

Ethics of High Frequency Trading: Insider information

Daphne Sobolev

Abstract

Aim. High Frequency Trading poses a large number of ethical questions. The purpose of this study is to examine the ethical perceptions of those who work inside the HFT industry.

Method. The research consisted of a case study. Participants (N=30) were high frequency traders, algorithm developers, consultants, quant analysts, quantitative strategists, ultra low-latency data scientists, or managers of HFT companies. Participation involved an interview (N=27) or a completion of a questionnaire (N=3). HFT actors were asked to report what ethical considerations are involved in their work.

Results. Participants' answers showed that many HFT actors considered legal and regulatory issues a central component of their ethical conduct. However, a proportion of the participants was concerned with the social contribution of their practice and with the public image of HFT. In particular, perceiving HFT as having neutral or negative effect on the market was related with sense of meaninglessness.

Conclusions. Ethics perceptions of HFT actors are characterised by a personal nature. Beyond the overlap between the notions of ethics and legality, they reflect the human tendency to search for meaning and the need to have a positive image.

Introduction

The practice of High frequency trading (HFT) is often described as ethically controversial (Harris, 2013). In particular, Davis, Kumiega, and Vliet (2013) asserted that ethical issues arise from the interdisciplinary nature of HFT. They claimed that, as HFT involves traders, quantitative analysts, and programmers, ethical conflicts may occur. Analysing HFT ethics using procedural and distributive fairness measures, Angel and McCabe (2013) concluded that certain HFT practices are unfair. Following Zelizer (2012), MacKenzie (2014) maintained that HFT actors perform 'boundary work', distinguishing between 'good' and 'bad' practices. MacKenzie emphasised that, unlike market-making, trading techniques which reduce the market's liquidity are considered unethical, though in some cases the difference between them is unclear.

To a certain extent, the decomposition of ethics to different disciplines (Davis, Kumiega, and Vliet, 2013), different measures (Angel and McCabe, 2013), or different techniques (MacKenzie, 2014) is artificial. This is because in many HFT companies, computer programmers (code writers) work also as trades and as quantitative analysts. The notions of procedural and distributive fairness are not independent (Cropanzano and Ambrose, 2001). And, as shown below for the case of market making, 'boundary work' did not yield ethical perceptions which are agreed on all market participants.

The purpose of this study is to examine the way people who work inside the HFT industry perceive their practice's ethics.

Hypotheses

Many aspects of HFT have been regulated (Chung and Lee, 2016). For instance, in some countries, traders with high order-to trade ratio are taxed. Algorithmic traders are required to report their strategies and risk controls. Banks often define ethics rules and codes of conduct (Fetiniuc and Luchian, 2014) and employees are required to learn them (Milic-Czerniak, 2012). In addition, there is a considerable overlap between ethics and legality in Finance (Erhard, Jensen, and Zaffron, 2016). Therefore, I hypothesise that ethics perceptions of HFT actors are tightly related to legality and regulatory considerations (H_1).

However, I suggest that HFT actors extend the notion of ethics beyond the narrow interpretation of the legal-regulatory aspect. Many times, ethics is associated with social contribution. For example, in the financial context, socially responsible firms, which are involved in screening, shareholder advocacy and community investment, are considered ethical (Peifer, 2014). In addition, social contribution is one of the social well-being factors (Keyes, 1998), and is correlated with sense of happiness (Oarga, Stavrova, and Fetchenhauer, 2015), just as is the sense of meaningfulness, or purpose (Baumeister, Vohs, Aaker, and Garbinsky, 2013; Kashdan, 2004; King and Napa, 1998). As the notion of ethics is associated strongly with social contribution, which is central to people's happiness and sense of meaningfulness, I hypothesise that ethics perceptions of HFT actors reflect their concerns about the social implications of their practice (H_2).

HFT-related ethical issues have been discussed frequently on the media, including popular books (e.g. Lewis, 2015), newspapers, magazines, journal articles (Kessler, 2014; Patterson, 2012) and TV shows (e.g. CBS's "60 minutes" about high frequency trading, 2014). The media covers HFT especially after failures such as the Flash Crash (Chung and Lee, 2016). HFT was even criticised for posing challenges to democracy due to the power and wealth it encapsulates (Golumbia, 2013). Therefore, I hypothesise that many HFT actors are concerned with the public image of HFT (H_3).

To examine these hypotheses, a qualitative and subjective research approach was utilised.

Method

Participants

Davis, Kumiega, and Vliet (2013) asserted that the interdisciplinary nature of HFT elicits ethics problems. Therefore, to obtain a wide range of insights into the ethics of HFT, recruitment process was inclusive, rather than exclusive.

Recruitment was performed through LinkedIn (<https://www.linkedin.com/>). HFT actors were identified using the key words: High Frequency Trader, High Frequency C++, Low Latency Trader and Low Latency C++ (C++ was chosen as a key word for the search as a large number of HFT code writers mention programming in C++ as one of their skills on their personal LinkedIn Web page). More than 1,000 LinkedIn connection invitations were sent individually to people who were working or who had worked at the HFT industry. Participation invitations were sent individually to nearly 400 people who accepted the connection request. Thirty people (29 men and one woman), who described themselves as high frequency or low latency traders, programmers, consultants, or company managers on their LinkedIn website, and who accepted the invitation, participated in the study. Participants' professions included high frequency traders, algorithm developers, consultants, quant analysts, quantitative strategists, ultra low-latency data scientists, and managers of HFT companies (CEO, director and vice presidents). Most participants ($N=16$) worked in London. The rest of the participants worked in Oxford, San Francisco, New York, Sydney, Hong Kong, and China.

The low participation rate could be explained by the secrecy surrounding the HFT industry (Lewis, 2014). For example, many employment contracts of HFT actors include clauses which prevent them from working at any competing company one to four years after they stop working at their firm. An HFT trader who did not want to participate in this study explained that his boss did not allow him to be interviewed. MacKenzie (2014) described similar difficulties in recruiting participants for his study. The low participation rate may result in a self-selection bias.

Procedure

Participants were interviewed in a face-to-face meeting (N=13) or a Skype meeting (N=14), or were asked to fill in a questionnaire (N=3), according to their request or location. All interviews were recorded, apart from three cases, in which the participant asked to not to be recorded. In these three cases, the contents of the interviews were summarised.

