

Interview with a regulator #2

- SPEAKER1 00:09 So first off, just to start, could you just sort of briefly summarize what your background is? You're in the market and trading and particularly relevant to the FICC markets, if possible?
- SPEAKER2 00:25 Yes. So, I've been involved in the markets for around 30 years, predominantly in the markets I traded. But dollar swaps. And I've also been responsible for running trading books and commodities and also inflation derivatives, predominantly RPI. I have done quite a lot of work in the securitization markets, particularly in relation to the providing of derivatives. So, for mortgage banks, for credit cards, also for clothes and various sort of other I mean a range of different securitisation structures and covid bonds as well. And then more recently, sort of in the last 10, 15 years, I was involved in structuring derivatives across eFX commodities and fixed income in both insurance, insurance, reinsurance, but also in banks. And those I'm running structuring groups across in financial markets, but also in capital markets. So that was basically sort of acting as an interface between salespeople, traders and the underlying clients to provide, I guess, some kind of enhancement in terms of analysis around particularly around risks and how those risks can be managed. And I left those markets in two thousand, ended 2014 and took a year. And in 2016, I joined the FCA, where I was involved in supervision.
- SPEAKER1 02:28 And in those you mentioned commodities and fixed income. And I mean, one of the things that this study is interested in looking at is how different markets lend themselves to. Greater or lesser involvement of algorithmic trading and trading strategies, knowing what you know from your background and what you've seen in the markets. Why do you think that some asset classes are taking these free lend themselves more to algorithmic activity than others?
- SPEAKER2 03:12 I mean, I guess it's largely to the extent that they're commodities and discreet. So that I mean, when we talk about, I mean, so equities, I guess, are an obvious area because they are well defined and discrete instruments and kind of FX again, is a discrete instrument. When you get into swaps, interest rate swaps or currency swaps, I mean, it becomes more problematic. On the other hand, there are kind of generic swaps. So generic swaps, I think, can be traded when it comes into bond markets. So, I think it becomes more complex. I mean, probably generic treasuries, etc. and, you know, regularly traded bonds may be suitable for these markets. But when perhaps if you're looking at kind of the corporate bond markets or more esoteric bond markets, it becomes more complex because there may be features around those bonds, which mean that they're not the kind of information required, you know, to basically understand the nuances of those bonds is greater. I suppose the other thing to look at focus on is that obviously these days ago, markets are probably best suited to those markets where, you know, there's relatively deep that the debt markets, there's lots of liquidity and also, I mean, where there are opportunities for so cross market trades. So,

looking at kind of opportunities for taking this risk or creating trades across markets, either, for example, I guess across the futures markets or other types of bases, which I think lends itself to algo trading generally.

SPEAKER1 05:18 Since you've sort of, I mean, you've been involved in markets for many years, and in your view, how is how have sort of this or progressive move to sort of more sort of electronic trading? You know, when I started a broker many years ago, I remember when I saw a point and click trading was brought in and that was a big deal and that was brought in. And, of course, you know, quite a bit of consternation of some people. But then even since then, things have moved on even more. And we're starting to see more and more involvement of actual sort of automation and self-calibrating algorithms. I mean, what what's your perception been of how the sort of how firms have evolved and how the culture of some of these businesses has changed?

SPEAKER2 06:08 And I think that possibly the.... I mean, it's a change which has had some positive impacts and some negative impacts, and I suppose some of the positive impacts is that it covers multiple markets. In theory, it could produce more liquidity. It produces perhaps more efficient trade execution and more efficient pricing and does. But on the downside, I mean, there are various risks, including kind of systematic cross market risk. And there's obviously been a lot written about the flash crash and then the risk of errant algos, as in kind of Knight Capital. And then they're all the kind of risks of market manipulation, which I guess some we're probably going to talk about later on, but which MiFID has made some attempts to deal with. But to my mind, the biggest issue really is that I think to some extent the growth of the algo markets has actually resulted in a reduction in liquidity. And that's coincided with the fact that you haven't got you know that the situation in terms of the market making capability that existed within banks, that's basically gone or being dramatically reduced as a result of capital requirements for that activity. And so, I think is possibly. I'll go there's a kind of false sense of the depth of liquidity available in the markets that's resulted from that, the growth of the high frequency traders and traders generally. Well, certainly, I mean, there is I think I've seen statistics suggesting that that sort of depth and if you look at, say, the S&P five hundred futures market, that depth in that market has kind of declined by about 90 percent in the past 10 years. And I'm sure that part of that is as a result of this move to these new forms of trading. Obviously, a significant part of it, too, is the fact that you haven't got those that kind of depth within the banks as well in terms of their own trading capability.

