How effective are enforcement activities at derivatives exchanges in the digital age? A survey of enforcement notices using HUMANS

Journal:	*Journal of Financial Regulation and Compliance*
Manuscript ID	JFRC-08-2023-0132.R2
Manuscript Type:	Original Article
Keywords:	London Metal Exchange, Market abuse, Conduct risk, ICE Futures, COMEX, enforcement

How effective are the enforcement activities of derivatives exchanges in the digital age? A survey of enforcement notices through the lens of HUMANS

Introduction

On 4th March 2022 the Financial Conduct Authority ("FCA"), Bank of England ("BoE") and the Prudential Regulation Authority ("PRA") announced that they had commissioned a skilled persons review[1] into the London Metal Exchange's ("LME") "governance and market oversight arrangements" (2022c). This followed the LME's decision to suspend the nickel market on 8th March 2022 (Jones, 2022).

The "nickel debacle" rekindled interest in the effectiveness of exchange enforcement. One high profile commentator on the commodity markets (2021a) (Blas and Farchy, 2021), Jack Farchy, remarked:

"Historically, the FCA has tended to leave the...policing of market abuse to the exchange. The last major enforcement action taken by the FCA (or its predecessors) against a company over its activities on the LME was more than two decades ago...." (Farchy, 2022)

Much has changed in the financial markets in the last two decades. The pace of disintermediation increased thanks to electronic trading platforms (MacKenzie, 2021). Most markets have closed their trading floors (Markham and Harty, 2008). Non-members have obtained the ability to transact directly on exchanges (Busch, 2016). Algorithms have become a staple of the digital market (Brogaard et al., 2023). Algorithms move faster than humans and help to remove the emotion and fatigue that can lead to bad trading decisions or errors (Borch and Lange, 2017). Undoubtedly, these changes have had wide ranging implications for enforcement strategy.

More generally, Feldman (2018) calls for a re-evaluation of the effectiveness of legal approaches towards enforcement. Feldman's central proposition is that most wrongdoers are not calculative, but many enforcement methods assume that they are. In light of this, attempts at deterrence often fail. Drawing upon the key tenets of Feldman's work, Hunt (2023) offers practitioners a simple lens called "HUMANS" with which to critique the effectiveness of their compliance programmes. In conceiving rules to aid the application of HUMANS, Hunt hypothesises that "a rule designed for an analogue world might not work in a digital one". The same might be the case for enforcement techniques.

This article seeks to act as a catalyst for shifting debate in the academic literature concerning the efficacy of exchange enforcement. Until now, academics have conducted this debate almost exclusively through a legal lens. This paper endeavours to encourage the greater use of behavioural lenses. This article uses HUMANS to generate insights into the effectiveness of the enforcement activities of four comparable derivatives exchanges: the Commodity Exchange Inc. ("COMEX"), two key divisions of the Intercontinental Exchange Inc. group: ICE Futures Europe ("ICE EU") and ICE

[1] Also known as a "section 166 review" after the provision in the Financial Services and Markets Act 2000 ("FMSA") which grants the FCA the power to request a third party to analyse a regulated person's systems and controls.

Futures U.S. ("ICE US"), and the LME. This study uses the resultant findings to generate suggestions as to how exchanges could enhance their enforcement programmes.

The remainder of this article is structured as follows. First, the article surveys the literature that has studied the evolution of exchanges and their enforcement activities. This section also provides an extended introduction to the work of Feldman and Hunt and the exchanges that are the subject of this paper. Second, the study's methodology is outlined. The third section details the research findings, structured through the lens of HUMANS. This is followed by a discussion which situates these findings within the body of previous research and considers their implications for future practice. The discussion also stipulates the study's limitations and suggests directions for future research. Finally, a conclusion reflects on the overall significance of the investigation.

Literature review

(a) Financial market misconduct: balancing public and private approaches

Billed as a "growth area" of research (Cumming et al., 2015), financial market misconduct is both elastic (Yadav, 2016) and unquantifiable (Cumming et al., 2018). Often faced with an inequality of arms (financial resources, expertise) public law enforcement agencies struggle to detect (Gottschalk and Glasø, 2013) and prosecute corporate misconduct (Eisenberg, 2017). Incentives to self-report violations are seldom acted upon (Soltes, 2019). Added to this are political restraints on criminalising misconduct in the financial markets. Some offenders are considered "too big to fail or jail", lest this create systemic risks for the financial system (Hardouin, 2017). Fearing that the aggressive pursuit of offenders through the criminal courts would result in increased jurisdictional arbitrage, some policy makers may be tempted to advocate for leniency (Gully-Hart, 2005). The prospect of a reduction in tax receipts or job openings may be enough to discourage impactful enforcement (Lord and van Wingerde, 2019) or sentencing (Coffee Jr, 2021). Then there are myriad evidential hurdles that the public prosecutor of financial market misconduct has to navigate. Large institutions with complex organisational structures make the assignment of culpability arduous when seeking to prove guilt beyond a reasonable doubt (Coffee Jr, 2021).

Faced with these difficulties, public policy in Western nations has tended to favour placing heavy reliance on private organisations to help regulate conduct in financial markets. This is most notably the case in the Anglosphere. This includes exchanges. Funded by licensee levies or member dues rather than by taxpayers, private enforcers benefit from higher levels of expertise. This means that they are more likely to detect misconduct, a pivotal part of deterrence (Croall, 2004). An emphasis on securing the cooperation of the regulated means that private enforcers are more inclined to persuasion than coercion. This explains the frequent use of out of court settlements. These are attractive to the accused because they limit the scope for reputational damage. Simultaneously, they spare the enforcer the expense of a lengthy criminal trial that has a good chance of resulting in embarrassing failure because of the high burden of proof (Croall, 2004).

The emphasis of private enforcement on cooperation is one of its fundamental weaknesses, assert critics. First, justice is not "seen to be done", giving rise to a sense of "two-tier" justice in some quarters (Croall, 2004, Larsson, 2007). Second, licensees will be tempted to "pay lip service" to regulatory compliance if they believe they will have the chance to settle "away from the cameras" if caught. This is why regulation is often reinforced by the threat of public prosecution, even if this is rarely used in practice. In the UK, policy makers have even equipped financial regulators with the powers to initiate criminal proceedings. The FCA has shown a willingness to use these powers, irrespective of securing few convictions. Contrarily, the FCA's US counterparts, the Commodity

Futures Trading Commission ("CFTC") and the Securities and Exchange Commission ("SEC") do not have these powers, and are instead fixated on issuing fines (Francis and Ryder, 2019). Certainly, a complex web of public and private enforcement agencies amounts to another Achilles heel in the Western world's efforts to prevent, identify and punish financial market misconduct (Kempa, 2010). For example, in the UK it is possible that the FCA, City of London Police, National Crime Agency, Serious Fraud Office could all be involved in a case. Various agencies may be conflicted, compete with one another for high profile cases or be confused as to their respective roles. Throw the enforcement apparatus of trading venues into the mix and the picture becomes even more Byzantine.

In many respects enforcement action taken by exchanges is mundane. This may explain why researchers have hitherto expressed limited interest in this area, as is the case for other self-regulatory organisations or private regulators such as the Financial Industry Regulatory Authority (Black, 2013). Furthermore, it is very challenging to gauge the effectiveness of the costly surveillance and enforcement apparatus operated by trading venues (Aitken et al., 2015). This was distinctly evident during the intense period of globalisation and digitalisation that followed the year 2000.

(b) Globalisation and digitalisation: exacerbating traditional anxieties surrounding exchange enforcement

Traditional anxieties concerning the suitability of the "for-profit" exchange as self-regulator and enforcer (Omarova, 2010) have been exacerbated by globalisation (Bradley, 2000). Demutualisation spawned the emergence of the cross-border "mega exchange" (Brown, 2013). Covering several asset classes and operating from several financial centres, these exemplars of globalisation pose a significant challenge to monitoring and enforcement (Diaz and Theodoulidis, 2012). Fierce competition forced former national champions to rapidly internationalise their offerings in the search of greater market share (Petry, 2021). Thus, cultural preference fused with digitisation to spark ever increasing disintermediation, harmonisation and financialisaton. The familiar faces of bustling, often chaotic, trading floors disappeared (Markham and Harty, 2008). Faceless and remote trading took its place, frequently employing algorithms and conducted at high speeds. Exchanges have outgrown their regulators, contend some (Mahoney, 1997). Abusive actors, or their agents, no longer exclusively lurk in pits or dealing rooms. Now they may be sitting behind a screen on the other side of the world thanks to direct electronic access ("DEA") (Culley, 2022). Even worse, highly sophisticated actors might "weaponise" artificial intelligence to engage in misconduct (Azzutti et al., 2021). Arguably, such features make trading in the digital era is even less transparent than in analogue age. Trading pits appeared chaotic to the untrained eye. Even so, they were regulated by social norms. Poor behaviour could lead to costly ostracisation. Most of the key players were concentrated in one location (Zaloom, 2006).