Interviews were partially structured. Given the secretive nature of the HFT industry, great care was taken to avoid questions which could be interpreted as threatening. Therefore, an informal formulation was chosen, and all participants were asked the question:

Q: "I am absolutely sure that everything that you do is legal, and I am not asking you about it. However, does your work involve ethical considerations?"

Participants who asked for clarification about the intention of the question were instructed to interpret the question in any way they chose to interpret it. Interviewees were asked additional questions about their daily work routine and other psychological aspects (Sobolev, in preparation).

At the end of interviews number 4-30, participants were offered the option to hear about the results of the interviews of the HFT actors who had participated before them (all participants were offered the option to obtain the results when published). Hearing the answers given by other HFT actors encouraged participants to elaborate more on certain issues and provided in many cases further insights into their ethical perceptions.

Due to the low participation rate, no claims on generality can be made, and this research should be considered a case study.

The study was anonymous. Throughout the paper, each participant is referred to by two randomly chosen letters.

Results

Regulatory and legality considerations

A large number of traders answered question Q by referring to the way they incorporated legal or regulatory considerations in their work. For instance, SG, the head of technology of an HFT provider firm suggested that regulations had a profound effect on HFT practices.

SG: "About ethics, before regulation, HFT was really, you know, especially in the US, where there are 14 different exchanges, all trading the same stocks, so that's the best playing field for HFT, that's why it started in the US actually. It was the Wild West. Those guys, they were really, you know, I said, what is happening now in Asia used to happen in America [...] It used to be, like, if you can scam the guy, if you can slow the guy, if you can spoof the guy, you will

do it. As long as you're making more money than he does. It used to be the Wild West. So, at that time, of course they were very "close door" business. You could not know what was going on in an HFT firm. You would not even know who was in an HFT firm. Now that there are regulations and so on [...] it's like any other business. We basically do what finance has been doing for years, ah... openly."

EO, a senior HFT software engineer, described a working environment which rejected illegal and unethical practices:

EO: "You know, I used to work for [bank name], and, as you know, the company has been on the news for [...] financial crisis issues [...] So, seeing first hand these people being disciplined and fired and some of them going to jail, etc.etc., am, I would say, gives [...] a hint, and that's pretty much the culture that was there where I worked, and here as well. If there is a hint that things are shady – we just don't do it, it's not worthy for us. It's as simple as that. So I, from that perspective, I never really question myself. In fact, if you want to do something [...] if you have some idea that even remotely seems questionable [you don't do it]. And also the exchanges these days are pretty good at policing people about, you know, spoofing [...] At least – let me put it this way – if there is something going on – it's not anything that I am aware of, and in this respect, you know, because I am ignorant about it, it just does not bother me."

OS, an algo trading developer, criticised the regulators. In addition, OS describes a highly limiting environment.

OS: "No, not at all. Ahhh, since I work at a bank, we are heavily regulated, and we need to follow all the rules, even when we think they are stupid, and they are, a lot of them are, the regulators actually don't know everything. But we follow them and I know that all of my conversations are recorded, every email is saved for ten years, so there is all of the track record, you can always go back and look what we have done, so we have no possibility to do anything outside the framework of the regulators [...] everyone at the bank [...] will say that regulators have good intentions but they miss their target because they don't know business. With that said, I think that a lot of the regulations are good [...] We are very cautious about ethics."

BJ, an HFT C++ developer reported that his company (a major bank) requires the employees to be aware of their ethical standards. BJ described also a conflict between ethics requirements and profitability, and the pressure caused by the demand to comply with ethics demands while retaining high returns.

BJ: "Yea, definitely, yea... The wider organisation pushes that [...] For me, internally, the trade nowadays is so locked down and repeating the mantra all the time about ethics, about doing the right thing by the client, you know, the best execution, and drilling that into people. It's not acceptable to do anything other than the right thing [...] by the organisation, and if you see anything at all that you suspect, it needs to be reported, and you are accountable if it goes wrong. And so, these pressures are there, and they are very apparent today, and I think that the system is now evolving to close those gaps, because, years ago, am, the wider organisations seemed not to ask the questions. It was like: there is a tidy desk over there, they are making so many millions per year now, no one is complaining, you know, don't ask questions – let me get on with it. And now – you know, things are becoming, I mean, what has happened in the press recently, in the media, there are books about HFT, it's all about press, and the big organisations are suffering future reputation damage as a consequence, am, and so they are moving to defend themselves against that, and that is also

interesting to see, because there is this payoff internally. As I said, at some level, you need to be making money, you need to be competitive, you need to make change, you need to have that, kind of trader, am, mentality [...] and make money as that, at the end of the day, they wouldn't, they wouldn't employ me if the traders would not make a profit, so, you know, I depend on them to make a profit, and I can't make a profit if the organisation is too overly-restrictive. A new regulation is coming in, and it would be interesting to see what will happen, how can we still remain competitive against [...] the hedge funds and the small organisations, how can we put the controls, the ethical controls as well as the risk controls in place, and operate effectively within these constraints, but still be competitive. It's really kind of interesting to see how would that play out. [...].

The traders themselves, they would be competing even against other desks internally, right? Yea, yea [...] That's why a lot of the time they do not want to share... because on an FX desk [...] the key component is what they call 'the alpha', which is their price prediction, where would the market go within the next 2-3 seconds. That's kind of the time horizon they are talking about. Now, if that was a common knowledge, if everyone knew it, then they have no value to add [...] even against other desks. So, you have got to remember that a desk is basically putting a business plan forward at the beginning of the year, saying, if the bigger organisation invests in me and my desk, I would make you this much profit. Obviously, [you have to] abide the rules and regulations and ethics of the organisation [...] so they are operating like a small business, yea? If they don't make the money, if they don't give the internal investment by the end of the year, then, you know, the business, the wider organisation will say: ethics is not profitable, get rid of them, sack them, and that does happen all of the time, so, many, many times I have been on the trading floor, and one day I would come in, and an entire desk is no longer there – they have just been sacked because they were not making the profit. And that is kind of hard... they, they kind of accept that, but it is very much a reality of how cut-throat it's like. And I respect that, I am not that kind of person [...] I do understand the pressure that they are under."

