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The role of automation in financial trading companies

ABSTRACT

High Frequency Trading (HFT) has significantly affected the financial market – how trade is performed, types of employees hired, technology, or even market regulations. There are arguments that important risks arrive from trade automation, especially with the use of ultra-low latency trading systems. It also gives a possibility of achieving (higher) returns more quickly with less residual losses, i.e. algorithms may lead to a lower risk of exposure than traditional ‘human’ traders. A higher level of automation in trading companies is a reality, which brings important management issues. The rise in competition between algo-traders has led to the rise of the so-called Quant 2.0: the rebirth of complex algorithms and artificial intelligence to collect, extract and process information available from any source of information.

The aim of this article is, through a literature review, to present the main issues concerning automation in financial trading companies, and how the highly probable introduction of the Blockchain technology may affect HFT and the financial market – either the general market design, or specifically, how trading is performed.

Keywords: algorithms, trading, Quant 2.0, automation

JEL Classification Codes: G10, G15, G23

Introduction

Algorithmic trading, especially High Frequency Trading (HFT) which is a type of trading model where computer programmes perform trades in a matter of milli, micro or nanoseconds, are designed to be self-dependent and as such, they should automatically respond to all market events. This is one of the elements of algorithmic trading (again, especially of HFT) that is seen as controversial because, if algorithms work on an if-then basis, they do not analyse in full the why and the scale of an event. In short, algorithms may see a panic in the market as a good situation to profit, and by making transactions, generate even more panic for other human traders, by triggering, e.g., other algorithms. An example which is often used against HFT is the Flash-Crash of May 6th, 2010. On that day, the Dow Jones Industrial Average dropped almost 1000 points in under 1 hour, of which 500 in just 5 minutes. Potential reasons were many: from transactions in options contracts, manipulation, or large futures transactions, which led other algorithms to entering into market transactions. In the end, every trader, algorithmic or not, was selling. Algorithms may also induce costs not only to other participants, but to the company using them, as on August 1st, 2012, when KCG (Knight Capital Group) achieved losses in the order of \$ 440 m USD.

Algorithmic decisions are based on many different elements – not every one of them to be an economic one. Due to the extremely high speeds involved in HFT, every movement in the market will be taken into consideration, which may be a result from economic activities but may also be every other type of information. Information types that can be used are numerous: “(...) everything from weather forecasts to Twitter streams (...)” [Salomon, 2011], or maybe just the fact that a key trader opened a position and many other reasons. Because information available is far of greater amount than it used to be, an efficient mechanism must be used in order to extract, gather and analyse this data. Automation is a clear mechanism allowing for the accomplishment of these steps in a faster and, if well used, in a more efficient way. Ultimately, management faces the responsibility of adequately performing a fragmentation of tasks in a company and responding to the technologically-led increase in competition.

As there are some arguments stating that there may be a trade-off between HFT and market stability, then Blockchain may provide to be the answer to these matters. Although by itself Blockchain trading does not offer the speed and opportunities that arrive with HFT, the back-office introduction of the Blockchain technology may in fact be a reliable mechanism for limiting transactions settlement concerns, excluding the need for settlement through third parties, and reducing greatly (maybe even in full) parasitic trading that some HFT may perform.

This paper performs a literature analysis on how selected technologies may affect fintech specialized in the financial trading sector. The first hypothesis is that even if Blockchain is not used in the front-office, its implementation in the back-office may lead to a decrease in trading costs, increasing market efficiency and finally, limiting some parasitical trading

performed by HFT, among others. Secondly, even if there is a decrease in the volume generated by HFT in the equity markets, that same volume will increase in the cryptocurrency markets as the volatility available there attracts HFT arbitrage strategies.