Courting new sources of liquidity, the newly minted global exchanges rushed to create products attractive to speculators (Boyd et al., 2018). In doing so, the exchanges risked alienating their traditional constituency: commercial hedgers (Carter and Power, 2018). Suspicious of being "front run" or spoofed by high speed traders enticed by greater standardisation, rebate programmes and other incentives (Seddon, 2020), hedgers sought reassurance from trading venues that they would be protected from abusive behaviours (Boyd et al., 2018). Nevertheless, the demutualised exchange may not be sufficiently incentivised to deter abuse, especially where commodity futures are concerned (Pirrong, 1995). Idiosyncratic specifications and market participants' reluctance to fragment liquidity create the conditions for natural monopolies (Posnick, 2015). Accordingly, a chief benefit of private regulation present in stock markets, namely relying on competition to calibrate the assertiveness of enforcement policy (Stringham, 2002) (Stringham and Chen, 2012), is lost. This may explain why some exchanges were accused of having underinvested in their surveillance and

enforcement apparatus in the early years after demutualisation (2010) (Kellerman, 2021). An alternative reason is fear of frightening customers away. Regulatory developments in the EU and US gave birth to alternative sources of liquidity such as Alternative Trading Systems ("ATS"), Multi-Lateral Trading Facilities ("MTFs"), Organised Trading Facilities ("OTFs") and Systematic Internalisers ("SIs") (Clausen and Sørensen, 2012). In comparison to ATSs, trading on MTFs, OTFs and SIs is not restricted to securities (Helm, 2023).

(c) Moves towards a more muscular approach to enforcement

The reluctance to lose business may have caused exchanges to rely on less formal enforcement mechanisms in the past (Stringham, 2002). Wishing to be seen as "honest brokers", brokers and traders were loathed to agitate one another, lest this led to the loss of a key source of liquidity (Gunningham, 1991). Exchanges exploited this anxiety by publicly "naming and shaming" errant actors, for example on a noticeboard (Stringham, 2016). This practice has continued, albeit via electronic means. Circulars give notice of disciplinary / enforcement action taken and are routinely published on public websites and emailed to those who wish to subscribe to them (2013a, Undated-e, Undated-h, Undated-j). Nonetheless, faced with increased scrutiny in the wake of major incidents such as the 2007-08 financial crisis and the 2010 Flash Crash, exchanges have been forced to up the ante (Carson, 2011, Kellerman, 2021). The more muscular approach has seen exchanges:

(i) take thematic initiatives in response to prevailing concerns, for example, in response to US Commodity Futures Trading Commission's "war on spoofing" (Mark, 2019). A key aim of enforcement action emanating from thematic work is to motivate other actors, usually member firms, to improve their systems and controls (Azzutti, 2022). Central to this approach are: (a) levying significant fines to attract the attention of market participants; and (b) publishing detailed enforcement notices that serve as "learning tools" to guide their future conduct. The following statement in a recent LME disciplinary case where a member was fined £100,000 for deficient systems and controls to detect market abuse is typical of this approach:

> "The LME reminds Members of the importance of having in place appropriate and adequate risk management systems in order to detect, deter, and deal with trading activity which is potentially indicative of market abuse."(2023b)

(ii) utilise additional powers granted to them by statute to extend their jurisdiction over non-member actors and, where necessary, take direct enforcement action against them. Notable examples of this are Rules 418 and 4.00 introduced by COMEX and ICE US respectively in response to §38.15(a) of the 2010 Dodd-Frank Act (2012b). These rules state:

> "Any Person initiating or executing a Transaction on or subject to the Rules of the Exchange directly or through an intermediary, and any Person for whose benefit such a transaction has been initiated or executed, expressly consents to the jurisdiction of the Exchange and agrees to be bound by and comply with the Rules of the Exchange in relation to such transactions, including, but not limited to, rules requiring cooperation and participation in investigatory and disciplinary processes."

As will be seen in the Findings section, these rules have acquired significance on US trading venues as digitisation has become more pervasive.

(iii) increasing the amount of fines levied in an attempt to strengthen the deterrent effect of enforcement action taken (Polansek, 2016). One scholar concluded that exchanges' penalties aimed at deterring significant instances of market manipulation such as abusive squeezes had hitherto been too small to be effective (Pirrong, 1995); and

(iv) issuing permanent bans in response to serious breaches to serve as the ultimate deterrent. Labelled as the contractual equivalent of a "death penalty"(Karmel, 2008), self-regulatory organisations have been particularly keen to deploy this when an actor accused of misconduct fails to engage with investigatory or disciplinary proceedings (Macey and Novogrod, 2011).

(d) Limitations of exchange enforcement

In spite of these efforts, exchange enforcement operates within the context of certain constraints. First, cynics assert that it represents an insincere attempt to stave off government intervention (DeMarzo et al., 2001) . Second, exchanges lack the supervisory competence of their government "overlords" (Azzutti, 2022). Exchanges are unable to perform cross market surveillance outside own commercial group (Aitken et al., 2015). Even if they do possess better information, superior experience and higher legitimacy than public sector bodies (Lee, 2000), an exchange cannot issue subpoenas or take punitive enforcement action (Cumming and Johan, 2008) (Black, 2013). Third, exchange enforcement is vulnerable to the budgetary whims that sometimes befall commercial organisations (Reiffen and Robe, 2011). Fourth, some claim that the relatively limited enforcement powers available to exchanges means that the outcome of any enforcement actions they bring is unlikely to influence regulatory reform (Gadinis and Jackson, 2007). Finally, it has also been argued that an expulsion only serves as a deterrent if membership of a "club" is perceived to be highly valuable (Macey and Novogrod, 2011). Therefore, as intermediation has declined in importance, so has the value of market membership, be it at an entity or representative (broker or trader) level.

(e) Rethinking approaches to enforcement

Advocates of exchange regulation cite quicker enforcement at no cost to taxpayers as being among its main benefits (Tarbert, 2021). Hence, private enforcement by exchanges appears to be here to stay. All the same, the aforementioned limitations are of the type that have motivated some scholars to advocate for a different approach to enforcement. In particular, Feldman (2018) is credited with conceiving a new branch of scholarship that aims to inspire a rethink in enforcement policy based on behavioural ethics. For Feldman, there are three types of wrongdoer:

(1) erroneous: those who engage in misconduct by mistake or because of a lack of awareness;

(2) situational: those who seek to rationalise their behaviour when presented with an opportunity to misbehave, cut corners, or imitate others in their social circle; and

(3) calculative: those who intentionally seek to do wrong having weighed up the cost benefits of doing so.

Feldman asserts that enforcement strategies should primarily target "good people" who engage in poor conduct by accident or self-deception. This requires recognition that wrongdoers:

(1) do not always behave rationally;

(2) may seek to rationalise their behaviour to maintain a positive self-image, for example based on their personal degree of respect for a rule or if an action is performed in the name of their employer and only benefits them indirectly;

(3) are not always conscious that they are engaging in misconduct because they are either ignorant of applicable regulations or blinded by their own self-interest;

(4) sometimes engage in misconduct "automatically", for example in response to situational or organisational pressure;

(5) emanate from different social and moral constituencies that are constantly evolving; and

(6) fuelled by a desire to cooperate, are more prone to misbehaving when in a group.

In consideration of the foregoing, Feldman avows that more effective enforcement strategies:

(1) employ a combination of "traditional" (incentive based, i.e. fines or rewards) and "non-traditional" (for example, increasing accountability and reflection) methods to target the different types of wrongdoer;

(2) place an emphasis on likelihood of detection than punishment because people are overly sensitive to this; and

(3) seek to limit the potential for an actor to make excuses for their behaviour.

On the other hand, Feldman claims that less effective approaches:

(1) place too much emphasis on the size of punishment in the belief that this increases deterrence;

(2) impose monetary penalties when this could be counterproductive, for example small fines that merely place a "price tag" on misconduct;

(3) obsess over "smoking guns" whilst missing the bigger picture;

(4) rely on ambiguity believing this will reduce the possibility for loopholes but which actually encourage risk takers who believe they can later rationalise their conduct;

(5) take a "one size fits all" approach, negating the characteristics of different constituencies; and

(6) ignore the importance of securing the trust and perception of legitimacy in those constituencies.

Behavioural scientist and ex-regulator Hunt (2023) provides guidance to help practitioners operationalise Feldman's recommendations. Called "HUMANS", it encompasses the following elements:

- H: Helpful – consider the likelihood of a policy or rule being perceived as helpful by the target constituencies;

- U: Understanding – consider whether a requirement is likely to be understood, both in terms of its substance and why it is being imposed;

- M: Manageable – consider whether the subjects are likely to be: (a) in a position to comply with a requirement with a minimum of friction; (b) deterred by the potential consequences of non-compliance; and (c) persuaded that there is a reasonable prospect of being caught in the event of non-compliance;

- A: Acceptable – consider whether the target constituencies are likely to find the requirements and their enforcers to be legitimate and fair;

- N: Normal – consider whether the target constituencies will find compliance with the requirement natural, especially when compared to peers' efforts to comply; and

- S: Salient – consider whether the target constituencies are aware of what is being asked of them.

Neither Feldman's nor Hunt's insights are specific to exchange enforcement. Notwithstanding, they provide a useful framework with which to re-evaluate the effectiveness of their enforcement efforts in the digital age. To conduct such reappraisal using through a human lens against the backdrop of "algorithmication" may appear counterintuitive. Forecasts of the imminent demise of human involvement in trading processes, however, have so far proved to be premature (Culley, 2023, Culley, 2022). This is especially the case in the trading of fixed income, currency, and commodity ("FICC") products owing to the lower levels of fragmentation and higher customisation (see above). It is conjectured that this accounts for the apparently lower level of academic interest in these markets than is the case when compared to securities venues. To contribute in reducing this gap, this study surveyed the enforcement activities of four trading venues which are predominantly, or exclusively, FICC orientated.

(f) Introduction to the four derivatives exchanges selected for this study

An overview of the methodology used to inform the study is provided in the section that follows. First, a brief introduction to the four trading venues.