OM, who was a director of an HFT firm, asserted that his company complied with the regulations and explained how clients who did not conform with them were dealt with.

OM: "Coming from an investment banking background, where we used to have a real-time risk platform, monitoring trading clients, and... and kind of being involved a lot with - so, for example, an exchange may phone us and say: we can see one of your clients is trading on a stock that has been highlighted today as a point of interest, and it looks like [...] price manipulation. So we would go away, have a look at that client, trading that stock, and, kind of see whether we think that he is doing the same thing. So we would get some guys in, and have a look at it, and kind of go, eeeee, it's not great, that looks a bit wrong. It doesn't look quite right. So, then, from a senior level we would talk to the client, very delicately, and the guy would go: "oh, yea, oh oops, my mistake. Yea, that's going a bit funny today. Sorry about that." And then he sorts it out. 99% of the times, when we have had these issues, that's what we did. And I have been very conscience of making sure that we always worked within the boundaries of market impact. You know – market manipulation, price manipulation - all of these things, to make sure that we [were] tightly within the boundary [...] we are tighter, making sure, from an ethical standpoint I'm always making sure that we are always legal, within regulation, within compliance, you know, and no way being destructive in our behaviour.

VX, an HFT quant analyst at an investment bank interpreted question Q in legal terms. He mentioned that illegal practices occur in other companies.

VX: “No, hardly ever. [It] may depend on the company: in the companies I worked for, they didn’t do anything illegal or unethical. But it happens in other companies [...] The orders I place, I am happy to take position of.”

The interpretation of NP, a quantitative researcher, was similar to that of VX:

NP: “I do things legally. There are spoofing – misleading others to trade. This behaviour is illegal in different countries and exchanges. We do not touch these boundaries.”

Though many of the interviewees shared the feeling that they worked according to the regulations, not all of them agreed on the ethical value of certain HFT techniques. For instance, AD, a senior HFT consultant and software developer considered market making ethical:

AD: “[...] I prefer market making. I regard market making as a public good. Like, if you would like to buy or sell something, it’s nice that there is someone out there who would buy or sell for me. You know, you can always find someone to trade with. And so, it keeps the price stable. But what we were doing was, we would detect that we thought that the market was going up, and our engine would buy. And then it would sell when it got up [...] it would sell as it turned to go down again. That was one signal. Another one, we would look for order book imbalance [...] so if there were more buyers than sellers, we would go, ok, well the market is going to go down, because there are more people selling, and we would look for that one, but everyone was looking for that, am”

Author: “And did you consider it ethical or unethical?”

AD: “I mean – it’s banking”.

However, when RT was informed that other participants in the study considered market making more ethical than practices which reduce the markets’ liquidity, he disagreed.

RT: “Than liquidity taking? - Because I perceive liquidity taking as a very constructive thing for the market. There is demand there, and you are helping the demand to be answered, right? There is a seller out there and you go and hit his offer. That means that you are actively participating. I guess I understand why, you probably spoke with many high frequency traders [...] Market making is making two sides of the book. If it’s the FX market and it’s unregulated and it’s a client that you did the analysis about him and you know that every time that you trade with him you are losing money, then suddenly you are creating such a wide spread that it is not worth trading with you. And suddenly there is another client that you did the analysis and you know that [you] are always making money [...] on him, you simply make a tiny little spread. So, you know, market making – I don’t, as a concept thing – I would perceive it as not the honest way of trading. But liquidity taking – yea, definitely. Actively participating in the market [...] So, the cash traders, they are high-touch, they are low frequency, [...] they are the ones being mainly screwed by high frequency traders. [...] well, you read the Michael Lewis book. The difference is that some people read the Michael Lewis book, and some people, like me, used to have access directly into those dark books [...] and I can tell you that the market makers are making all sorts of dishonest things. I mean, within our organisation we were smart enough to identify it very early on and get rid of them, cleaning our dark books, making sure we don’t have any of these toxic positions lying around. Obviously [bank name] weren’t as smart and they paid 3 billion dollars or so because they did not do it. But, in general, if you think about the vanilla high-touch cash trader, getting an order on his form and executing it on behalf of the client, there is nothing more pure to me and innocent than that activity, actually participating on behalf of an

investor, hopefully believing in a company, or has some alpha, and wants to participate in the market. But what a high frequency market makes does, he sees the statistical differences and dissimilarities and correlations within the market, and taking advantages of those, he is not there to buy and sell stocks because he strongly believes in one company or another, he is there to make money on the fact that the cash-trader is locked. That's what he is there for. Simple.

Obviously the other guys will say that, look, with market makes providing liquidity on both sides of the book, you narrow the spread, and therefore a cash-trader then has a narrower spread and he is getting a better, good quality price. He is getting a better price, but at what expense, because at the moment he trades, he is getting screwed by the market maker straight away, because the market maker pre-positions himself everywhere on the book and the market maker will make some statistical analysis, identify that it is a stupid client, and making money on top of it [...] Everyone has an opinion, I have my own opinion, someone else will tell you the exact opposite of everything I have just said, this is just the way it is, right?"

YR, a senior HFT software expert, pointed out that regulations can be interpreted in different ways. YR also emphasised that actors from different disciplines attempt to help each other understand the regulations.

YR: "I think that there are always areas where exchange rules are interpretable [...] You read the [...] exchange rules and unless you are literally a lawyer, am, you don't know really exactly what they mean [...] If I had such a concern I would always try and speaks with somebody, in terms of: I don't understand this, tell me what to do. It's not my job to interpret this, it's somebody's job to tell me what I am meant to do. Because, like you say, you know, if you do it wrong, that can end you up in jail. And it's a jail in America as well, and that's not very nice. So, you know, you always have to be careful and consider it".

Author: "So did you actually work with lawyers in order to prevent such problems?"