SPEAKER1 09:00 One of the things that's interested me in the last few years is the work that the regulator has done on conduct risk, but also how some outsiders have interactive that. So, there's a couple of people at the moment. There's a there's a book that's been written by somebody called Dr Roger Miles. I don't know if you've heard of Dr Roger Miles, but he wrote a book on conduct risk management, and he's recently published another book on culture audit. And I mean, looking at

those books and also, you know, the basis of the five conduct questions type reviews and things like that, it's quite clear that, you know, or appears to be that a lot of the conduct risks are that are envisaged all very human in nature. So, you know, looking at things like greed, emotion, the fact that human beings are perhaps not rational, always rational actors. Do you think that that sort of idea holds up as the market's progressed to more? Sort of towards more automation and sort of AI and things like that, or is there a risk that that sort of thinking may already start to be out of date?

SPEAKER2 10:27 I don't know, I said I think I agree with that, but actually, I think there's an interesting twist here in that. I think this may have actually been sort of identified by the FCA. I think Julia Hoggett mentioned something along these lines a couple of years ago, but it was she was in charge of the market oversight area where this concept that it might be completely irrational for, you know, a guy acting in an unconstrained way. To deem it completely irrational to commit market manipulation and therefore you feel that the way in which your algorithm operates, I mean, increasingly, I guess, with machine learning and generally is there a situation where, you know, your algorithms start behaving in a way which is rational for them to behave, but sorry is rational in terms of the that the parameters are within that which they're operating but would not be acceptable for a human operator to do. And therefore, the whole issue then comes down to the importance of those involved in the deployment of the trading algorithms and those that have significant responsibility in terms of ensuring compliance with the firm's obligations. So, I'm just interested in this concept of is there an issue? Can you actually separate that function off? And if you look at the regulation, the hold of the kind of market regulation around, this is all around you that oversight's checking and that. But actually, can you have a situation where you can I mean, can you actually achieve that or is there a risk that the algorithm kind of. For want of a better word, and it creates the mind of its own.

SPEAKER1 12:53 Yeah, I mean, there's I don't know if you've come across the book, the popular book by his name is Yuval Noah Harari and Homo Deus.

SPEAKER2 13:01 Yes, yeah.

SPEAKER1 13:04 I mean, if you haven't. Have you read that book? Have you read the book? Yeah. I mean, what I thought was really interesting, but he sorts of in one of the points he sort of makes in that book is that, you know, human beings have been used to being sort of centre of the universe, if you like. And but he sorts of he puts a sort of theory out there that possibly the way things are developing and possibly quicker than we might appreciate, maybe that we're not the most intelligent thing on the on the earth anymore. And therefore, we'll need to rethink things like accountability for some of these, you know, some of these machines and so and what's quite interesting is the European Union, they've had some debates, I think, in the European Parliament where they've been talk about conferring

agency on some AI and algorithmic actors. And that got me thinking because I was thinking, well, we've some of these more sophisticated trading algorithms, because obviously they do vary in their sophistication. Most brokerage firms tend to use, you know, off the shelf sort of very basic Stop-Loss type iceberg. Yes. But the more out their type of firms that certainly developing things, which are a lot more interesting, and I know one person in the food chain understands all of that, because if they walk out the door, it's quite risky.