1. The essence of High Frequency Trading

The name High Frequency Trading implies high frequency and trading, but which may not be necessarily occur together, which is seen as controversial by many. Firstly, what can be understood as high frequency is a time frame measured in milli, micro or even nano seconds – far quicker than a human trader is able to react, considering that the human eye blinks between 150 ms and 400 ms. Secondly, actions taken by HFT can be many times only price-related and do not lead to an actual trade. Acting as market makers, HFT may perform discretionary price changes without leading to a trade, even though they may be intended to be finalized with a trade. Very quick price changes may mislead human traders which, for being slower and not being able to obtain market information as quickly, may enter unfavourable transactions. From a different perspective, the use of more automated and faster transaction ‘systems’ may significantly diminish information asymmetry. If automated traders obtain and process information much faster, then prices should theoretically be much closer to the intrinsic fair value (and more quickly). HFT relies on using complex algorithms to lead to the fast turnover of large amounts of capital by using state-of-the-art technology [Aldridge, 2009]. This means that, due to the significant amount of orders, marginal profits are much lower than traditional trading. The beginnings of electronic trading started in the US with the SEC allowing for electronic exchanges to compete with traditional ‘human traded’ exchanges. The goal for this action was to allow for every person with a computer to trade [Duhigg, 2009]. This was the start of a technological revolution in how trading was performed and how trading companies function. It is, however, important to place HFT in the general algorithmic trading. According to the literature, e.g. [BIS, 2011], the level of automation in algorithmic trading may be divided into two general groups:

- Algorithmic execution. Under this category of algorithms, there is always a human element relying on making decisions on which instruments to trade. The algorithms will later ‘decide’ when and what is the best way to perform the trading, i.e. submit and execute orders. This is an important element of trade because sometimes it is better to perform many trades instead of trading all the capital available at once. This depends on many factors such as the time of the day, general activity, and many others;
- Algorithmic trade decision-making. This is by far the most complex type of algorithmic trading type under which HFT is placed. The human factor in this case is limited – it will only build the algorithms and the structure of how decisions are made by these computer programmes, or for example strategies to be used. As such, full decision is left to algorithms – on instrument(s), opening, changing or closing positions. Due to the rise in competition

between companies and algorithms, there is also an increased use of artificial intelligence in order to achieve faster and better results.

It seems important to show what the level of automation in trading is. This may be presented as the percentage of activity of algorithmic trade decision-making models (HFTs) in the market. Although data on HFT activity are quite difficult to assess, estimations show that between 50% and 60% of equity transactions in the US are performed by HFT. In Europe, this number reaches an upper cap of 50%. In the Australasia region, these numbers are quite different, as presented in Table 1.

Table 1. Percentage of HFT activity in equity markets

Country	HFT % in equities
Japan	0.45
Australia	0.27
Hong Kong	0.2
Singapore	0 (30 derivatives)

Source: [Kauffman et al., 2015].

The percentage rates of HFT activity in the Australasia region are quite different from those in the US and Europe, but what is surprising is the low activity of HFT in Hong Kong and Singapore – especially the later. Although technologically adapted, HFT companies in Singapore seem to be reluctant to enter this market due to the high trading fees on the Singapore Exchange (SGX), and due to the fact of being only one exchange in the country [Kauffman et al., 2015]. A question may arise concerning the difference of 0% HFT activity in the equities from the 30% in the derivatives market. This is directly related to the main HFT business model generally used – the arbitrage model. Because Singapore has only one exchange, it is impossible to achieve arbitrage profits from transactions in financial instruments listed on the SGX. However, arbitrage is possible through the derivatives market, since HFT explores the differences in value between derivatives and the instruments they are based on. Hong Kong presents a similar situation when it comes to profitability, because the regulatory body imposes a tax of 0.1% on the purchase and sale of equities [HK.gov, 2017].

