset of high-speed trading firms (…)" (SEC, 2016). Despite the harsh critique of the D-peg, as of March 2016, NYSE filed a proposal to the SEC to offer D-peg on their exchange. This in itself is a big testament to IEX and their patent pending D-peg (NYSE, 2016).

The functionality of D-peg was also down sized in "*Money Yesterday"* where the host, Matt Levine suggested that the feature resemble what a traditional broker does rather than what how an exchange classically operates (Meanderful, 2016). In essence, this is not accurate. Brokers are unable to reenact the protections that D-peg offers. In order for a broker to be able to offer the same protection, the broker has to be faster than every participant in the operating market. The jist of the function is that the D-peg combined with the speed bump allows IEX to be faster than the market participants at processing market data.

3.2.3 Free data publishing

The sections 3.2.1 and 3.2.2 explained the technical and most important traits of IEX´s business model that differentiate them from other exchanges. Moreover, they have also chosen to strip away some of the services offered at other exchanges.

Where other exchanges offer to sell direct feed data on a subscription basis, IEX chooses instead to publish data for free online (IEX Trading, 2016). The direct feeds are somewhat faster than the data derived from the SIP (Nanex, 2016) as the information travels directly to the subscribers. As a result, the traders who are willing to pay for direct feeds are able access

information even faster and in turn front-run other traders. By providing free data to traders at the same time, IEX aims to create an exchange without any information asymmetry.

One might wonder how there are no regulations prohibiting the practice of traders receiving data at different times. The Regulation NMS debates stated in 2005 that the data had to *leave* the exchange at the same time (Bloombergtradebook, 2014). It does not say anything about whether it should arrive at the same time or not. As technology has allowed some traders to benefit on latency arbitrage, some believe those regulations need to be reevaluated. One way could be to state that the data should arrive at the SIP at the same time as the co-locations. However, this does not really eliminate the problem because the users of the SIP will still receive the data at a slightly later point in time, as figure 7 depicts. The complexity of controlling that everyone is receiving the data simultaneously might be the reason why the SEC has not changed its regulations. IEX address the problem themselves by publishing data for free and not selling direct feeds.

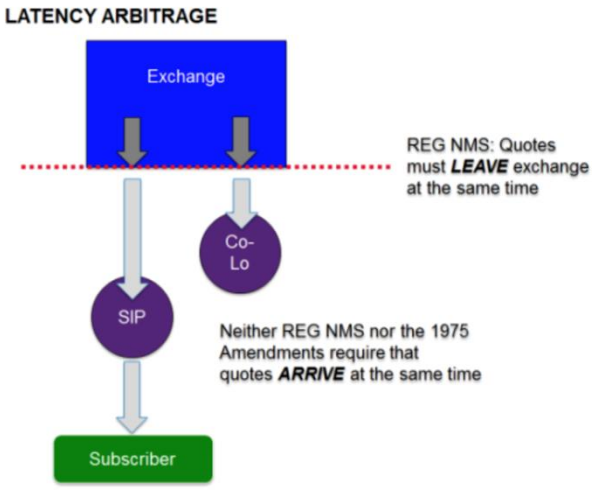


Figure 7: Even though the data leaves at the same time, it might arrive to the subscribers at different times, allowing latency arbitrage.

3.2.4 Ban of co-location

Co-locations are a source of income for many exchanges. As it provides a benefit for the traders who pay for this service, IEX has banned it (Forbes, 2015). This has the same effect as the speed bump and not selling direct feeds, mainly that it makes it harder for HFTs to profit from their speed.

3.2.5 No fees and rebates

In the late 90's maker-taker models were developed to stimulate trading in markets with narrow spreads. The essence was to give a trading rebate to market makers and a fee to takers, to give incentives to provide liquidity. It is practiced at exchanges like the NYSE Euronext and BATS (Investopedia, 2014). As HFT firms often provide liquidity, this model benefits

them, the same way it hurts long-term investors. However, stating that HFT provides real liquidity is controversial, some call it "ghost liquidity" because it is gone as fast as it came. Therefore, IEX believe that giving such rebates is an unfair practice. As a consequence, IEX does not support such maker-taker models (IEX Trading, 2016), which is benefitting long-term investors and hurting HFTs.