SPEAKER2 14:29 No, I remember I discussed in 2016 with algo first and talking about the whole audit process around how they , you know , when they introduce new ones and the checking process that goes on, the checks and balances and controls were definitely there . But obviously, you know, there's a massive reliance on that human component as well. And there's also massive reliance often on individuals, you know, in terms of the development of this of an algo and the underlying coding, etcetera. So, there's all that exposure. I just I mean, just back to the business about the algo kind of creating a mind of its own. I think you've probably seen it, but I think it was sort of mentioned in a speech which Julia Hoggett did in February. I think it was February 2019. I think, you know, maybe this is something which the regulators are that kind of thinking about.

SPEAKER1 15:48 Do you think I mean, having worked as a regulator, do you think could you ever see a situation where. You know , there may be a shift in that there is agency conferred upon a non-human actor, because I remember, you know, as a as a law student , one of the things we learned was how not to write legislation. Yeah. And you may have come across the Dangerous Dogs Act from the early 90s. And this was always held up as an example of terrible legislating. And, you know, effectively, from what I recall of that, it talked about almost conferred agency on not just a human, which may have had the dog in a certain way, but there's also consequences for the dog because the dog can be put down. So, it was an agency. I mean, can you foresee anything like that with a regulator?

SPEAKER2 16:49 Well, I mean, I think the comment that came out of this speech that I was referring to from February 19 was you can't prosecute a computer, but you can basically seek to prosecute you know, the people who provided the governance over that computer. So, I mean, I suppose I mean, I suppose you can have the things switched off. But, you know, I I'm just, as you know, far more about this than me in terms of the work that you've done. But I am kind of interested in in this idea about, you know, how you can I mean , given my kind of experience of dealing with issues of market abuse and where you've got a human element , I mean , this goes on all the time because obviously it's kind of human nature to try and take advantage of , you know , stuff that , you know or things the opportunities that you see in the market . And some of those opportunities are deemed to be acceptable and some of them are not. And what I'm interested in is, is when it comes to actually programming and I'll go on creating an algo to carry out a similar function, how you make sure that that algo has, you know, the same kind of contact consciousness. That's a that's a good operator, a good

human operator would have in the market and how you actually prevent it from doing stuff which might be considered to be market abuse.

SPEAKER1 18:36 I mean, some of those things on market abuse. I mean, how do you do you sense that there's been a change in. You know, the type of abuses that are committed or is it more of an evolution in how they're committed? That was

SPEAKER2 18:55 I mean, specifically in terms of algo markets, so,

SPEAKER1 18:59 Yeah, for example, I've got a lot of contacts in the foreign exchange market, and they were always telling me you know, the sort of things that used to go on in the 90s, in the 80s before, you know, regulation became a lot more sophisticated and whatnot. But now that, you know, some of them have said to me, well, actually things have moved on again from there because, you know, where we used to do the trading, we don't anymore. It's sort of almost passive observers of what's happening. Yeah. Yeah. Do you sense is it I mean; are we witnessing the birth of new conduct risks and market abuse risks because of this type of trading?

SPEAKER2 19:42 Yeah, I just I mean, there's obviously quite a lot of material out there, isn't there? But it's kind of it's almost from pre-MiFID, I guess I all I mean, on some of the or sort of from around the time I guess the Dodd-Frank Act. So but I mean there's a there's a whole load of suggestions around the risks of algo trading, particularly in relation to kind of spoofing and layering and stuffing and manipulating, closing prices , etc. , but I mean, one could say that if it is attempted to address that and also MAR, was it a which is it small seven, eight, three or something of those specific requirements that for passivity, for algorithmic trading, which is focuses, I guess, on. Obligation to continue to provide prices and the relationships, the trading venues cetera, and having proper systems to control such a threat, that the issue with all this kind of regulatory oversight is that it's basically all back down to the human controllers. So, if you look at some of the MiFID requirements, it's around systems and controls business continuity testing, pre and post trade controls and monitoring kill functionality and basically so the regular self-assessments and validation. So, this is all it's the operators who are who are basically on the hook. And, you know, I just I wonder sometimes whether you've got that, but you've got three elements here. You've got the actual algo itself, that trading operation. You got the developers and the operators and the managers who are responsible for it. And then you've got the regulators sort of overseeing the markets to make sure that everything's happening properly and that the weak link in this to me seems to be that the whole of the regulatory framework here involves is focused on the way in which those developers and operators and managers who are responsible to this thing carry out that oversight. And, you know, I that there are all sorts of possible links, I'd suggest that might exist in that chain. I mean, one of them being all those managers, for example, with responsibility. I mean, do they have the capability or the knowledge to actually provide that oversight? Where how do you manage