YR: [...] Generally, you would ask a trader, and the trader would already have a trading qualification, which meant that they understood these sorts of things. But sometimes there were cases where you would have to get an interpretation and we [would] always [be] on the side of legal compliance. Clearly, I mean, if there was the opportunity to get something wrong [...], we wouldn't do it. Simply because, I mean [...] ignore the ethics, because none of us wanted to be in jail, but even in terms of the business, it does not make sense to do it. You know, that tiny little benefit that you get from doing something that is, is, is not right, you know – churning is a classic way in high frequency trading, when you are trading for no particular economic advantage [...] and, you know, that's the sort of thing that you see that people do it. But, you know, it's ridiculous, because, you know, you will end up in jail [...] You used to see it, not so much now, but once upon a time [...] So, for instance [...] they would put a very large order on the other side of the book, to make the price move that way, and then they pull in all of a sudden and put an order on the other side. That's called 'flipping'. And, and, you know – it was around for years. And it took a long time for the regulatory authorities to catch up with it [...] In the company I worked for, it was, you know, one of the largest hedge funds [...] they were using 30 billion dollars, you are not going to muck around when you [are working with] 30 billion dollars. Everything is by the book, you know. And I would be instantly sacked if I had done anything wrong".

It is important to note that, in line with Davis, Kumiega, and Vliet (2013), not all HFT actors are aware of all the legal aspects of their work. For example, SK, the only woman who participated in the study,

who works as a senior software engineer, said that she was unaware of the ethical aspects of the code that she was writing:

SK: “yes, but I am not aware of them. So we do have [a colleague] that would be working on our relationship with the exchanges. Am, I mean there are ethics involved. For example, the exchanges have to make sure that all of their clients, including us, are receiving data at the same amount of time, so that nobody has an unfair advantage because they are receiving information faster [...] there is a behaviour, so you can trade in a way, I don’t understand it fully, but you can trade in a way that you are just testing the water and you want to see how other people, other traders would react. Am... they have a name for it [...] We have to make sure our algorithms don’t behave like that way, because if they did, you could get a slap on the wrist and I believe you could even be barred from an exchange, if your behaviour is kind of, is being reckless if you like, at the exchange. So we do have to consider that, and that gets written into our algorithms and our strategy. So when I am writing a strategy in code, that’s already included in the strategy and I would probably not be aware of this. You know, I’m just writing the logical steps in and I would not fully understand the reason it is doing everything that it is doing. I have to make sure it works the way they ask me to make it work.”

Similarly, DW, a senior software engineer (and one of the participants who filled in a questionnaire) answered question Q by referring to responsibilities of other people:

DW: “No. It’s the end user who can use the system anyway they want.”

These interviews support Hypothesis H₁: ethics perceptions of HFT actors are tightly related to legality and regulatory considerations.

Social contribution of HFT

Many interviewees chose to refer to the social contribution of HFT when answering the ethics question. For example, OM described the work of a lobby group explaining the positive contribution of HFT:

OM: “It’s an interesting one [...] There is the *Modern Markets Initiative*, I don’t know if you have seen, so, there is a lobby group called the *Modern Market Initiative*, that produces independent research and papers about the ethical [...], how high frequency trading provides more liquidity and tighter spreads in the market, so [the market becomes] better [...] So it’s a lobby group made out of a number of a high frequency firms, that have commission independent studies on the benefits of high frequency trading.

TF, a CEO at an HFT firm, considered the intellectual challenge of HFT a determinant of an advantageous social order.

TF: “Well, we have a code of ethics here and we have business ethics to our customers. So if you are an HFT trader, you have to do your job [...] and what you do, you are making money for someone [...] I think that it is ethical to be bright and to be better than other traders. That’s absolutely ethical in every society, and I have no shame and I have no... excuses for people who just try to be better than everybody else. And if they spend lots of, tens of years in

university programmes, courses, trainings, I don't know, reading books, it's ethical to be better than others and, of course, to make money. And in fact, that's kind of [...] economy of brains, when you don't make money just bidding and selling, you make money by your intellect. And that's a huge advantage for every society. You have more people like that, so you have better people, and you make them kind of heroes, because I really like these people [...], and I think that they are the heroes of our time.

AD considered tax payment his positive social contribution:

AD: "Ah... I mean, I liked the [company name], the market making system I wrote for them. They paid me very poorly in the first year [...] but the trader think, well, ok, we have just paid enough tax to pay for a nurse's salary for a year. That's why the government, the previous government, anyway, likes the City, because it gives them a lot of income tax from all of those traders."

Author: "So, do you consider it some kind of social contribution?"

AD: "We are certainly not robbing from the poor".

However, a proportion of participants expressed a strong sense of meaninglessness, resulting from lack of social contribution. For instance, XM, a senior operations analyst, maintained that paying tax was his only positive social contribution. XM expressed a deep regret for not contributing more than that.

XM: "So, when I was an undergrad I always wanted to go into research. And, in some way, this dream of wanting to contribute to society... Ever since I have started working at, so I used to work at [University name] as a research assistant. And with the exception of that, I did absolutely nothing to benefit society directly, and I always used to feel terrible about that [...] Am, for example, I wanted to work at research, I wanted to do something for society, but ever since I started working in Finance, am, this isn't necessarily limited to just HFT [...] I found that I simply don't contribute to society in any meaningful way. And the only thing that makes me feel better about myself is the fact that I pay my taxes. That's all that I do to help society. I feel terrible about it [...] The question of the meaninglessness, that's not just limited only to HFT, I think, for anybody who wants to benefit society in some way, going into Financial services, in general, is not the best thing".

When RT was told that other participants in the study felt a sense of meaninglessness, he said that he experiences similar feelings.

RT: "My parents are really happy that I am working at this kind of area, because I am financially stable [...] but I can definitely, definitely correlate to that sense of meaninglessness [...] I enjoy the challenge of playing with the data so much that sometimes I forget how useless it all is. It is completely useless. Completely useless. If I were to redesign the financial system, I would regulate trading so badly, because trading is just a big casino for people to play. I am not a great believer in making massive changes and transformations in perceptions of people and society and whatever, I am a very realistic person. This is how society works, [...] this is why I do what I do. But many, many of the functions of products in the market are completely useless. Completely. I see on your face that you are concerned. I wish that more people were concerned as your face looks right now. This is my personal opinion and I am providing bread and I am paying rent with doing that, but that sense of meaninglessness – sometimes, you know, I see a Youtube video about some crazy robots people are doing or some crazy engineering solutions that I could have done instead of doing that, and I'm thinking to myself many times, why. But then, financially speaking, I got

used to a certain style of life. If I go to the equivalent engineering job, I'm looking at a 40% cut. No joke. 40%. Getting used to a certain lifestyle - you don't necessarily want to throw down 40%, right? It's a big decision to take. But I completely relate to that. Completely. [...] But on the other hand, I told you how much I enjoy my work. I truly, truly enjoy it, but there is a big aspect of meaningless[ness]. With the kind of tools and knowledge that I'm having, am, couldn't I work in a technological company and make the next product? But then what [...], I used to work in [...] a chipmaker, every single phone or electronic portable device has this kind of chip inside, it's like the brain of those devices [...] which was great and fantastic, but this is also meaningless in a way – just a little product with some beautiful colours in it, then you get into conceptual questions – what is meaningless and what is not meaningless. To me by definition, the most productive best job ever to society is a doctor, is a nurse, is a fireman, is a policeman, etc. But not everyone is a doctor or a nurse or a fireman or a policeman”.