3.3 Pricing structure

All the above mentioned features form IEX´s business model, however, it must be emphasized that the speed bump and the order design are the most prominent and distinct traits of IEX.

The speed bump slows all participants down and the market in turn will impede HFT activity. Other exchanges were facilitating trading by offering different speed on connectivity, co-locations as well as selling market data. This in turn creates market share and attracts other types of customers than the ones sought after by IEX. Naturally, the aforementioned features offered by *other* exchanges represent a source of revenue for them. Therefore, IEX has to differentiate their pricing strategy in order to be profitable. Where other exchanges normally charge about $0.0002 per share, IEX charges a flat fee of $0.0009 per traded share for both buyers and sellers, which of course is a significant premium (McKenna, 2015). Prior to its approval of becoming an exchange, IEX had a market share of about 2% of the daily traded volume in US. Larry Tabb, CEO of the market research firm Tabb Group, stated that in order for IEX to obtain a market share of 5-10% they would have to implement a more competitive pricing structure. To this, IEX answered they believed in the possibility of an exchange choosing a different course and they will instead let their customers render a verdict.

In essence, with the different approach to their business model, IEX is trying to offer an alternative to the classical functions of current exchanges. The effects of this are that investors are provided with much desired protection from predatory traders. The pricing structure itself can not compete with that of other exchanges, but there is an inherent tradeoff for potential customers between costs imposed by being front-ran by predatory traders and paying a premium for the services of IEX. It is worth noting that, as Brad Katsuyama claimed, the market share of other exchanges are static and stagnating because they do not differentiate their services from one another (Mckenna, 2015). Put in other terms, the other exchanges use

the same business model where their source of revenue is charging customers for connection speed, selling market data and co-locations etc. For these reasons, it is evident that those exchanges must charge the trades at a discount. In comparison, IEX differentiates themselves from the dominating exchanges by applying technical aspects such as the speed bump and D-peg as well as stripping away some of the classical revenue streams and rather charging the trades at a premium on both sides.

4.0 Reflections and outlook

IEX and HFT are highly debated topics and there is no consensus about what is right and wrong. Therefore, there is a lot of room for individual thoughts and reflections. In this section, we want to provide insights in topics related to IEX which might not be obvious, and also offer insights into how these can affect IEX in the future. These are all topics of importance for the business model of IEX, which is why they are relevant to our paper.

4.1 Can others copy IEX?

The IEX model is unique and innovative. As a consequence, it might be interesting to discuss whether others will, or can in fact copy their business model. Factors affecting this are first and foremost patents and trust. As IEX received public attention and was portrayed as the solution to a "rigged" market in the book *Flash Boys* (Flash Boys, 2014), IEX might have obtained a unique trust in the market. One can view it as a first mover advantage. This might affect other entrepreneurs' ability of copying IEX, and other exchanges' ability of imitating their model. Of course, the history of IEX's application process of becoming an exchange shows the complexity of this process, which again will create a hinder for new entrepreneurs to copy their model.

The business model of IEX is centered around the speed bump and the D-peg. The D-peg is currently patent-pending (IEX Trading D-peg, 2016). If the application is approved, it will of course offer additional protection to IEX's business model.

Just a couple months after IEX became an exchange, the Chicago Stock Exchange revealed plans of their own speed bump in order to blunt the advantages of the fastest traders (Bloomberg, 2016). The NYSE has also applied to SEC in order to use the D-peg. Hence,

there are signs that other exchanges are moving more towards the business model of IEX. Therefore, a challenge for IEX will be to remain the unique exchange it is today.

4.2 What hinders growth of IEX's market share?

IEX is offering an exchange that differs from other exchanges at several main aspects, causing it to impede HFT activity. Although a market share of about 2% is impressive after just four years of existence, one might wonder what hinders more investors to join IEX given that HFT is benefiting on behalf of other investors on other exchanges.