Founded in 2000, ICE rapidly grew to acquire a significant presence as a venue for the trading of energy, financial and agricultural derivatives (Brown, 2013). Two of the most significant divisions of ICE are ICE EU and ICE US. ICE EU has operated as a Recognised Investment Exchange ("RIE") under Part XVIII of the Financial Services and Markets Act 2000 ("FSMA") in the UK since 1st November 2007. RIEs are similar to Self-Regulatory Organisations ("SROs") in the US in that they promulgate and enforce their own rules (Carson, 2011). ICE US is such a SRO, being registered as a Designated Contract Market ("DCM") under Section 5 of the Commodity Exchange Act 1936 and Part 3 of the CFTC's regulations (Tarbert, 2021). Neither ICE EU nor ICE US offer floor trading , with the group's last soft commodity pits closing in 2012 (Wigglesworth and Stafford, 2021). Today, most trading is conducted through the group's trading platform, WebICE or via third party remote trading platforms

(2010), although ICEBlock is also used to register large-in-scale transactions[2] (2023f, 2017d, 2014a) that have been negotiated off exchange. As Figure One illustrates, ICE EU and ICE US volumes have grown rapidly since 2007. As of early 2015, ICE US employed 22 market supervision professionals. At the end of 2022 ICE EU employed 200 people, but it does not publish department level headcount data.

COMEX is one of the smaller divisions of the Chicago Mercantile Exchange ("CME"). The CME is credited with having kick started the drive to demutualisation in 2000 (Keaveny, 2004), although COMEX is a DCM in its own right. In 2016 COMEX offered 29 products, but most trading is in gold, copper and silver contracts. Average daily volume at COMEX is small and declined during the COVID-19 pandemic, see Figure Two. By early 2015 91% of this volume was being traded on the CME's proprietary trading platform Globex, with the remainder "pit" and "ex-pit"[3]. This led to the pit's closure at the end of 2016 (2016a). COMEX shares the market supervisory and enforcement functions with the CME's other venues (for example, NYMEX). In 2016 this team was comprised of 13 lawyers.

Having itself demutualised in 2000, the LME quickly sought to emulate COMEX by introducing its own electronic trading system, LME Select, in 2001 (Seddon, 2020). Consequently, the demise of the LME's distinctive trading floor, the "Ring", was predicted. Nevertheless, caught in the tussle between financial and physical interests that has dominated politics at the exchange since the introduction of Select, the Ring continues to endure today. Still, its importance has gradually diminished over time. The Ring and Select are complimented by a telephone or "inter-office" market handling orders that are large in scale or to be customised to specific dates. This function is perceived to be very important by commercial users who laud the LME's status as a forward market with unique date structures, distinguishing it from standardised futures markets such as those offered by the CME and ICE (Gilbert, 1997). Like ICE EU, the LME only publishes high level data concerning the number of people it employs. 310 people were employed at the end of 2022 (2022a), a significant increase from the 105 employed in 2012 when the LME was acquired by the Hong Kong Exchange Group ("HKEX") (McNulty, 2012, 2012a). Post takeover, volumes peaked in 2018 but have since slumped significantly (Figure Two).

The LME has been praised by some for aggressively fighting manipulation (Slavov, 2001) though it has witnessed some of the biggest instances of misconduct to happen in the commodity markets. These include: the Sumitomo-Hamanaka abusive squeeze (1996) (Kozinn, 2000), the Metro warehousing scandal (2011) (Posnick, 2015) and the nickel market squeeze (2022). The latter event prompted: (i) a regulatory investigation into the LME's governance and market oversight arrangements; and (ii) a raft of law suits both of which are, at the time of drafting, still ongoing (Earl, 2023).

Methodology

(a) Sample

The four exchanges introduced in the Literature Review were selected because: (a) ICE EU and the LME are the two oldest extant derivatives venues that are UK RIEs (Undated-l); (b) and ICE US and COMEX are the two US DCMs that are the natural counterparts to these. The longevity of these

[2] Trades that are large in size "compared to normal market size" in accordance with thresholds specified for particular contracts. For an example, see the ICE Futures Europe thresholds for June 2023.

[3] Here "pit" referred to price discovery occurring on a trading floor via "open outcry", i.e. verbal and signal communication. By contrast "ex pit" referred to privately negotiated transactions between market participants.

venues provides an opportunity to examine the effectiveness of exchanges' enforcement efforts over an extended period. Furthermore, this enables one to collect a greater depth of enforcement data than is possible for newer venues. All four venues publish a wealth of information online about their enforcement activities. By contrast, some other important venues only provide high level information about cases they have brought, most notably the Shanghai Futures Exchange.

(b) Data collection

All enforcement cases since 2007 were harvested from each trading venue's website and, in the case of the LME, the Lexis Nexis database. 2007 was a defining year in the financial markets. Of course, it was the year in which the financial crisis that had been brewing since at least 2005 hit the headlines with the collapse of Northern Rock (LaBrosse, 2008). This would trigger a massive regulatory response that promised to significantly tighten controls on derivatives trading (Helleiner et al., 2018). That this crisis came hot on the heels of the first Markets In Financial Directive ("MiFID I") is ironic: a central plank of the directive was the introduction of MTF and SI to increase competition to traditional trading venues (de Meijer, 2009). It was this type of competition that had led ICE to purchase The New York Board of Trade ("NYBOT") in January 2007 (Olson, 2010). NYBOT would change its name to ICE US in September in the same year (Gorham and Singh, 2009). Circa eleven months later the CME purchased COMEX for similar reasons (2008). The age of the mega exchange had begun. For these reasons, 2007 seemed like an ideal starting point for collecting data.

A total of 799 enforcement notices were collected across all four exchanges, see Figure Four. Each notice typically contains: (i) a summary of the events that led to enforcement action being taken; (ii) a statement of the exchange rules contravened; (iii) if relevant, the weighing of aggravating and mitigating factors in the case, for example, whether the respondent was cooperative whilst under investigation and/or customers were harmed; (iv) a statement of the penalty imposed, and whether this was reduced in accordance with the terms of a settlement or because of financial hardship; and (v) the date penalties become effective. All enforcement notices receive a unique case reference number. An enforcement notice may be linked to other notices which are based on the same facts, usually in situations where there are multiple respondents (for example, where an exchange has taken action against both an employee and their employer). A notice is normally published swiftly after the conclusion of a case. It is signed off by the head of enforcement, surveillance, general counsel or similar, with the name(s) of the signatory(ies) appearing at the end of the notice.

~~Finally, t~~To supplement the enforcement notices, the author collected a range of other secondary data sources. These included:

(1) annual audited financial statements ~~:~~gathered because these offer insights into: market structure, how many staff an exchange employs, trading volumes, revenue streams, and a statement of the principal risks an exchange perceives that it faces in a given year;
(2) relevant reports from competent authorities. The CFTC conducts supervisory reviews of DCMs to appraise the performance of their enforcement programmes. After completion, the CFTC publishes a report documenting the size, scale and nature of an exchange's enforcement apparatus, its strengths and weaknesses, and commentary on notable cases. These reports helped the author match enforcement notices to supervisory priorities; and~~:~~ ~~particularly following supervisory reviews of the exchanges they recognise or designate; and~~
~~(2)~~(3) information gleaned from various websites, predominantly those hosted by the four exchanges themselves and the CFTC and FCA. These assisted with the interpretation of specific rules and in understanding enforcement approaches. ~~.~~

~~This information was useful to provide context to certain approaches and events.~~

~~A total of 799 enforcement notices were collected across all four exchanges, see Figure Four.~~

(c) Analysis

First, ~~-~~ the author read each enforcement notice to obtain a general sense of their length and typical themes. Separate "codebook" tables were then created to summarise or extract the key findings from each enforcement notice.

Second, Rule REC 2.15.3 (2013b) of the FCA's Handbook was used to distinguish between disciplinary actions: (a) taken against members; (b) taken against non-members; (c) requiring suspension of a legal or natural person's access; and (d) instances of referral to national competent authorities for possible further action. Although REC 2.15.3 is a UK rule that does not apply to US exchanges the author considered that it still serves as a useful framework. After all, both COMEX and ICE US hold the status of Recognised Overseas Investment Exchange ("ROIE") in the FCA's Register (Undated-m). This status means that the FCA considers that both US exchanges operate within a regulatory environment that is broadly similar, so much so that they can participate in UK markets (2016b).

Third, the author alighted upon Hunt's HUMANS as an ideal framework through which to conduct content analysis. This was justified by its ease of use and accessibility. HUMANS was designed by a practitioner, for practitioners to help them identify, and reflect upon, behavioural themes in their compliance initiatives. It is easy to understand and apply, critical considerations for time poor part-time researchers and busy professionals alike. The absence of a complex model helps ensure that findings are accessible to the broadest possible audience, an essential consideration in matters of conduct. Equally important is that HUMANS facilitates the rigorous analysis of qualitative data. A common concern about deductive coding is that is vulnerable to researcher bias. This is due to the fact that it usually begins with assumptions. Here, HUMANS acted as a natural safeguard against definitional drift. For this reason, each element of HUMANS (as outlined in the Literature Review) was selected to represent an a priori theme. This also helped to mitigate two limitations associated with the study of enforcement notices published by exchanges. These are variability in the (i) detail contained in enforcement notices; and (ii) the pace at which enforcement actions are conducted. HUMANS inspired the author to look for deeper patterns between notices, instead of dwelling on temporal and superficial distinctions between cases. Admittedly, it is improbable that any single method could eliminate all bias deriving from these drawbacks.