Similarly to XM and RT, when OS was told about a sense of meaninglessness of other traders, he expressed similar views. However, unlike XM and RT, OS said that he was not concerned about it.

OS: “I agree with what they are saying [...] Yes, I can understand that, because we don't produce anything, ahhh... we don't make shovels. If we made shovels, we would probably make the best shovels in the world, but [...] we don't produce anything. We just move ones and zeros back and forth... [It's like a] casino. So it's true that we don't produce anything. On the one hand, I'm in the foreign exchange business. We mitigate transactions between companies which are, maybe, producing shovels, or, I don't know, dynamite, or whatever, actually building stuff, so they can do their trades and buy stuff for other parts of work. So, in that sense, I do feel that I am contributing to the society [...] ”

Author: “[...] Does it bother you?”

OS: “Well, it doesn't really bother me at all. I think that everyone is thinking about what they should do with their life [...] existential questions I think everyone has.”

EO emphasised that he works to provide for his family. In particular, EO mentioned that this demand made him stop thinking about issues relating to wider-scale contributions.

EO: “I can tell you one thing: whatever you read in the books - it's simply not true. In fact, first of all, the competition in this business is brutal. That's number one. Number two, if you are a customer – if you are the small guy, you get the best view, and that is true, and you can see that mathematically [...] If anything, you know, I mean, the only ethical consideration that I can think of, I am going to call it ethical, I am not saving children in Africa. You know, I am doing something that makes money. So maybe I am not doing good for the world, so to speak, but I stopped thinking about these things a long time ago because, you know, whatever profits I make, you know, they are going to support my family, and I don't care [...] Other than that, I don't have any ethical dilemmas at all”.

On the other hand, BJ finds sharing the code that he writes rewarding, as he believes that, doing so, he helps the technology developed for HFT be used in other industries.

BJ: “I kind of love the low level detail, how computers work at the lowest level [...] I have always kind of liked doing the most I can with low-capacity devices [...] That's very interesting because you are in a very constrained environment [...] a good kind of HFT guy would be able to exploit that to the max, and do kind of great things with it, and it reminds me, it takes me back to when you are a kid [...] when you did not have powerful computers, to do something

impressive you had to know how the machine worked, but in the nineties computers started to get exponentially more powerful [...] and generally people said, no, you know, performance – we don't need to worry so much about that, we will just wait for the next generation of hardware and that will make our software [...] faster. Naturally. So don't worry about performance. But in HFT, even now, it's all about how to get the max out of the hardware [...] So many interesting aspects come out when you are talking about nanoseconds and microseconds, there are so many interesting angles to the problem [...] You can spend days on tweaking and optimising and looking at all of the detail [...] Here we are always looking for optimisations and people come up with fantastic ways. This is the thing, I think, which is interesting in HFT. I know it has a very bad reputation, but [...] there is a lot of good stuff which is going to leak out to the surrounding industry because technologists want to share, they are like mathematicians, they believe in peer reviews and openness [...] the lessons learnt and the techniques we learn will apply elsewhere and we do share them on [web site names] . Not the trade's secrets, not the trading models, but the "how you make system work fast", and that, by itself, for me, is great, because you put yourself in that environment, you learn all these interesting things, then you share. So that's rewarding.

However, when NL, a lead quant infrastructure developer heard that HFT developers used to upload parts of their codes on free-share websites, he asserted that this was not a prevalent norm in the HFT industry.

NL: "Apart from the thirty screens, there are splitting like, so in my case I have [...] two towers [desktop computers], one tower is connected to the internet and it has outlook and a browser [...] and the other one is not connected to the internet, and it connects to the internal systems. They don't even talk. And if you check out code you cannot [...] It's unheard of, to post code from one of these online. In banks – yes, in banks – it's less, banks don't do speed in the same level [...] [In our towers] you can't even put headphones. You have to ask permission so someone will come with a key, plug in the headphone, because the thing is locked[...] If you plug USB keys, nothing works [...] If you try to email stuff – nothing goes in or out of the system. And if it can go in or out, you can be 100% sure that everything is monitored."

NL's interview reveals his uncertainty about the nature of the contribution of HFT to the society. In particular, he thinks that the HFT industry attracts talented people, who would otherwise work in jobs which he perceived to have greater social contribution. The same views were held also by RC, a director of a financial firm, and by VR, a code writer working on algorithmic trading and market connectivity.

NL: "In HFT it's purely, am, it's very pragmatic and scientific, there is no malice. I don't know whether it's good or bad [...], but there is definitely no intention to harm" [...]
"I used to ask my boss many, many times: remind me what we do? And he would just go like: "we provide liquidity, [NL], we provide liquidity". OK. [...]
Usually HFT will play with its own money. I'm from a rather poor family [...] [HFT] never takes outside money [...] There is no retail, there are no pensions, there are no investors [...] It's not a hedge fund for investors with outside money, it's usually their own money [...] HFT is not directional in general, so it does not care whether the market is going up or down; it just cares that there is volume in the market. So it trades on both conditions, it is profitable on both conditions. Now, this can be seen as good or bad [...] Good: it does not seem to be aligned with what you could perceive as intentionally, you know, manipulating the market [...]. Having said that [...] you must understand that I don't even know sometimes what we are trading against. Sometimes it's just numbers [...] We don't know the participants [...] I don't know

what is the impact of that in the market. Frankly, I have no clue, not only the one, what my group is doing but also what all these groups are doing [...]