the kind of conflicts of interest that potentially exist in terms of the maximising the performance of the of the algo trading function? Obviously, and in turn because in terms of the profitability of the firm and the level of oversight that you provide to ensure that what's happening there is happening properly and therefore what is the importance of things like, you know, the internal audit functions or external audits, etcetera, and ensuring that that the firm is meeting the requirements of sort of the of the regulations, et cetera? I mean, it's just I mean, I suppose one could say it's actually no different in a way from a human operator. I mean, that human operator needs to be monitored, that human operated can-do things that the firm doesn't know by which he or she shouldn't be doing. I'm just. Wondering what the what the specific issues are around when that operator is a machine as opposed to a human being , what you know , what additional issues that builds in in terms of the robustness of that chain of oversight and ensuring that that the machine itself doesn't sort of , you know , commit misconduct or market abuse or whatever ?

SPEAKER1 24:25 I suppose part of the challenge is I mean, certainly. For myself is where someone's sort of writing a proprietary algorithm. If you're in a in a support function like compliance, it's the accessibility of the code, not just from the sense of. I can actually I've got the password or whatever I can, I can go in and have a look at it, but also the accessibility and your ability to understand it. And that's something which I'm not wholly you know, I don't really know how we bridge that gap, because I think

SPEAKER2 25:04 I think it's even I mean; I think that exists at the development stage as well. You know, I think ensuring that you've got I mean, there's usually from what I remember, this is sort of most of these terms will have a process where they'll have to develop as we will check something or check any amendments to it now before it goes live, etc. But you know how I mean? I mean, I think there are challenges. Even within that development phase , in terms of the ability of everybody to understand exactly what's going on , let alone , I mean , the best for of the world , I mean , I think it's highly unlikely that most compliance functions in these firms would have the wherewithal to actually go through the code and understand exactly what was going on and be able to derive from that any potential conduct issues that might exist . And then again, probably one stage further removed, as well as any senior management with ultimate responsibility for those for those trading activities, that I don't imagine that there are many people in those positions who would have the ability to go back to the source code and understand exactly what this thing is doing.

SPEAKER1 26:25 Could you foresee a sort of I mean, that is becoming more prevalent now on LinkedIn and stuff? You will see there are groups that LinkedIn is still running short courses in Python and on different coding languages. Do you think we might go to a place where if you if you think about take the retail distribution review , they were required qualification requirements put in by the FCA, the regulators by legislators and regulators working together on you know, if I want

to go and advise a client about securities, I have to take the CISI I exam in securities advice. And, you know, it gives me all the background about all the different features of the product and the risks and things. Do you think we could move to a stage where the regulator imposes similar types of requirements on code and technology?

SPEAKER2 27:16 I really don't know, actually. I mean, I think the regulatory framework at the moment is to say, look, you did that. The controls are basically put around the individuals who are developing and I'm running these operations and the managers who ultimately oversee that business. And I don't think it's got anywhere near sort of drilling down to the specifics of how they do that. But equally, I suppose having that framework as it is, it's sufficiently broad to be able to say, well, I identify quite easily where it's not working. I mean, I. I think my point was really around the ability of the firms, I mean, the regulatory control framework is kind of bad because it says you've got to have a system that controls you've got to have a continuity, you've got to have testing, you've got to have the ability to switch the thing off, etc. So, it's sort of dealing with the macro issues. What I'm kind of not convinced about is how effectively firms can actually do that and whether they've got the wherewithal to actually provide independent oversight over the developers or the individuals who are actually running these trading activities.