Finally, the extracts from the notices were assigned codes to facilitate grouping by each element of HUMANS. The author used a set of highlighter pens to indicate the presence of a theme in an extract. Each theme was coded "flat", i.e. assigned an equal level of importance. To try and ensure the reliability of the coding, the author set the initial work aside and returned to it afresh after an extended break. The enforcement extracts were re-read and appropriateness of the initial codes reconsidered. On occasion, an item was identified that was deemed to be a better fit to a different element of HUMANS than initially coded. The author was working alone. Without doubt, a team is better placed to reduce the potential for bias or oversight. Each researcher can take turns in coding the same dataset afresh, triangulating different perspectives. To the author, a time lag partly captures the fresh vantage point offered by team research. Having said that, this study's findings must be read in light of the lone author's constraints.

~~Finally, to supplement the enforcement notices, the author collected a range of other secondary data sources. These included: annual audited financial statements; relevant reports from competent authorities, particularly following supervisory reviews of the exchanges they recognise or designate; and information gleaned from various websites. This information was useful to provide context to certain approaches and events.~~

Findings

H = Helpful

In this study, the first element of HUMANS was used to assess the effectiveness of enforcement notices as learning tools.

An initial observation is that the fragmentation of enforcement databases detracts from helpfulness. The enforcement notices for COMEX, ICE EU and ICE US are all publicly available. By contrast, the LME only publishes a small number of enforcement notices on its website. These notices all relate to enforcement action taken since August 2019 and cover the most significant cases (at least in terms of fines levied) (2023c). To access other notices, one must either obtain them from the LME's Company Secretary team or subscribe to Lexis Nexis (2023e).

At the time of writing, a consolidated database of enforcement actions taken by RIEs and/or DCMs is not publicly available. Perhaps the most helpful database of enforcement cases is the Financial Market Standard's Boards ("FMSB") Behavioural Cluster Analysis (Undated-d), although this is limited to: (a) instances of market abuse and manipulation; and (b) does not include COMEX, ICE EU, ICE US or LME cases (Undated-c). Violation Tracker offers a similar service but is US centric and limited to action taken by federal regulatory agencies (2022f). Coverage of exchange level enforcement actions by commercial providers is variable. Given that trading venues place substantial reliance on their members to ensure that barred persons do not access their matching engines (2017b), the lack of a consolidated database in a machine readable format may be frustrating this first line of defence.

In all enforcement notices reviewed subjects' names were "put up in lights". Individual accountability was strengthened in many G20 jurisdictions in the aftermath of the 2007-08 global financial crisis (Engler, 2018). By extension, disciplinary action taken by exchanges became more important. Whereas previously they may have been perceived by many to be the financial equivalent of "traffic offences", the implementation of initiatives such as the Senior Managers and Certification Regime ("SMCR") in the UK mean that exchange disciplinaries now have the potential to become "conduct events" that threaten a subject's future employment prospects (Jordanoska, 2021). Therefore, naming subjects is helpful in several respects.

First, firms have access to free independent sources that can be used to check an applicant's fitness and proprietary prior to making an appointment.

[Illustration One: "The front runner"]

Second, line managers can use these sources to provide role specific conduct related training to their staff. Some exchange communities, particularly amongst members are small (Pirrong, 1995). It is ventured that learning from cases that involve peers is likely to resonate more than theoretical examples.

[Illustration Two: "Failure to supervise or train"]

Third, named notices have the ability to harness the power of gossip. This may not be intentional or conscious but it is submitted that informal channels are possibly more important than formal training in embedding behavioural change.

[Illustration Three: "The Ringside confrontation"]

That an exchange would disclose the names of the parties to its enforcement actions may seem natural to readers in the Anglosphere. Identification is not always customary practice in other financial centres. The Shanghai Futures Exchange ("SFE") publishes a summary of its enforcement activities each month. This stipulates the numbers of actions taken, grouped into themes. Absent from this are respondents' names and the specific details of each infringement, limiting the usefulness of the SFE's publications to practitioners. Likewise, the author could not find a single enforcement case on the European Energy Exchange's ("EEX") website. This could simply mean that the EEX has not brought any, or that they are extremely inaccessible. Alternatively, EEX could be following in the German tradition of anonymous case reporting as practised by the German regulator, the Federal Financial Supervisory Authority, in many instances (2018).

As the digital age draws to a close, certain features of existing enforcement notices might render them less helpful. First of all, effectiveness of attributing cases to personalities may decline with increasing algorithmication. For example, since 2018 ICE US has issued a large number of summary fines for a failure to retain electronic audit trail data (see Figure Nine). In every case these are levied against a legal entity rather than a natural person. The same approach is taken, in some, but not all, cases involving the deployment of trading technology. This is could be because the exchange has struggled to identify a human wrongdoer. Whatever the reason, a growing lack of attribution could embolden wrongdoing in the name of one's employer, a catalyst identified by Feldman (2018).

[Illustration four: "The disorderly algorithmic traders"]

Second, an exchange "community" has become much broader than its membership. Nowadays an individual may be "named", but they are not necessarily "shamed". Geographically, individuals could be spread everywhere so they may not feel the same social pressures to conform as representatives of traditional financial institutions that are typically congregated around the historic seat of an exchange. Enforcement notices do not provide clues about the locations or nationalities of respondents. It is proffered that a failure to appear is a potential indication that a natural person accused of committing breaches of exchange rules is based abroad. This is on the basis that the penalties for failing to appear are usually very severe (see the section on salience below). Figure Five shows that the number of persons penalised for failing to appear at hearings initiated by COMEX or ICE US has steadily grown since 2007. Equally, the notable lack of such cases at ICE EU and the LME could indicate a reluctance to pursue individuals who are based abroad due to the complexities of doing this.

Finally, even where this is not the case, structural and demographic changes to financial institutions themselves may mean that individuals feel more "remote" from an exchange. Unless a financial institution makes the effort to broadcast relevant rules and the findings from enforcement, it is quite possible that some intended targets are not even be aware that they exist. In view of the fact that nearly all employees of UK financial institutions are now exposed to potential personal liability under SMCR, this would be far from ideal. In contrast to the UK, the US does not currently operate an individual accountability regime (2023a). Regardless, several high profile cases brought by law enforcement agencies and either the CFTC or the Securities and Exchange Commission ("SEC") after referrals from exchanges demonstrate that the dangers emanating from a lack of awareness are even higher in the US.

[Illustration five: A trailblazing prosecution for an algorithmic spoofer]

U = Understand

Following on from the above, it is conjectured that the target audiences for enforcement notices concerning systems and control breaches are firms' control functions (compliance, risk) and senior management. Conversely, it is speculated that the target audience for enforcement notices regarding individual conduct is broader. For example, LME disciplinaries pertaining to offences occurring on the trading floor have to be understandable by so called "barrow boys" (Williams, 2012). This is equally the case whether they relate to dealing matters such as "bidding out of line with the market" (65 cases) or maintaining personal decorum by not using foul and abusive language (three cases) or not dressing appropriately (two cases). Moreover, as mentioned in the previous section, because of the demutualisation and digitalisation of markets, this target audience has become more diverse as "outsiders" such as "techies" (calibrating algorithms in or outside firms) and "global citizens" (using DEA) participate in trading.

Communicating behavioural expectations through detailed notices is more difficult if the first language of many intended recipients is not English. Indeed, this could undermine any deterrent effect a trading venue seeks to achieve through the imposition of heavy penalties. In 2019 the CME claimed that Globex could be accessed from more than 150 countries (2019c). As at 13th April 2023, ICE US officially offered WebICE in 23 jurisdictions where English is not an official language. Among the jurisdictions were China, Japan and the UAE where English proficiency was assessed to be "low" in the 2022 English Proficiency Index (2022b). ICE EU permits access to WebICE from an even broader range of jurisdictions. Of the 33 jurisdictions ICE EU partially or fully supports, a third are rated "low" or "very low" in terms of English proficiency. Access to the LME's trading platform, LME Select, is currently limited to small number of jurisdictions. With the exception of China, France and Japan, English proficiency in all of these jurisdictions is considered to be high or very high. Table One provides a comparison of the various levels of access and English proficiency.

To test the likely effectiveness in being understood, four enforcement notices were sampled. One notice issued by each venue (COMEX, LME, ICE EU and ICE US), representing the heaviest penalty imposed on a natural person market participant (member employee or non-member), was selected. This is because, it is supposed that it is through the heaviest penalties that a trading venue seeks to achieve the greatest salience. The text of the four notices was then fed through the Readability Test tool made available by WebFX to calculate a score for Flesch-Kincaid Reading Ease (Undated-k). Developed in 1975, Flesch-Kincaid readability tests were conceived to assess how easy it is to understand tests written in English. For an overview of the Flesch-Kincaid scale, see table Two.

Table Three summarises the results of this exercise. In short, the relatively low Flesch-Kincaid scores for all but the LME notice could undermine the effectiveness of enforcement notices. To better understand their regulatory obligations, individuals trading remotely on COMEX, ICE EU or ICE US would have to access the notices in either HTML or PDF form and probably copy and paste the text into an application like Google Translate. This may sound simple, but in fast paced markets this adds friction into a trader's day. The desired "sit up and take notice" effect of imposing the large fines and bans is conceivably limited to parts of the world where proficiency in English is high. Besides, it is surmised that this also reduces the likelihood of secondary circulation in non-English language financial and trade publications. On occasion, this plays a key role in disseminating the key messages from exchange's enforcement efforts and other regulatory initiatives. Good examples include coverage of the enforcement action taken by the LME following the Sumitomo-Hamanaka scandal (2000) (O'Connor, 1999), the CME in the Coscia case (Leising, 2013) and in respect of permanent bans handed to three traders for spoofing its base, precious metals and oil markets in 2013 (2015) . Many firms will subscribe to information services of the type offered by Bloomberg, Reuters and the Financial Times so it is easier for their staff to stay abreast of key developments. Even further, they

have a good chance of reaching non-member traders who may not necessarily be subscribed to receive exchange notices.