I have a colleague, 22 years old, he makes me laugh a lot. And actually I often tell him that I feel sorry that all these young people, that I honestly think, that people like him are being sucked by this [HFT], because [...] it really shows that the world is turned up-side down. So it would be nicer if we all worked to do the kind of stuff that the brain power and the computer power could be applied. Sometimes you go to the NHS and you see people with CRTs that is, these old screens, I'm like: how old is your screen? We have 32 screens and you know, all the latest technology. We could have sequenced the genome in weeks, months, it's just that the incentive isn't there [...] the sequence of the genome is actually pattern matching, it's something that probably [could be solved] with high computer power or HFT, probably shifting the resources to something else [...] My boss would say stuff like: "we provide liquidity", as if that's the, I don't know, I don't know whether that's good or bad, I have no idea, like I said, I am emotionally detached. You know, when I tell my mom: "I provide liquidity, mum", she goes very excited. She does not know what I do. Still. So, God knows. I don't know.

[...] There is probably an explanation why, I am going to be mean, why when you log in to the NHS site, or the UK.Gov site [...] the web site is terrible, because all the good people are being sucked by all these firms. Paywise and excitementwise, it's, of course [...] so you have free food, you have free drinks, you have very relaxed hours, you have all the technology you can think of, of course it's not competitive [...] I have no idea what HFT contribute to society, but I doubt it whether it's good. At best I think it's neutral or irrelevant, but I don't know if it's good."

These results support Hypothesis H₂: A proportion of HFT actors are concerned with the social implications of their practice.

The public image of HFT

A large number of participants expressed concern about the way other people perceive HFT. In particular, they expressed discontent with the way HFT is presented in the media and in popular books such as *Flash Boys* (Lewis, 2015). A few participants referred to the way their family and friends perceived HFT. For example, BJ said that his father would like him to have a different position. He maintained that his father perceived his position as unethical as a result of the media.

BJ: "I mean, my, my father, he, you know, he has, kind of, got a very different view on banking than I have because he is looking at the main stream press and he has got that impression."

VR chose to answer the ethics question referring to his friends' and relatives' criticism of his work at an investment bank. He also referred to the attempts of the bank to engage in charity activities to improve the bank's image.

VR: "We don't ask ourselves whether what we do is good or not, because at the end of the day we are just offering a service to clients, right, which is, you know, offering them to be faster than the competitor in the market. Whatever they do with our service is their business, right, so, in that sense, provided that we don't do anything illegal on our side, but that's something different, then, ethically speaking, we can find, like, abstract away the problem. Myself – I don't really ask myself ethical questions, because – I wouldn't be working at an investment bank if I were, after, you know, the financial crisis, so – not really. I

mean, as I said, I am very mathematical and stuff. And if you start asking yourself ethical questions, you are going to ask yourself a lot of questions, a lot[...] Some of my friends or relatives, they [...] are asking me if I am not ashamed to work at an investment bank, so my most left-wing friends, right, they are just like, aren't you ashamed when investment banks are doing algorithmic trading [...] which is destabilising the markets and it's not something right [...] My usual answer is like: you have got a knife in your pocket, right, are you asking yourself ethical questions whether it has been, you know, made [...] by a poor guy in China or not, it's just, you know, a part of the system, right, I mean everybody has a knife or something that has been designed by a poor child, a poor 16 years old child in China [...] and that's not good at all, right, and it's not fair, it's not the way it should be [...] but nobody really cares, right, they care once in a year when they see a documentary on TV about it, and they just like post Facebook statements saying "Oh, that's terrible", but, at the end of the day, the day after, they continue going shopping and they don't do anything about it [...] Why should I ask myself ethical questions, I mean, I know it's not ideal, but the entire system is not ideal, right, it's just the best we can do and [...] at least I'm forcing myself to think that otherwise [...] I wouldn't be really living. It's just like someone manufacturing a weapon, like a gun or something, it could be [used in] a situation to protect people, for a cop or something like that, right, but it could also be sold to a foreign army doing some random war in some random country. But I think that the guy that manufactures the gun doesn't really think about it otherwise you just don't live, right, you can't. I guess [...] I am only asking myself ethical questions when I have an impact on what I am doing [...] The quick answer is like: no, I don't really ask myself ethical questions.

[...] There is the whole helping charity stuff. To me – I find it a bit [hypocritical]. So [the bank] has this programme where they give money to charity [...] That's kind of good, right."

SG considered it important to explain that HFT salaries and practices are not as imagined by the public.

"So, regulation is pretty tight in the financial markets, it is not 2008 anymore. And even before that [...] All of the stories that I see, you know, in the movies and so on – I have never experienced them in real life. And the salaries, the bonuses, everything shrank dramatically, I mean, I have never met a single trader who was making a million dollar a year. It doesn't exist anymore. I mean, one very good friend of mine is a seven-year trader in a very large American bank [...] and during his best year he was making, you know, 250, 260 [thousand] pounds. So this is a lot of money, a lot of money, but it's very far from people's imagination. The truth is that the people who are making really a lot of money are either very, very high, senior persons in the banks, which joined so long ago, that they still enjoy their wonderful contract of, you know, old age, or hedge fund managers who are making a ton of money not because they are in finance, but because they are entrepreneurs. So that's why... so, I don't think, you know, that all the glamour and so on, that you see in the movies - it's gone, it's completely gone. If you go on a trading floor it's actually very quiet. It's not at all like - You don't have people screaming, you know. I mean, when I started in Finance, I used to be [on] the trading floor, there were people screaming, shouting, people going nuts throwing their keyboards across the room, it was ten years ago, yea, ten years ago. It was still a bit crazy [...] Now, if you go on a trading floor it is all silent."

Author: "Are you talking about HFT trading floor or...?"

SG: "No, they are mixed, they are mixed. If you go to a bank [...] they are not dissociated anymore. And if you go on those floors, you will have the quant, you will have the technologist

IT quants, you will have the traders, you will have the managers, and it's quiet. Very quiet. You would not believe it. We have 200 people sitting there, and except for the sales sitting there with phone calls and so on, it's silence. Yes, that's the new finance. People do not imagine that at all [...] So it's not at all like in the movies. The only place that you can still see some action is the brokers' office [...] they still trade by voice [...] but they are slowly dying, they are shrinking every year [...]