SPEAKER1 29:00 Similarly, how do you think a regulator or a market operator or trading venue can compete in terms of having the knowledge base to be able to challenge the firms on some of these things?

SPEAKER2 29:18 I suppose that they're looking at the outcomes, aren't they? So, I would imagine the FCA would say, you know, we can look at transaction data. We regularly monitor and analyse that. We run our own algorithms. I think there was a recent talk by Mark Stewart, the head of enforcement in the FCA, talking about, you know, the way in which the FCA sort of looks at and also was a market watch article, I think, in May this year. So, I think it's number sixty, sixty-six or sixty-seven, something like that, so I mean, the regulators are kind of running their own internal surveillance. Algorithms and they're looking at trading activity by other algorithmic trading firms. So I suppose I mean, there are two aspects of this, is that they the regulators will be actually looking at the results of that trading and they will also through that regular kind of engagement with the firms and firm visits and things now that they'll look at the internal systems and controls that exist in the firms in terms of their ability to meet the regulatory requirements in terms of oversight etc. But, in a way, I guess from that, you know, the ability to sort of I mean, you can see what's going on because you can see the trades that they know that are coming, I suppose. I suppose trading activity.

SPEAKER1 31:24 Sure, in terms of the sort of transaction reports and things like that...

SPEAKER2 31:28 Yeah, so I mean, if there's something I mean, that's how I mean, obviously you identify when something, you know, was awry. And that clearly does happen from time to time. I wouldn't really like to comment in terms of how effective that oversight is. But I mean, it's definitely going on, it's definitely there.

SPEAKER1 31:53 How would you I mean , just looking at RTS 6 and how firms sort of in London have sort of grappled with that , because certainly I remember from my time , you know, there were a lot of my peers were casualties in the sense that they I think once they had gone through the experience of trying to implement it to , they sort of vowed never to work again in London, I think, I mean, do you think that the balance is right between where we were we've sort of ended up and our ability to innovate and. You know, the ability of firms actually to meet the requirements, because certainly my sense is, is that a real broad range of. Sort of responses to the regulation in terms of how it was implemented and how it should have been interpreted and applied going forward?

SPEAKER2 32:50 Yeah, I mean, to be honest, I haven't had any sort of direct experience of the annual self-assessment and validation process for algorithmic trading activities, but. I mean, I'm not I wouldn't single this out, I don't think is being something which represents a significantly greater constraint than any other particular regulation , I mean , yeah , we talked a little bit about liquidity earlier and arguably the effect on liquidity brought about by the increased capital requirements for trading desks , etc. , and the fact that we've seen a significant decline in in in the depth of liquidity as banks have pulled back from providing trading . I mean, that that's you know, I would say this is has been a very significant impact across the entire market. I'm not convinced that London is any less competitive in the algo trading market as a result of, you know, the new regulatory requirements.

SPEAKER1 34:17 Could you see maybe in the future any scope for some of these sorts of third-party vendors which currently sits outside the regulatory perimeter? But who are very arguably very influential because they provide a lot of the kit, they test it like, you know, they conform it to venues for many sorts of brokers and things actually even take them on. And they do have a lot of functionality in them. Could you ever see where they might actually at some point be brought into the perimeter? Because of what they've got and know, the firms are unable to actually look at their systems design and stuff, because obviously it's information which is proprietary to them.

SPEAKER2 35:05 These are kind of off the shelf systems which are then

SPEAKER1 35:08 seeking access, you know, those types of things,

SPEAKER2 35:11 and then used by regulated firms.

SPEAKER1 35:16 Yeah. So, they might sort of put auto spreading between different markets or something like that or...