Leaving aside academic and regulatory discussions, in algorithmic and especially in HFT trading a significant emphasis is put on every individual part of a transaction process, i.e. order submissions, order processing, and trade actions. When analysing changes made in how companies operate, it is crucial to discuss a typical trading process. This process may be divided into four steps [Idvall, Jonsson, 2008], all founded on one fundamental component. This component is information or data collection. This is of such importance that currently companies, not only trading ones, are focusing many on their resources to achieve the most efficient mechanism of collecting data. Initially, human traders would gather information directly from the trading floor or press conferences. As technology evolved, but before information was so commonly available, many information agencies, such as Bloomberg or Reuters,

became of much importance by delivering almost any type of information in a compiled and structured way. Now, a lot of information can be gathered from the internet – not necessarily from information agencies. But as the amount of unstructured information increases, it becomes a more challenging issue. After information is gathered, the first step in the transaction process is information analysis. Traditionally, this step is performed by human analysts who use, among others, economic theories and rules to structure data. This step is becoming more automated with the introduction of algorithms which perform analysis significantly faster. Afterwards, in the second step, trading signals are generated, while in the third step a trading decision is made, which may be to a lesser or greater extent in accordance with the trading signals generated from the previous step. Algorithms, in this case, eliminate the potential emotions that may exist when taking a decision. The last step is the trading execution. When this step is reached, the process will start over again, leading to an increase in the number of already opened trades, modification or the closing of existing trades.

As time went by, technology was used by trading companies to increase the speed of trading execution – something that eventually led to the rise of HFT companies. Currently, the more technologically advanced a trading company is, the higher the level of automation that will be employed in the different trading steps mentioned above is – not to mention the highly-qualified personnel necessary in order to build and manage that technology. As soon as trading companies reached a technological peak in the trading execution, reaching speeds of micro or even nanoseconds, and in the rise of competition in this sector, much effort has been focused on improving the speed of information gathering and analysis. This has led to the rise of the so-called Quant 2.0 discussed later on, and what is interesting to notice, it does not only apply to trading companies but also to other businesses.

2. Technology innovation in algorithmic trading

Data transmission technology

One of the most technologically demanding trading business models is High Frequency Trading due to the high speeds involved. Already back in the 90s, or even now, HFT companies put significant investments in state-of-the-art technology. Enhancements have been made in either the materials used for hardware, or programming efficiency affecting trade execution, and above all, communication speeds. These communication improvements do not apply only to the speed of data between companies and exchanges in one country but also between countries or even continents. As for the types of communication methods used, there is nothing that could be considered new. Although companies can use metal cables, many investments have been made in laser beam networks, optical cables, and microwave technology – the technology already known since 1949, when it was used to connect New York and Chicago [Anthony, 2016]. With all of them having certain advantages and disadvantages, generally laser beam

technology is difficult to be widely used, due to all the obstructions likely to occur between the transmitters and receivers, especially those resulting from weather conditions. Although being this an important obstacle, it is worth noting that Anova Technologies offered in 2014 one of the most technologically advanced wireless laser networks available set between New York's NYSE and Chicago's NASDAQ (and London's BATS/Direct Edge) which, as the company states, is "(...) resistant to all varieties of inclement weather conditions (...)" [Anova, 2015].

When considering fibre optic cables, where speed is similar to laser technology, the problem arises with the infrastructure that is necessary to build a network – even if used, it is not possible to assure that the hardware at different locations will have the same speed capability. There will be routers, transmitters or receivers which are significantly slower than what fibre cables offer. Not taking hardware speed capabilities into account, there are at least two significant logistic setbacks with fibre optics. First, it is expensive to prepare a fibre cable network if there is not already an infrastructure ready. One needs to remember that this network is not only necessary within a company but between thousands of companies and different exchanges. Second, it seems more practical for communications to be wireless than having different types of cables. If, however, an infrastructure is already in place, then fibre optic cables are less expensive than microwave transmission. On the other hand, when taking into account speed, data travel faster by air than by cable – even fibre optic ones, which makes other technologies than fibre optic cables more interesting to HFT.