The current formatting of some enforcement notices has another consequence for understanding. PDFs are not automatically machine readable (Undated-i). As markets are tipped by some researchers to become dominated by machine learning algorithms (Azzutti et al., 2021) this may represent a considerable impediment to training them to behave ethically.

M = Manageable

The next limb of HUMANS as described by Hunt goes to the root of what exchange enforcement seeks to achieve: deterrence. To the outsider, the costs of non-compliance with the rules of COMEX, ICE EU, ICE US or the LME might appear to be trivial. As Figure Three demonstrates, the revenue generated from enforcement activities is small. For context, the net USD profit[4] for the LME in 2022 alone was $56m. This is more than the combined total of all four exchanges since 2007, at least in terms of enforcement notices that are publicly available. This risks some calculative individuals merely perceiving certain types of enforcement action as merely being a "cost of doing business", particularly where an exchange rule is viewed as a nuisance or unduly burdensome.

[Illustration six: wash trading to circumvent position transfer rules]

It can take time for an exchange to approve a request to make a position transfer. For example, the LME can take up to two business days to respond (2022d). Also, there is a possibility that an exchange rejects a request, for example "*where unacceptable margin or risk requirements would be generated*"(2019b). In the abovementioned example, an organisational view may be taken that a fine of $7,500 represents only a few seconds' takings.

The CFTC has occasionally chastised US trading venues for handing down penalties so low that they are ineffectual at best and, at worst, even counterproductive. In its rule enforcement review of ICE US concerning the period 1st June 2007 – 1st June 2008, the CFTC concluded that the exchange's policy for levying small fines of circa $100 for repeat violations was "inadequate", stating:

> "Such a high non-compliance percentage suggests that members may not have understood the Exchange's trading card requirements, or that the penalties issued for violations of the Exchange's recordkeeping requirements were not sufficient to serve as effective deterrents….levying warning letters and summary fines in the $100-$400 ranges was viewed by members as a "cost of doing business" rather than a deterrent."(2010)

In a later review relating to the period 1st November 2010 to 1st November 2011, the CFTC criticised ICE US's decision in Notice #2010-060 to only fine a firm and its employees $100k for a bout of wash trading (2012b). The CFTC determined that ICE US had failed to identify the systematic nature of the wash trading. Following instructions from management, traders and developers had coordinated to

[4] ICE EU and LME fines are published in GBP. These were converted to USD using currency website Oanda on 16th August 2023.

design a computer programme for this specific purpose. As such, the fine was inadequate, held the CFTC.

Case #2010-060 touched upon issues discussed in relation to the "Helpful" limb of HUMANS, above, chiefly the ability to identify a wrongdoer in situations identifying algorithms. A related challenge for exchange enforcement is the temptation to try and "outsource" liability to an algorithm contending that it is difficult to manage. A senior representative of ICE US offered a window into this problem at an industry conference held in 2011. Tom Farley, then Chief Operating Officer, was reported as saying that "they [algorithms] get blamed for everything under the sun" in the soft commodities markets. He elaborated: "I spend a good deal of my day fending off complaints that I get, say, 'Your fill-in-the-blank ... market has run amok, it's all high-frequency traders'" when "In reality, it was one guy on the floor who decided to put $30 mln of sugar in as a market order" (Rampton, 2011).

The high instances of settlement, particularly in US cases, could also be an indication of "liability washing", i.e. if one makes a financial settlement, "they have paid for their sins". Figure Four provides a comparison of the rates of settlement at each of our four exchanges.

To counter perceptions of weakness, an exchange may be tempted to "go in hard" (see Salience, below). On occasion, the respondent is unable to pay a large fine. Counterintuitively, in these circumstances, the loss of a (relatively) small amount of revenue from the trading venue's perspective could actually be beneficial. As an enforcer of contracts, an exchange has to be careful not to stray into punitive realms, lest issues of natural justice arise. It follows that a couple of instances where "financial ruin" is pleaded can help to create an image that exchange enforcement has "teeth".

[Illustration seven: "we could be put out of business"]

According to Feldman and Hunt increased frequency of action is the best anecdote to a lack of: (a) conviction that rules are manageable or meaningful; or (b) knowledge that they exist. As the graphic below exemplifies, this is a tactic that the exchanges examined in this study appear to deploy. Deliberate or not, the effectiveness of such a strategy is difficult to gauge in the exchange context. The ratio of enforcement actions to detections or escalations of suspicious activity is not publicly available. It is well known that the rate of detection in proportion to total volume is almost impossible to know. However, it is suggested that this approach also risks normalising certain breaches which will be considered under the penultimate element of HUMANS.

A = Acceptable

It has been observed that legitimacy plays a key role in exchange regulation. Yet, opinions on acceptability among distinct types of market participant are difficult to measure from enforcement notices alone. As a consequence, one is forced to use a range of proxies to possible insights.

Example: "No-shows" as a proxy for illegitimacy

A failure to respond to a request: (a) for information during an investigation; or (b) to attend an enforcement hearing are strong indicators that an participant does not believe he or she is subject to the same rules as everyone else. Figure Five shows "no-show" rates since 2007. Two things are immediately apparent: (1) COMEX's enforcement processes appear to have been disrespected the most; and (2) no instances of a failure to appear or respond have been recorded at the two UK exchanges which are the subject of this study. Possible explanations for this include: (i) the global prevalence of CME Globex in comparison to DEA systems offered by the other exchanges (see "Understand", above); (ii) COMEX is more aggressive in pursuing violators than the other exchanges;

(iii) a lack of empowerment or willingness on behalf of the UK exchanges to pursue wrongdoers who are based overseas; (iv) wider cultural differences between US and UK styles of enforcement. It is inferred that the majority of the non-respondents are based outside the jurisdictions in which the relevant exchange is based. Physical attendance may be impractical for such persons (there is no indication in any of the notices regarding whether hearings were conducted in person or remotely, for example, via Microsoft Teams or Google Meet). In the alternative, some errant overseas participants may believe that their status as DEA traders somehow means they are "off grid". Unfamiliar with enforcement processes, they may wrongly assume that if they fail to appear they cannot be held to account or cause embarrassment to their employers.

Example: instances of disrespect shown to exchange staff and environment

It is reasoned that instances of disrespect shown to exchange staff and environment by market participants represents a direct challenge to legitimacy. In this case, the acceptability of the operation of a rule or enforcement regime is called into question. Forms of disrespect typically exhibited include:

- the use of foul and abusive language towards employees or in their presence;
- misrepresentation of facts in response to queries;
- failure to pay a penalty levied for a previous breach;
- breach of cease and desist orders;
- bypassing exchange controls;
- directing others to commit breaches;
- in floor contexts:
    - damage to property;
    - dressing inappropriately;
    - consuming food and beverages in full view of monitoring staff;
    - using a mobile telephone on the floor; and
    - standing in the Ring (LME only).

As opposed to trade practice violations, instances of disrespect should be easier to observe, and by extension, measure. As a generalisation, the enforcement notices involving these types of misconduct tend to be light on detail because, taken in isolation, many of these breaches appear trivial. Taken together though, a series of lower level breaches may be suggestive of an endemic lack of respect.

That an apparent decline in outward exhibitions of disrespect appears to have coincided with the decline of the trading floor as the digital age has progressed is not a surprise. What is surprising is the relatively paucity of cases when floor trading was stronger. This lends support to notions of the self-policing nature of private actors the comprise an exchange community. Acceptance has apparently been consistently strong since 2007, at least among member participants. Also unsurprising, but clearly noticeable, is the drop in instances of disrespect during the COVID-19 pandemic when the LME Ring was temporarily closed. Lastly, there is banal, but noteworthy, implication of the transition from highly charged personal interaction to more remote, "faceless", and in some cases, slower forms of communication between an exchange and its participants. This is that impulsive, situational, type behaviours are possibly being supplanted by more calculative conduct whereby individuals are taking more time to think before acting. It is therefore curious that the LME's enforcement efforts have remained very floor centric since 2007, despite the reductions in volumes and role of the Ring (see Figure Seven below).

Another challenge to the acceptance of exchange rules and enforcement is the rationalisation of misconduct by market participants. There is a risk that certain requirements are viewed as being "sludge", i.e. bureaucratic exercises that lack social utility. Thus, a participant might be tempted to break a rule on the grounds that this would be "victimless", is beneficial to a client and so on. This is contrasted with types of (suspected) manipulation which often provoke strong, emotional, responses among specific sections of a market. A high profile example of this line of thinking emerged in the midst of the CFTC's case against Navinder Singh Sarao who stood accused of engaging in illegal spoofing activities on the CME's markets between 2009-2014 (Vaughan, 2021):

> "Still come traders complain, CME tends to impose small fines for minor infractions while ignoring patterns such as Mr Sarao's cancelled orders, which CME does not have appeared to have referred to the CFTC." (Scannell et al., 2015)

Although taking place on another division of the CME, it is easy to see how this resentment could lead some to rationalise non-compliance on any venue, including COMEX. An example would be a participant testing new or recalibrated algorithms or systems by entering small orders in the "live" market rather than in a "test" environment. The participant may think that, in contrast to Sarao's activities, "no one will get hurt", so they are morally beyond reproach.