SPEAKER2 35:24 Well, that's an interesting dilemma, isn't it, because ultimately the hook or the responsibility under MiFID lies with the but the firm that's operating it, isn't it? So, it's I mean, I think the approach would be that. But you've got to ensure that you that basically you. You know, meet those requirements and how you do that when you're buying some, you know piece of kit where you may not necessarily be able to see exactly what's going on. I would think from a regulatory perspective at the moment that the buck would stop with the with the firm that's using it. And it's kind of their problem to ensure that they understand. But sitting behind it. I'm not aware of any kind of initiatives to bring those developers into the into the framework, because the actual the regulation at the moment lays the responsibility with the with the operator?

SPEAKER1 36:31 Yes, at the moment that is the case, but I think that the challenges we have with a lot of sustainable, quite vary and the amount of the degree of resources that they have. Of course, the Threshold condition says you need to have enough adequate resources and things like this, and that's human resources as well as financial resources. But in practice, you know, there's a big difference between how the banks do something and how the other firms do. So yeah, yeah. Um, quite often we have the smaller firms have to sort of talk to each other to try and help each other out because they just don't have the ability to like you do in a bank.

SPEAKER2 37:20 Well, I think from the regulators, I mean, the away from the regulator's perspective, I mean, that's all part and parcel, as you and I know so well, the whole kind of supervision process, isn't it? I mean, it's a question of. Supervisors trying to understand and get comfortable that the control environment. That exists. The firm is fit for purpose. Yeah, I mean, there were kind of two aspects of this from a regulatory perspective, that's the kind of monitoring and market oversight. So, you know, as we said, you can identify I mean, the regulators have the possibility to identify poor conduct and from the perspective of trading activity. So, you can identify potential market manipulation or whatever or insider dealing or whatever from the transaction data. But then on the kind of human side, I guess it's part and parcel of that general supervision function, you know, ensuring that the firm has the appropriate oversight systems and controls business continuity, et cetera, to basically get comfort that it is compliant with the regulations.

SPEAKER1 38:51 Another problem that a lot of intermediaries have grappled with in the market is direct electronic access and in particular secondary DEA where you have an indirect client. And they typically will be sitting in the Far East and, you know, they could be sitting in their bedroom somewhere and they don't unlike the traditional trading they're not even our clients and they're not interested in any sort of real communication like you might get with a physical trader in Switzerland or something. And, you know, one of the real challenges is trying to sort of stop them from doing activities which could infringe our regulations here. And in particular, where you say to your direct line, or actually that subaccount

five, six, seven, eight, whatever it is, that strategy that they're running doesn't meet our risk appetite. Please, could you either educate them or tell them to switch off? And then what will happen is it's like that game at Brighton Beach where, you know, that head will pop up somewhere else, another one of your indirect clients or something. And is that something which the regulator... I mean, is that something which causes concern, this sort of transnational element of it? Because I think as a broker firm, you're always even with your best efforts is a massive struggle to challenge that. And I do think that that will be something that will cause a problem in the future somewhere.

SPEAKER2 40:31 Yeah. I mean, that's a general issue. It's not something which is specific to the algo market itself, is it? But I mean, there's definitely that question of transparency. And, you know, when you're looking at sort of prime brokerage operations and you're looking at. I guess, you know, the whole kind of issue around running omnibus accounts and that kind of thing. It's that that is definitely, I think, a concern, the whole question of KYC and also ensuring that the client is in some. Acting properly, but ultimately, the responsibility lies with the firm, and I suppose there are the processes in place or kind of reporting these issues, you know, the whole kind of STOR regime and that kind of thing. But I agree that I think this is a problem when you haven't got kind of complete transparency around where those orders are coming from.

SPEAKER1 41:52 Yeah, and I think, you know, even though it's not. Completely specific to algorithms, I think it's more challenging. I think the algo thing adds an extra dimension to it because, you know, when you're facing a direct client, you can in most cases, you're giving them the trading platform that they're going to trade on, you know, and, you know, the hedges. And it's pretty straightforward, transparent what they want to do. But often in these cases, you're not giving the platform, the platform being given by somebody else. And so, but, yeah, that's that creates an interesting element. I'm coming towards the end will be relief tonight. But one of the things I am curious about is the difference between Britain and America in terms of how these cases are dealt with because in America, as you know, you'll see there's plenty of cases that seem to come up where the CME or sometimes the CFTC are finding they're almost given out like parking tickets, it seems, for spoofing and, you know, algo related infringements where someone is, you know, set something up and then it's not behaved properly or it's run a big riot or something. And then somebody is getting a fine and they seem to get banned for sort of 90 days and then they can come back and start all over again. Whereas in London, there seem to be far fewer instances. In fact, in the markets, the only one that springs to mind is the Michael Coscia case. Which is what? What do you think accounts for that difference? Is it more there is a difference in the approach of the authorities or is it just that there's more?