First of all, IEX does not have a competitive pricing structure. As they need to make up for the loss of revenue by not selling direct feeds and co-location spots, they are charging a higher fee on each share traded. As some investors might find it beneficial to pay a lower fee, even though it results in losing to HFTs, it creates a hinder for IEX in achieving bigger market share. Also, long-term institutional investors are trading rarely which makes the losses to HFTs insignificant, meaning that joining the IEX does not have any significant impact, especially given that the spreads are extremely narrow. Furthermore, some might be utilitarian investors, meaning that they have other ambitions than pure profit, for example risk management. As a result, the benefits of trading at IEX do not appeal to certain investors. It should also be noted that HFT makes up about 50% of trading volume, which IEX does not aim to take a share of. The fact that IEX is not offering rebates might also be a hinder of IEX achieving even bigger market shares.

4.3 Legislative consequences

As a result of significant amount of trading volume HFT accounts for, there have been several countries trying to regulate this form of trading, which makes it interesting to discuss how this can affect IEX if it were to happen in the US. Both Italy and France have introduced a pretty similar tax on HFT trading to avoid exchanges losing their integrity. Probably the most remarkable one is the Germans High-Frequency act (HFT Act). This resulted in strict supervision from the Federal Financial Supervisory Authority (BaFin, 2014) in Germany with requirements like order to trade ratio for all high frequency traders (Fidessa, 2014). This is done to avoid market interruption or abuse such as entering orders with the purpose of misleading or providing incorrect information rather than actually trade.

The results of this has been shown through reduced amount of intraday order submissions, only affecting the amount of trading volume per day fractionally (Haferkorn, 2014). On the other hand, a large part of the lost order submissions were providing liquidity at competitive prices, thus resulting in low transaction costs. Losing those meant increased bid-ask spreads, but since they were only representing a very small part, the overall liquidity supply to the order book remained unaffected.

If the US were to introduce a similar Act as the German HFT Act, it is challenging to see if this would have any notable effect on the IEX. In Germany they noticed a reduction in non-executed orders and an increased spread, but it looks to only make the market more stable and more predictable since they are now avoiding orders that in fact were submitted with the intention of actually not buying or selling. If this were to affect the IEX, it probably would lose customers. A NASDAQ without misleading orders would probably make the exchange more attractive for the institutional traders.

Regarding HFT tax, it is difficult to see direct consequences of these taxes since they were implemented at the same time as other forms of financial tax rules. Therefore, it is difficult to distinguish the effect of the different financial taxes. A quite remarkable drop in trading volume occurred right after it was introduced (Jones, 2013), but it is hard to say if the drop was directly linked to the implemented HFT tax since there were other tax rules on financial trades implemented at the same time. We could also see that the exchanges in both France and Italy were stabilized after the initial shock (Rühl, 2014).

High frequency traders will probably react on these legislations by adjusting themselves to these regulations. If such legislation were copied to the American market, the change in trading behavior would have little impact on IEX. Another consequence could be that high frequency traders that usually operate on for example NASDAQ could choose to start trading on exchanges outside the US to avoid these regulations. This could affect the trading volume on that specific exchange, but also make the exchange more attractive again to traders who first decided to switch to IEX. Since the legislations seem to have such limited effect on traders in countries like Germany, it probably will not have significant effect on the US Exchanges nor the IEX.

4.4 Turbocharged SIP

We find it interesting to discuss how robust the business model of IEX is in terms of external influence. An example of such could be the major upgrade in the SIP operated by NASDAQ that was enrolled in October of 2016. The implication of this upgrade was the information processing time being brought down from about 500 microseconds to 20 or less. (Bullock & Stafford, 2016). As the delay in the SIP is crucial to HFTs benefiting on behalf of institutional traders, a faster SIP could have affected the circumstances that IEX base their model on.