Microwave technology is the fastest transmission channel after laser communication (likely a few nanoseconds slower) and is an important reason why probably most investments have been made in this type of technology. The changes that have been made are related to the improvement and optimization of data transfer. For example, Vigilant Global, a telecom company, announced in 2016 a plan to build a 320-metre tall telecom tower (the sixth tallest structure) in Britain [Martin, 2017] with the purpose to ensure a completely unobstructed (both optical and radio) line of communication between Britain and Europe. The costs of microwave technology are not small, though. Each transceiver is estimated to cost between £10,000 and £20,000, and each mast between £100,000 and £200,000 [Anthony, 2016] while the average distance between masts is from 30 to 65 kilometres; for a distance between Frankfurt and London it would mean the necessity of 20 masts, and a total cost between £2.5 million and £5 million.

The rise of Blockchain

Blockchain is a technology that has been revolutionizing different segments of the financial sector, especially the financial markets, by offering speed, lower costs and security in transactions. The general idea behind Blockchain “ (...) is an algorithm allowing users to simultaneously update the cloud database while maintaining the database's integrity, all in real time” [Aldridge, Krawciw, 2017]. This means that the time of the settlement process is significantly reduced from T+2 or T+3 to real time. In addition, contrary to the usual

transaction settlement process, when using Blockchain there is no need to use intermediaries, something that significantly lowers transaction costs. It is worth mentioning that real time settlement also eliminates risk – for example, potential counterparty risk, which is extremely important in the operational risk management of large corporations and banks. One other potential and important implementation of Blockchain is in the foreign exchange market. A solution that for many years has been used is the Continuous Linked Settlement (CLS) system which through a global entity settles foreign exchange transactions between commercial banks or large institutions with nearly no counterparty risk, and settlement time for US and Canada is reduced to T+1. This system works by having CLS participants to use accounts in the CLS system, which further settles transactions with other institutions, also using that same system. What CLS achieves in this way is to have a ‘global’ bank with clients from many different countries settle ‘internally’ (within that CLS institution). Blockchain could change this complex network since it is designed to settle in a peer-to-peer relation, without agents in between. For HFT companies, Blockchain mainly optimizes the settlement of transactions, which already are considered to be extremely fast.

As to High-Frequency Trading, the Blockchain technology may become a serious threat to those traders acting in traditional financial markets. Since the essence of HFT is to profit from slower traders and price inefficiencies, also if possible from high volatility, the moment when trades are settled in real time by using the Blockchain technology directly between traders and without the use of an intermediary to process trades, HFT will no longer be able to profit from the speed they achieve by investing in proximity policies (colocation) and procedures, as there will be no servers to come close to [Batog, 2015]. As it already is becoming reality, HFT may in fact move from the traditional equity markets to the cryptocurrency markets. When cryptocurrencies markets present volatilities of approximately 13.4%, while Bitcoin volatility alone is close to 70% [Cantu, Reiners, 2019], these products and the markets they operate in may become a profit-making source just as the equities markets were 15 or 20 years ago for HFT traders using strategies that profit from volatility. These markets have also an additional advantage in comparison to traditional markets, being that the trading time is 24h for the cryptocurrency markets. These have already been implementing policies in order to attract institutional traders. Not only are cryptocurrency exchanges introducing institutional accounts but they are also adapting their fees according to the volume generated by these traders [Coinbase, 2019].

One important question that remains open is how the eventual decrease of the HFT activity in the equity markets from the implementation of the Blockchain technology may impact the adverse selection protection mechanism offered by HFT, which in the end diminishes trading costs understood, for example, as spreads – something that may significantly affect the interest of retail traders, as well as institutional traders in some financial instruments.