[Illustration eight: "Procedural breaches aren't the same as manipulation: it's a symptom of wading through sludge"]

N = Normal

It is possible that enforcement notices could be conveying messages to their target audience that is wider than their intended purpose. These messages may make compliance with a particular exchange rule seem more or less normal to participants.

First, a deluge of causes could communicate "everyone else is doing it, so it's no big deal" and encourage further breaches of a similar nature. This might be exemplified by:

- the high frequency of "bidding out of line with the market" style cases brought by the LME as a proportion of its total case load since 2007 (65/149 cases). These offences are committed by a dealer in the Ring who: (i) bids or offers lower, or more, than the offered price; (ii) does not buy the total lots available; (iii) does not sell to the dealer with priority; or (iv) who makes a fictitious offer away from the prevailing market price. In most instances, the offending dealer receives a small fine (typically £2,500 based on recent actions) and penalty points;
- the appreciable quantity of wash and accommodation style cases at the CME (55/247 cases) and ICE US; and
- the relatively widespread non-compliance with block trading rules at the ICE exchanges (ICE US 50/303 cases; ICE EU 12/102 cases).

Second, a dearth of cases might be taken that no one is getting caught for a particular type of breach, or that it is a breach "no one cares" about. Notable absences from the enforcement repertoires of each of the exchanges studied for this article include:

- the lack of wash trading style cases brought by ICE EU in comparison to the substantial number brought by its sister exchange ICE US (32), even though both exchanges share trading infrastructure and, most likely, participants;
- ditto layering and spoofing (two brought by ICE EU versus 44 by ICE US);

- the complete absence of action by the UK exchanges against non-members relative to the regular action taken by the US exchanges against indirect participants (see Figure Eight). This comes across as an anomaly in the digital age.

Third, decision makers contributing to a breach could calculate that a fine poses no threat to them personally as their company will "pick up the tab." A "parking ticket" is a small price to pay to expedite a tedious process with an uncertain outcome. It is for this reason that the FCA prohibits firms from paying any financial penalties it has levied on their staff:

> "No firm, except a sole trader, may pay a financial penalty imposed by the FCA on a present or former employee, director or partner of the firm or of an affiliated company."(GEN 6.1.4A (2017c))

No provision equivalent to GEN 6.1.4A currently exists in the rulebooks of COMEX, ICE EU, ICE US or the LME.

Fourth, the relatively low proportion of cases brought to volumes (Figures One and Two compared to Figure Four) is liable to being received by calculative actors in such terms as "there's so much data nowadays, they can't examine it all".

Drawing conclusions about attitudes towards normality based on a review of enforcement actions alone is obviously difficult. At any rate, it is asserted that these observations constitute a useful starting point for exchanges to reflect on the subliminal cues that their actions or inactions can trigger.

S = Salient

It can be inferred from the notices studied for this article that the four derivatives exchanges under examination seek to achieve salience in the enforcement activities in numerous ways.

First, it has been said that permanent bans are a private club's version of "capital punishment"(Karmel, 2008). Rarely used by the UK venues studied, it is hereby argued that this is a distinguishing feature of US exchange level enforcement. Figure Nine provides an overview of the number of enforcement cases since 2007 where the trading venues have issued: (a) permanent bans; (b) lengthy suspensions (greater than 3 months in duration); or (c) short suspensions (3 months' duration or shorter).

It is immediately apparent that the permanent ban is an exclusively US phenomena. This enforcement weapon is almost exclusively used in situations where a respondent fails to appear at a hearing, cooperate with investigatory processes, or respect the outcomes of previous actions, for example by paying a fine owed. To date, the vast majority of these have been issued to non-members, see Figure Nine. That being the case, it appears clear that COMEX and ICE US use the permanent ban to make it conspicuous to participants that not engaging with its processes offers no benefits. It is a simple tool: even one who is unfamiliar with the intricacies of an exchange's rules they will be able to grasp what exclusion means: a potential loss, or partial loss of livelihood.

Lengthy bans have similar connotations for market participants, even if they are not "terminal". Exclusion from a market would force a proprietary trader to: (a) seek alternative venues; or (b) expend wealth whilst being "sin binned". Seeking alternative venues may not be straightforward. This stems from a possible need to retrain to understand other products and the rules and customs of other market ecosystems. More troubling for such a trader is the possibility that another,

unrelated venue, or its "gatekeepers" (principally, members of that venue) deny him access until the ban has been served. In the era of big data, exchanges will be aware that their enforcement notices will easily be discoverable by regulators, other markets and sell side firms. Anxious to protect their own reputations, such actors may be reluctant to onboard so called "rolling bad apples" (Zaring, 2019). This serves to reinforce the salience of both permanent and lengthy bans.

On the flip side, it is posited that short term bans, especially when counted in days rather than months, are likely sensed as little more than an irritant by their subjects and other market participants. Very short bans laid down against the employees of exchange members are likely to be "served" by the performance of non-trading related tasks. "Star" traders or brokers may simply "put their feet up" if such tasks are considered "below them" (Miles, 2017). It is hypothesised that may involve periods of socialising, browsing the internet or personal account dealing. It is envisaged that non-members forced to observe temporary bans on one market would simply spend time trading on another, although this could frustrate cross market strategies, for example arbitrages. Where member firms pay quarterly bonuses there is a prospect that a longer short term ban on an employee's participation contributes to a reduction in their variable remuneration.

Another key asset to achieve salience is thematic enforcement. It is observed from the notices reviewed that there have been several clusters of thematic action since 2007. There notable campaigns have included those set out in Figure Ten.

Repetition is central to thematic action. Notably, when clustered together, regular small fines that might go unnoticed under different circumstances achieve a higher degree of prominence. This carries a risk of desensitisation (see, "Normal", above). In like manner, to compound the impact, this tactic might be combined with "shock and awe" fines of the nature discussed in the "Understand" section above.

To finish, disgorgement and restitution are also popular methods of enhancing the notability of enforcement cases at COMEX and ICE US. Disgorgement is where a party must surrender gains made from misconduct. Restitution involves a party compensating the victim for harm resulting from his/her/its misconduct. Specifically, restitution aims to "restore" the victim to the position he/she/it was in before the misconduct occurred. During the material period, COMEX ordered a total of US$ 5,842,474.99 of disgorgement and restitution, with ICE US following close behind at US$ 5,220,974.14. Disgorgement and restitution signal to calculative wrongdoers that there is no point in offending because "you'll pay it all back and then some", i.e. a fine. Be that as it may, the practice has not caught on at ICE EU or the LME, with no instances of these tools being deployed since the beginning of 2007.

Discussion

Returning to the research question, the findings exhibit several attributes of the exchanges' enforcement programmes that increase their effectiveness. To begin with, the detail provided in some notices limits ambiguity (Feldman, 2018). This is also helpful to compliance officers seeking to calibrate monitoring and training programmes. On top of that, this enhances the ability of the exchanges to quickly disseminate messages through harnessing "gossip", especially as anonymity is not granted to those found culpable of misconduct. This feature also helps entity participants identify "rolling bad apples", enabling them to make an informed decision as to whether to offer them employment or a trading account (if a prospective customer).

Taking thematic action to targeting specific offences tends to lead to a lower rate of cases exhibiting offending behaviours, at least in the immediate aftermath of a campaign. This could be testament to the effectiveness of this approach in increasing salience (Hunt, 2023). That said, caution is needed. This could purely be owing to coincidence, or because a venue has decided to commit its resources elsewhere. The fewer instances of "no shows" in response to enforcement action taken by UK exchanges in comparison to those in the US is also "double edged". Viewed optimistically, this could be indicative of a stronger culture of compliance and/or higher inherent respect for authority amongst the participants of the UK venues. More likely is that the US exchanges are making a more concerted effort to reach indirect participants than their UK counterparts, most notably in the case of COMEX.

In certain respects, the picture concerning the effectiveness of the exchanges' enforcement programmes is mixed. The likelihood of detection appears to be higher for certain types of infringement than for others (Feldman, 2018). This is perhaps inevitable but calculative wrongdoers might take cues from what is, and what is not, pursued. A perception that an exchange is only willing to chase less technical breaches, whilst leaving more complex activities unchecked could prove very damaging to the credibility of its enforcement efforts. An example of this would be taking regular action in relation to issues occurring on a trading floor whilst paying less attention to those involving algorithms. Such a perception may also serve to undermine legitimacy, another aspect of exchanges' enforcement operations which, based the pattern of cases brought since 2007, shows signs of being variable (Feldman, 2018).

There are a number of properties of the exchange's enforcement campaigns that seem to be less effective.

First, the exchanges studied have sometimes sought to increase salience and deterrence through the use of sizeable monetary penalties, a strategy that Feldman contends is counterproductive (2018). Plus, the use of complex English in enforcement notices may be undermining the effect of these "shock and awe" cases among the international community that now constitutes the exchanges' constituency. For Feldman, this would probably be an example of a sub-optimal "one size fits all" method of enforcement.

Second, the lack of a consolidated database of exchange enforcement cases makes it harder for practitioners to identify behavioural trends across markets and borders. Correspondingly, not posting notices in a machine readable format in the ChatGPT era limits the ability of enforcement messages to reach new audiences, including, potentially, artificial trading agents themselves.