The fact that the processing time has been so slow in relative terms, has provided HFTs with a possibility to arbitrage on latencies by subscribing to direct feeds. The potential result is HFT activity being impaired, by interfering with one particular strategy that HFTs use when conducting their business. As questions were raised to how this might affect IEX, the immediate answer provided by IEX itself was that it would have no effect at all (Bullock & Stafford). With the discussing of the speed bump in section 3.2.1 in mind, IEX's reply does seem credible. Ingoing and outgoing trades are still subjected to the delay, while updates are not.

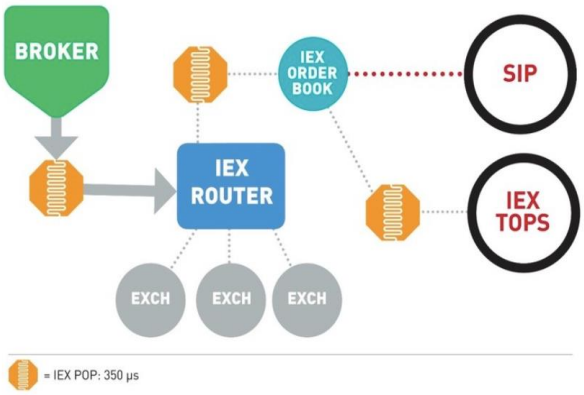


Figure 8: IEX connection network.

Despite the answer of IEX, one thing is evident about the business of securities trading, mainly that every actor has an angle, meaning no one is strictly unbiased. The SIP becoming turbocharged might have changed the circumstances by reducing HFT activity, which in fact is what IEX itself bases its business on – the presence of HFTs. However, HFTs are known for the diverse set of strategies and did probably not experience a significant setback by the SIP being upgraded. The outcome also depended on whether HFT firms were able to aggregate data from direct feeds to determine the NBBO faster than the SIP, which many of them probably still were.

5.0 Summary and conclusion

Technological advancements have led to growth in HFT activity, causing issues for institutional investors and individual investors. Some HFT activity is beneficial, however, some HFTs base their strategies on deconstructive actions such as front-running. As this raises the price for the investors being front-run, IEX aims to provide an exchange where these issues are solved.

The specifics about IEX that prevent deconstructive HFT activity include a speed bump that delays certain information. Also, IEX provides only a few orders in which none are in favor of HFT activity. Regarding services, IEX provides free data online and co-locations are banned. This reduces HFTs ability to profit by acting faster than other investors. As a result, IEX's business model consists of several traits, all of which aid in preventing deconstructive HFT activity.

Several interesting topics regarding IEX's business model arise. IEX has achieved a unique trust in the market, which makes it hard to copy their business model. Potential patents will create even more hinders for people aiming to copy their model. However, there are signs that some exchanges want to copy some of the traits of IEX. Possible explanations to why IEX does not have a bigger market share is the lack of a competitive pricing structure, and long-term investors simply not caring too much about the small losses to HFT. IEX is also subject to possible changing regulations as the SEC constantly monitors the market. Several countries in Europe have enforced laws directly related to HFT activity. If this were to happen in the US, IEX would be directly affected, however, in somewhat limited manner. Finally, the SIP is important for the HFTs in order to profit. As the NASDAQ SIP has become turbocharged, this might prevent HFT activity at other exchanges, leading to a reduction in the demand of an exchange like IEX.

Working with the paper we have experienced how controversial and heated the debate about HFT and IEX is. There are lots of biased papers, and there is no clear consensus about the consequence of HFT. The conclusions are hard to draw given that it is very complex to get an overview of the impacts of HFT. However, it becomes clear the IEX has been successful in creating a model that impedes HFT activity. By doing so, IEX has been successful in their dedication to investor protection. IEX.

6.0 Bibliography

The use of sources has been challenging due to biased opinions and secrecy. It seems that there are few neutral actors in the market, because most people will be affected in one way or another. However, by comparing a variety of sources, we believe that our paper has presented a neutral perspective on the issues related to HFT and IEX's business model.

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