3. Algorithmic trading and Quant 2.0

Back in 2016, the Securities and Exchange Commission (SEC) granted the approval for the IEX (initially more of a dark pool established in 2013) to become the 13th official exchange in the US [Durden, 2016]. This decision came as a surprise because the main feature of the IEX is that it includes a 350-microsecond delay to every trade – something that seems contrary to regulations of the National Market System (NMS) requirement to disseminate information without any programmed delay [Rosov, 2016]. What seems more controversial in this case is that the IEX own routers may avoid this speed delay – contrary to everyone else [Byrne, 2016]. Nevertheless, the IEX approval from the SEC led the NYSE to also applying to the same regulator for an approval for a speed delay. The SEC gave this approval in May 2017, allowing the NYSE to introduce a 350-microsecond delay to trades for small and mid-cap companies [Bullock, 2017]. It seems interesting, though, that the NYSE being initially a strong opponent for the IEX effort to become an eligible exchange, now applies the same feature as the IEX – something that the board of the IEX is not happy about [Bullock, 2017]. Some exchanges may indeed introduce these time delays to try to expel such business models as HFT, but as long as investors believe in the rates of return that funds achieve by using HFT methods, it will be difficult to ‘remove’ such companies from the market. One other thing to take in mind is that such funds also generate profits for exchanges in the form of trading fees. If exchanges start implementing delays in execution or price information, HFTs will simply change exchanges, and profits may significantly drop.

What seems to be some irrelevant and simple changes for a ‘mortal’ trader, for algorithms a speed delay can be the difference between a profit and a loss. The speed delay of 350 microseconds significantly limits the ability for HFT to achieve returns. Even though initially this IEX feature was seen by many as the only possible legal mechanism to avoid HFT predators and something that promotes competition, now it is seen by some as a mechanism that generates further complexity in the market. Independently of the reason, there has been a decrease in the activity of HFT and consolidation among companies in this sector. Interestingly, in response to these setbacks companies state that speed is not the principal HFT business model as it once was [Rosov, 2017], and that changes are needed to achieve profits and fund the extremely high costs which were borne in the function of, for example, technology needs. Now, these firms are turning their focus on more complex market prediction and analysis models basing on, what for many years was not as popular, intricate algorithmic quantitative models and Artificial Intelligence (AI) – *quants*. This comeback has been popularised by the name of Quant 2.0. The difference between the quants previously and currently is in the aim they were used for and their complexity. Initially quants relied simply on putting in algorithms the ideas and processes used by human analysts and traders. Later, quants were used with the aim of achieving the highest profit possible. This was a combination of complex algorithmic quantitative models and trading algorithms. Quant 2.0. or the latest stage of quants is a much

more complex use of algorithms not only for quantitative models but for all the large amounts of information that are difficult to process using typical analytical models [Hwang, 2016].

The importance of Quant 2.0 in the financial market seems unquestionable as its presence has never previously been so high as it currently is. As R. Zamagna states and according to a report by JP Morgan, traditional traders (non-algo and non AI) in 2017 represented only 10% of all traders [Zamagna, 2019]. This represents a significant increase from previous years since in 2014 the share of HFT and Algo traders in the US was at 75% while in 2010 it was not close to 60%–70%. Interesting to see in the future will be how Quant 2.0 will affect the cryptocurrencies markets, since it is already a point of interest for HFT traders.

Fintech and Quant 2.0

The rise of web and digital technology has fundamentally changed the environment of the financial services sector. Fintech has become a more popular term used in the media, to mention technology companies and startups that use new technologies to create new and better financial services for consumers and maybe especially for other businesses [Sanicola, 2017]. Fintech may also be understood as companies that use intensive analytical processes to process information faster, and to more efficiently compete with traditional financial companies such as banks or insurance companies. Competition from fintech is impressive. Not only more effective products and services are offered, but also they are offered more cheaply, without commissions or fees due to, for example, online services as opposite to traditionally offered services. Quant 2.0 can be considered the re-birth of quantitative models and artificial intelligence that for many years were put aside by financial companies. With current competition and regulatory barriers, HFT companies will need to find other additional profitable mechanisms than just those previously used (based only on speed).