Third, the seeming reluctance or inability of UK exchanges to take action against indirect participants risks giving this type of user a sense of impunity. For some, this may be viewed as a manifestation of the conflict of interest that dissuades an exchange from disciplining certain types of exchange user, lest they decide to take their business elsewhere (Omarova, 2010) (Bradley, 2000). Whether this has foundation or not, this is liable to frustrating member intermediaries who, despite their best efforts, cannot eliminate all the risks posed by their clients' trading (Culley, 2022). This may be seen as "lazy" enforcement by members. Take, for example, the floor centric nature of LME's enforcement activity. This may create an impression that the LME does not have the means to tackle abuses perpetrated by other actors. There are fewer cases targeting new forms of manipulation in the digital era at the UK exchanges, contrary to Slavov (2001). Due to this fact, speculation about effectiveness of surveillance apparatus is likely to persist (Kellerman, 2021). In the same vein, the low proportion of cases brought to volumes could create an impression that exchanges are powerless to prevent misconduct (even if most participants are well behaved!). In kind, there is evidence that some

participants view some rules as mere "sludge" with limited social utility. All these factors serve to reduce legitimacy / acceptability in the estimation of market participants.

Fourth, the preponderance of small fines and short term bans risks reducing some enforcement activities to the level of "parking tickets" in the minds of would-be offenders (Feldman, 2018). Resultantly, such penalties are unlikely to deter future misconduct and may actually encourage it, building upon Pirrong (1995).

In like manner, the high rate of settlements at the US exchanges studied may foster "conscience washing". It is widely commented that criminal justice systems often struggle to process cases involving alleged white-collar misconduct (for example, (Croall, 2004, Larsson, 2007, Kempa, 2010). On that account, settlement may be regarded as one of the best options available to exchanges. It is quicker and cheaper than a contested hearing. Resources saved through settlement can be promptly allocated elsewhere. For all that, language such as: "Pursuant to an offer of settlement in which [a Person] neither admitted nor denied the Rule violations or factual findings upon which the penalty is based" contributes to ambiguity of the type Feldman (2018) warns could be counterproductive. Allowing a wrongdoer to avoid admitting responsibility for, or being found guilty of, misbehaviour could give rise to self-deception. Merely paying a monetary penalty and "moving on" is unlikely to create a strong impetus for self-reflection and lasting behavioural change. If anything, it could trigger feelings of "victimhood" on behalf of the accused, for example: "I only paid the fine to get those bureaucrats out of my life. I just want to get on with business. There was nothing inherently wrong with what I did. Everyone else is doing it. They just singled me out."

Even with settlements, the pace of exchange enforcement can sometimes be surprisingly slow (Tarbert, 2021). This may diminish salience. Coupled with the relatively high rate of "no-shows" at US exchanges, these facets again raise questions about perceived legitimacy in the remote trading era, contrary to Lee (2000) and Stringham and Chen (2012).

When compared with findings of previous studies, there is limited evidence that the UK exchanges have "outgrown" their regulator. Neither has artificial intelligence entered the enforcement equation yet (Azzutti et al., 2021).

This paper's findings must take account of the study's limitations. At the outset, the exchanges studied are solely based in Anglophone / common law jurisdictions. Exchanges based in civil law jurisdictions or in countries with very different cultural and legal traditions like China may utilise different enforcement strategies with greater or lesser success. A comparison between the potentially contrasting approaches of exchanges based in each tradition would make for an interesting avenue of further research, to the extent that meaningful access to exchange officials and records can be obtained. Irrespective, at the time of writing, eight of the ten highest ranked financial centres are Anglophone or partially Anglophone (2023d).

Even the records published by exchanges based in the West are variable. By nature, no two exchanges are 100% "like for like", even where they are owned by a common beneficial owner as is the case with ICE EU and ICE US. This is to be expected due to the distinct historical evolution of each venue and desire to establish unique selling points. Then again, this creates a number of challenges for a researcher. For instance, annual volume data for some of the years covered by this study is not publicly available. Where it is available, COMEX, the LME and the ICE markets all use different counting conventions, making direct comparisons difficult. The US exchanges also operate consolidated accounts which are less granular than those of their UK counterparts. In similar fashion, it is difficult to count the number of cases occurring in each year precisely. Many are concluded in a year different to that when an offence occurred. Sometimes a conclusion is not reached for several

years. This makes it tricky to make concrete deductions about behavioural trends. Undoubtedly, this is not an ideal situation for parties accused of wrongdoing either. This situation has previously led the CFTC to criticise COMEX (2014c):

> "If problematic behaviour identified in a complaint remains undetected for an extended time and a case is not promptly initiated, case resolution is ultimately delayed, which makes repeated transgressions more likely to occur."

The US CFTC publishes such exchange supervisory reports in the public domain whereas the FCA does not (if it even performs these). In the event, none of the aforementioned limitations represented a major obstacle to this study.

The practical implications arising from this paper's findings have informed the policy recommendations that follow.

First, ~~it is recommended that~~ exchanges could work together to create an international central repository of enforcement actions they have brought. This might~~could probably~~ be achieved by working with a commercially "neutral" organisation like the Futures Industry Association ("FIA"). Such a repository would be an excellent learning tool, especially if the notices were rendered in plain English per the Flesch-Kincaid scale. It is plausible that this would increase the ~~The~~ salience of enforcement notices ~~would be increased~~. A central repository~~This~~ would be invaluable to risk officers conducting horizon scanning of incident trends. It would also reduce friction for compliance and human resource professionals in performing client and staff onboarding checks, i.e. to prevent "rolling bad apples" from re-entering markets. Additionally, if ~~all the~~ enforcement notices in the repository were ~~should be~~ machine readable, ~~so~~ they would be~~are~~ accessible to the large language models ("LLMs") (Fröhlich and Chapin, 2019) that are set to become a vital component of firms' surveillance and trading architecture alike.

Second, this paper recommends that exchanges consider abolishing small fines and bans of extremely short duration ~~be abolished~~. Instead, it is proposed that exchanges move to a penalty points system for minor offences. Operating similar to systems used to penalise driving offences, offenders would face the prospect of substantial fines and lengthier bans for repeated transgressions. This ~~would~~should help eliminate notions of merely collecting and paying off "parking tickets" and focus minds on improving behaviour to avoid penalties that will hurt, both financially and career-wise. Equally, actors would be rewarded with a "clean slate" if they stayed out of trouble for a sustained period, for example after two years without an infringement. The LME does operate a penalty points system for floor related breaches that incorporates these features, although this is combined with the use of small fines (2022e). It is submitted that floor-based violations differ from those engaged in via digital means in that wrongdoers come face-to-face with exchange surveillance staff on a daily basis. This may exert some social pressure to behave properly, but value of this has decreased with the continued decline of the floor, especially after its role was further reduced during the COVID-19 pandemic (Burton, 2021). In accordance, the LME should expand its points system beyond Ring dealing. "Sin bins" could also be introduced for proprietary trading algorithms that repeatedly offend to deny profit making opportunities.

Third, this article suggests that~~calls for~~ settlements are~~to be~~ used cautiously. The US exchanges explored in this study sometimes make use of restorative justice techniques, principally restitution and disgorgement, which help to counteract conscience washing. Naturally, restitution is only really viable where there is an identifiable victim of an actor's misconduct. For example, it has been used where an employee has been caught trading ahead of his employer's orders for the benefit of his personal account (2014b). Such techniques could be complemented by a rule like FCA GEN 6.1.4A to

prohibit entity participants from paying fines levied on their employees for misconduct. Fourth, this paper advocates for the UK exchanges to enact an equivalent of COMEX rule 418 and ICE US rule 4.00 to empower them to take direct action against non-members. REC 2.15.3 currently implores UK exchanges to: "where appropriate, enforce its rules against users (other than its members) of its facilities". Based on the evidence reviewed for this article, this has not had much of an impact at either ICE EU or the LME. This is unlikely to be ~~un~~sustainable in the digital era.

The Disciplinary Section of ICE EU's 2023 Regulations states that the exchange may only take disciplinary action against a "Person Subject to the Regulations". In the trading context, this includes a member, their representatives and staff, a liquidity provider or MiFID II market maker or persons participating in the exchange's liquidity provider or market maker programmes.

Turning to the LME, the costs of pursuing misbehaving end clients aggressively potentially explains the introduction of the LME's compromise 'client of concern' protocol. Effective from 1st March 2021 (2020), this enables the LME to "direct Members to take action in respect of clients in certain circumstances". The protocol allows the LME to: (a) request information about clients' activities from members; and (b) direct members "to cease to trade with a client if necessary, as a tool to prevent market abuse". Staying faithful to the tradition of principal trading, the LME was keen to stress that it "…does not have any direct relationship with clients, and therefore cannot impose sanctions against such clients directly".

In minimising costs to themselves, exchanges ~~such as ICE EU and the LME~~ risk being~~could stand~~ accused of passing them onto members and wider society. Members may feel exchanges have outsourced a large element of their disciplinary and oversight functions to them. Moreover, facing a lack of official sanction, malfeasant end clients could simply move between brokers. Coincidently, this hollows out the experience and expertise of exchanges, limiting their utility as a market steward. This is potentially very significant as, post Brexit, the UK Government has made market led supervision a core tenet of its *Wholesale Markets Review* (2021b). This is where SupTech could play a pivotal role.