Two years ago, you know, *The Wolf of Wall Street* came out and everybody went like, ah-ah, finance [...] Yes, guys, I would like to remind you, you know, in this movie, this guy is basically a crook, so, he could have worked in finance or the automotive industry, or - I don't know, in education or whatever - he was a crook. So, obviously he made a lot of money, because he was scamming people. But that does not exist in the real world [...] So people should understand that finance has really changed [...] A first year trader gets £40,000. Yes. It's not like the amount that people imagine. When I started I was paid £40,000. In London. So, with the rent and everything, at the end of the day, you are not so well off. You don't go out, you don't go on holidays, you don't party at all, you don't actually leave the country, you live a normal life. It's not like a glamour life. After 5-7 years you start having a high pay cheque, but it will never reach... you might retire with a couple of millions on your bank account after a career of 30-40 years, but you will not retire at 30."

SG also considered it important to improve the image of HFT. His reasons are presented below.

SG: "...And I think that the mistake that HFT has done [...] is miscommunication. We didn't communicate at all. And we let people build on fantasies that HFT traders were, you know, manipulating the market, and scamming, you know [...] people trying to trade on the internet - no guys, you lose money because you are not fast enough because the technology is better than you, that's it. It's not because someone on the opposite side is trying to scam you. It's just, he is doing his job automatically, million times faster than you can even imagine doing it. That's why you are losing money. So you - know, it's a business. You adapt or die. Any business is like that. It's not just finance. And because of that, there was this misperception, especially when you look at the astonishing numbers of thousands of orders per second and so on, that HFT does not participate in the economy [...] The truth is that they create a better price discovery. We do, HFT, do increase volatility [...], it's true, that the one black thing that you can push to HFT. But at the end, better price discovery, tighter spread, less friction in the market, more counter-party, overall the quality of the market has improved. Would you rather have an HFT guy passing an order for you, trying to get the best price over 14 different exchanges at one time, and trying to grab the best price for you and fighting to get the best price for you, or would you rather pass your order to, ah, John, who is an old bid trader, who is drinking Vodka with his friends, you know, at eight o'clock in the morning before the opening bell? And who has already fixed the price with his buddy, when the market is not even open? Because that was the case [...] Now at least it's fair. Everybody is on the same page [...] For those old guys, you know [...] HFT is pretty bad. So they have been trying to discredit HFT for years. And, in response, HFT, because they started a bit rogue, decided not to speak, and just shut up, and now there is a big misconception about what is HFT, what it is doing and so on. And that's why I decided to come to you today, because I think that we should communicate more, explain, we should educate people what we do."

Finally, BJ perceives the public image of HFT as a possible threat to the future of the industry.

BJ: “There are many models that work, and I have seen, here suddenly one day they stop working, and they don’t know why, they don’t know why it was always a great model, it was always making 20K a day, a nice little profit, and suddenly one day it stopped. No one knows why, no one can explain it, but, that goes on for a while and then you switch off and develop a new one. Because the market itself is obviously evolving, 10 years ago it was so much easier to make money than it is now in a kind of HFT environment [...] You know, this is like a big AI system, right, its learning about itself [...] it’s like a conscious being, right, you kind of plug new intelligence into the system, and the rest of the system learns and reacts, so [...] you have to keep changing, you can’t leave it. If you leave it, it will eventually sizzle out because the rest of the system will learn about your model [...] But personally, my, my personal take on it is that we are going to move away from this, it has a limited life time, I don’t believe that HFT is going to last. I am kind of in it because I think that there is a value in it [...], and I enjoy it, but I’m kind of with the view that I should enjoy it while I can [...] because I think that this is kind of a doomed approach [...] There shouldn’t be a competitive advantage to being, am, co-located with an exchange with all this, and it should not require such a huge investment, and building a direct line across... from data centres around the world [...] HFT itself, I think, is going to be dying out, and certainly the big banks are turning their back on it, and in a lot of them now it’s kind of, am, its [...] a label they don’t want to be known as an HFT shop working that way. It’s just, am, it’s too risky [...] and there is not enough profit in it.”

The interviews performed support Hypothesis H₃: HFT actors are concerned with the public image of HFT.

Additional aspects of ethics

It is important to note that other aspects of ethics were mentioned, as well.

VW, an HFT trader and code writer, mentioned questions about the value of money, resulting from the extent to which values of companies may change in a single day in the market, regardless of their true (fundamental) value.

SK (a woman, senior software developer), mentioned that her male colleagues’ use of language was making her feel on the verge of being harassed. Indeed, Hassoun (2005) mentions that traders often use strong language on the trading floor. (On the other hand, NL mentioned that the single woman who worked at his desk used to curse more than her male colleagues; NL did not refer to SK).

NP mentioned relationship problems in his firm, which occur in cases when people have good strategy and do not want to share it with other people in the company. Such situations result in ethical conflicts and tense relationships. NP mentioned also that he disliked the non-competition clause in HFT’s employment contracts

OG, a consultant quantitative analyst, raised the problem that when HFT people leave their jobs, it is forbidden for them to take with them any parts of the code that they wrote. However, it is unclear whether they can use the knowledge which they accumulated at that position. That could create an ethical conflict.

JC, an HFT software architect stated that he had written liquidity-taking algorithms, though he believed that they were less ethical than market-making algorithms.

Finally, RT, an HFT quantitative strategist working at a bank, related ethics to the accuracy of the data he was providing. RT explained that the motivation for his ethical approach is beyond the requirements of the law.

RT: "I am very, very happy sitting at a quantitative strategist job, because it's all about the ethics. If I were working in sales then, as everyone working in sales knows, that you cannot sell a product as it is, you have to repackage it in a nice [package] within the boundaries of the law [...] But when you are working in a quantitative work, providing solutions to risk traders sitting within the bank, there is no bullshit, you have to be real, you have to know your numbers, you have to provide the exact, accurate solution. If it's horrible, [...] you work on a new solution. You don't just fudge the numbers and send it through [...] All I say is that it's all about integrity in my line of work and I love it [...] One of the most important things for me is that there is no such a thing as coming up with some numbers and go ahead and present them to the client. The way that I ensure that these numbers are accurate is the essence of ethics. And I think that another person looking at it and confirming that those numbers make sense, that those numbers have been calculated correctly, is a crucial thing and I always make sure it happens. It's not about going to jail and it's not about being prosecuted etc. etc., it's about doing an honest, realistic job, job that I can be proud of, job that is professional and accurate".