Although Quant 2.0 seems to be the new ‘black horse’ in trading for now, one should take into consideration if the potential profitability that these methods bring will not decay gradually as more entities use them. When HFT surfaced, competition was scarce and there were virtually no barriers – only technological ones that have diminished over time thanks to the enormous HFT investments in new technologies. This led to the creation of new companies, new investment funds and to significant profits. However, as mentioned previously, this has somewhat changed. According to data from the TABB Group, HFT revenue has dropped 85% – \$1.1 billion in 2016, in relation to the \$7.2 billion in 2009 [Chaparro, 2017]. The same could be for Quant 2.0 companies, because currently there is a disproportion in the technology used, just in the same way as when HFT companies started. When these differences erode, by introducing Blockchain or other technologies in companies or markets, improving even more communication time and other elements, the marginal profit will also decrease. When more and more traders use algorithms that predict and interpret information at the same time, information asymmetry will decrease and so will profits. Obviously, market manipulation is one possibility to continue to assure revenues, but it seems a short-sighted one. Kaminska [2017]

presents an interesting observation showing the same line of thought. While in the future competition increases, it “ (...) becomes cost effective to invest in protectionist inefficiencies” [Kaminska, 2017]. What this means is that in the future the market will see, for example, further fragmentation or the use of dark pools (which have already been more popular).

Dark pools work in a similar way as a normal exchange, where buyers and sellers enter the market to meet their own needs. The main features (and differences) in dark pools is that access is limited and members do not know with whom they are trading [Hudak, 2015]. In other words, members are matched without information being released on the best prices. Dark pools become, therefore, an excellent environment for information asymmetry. It is reasonable to assume that the use of dark pools will continue to grow since informed traders do not want other traders to become informed in the same way, thus, willing to support exchanges where information asymmetry remains. As the result of such trading environments, one other mechanism similar to dark pools is the use of batch auctions by exchanges instead of the traditional continuous trading. The London Stock Exchange (LSE), for example, introduced batch auctions already in March 2016, in the form of a 2-minute batch auction at 12.00, every day. Another exchange that has introduced such a mechanism in June 2016 is the Chicago Stock Exchange (CHX). What may be interesting for participants of batch auctions, similarly to dark pools, is that only limited trading information is disclosed: instrument symbol, size, time or price [CHX, 2016].

When the number of such measures continue to increase, the efficiency of Quant 2.0. with everything that is related with information or data becomes critical. As Kaminska underlines, for trading companies to continue to achieve any profits, investments need to be directed into “mass data collection, analysis and hardware” [Kaminska, 2017]. For companies with HFT business models, speed is being shifted from trading into the process of collecting and extracting the different types of information from unstructured sources of information, as the internet is. What is challenging in this case is, after the significant amounts of data are gathered, it needs to be structured according to time and other specific metrics, giving the possibility of being used to generate trading signals. As such, companies will not only compete in the trading ‘floor’ but, in the way how fast and efficiently information is obtained and processed. Obviously, when there is a rise in the number of companies performing the same activity, speed of trading still becomes an important element; it will simply not be the only one.

One important change that may already be seen in the financial sector, especially for those companies focused in such activities as trading, is what regards employment. On the one hand, such business models as algorithmic trading employ significantly less employees than traditional trading companies but on the other hand, these employees have fundamentally higher academic qualifications (frequently with a Ph.D. degree) and are more specialized. The academic skills required are most often mathematics, physics, computer engineering, programming, data science, econometrics, or other. This means that, as more computerized and focused businesses are, the faster the number of employees will decrease, and at the same time required qualifications will rise. Additionally, depending on the type of companies, there may

be necessary more employees, who do not have any special academic degree. These changes can already be seen in trading companies. Algorithmic trading companies already use a limited number of highly qualified personnel. It seems reasonable to assume that in other business models, such as banking or other financial services, less academically qualified personnel will be used due to a higher level of fragmentation in services and more specialized activities within a given company. Employees, even now, already get training on how to perform their duties in very focused tasks. As such, a general knowledge of, for example, all financial instruments is something unnecessary as it was in the past. In banking services, there may already be different personnel for current accounts, savings accounts, mortgages, for investments, and for the different investment types (instruments).