SPEAKER2 43:36 Is it I mean, is it. I'm not very familiar with the.... Is it Dodd-Frank that basically covers the US? Is that being that the framework for this? I'm just wondering if

the regulation has been around for longer in the US than it has in Europe, for example. And I suspect, I don't know for a fact, but I'm wondering if there is more kind of comprehensive surveillance, perhaps in the US than in Europe or in London.

SPEAKER1 44:23 You know, I think there's a number of different legislative bases, I mean, Dodd-Frank is one of them, but there's also a Commodities Exchange Act and yeah, each of the venues, they have their own rules about when you can trade.

SPEAKER2 44:38 Yeah, I wouldn't really know the answer to that, but it seems that. I'm just wondering if the kind of it's a more kind of mature market in the US and it's been around for longer, and then perhaps, you know, the surveillance capabilities may be deeper then and here, but I wouldn't like to hazard a guess on that.

SPEAKER1 45:06 What's impression of industry led solutions? I mean, you know, the FICC Market Standards Board as an example...they publish a lot of different sorts of initiatives and papers to try and help firms improve their systems and controls. You know, one of which relates to algorithms, but there are a number of different initiatives that they've got. I mean, if you're a regulator, do you look at those things and think, oh, yeah, that's you know, that's a genuine attempt to try and make things better? Or is it sort of something which your kind of cynical about... is it trying to head off further intervention?

SPEAKER2 45:50 No, and I think that is a clear distinction between those industry bodies and the kind of advice that they produce and the action that the regulator and I mean, but. And I mean, I don't I think if the regulator wouldn't say that it kind of works with those bodies, but there is a there is a close kind of I mean, they and I wouldn't say they even collaborate together, but I think the regulator watches very closely in terms of where the advisory process is going when those bodies actually produce findings or advice, you know, to the market. So, the two, I think, are completely separate things, and I don't think the regulator would seek to kind of influence that or would collaborate necessarily with those industry bodies. But on the other hand, I think the regulator sees the products coming out of those industry bodies as extremely useful in terms of setting the expectations. Of and also, you know, that they're useful in terms of the research that comes out, because very frequently they involve surveys and polling firms are actually collecting data and seeking opinions, etc. So, I and certainly I mean, I wouldn't be surprised in the if regulatory publications have been things like the market watch articles, for example. I mean, you might see the big market. Some of you might see some of those industry bodies kind of quoted in there, but some. But not that there's a pretty solid line, really, between the function of the regulator and the function of those bodies, which, as you say, are obviously ultimately representing the industry themselves, but actually didn't touch those bodies, I think is generally a good one.

SPEAKER1 48:25 Finally, how much would a regulator like the FCA work with similar regulatory authorities and other highly regulated sectors, aviation, something like that, where there's also been a lot of algorithmic deployment in those sectors. You know, talk about maybe even a GP no longer being a human being and actually being an algorithm, algorithm driven sort of interaction in the future. Are you aware of any real dialogue between them to learn from lessons, maybe from incidents that happened in those other industries? Or is it more of a case actually that the different sort of sectors is quite separate from each other? There's not really much sort of cross pollination in terms of thought leadership...

SPEAKER2 49:22 I don't know about that, to see whether it's sort of high level. Those kinds of discussions go on, but I mean, I'm not aware of having sort of seen that myself.

SPEAKER1 49:37 OK, that concludes the interview. Sir, thank you very much for that and conscious that I'm just going to switch off the recording.