Conclusions

The results of this research confirmed that legal-regulatory considerations are an important component of ethics perceptions of HFT actors (H_1). This is in line with Erhard, Jensen, and Zaffron (2016), who suggested that there is an overlap between ethics and legal perceptions. The study also showed that in some cases, HFT actors are not entirely aware of all ethics aspects of their work, as Davis, Kumiega, and Vliet (2013) asserted. On the other hand, it revealed that many HFT actors attempt to understand the legal and ethical implications of their practice. Moreover, the results showed that, though boundary work is performed by HFT actors as MacKenzie (2014) described, in fact, the resultant boundaries and perceptions are subjective and sometimes contradicting. Though Angel and McCabe (2013) studied both procedural and distributive aspects of ethics, most HFT actors were concerned with procedural fairness issues rather than the distributive ones.

However, the study revealed also that HFT actors are concerned with the social implications of their work (H_2). Importantly, considering the social effect of HFT negative may lead to a feeling of meaninglessness. These findings extend Taffler and Tuckett's (2012) work. Taffler and Tuckett performed a large-scale research about the psychology of fund managers. They found that fund managers strive to make sense of their environment. In particular, attributing meaning to the environment enables fund managers to develop a conviction in their actions and hence make decisions. However, people attribute meaning not only to their environment, but also to their actions. This study extends the research on meaning from fund managers to HFT actors, and from interpretation of the nature of the market to questioning the ethics of one's behaviour and practices.

The research demonstrated the importance that HFT actors attribute to their public image (H_3). In particular, they consider their public image distorted.

Finally, the study emphasised the personal nature of the ethical perceptions of HFT actors. Though all participants were asked the same question (Question Q), each participant chose to interpret it in a different way, thus shedding light on a unique aspect of the HFT industry.

Acknowledgement

I would like to thank each of the HFT actors who participated in this study. I consider their contribution important, and I am grateful that they were so honest and helpful.

References

- Angel, J., & McCabe, D. (2013). Fairness in financial markets: The case of high frequency trading. *Journal of Business Ethics*, 112(4), 585-595.
- Baumeister, R. F., Vohs, K. D., Aaker, J. L., & Garbinsky, E. N. (2013). Some key differences between a happy life and a meaningful life. *The Journal of Positive Psychology*, 8(6), 505-516.
- Chung, K. H., & Lee, A. J. (2016). High-frequency trading: Review of the literature and regulatory initiatives around the world. *Asia-Pacific Journal of Financial Studies*, 45(1), 7-33.
- Cropanzano, R., & Ambrose, M. L. (2001). Procedural and Distributive Justice are more similar than what you think: A monistic perspective and a research agenda. In: Greenberg, J., & Cropanzano, R. (2001). *Advances in organizational justice*, Stanford University Press, Stanford, California.
- Davis, M., Kumiega, A. & Vliet, B. (2013). Ethics, finance, and automation: A preliminary survey of problems in high frequency trading. *Science and Engineering Ethics*, 19(3), 851-874.
- Erhard, W., Jensen, M. C., & Zaffron, S. (2016). Integrity: A positive model that incorporates the normative phenomenon of morality, Ethics, and legality – abridged. Harvard Business School, NOM Unit, Working paper No 10-01.
- Fetiniuc, V., & Luchian, I. (2014). Banking ethics: Main conceptions and problems. *Annals of the University of Petrosani : Economics*, XIV(1), 91-102.
- Fischer, J. (2004). Social Responsibility and Ethics: Clarifying the Concepts. *Journal of Business Ethics*, 52(4), 381-390.
- Golumbia, D. (2013). High-frequency trading: networks of wealth and the concentration of power. *Social Semiotics*, 23(2), 278-299.
- Harris, L. (2013). What to do about High-Frequency Trading. *Financial Analysts Journal*, 69(2), 6-9.
- Hassoun, J., P. (2005). Emotions on the trading floor: Social and symbolic expressions. In Cetina, K. K., & Preda, A (Ed.), *The sociology of Financial Markets*. New York, NY: Oxford University Press.
- Kashdan, T. B. (2004). The assessment of subjective well-being (issues raised by the Oxford Happiness Questionnaire). *Personality and Individual Differences*, 36(5), 1225-1232.
- Kessler, A. (2014). High-Frequency Trading Needs One Quick Fix. *Wall Street Journal*, Jun 16, A.15.
- Keyes, C. (1998). Social well-being. *Social Psychology Quarterly*, 61(2), 121-140.

- King, L. A., & Napa, C. K. (1998). What Makes a Life Good? *Journal of Personality and Social Psychology*, 75(1), 156-216.
- Lewis, M. (2015). *Flash boys: Cracking the money code*. Penguin books, Random House, UK.
- MacKenzie, D. (2014) *A sociology of algorithms: High-frequency trading and the shaping of markets*. Preprint. School of Social and Political Science, University of Edinburgh.
- Milic-Czerniak, R. (2012). Business ethics education in banks – Levels and methods of education. *Management and Business Administration. Central Europe*, 3(116), 71-84.
- Oarga, C., Stavrova, O., & Fetchenhauer, D. (2015). When and why is helping others good for well-being? The role of belief in reciprocity and conformity to society's expectations. *European Journal of Social Psychology*, 45(2), 242-254.
- Patterson, S. (2012). Global Finance: CFTC Plans to Examine High-Frequency Trading. *Wall Street Journal*, Jan 31, C.3.
- Pfeifer, J. L. (2014). Fund loyalty among socially responsible investors: The importance of the economic and ethical domains. *Journal of Business Ethics*, 121(4), pp.635-649.
- Sobolev, D. Psychology of high frequency traders. (In preparation).
- Taffler, R. J., & Tuckett, D. (2012). *Fund management: an emotional finance perspective*. UK: Research Foundation of CFA Institute
- Zelizer, V. A. (2012). How I became a relational economic sociologist and what does that mean? *Politics & Society*. 40(2), 145-174.