Two last aspects that touch employment in face of an increase in competition are micro issues and macro issues. The first one that exists at the corporate level is what was once accomplished by full-time employment, now it may be achieved by short-termed employee-employer relation, i.e. part-time employment, or even the outsourcing of services to individuals [Sundarajan, 2017]. Full-time activities, due to technology improvements, may now be easier to separate and partition – meaning that it is easier to assign tasks to the many different types of technology mechanisms. This brings an issue of macro proportions. If, for the different types of businesses, it becomes cheaper to use technology, e.g. algorithms or robots, then, due to higher competition, salaries at the macro level may fall. As salaries fall, it will become more difficult to find clients for the products sold. Certainly, this is an issue that affects, to a greater extent, retail businesses than financial ones, and that may be still far from becoming reality, but it can eventually become a serious one.

However, as of final notice, there are reports (mainly focused on investment fund activities) showing that, when comparing a human trader with an algorithmic trader, the investment outcome is similar [AQR, 2017]. The difference between them will rely on the exposure to risk, which seems to be lower for algorithmic traders than human ones. Also, what may be of particular importance to investment funds, is that returns achieved by algorithmic traders are less sensitive to market conditions [AQR, 2017]. It is, nevertheless, extremely difficult to assess how much of the trading is algorithmic or not, although there are some opinions that it could reach 90% of total trading [Melin, 2017]. This, in conclusion, would mean that at the moment management issues are related to smart integration of both types of traders rather than the exclusion of either one.

Summary

The highest rise of the interest in algorithmic trading companies was probably in the 1990s. The use of algorithms in quantitative models helped significantly the work of analysts by providing faster and accurate analyses. Later, with the increased competition in the financial sector, algorithms were focused on profit maximization by being used also in the trading

process. This ultimately led to large investments in data transmission technologies and the rise of High Frequency Trading firms. Priority was given to speed of trade execution, which now can be measured in microseconds or even nanoseconds. Due to controversies regarding this type of businesses, regulations and mechanisms have been introduced, making it more difficult to benefit from speed advantages. Currently, companies in order to achieve returns also focus on information collection and analysis. This has become a difficult task due to the large amounts of data available from many different sources. In order to reach for alpha returns, trading companies turn to other unstructured data and sources of information such as Facebook, Twitter or other social media and not only financial sources.

The use of complex algorithms has also led to changes in how trading companies function and use their resources. HFT companies, for example, have reduced personnel to the most academically qualified ones, responsible for the management of the used algorithms. Currently, it is difficult to claim a complete replacement of human capital in favour of algorithms, although it certainly seems to be a future direction. As such, the main management issues in financial trading companies centre around the efficient integration of both human and technological resources.

Since price inefficiencies in the capital markets have been declining significantly, causing HFTs to have lower returns than in previous years, these are also turning their investment focus to cryptocurrencies, where price volatility is significantly higher than 'traditional' instruments. Moreover, the controversies related to, among others, the volatility generated by human traders in these mentioned markets will probably decline with the introduction of Quant 2.0 mechanisms. Volatility may also be levelled off due to the high level of volume generated by algorithmic trading, which in turn can also include complex AI mechanisms that can introduce in their trading algorithms trader's sentiments (or emotions) – available in large numbers of sources, such as social media or blogs.

The presence of technology in the financial markets in the future is unquestionable, but what seems to be unanswered is how large the changes will be in the financial market design and its structure. Will traditional traders be replaced by algorithms, and will the many types of investment funds be replaced by ETFs using AI? One other question that is extremely important is taking into account the domination of HFT and AI in the current capital markets, whether it will still be possible there to achieve alpha returns, or these will only be possible to be achieved in alternative markets such as in cryptocurrencies markets. These questions are some of many doubts and problems that still remain open when mentioning algorithmic trading and Artificial Intelligence, making these topics, without any doubt, worth taking into account in future research papers.

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