Fourth, exchanges could use HUMANS to help them buy, build and fine tune SupTech solutions for more effective enforcement. Classed as a subset of RegTech (Barrière, 2021), SupTech refers to technologies which equip regulators to "conduct supervisory work and oversight more effectively and efficiently" (The Basel Committee on Banking Supervision in Magalhães Batista and Ringe (2020)). Thus far, analyses in the burgeoning literature have largely focused on the potential of SupTech to transform public or national competent authority level supervisory and enforcement operations (Grassi and Lanfranchi, 2022). However, as "private" regulators, exchanges could take a lead role in encouraging their (at times) tech shy public counterparts (Anagnostopoulos, 2018) to switch from analogue to more digital approaches to enforcement. In this regard, exchanges could increase the influence of their enforcement actions on the regulatory reform agenda. Applying the HUMANS framework:

- developing a "unique trader identifier" for use across markets (and borders) could increase the **salience** of enforcement actions. Exchanges and members in a "network" of linked trading venues would use the same identifier for a natural person or algorithm. Each exchange and member in the network would be immediately alerted by SupTech when an exchange in that network had taken enforcement action against a particular identifier. Today, exchanges either use their own identifiers, for example Tag 50 for CME Globex, or draw upon those used in general regulations, for example Commission Delegated Regulation (EU) 2017/580. This fragmentation inhibits cross-market surveillance efforts. Exchanges in network might be competitors and in different legal groups and jurisdictions. Nonetheless,

using an international trader identifier ("ITI") could facilitate the easier and quicker "crowdsourcing" of otherwise disparate enforcement efforts. An ITI could function in a similar manner to the internationally recognised legal entity identifier ("LEI") that currently exists (Wolf, 2022);

- in turn, an ITI could also be used to increase the potency of exchange level sanctions by raising the prospect of cross-market recognition of the outcomes from certain enforcement actions. This way, traders and algorithms found guilty of serious breaches could be barred from trading on any exchange in the network whilst they serve their ban. This would be a serious deterrent to individual market, cross-market and cross-member abuse alike as the prospect of "earning whilst serving" (see the sub-section on "Salience" in the Findings section) would be greatly reduced;
- structuring enforcement notices in a format commonly agreed between the exchanges in the network would be **helpful** to SupTech that is powered by artificial intelligence. Inspiration could be taken from initiatives such as the European Legislative Identifier for this purpose (Bauerfeind and Di Prima, 2019). This could equip exchange supervisors with more powerful trend data, including the ability to spot conduct risks emerging on other markets which have not yet reached their venues;
- such standardisation could also make enforcement notices more accessible to artificial intelligence driven translation tools. As machine learning based language analytical tools improve, it might be possible for exchanges to retain technical English in the original notices. This is because these tools might be able to translate the original notices into the technical language of the target "tongue", for example, Chinese. This way, an enforcer might be able to meet the twin goals of precision and ensuring a notice's messages are **understood** by the broadest possible audience;
- SupTech could help make enforcement processes more **manageable** through the auto calculation and dissemination of penalties, particularly for minor technical infractions (Grassi and Lanfranchi, 2022). This facilitates a more proportionate, risk based approach (Arner et al., 2017) which could free up tight supervisory and enforcement resources for allocation to more complex cases. In addition, this could help to "depersonalise" some enforcement interactions, reducing instances of disrespect and non-cooperation;
- similarly, SupTech could increase the speed at which certain processes are conducted, again making enforcement processes more manageable or avoiding the need for enforcement altogether. For example, artificial intelligence enabled systems could possibly process position transfer requests with such rapidity that the incentives to rationalise the circumvention of the related rules greatly diminish. Into the bargain, this would also help to counter any notions that there is too much data for an exchange to process, and that, consequently, avoiding scrutiny is somehow "**normal**";
- SupTech could bolster the **salience** of enforcement initiatives by making them a permanent, or "rolling" feature of exchange trading. Today, thematic action is taken to counter the perceived "big ticket" threats of the day. These risk "fizzling out" as panic subsides or other issues emerge which demand the re-allocation of resources. In contrast to human supervision, SupTech has a greater potential for "multi-tasking" 24 hours a day, all year round; and
- taken together, these advantages of SupTech could help to counteract the negative impacts associated with the diminution of exchange members as "gatekeepers". With time, supervision and enforcement should become more pervasive features of technical market structure. As businesses and platforms fragment and new social and technological practices

emerge (Walker, 2021), some argue that deeply embedded SupTech will be essential to meet the challenges posed by this paradigm shift (Arner et al., 2017).

Conclusion

Since 2000 humans have gradually diminished as the public "face" of exchange trading as floors have closed in favour of digital centric means of price discovery. Aggregation, matching and trading algorithms power interactions on a modern trading venue. Yet, human behaviour continues to shape conduct of trading "behind the scenes". Humans design and calibrate algorithms, decide who to permission for DEA and manually place orders using remote trading applications. In recognition of this fact, this paper has attempted to shift the examination of exchange enforcement from a purely legal to a behavioural lens using HUMANS and insights from Feldman. Employing this approach, this paper concludes that the effectiveness of enforcement efforts at the four derivatives exchanges studied to be a mixed picture.

From one perspective, the exchanges have recognised that their constituencies have shifted in the era of electronic trading. This has seen COMEX and ICE US extend their jurisdictions over the trading of non-member participants; the LME place more attention on their members' supervision of DEA activities; and thematic enforcement operations targeting specific clusters of misconduct, thereby signalling an increased likelihood of detection. From alternative perspective, the jurisdiction of ICE EU's and LME's rulebooks have been sluggish to react to the new realities of non-member participant directed trading, possibility creating a sense of immunity amongst this constituency. Enforcement notices written in complex English and posted in fragmented, in the case of the LME member only, locations may inadvertently be contributing to ignorance. This is suboptimal in an era where concerns about cross-market manipulation are rife and many indirect participants will not have a native level command of English. The continued use of small fines, short term bans and settlements that allow the accused to continue denying wrongdoing are probably counterproductive. Possibly fuelling contempt for the potency of exchanges' enforcement mechanisms, their effect is further undermined by the lack of a prohibition on firms paying fines imposed on their employees. To the extent that exchange participation is still considered valuable, it is possible that only the prospect of permanent or extended exclusion is appropriate for the most egregious offences. To date, UK venues have appeared reluctant to emulate their US counterparts in this respect. This is another significant anomaly in the era of the globalised marketplace. The prospect of recovering fines from abusive actors based in third countries may be very remote indeed. Even as we move from the digital to artificial intelligence era, exchange enforcement still requires a human touch to be effective.

References

2000. LME imposes Pounds 1m fine on Wolff. *The Times*, 12th May 2000.
2008. CME purchase of NYMEX, COMEX official. *World Refining & Fuels Today*.
2010. Rule enforcement review of ICE Futures U.S. . Commodity Futures Trading Commission.
2012a. Annual report and financial statements. Companies House: London Metal Exchange.
2012b. Rule enforcement review of ICE Futures U.S.: Commodity Futures Trading Commission
2013a. ICE Futures U.S. disciplinary notices. ICE Futrues U.S. .
2013b. REC 2.15.3 FCA Handbook: Financial Conduct Authority.
2014a. *Guidance: ICE Futures Europe block trades* [Online]. ICE Futures Europe. Available: https://www.ice.com/publicdocs/circulars/14152_attach.pdf [Accessed 26th August 2023].
2014b. Notice of disciplinary action: settlement of charges against Stephen A. Poloka JR. Case Number 2012-055 ed.: ICE Futures U.S.
2014c. Trade practice rule enforcement review: The New York Mercantile Exchange and The Commodity Exchange. Commodity Futures Trading Commission.
2015. *CME permanently bans three traders for spoofing, other violations* [Online]. Reuters. Available: https://www.reuters.com/article/us-cme-trading-bans-idUSKCN0S625K20151012 [Accessed 13th August 2023].
2016a. *CME to close New York options pits, shutting down trading floor* [Online]. Nasdaq. Available: https://www.nasdaq.com/articles/cme-close-new-york-options-pits-shutting-down-trading-floor-2016-04-13 [Accessed 25th June 2023].
2016b. *STSM123030 -Financial markets: Recognised Overseas Investment Exchanges* [Online]. HM Revenue and Customs. Available: https://www.gov.uk/hmrc-internal-manuals/stamp-taxes-shares-manual/stsm123030#:~:text=Recognised%20Overseas%20Investment%20Exchanges&text=Being%20a%20ROIE%20facilitates%20the,investment%20exchanges)%20have%20been%20met. [Accessed 12th August 2023].
2017a. Commission Delegated Regulation (EU) 2017/580 of 24 June 2016 supplementing Regulation (EU) No 600/2014 of the European Parliament and of the Council with regard to regulatory technical standards for the maintenance of relevant data relating to orders in financial instruments. European Union.
2017b. Disciplinary program: rule enforcement review of CBOT, CME, COMEX and NYMEX. Commodity Futures Trading Commission.

2017c. *GEN 6.1.4A: Payment of a penalty imposed on an employee* [Online]. Financial Conduct Authority. Available: https://www.handbook.fca.org.uk/handbook/GEN/6/1.html#:~:text=No%20firm%2C%20except%20a%20sole,or%20of%20an%20affiliated%20company. [Accessed 13th August 2023].

2017d. *MiFID II / MiFIR post-trade reporting requirements* [Online]. Association for Financial Markets in Europe. Available: https://www.afme.eu/portals/0/globalassets/downloads/publications/afme-mifidii-mifir-post-trade-reporting-requirements.pdf [Accessed 26th August 2023].

2018. *Measures and sanctions by BaFin's Securities Supervision Directorate* [Online]. Federal Financial Supervisory Authority. Available: https://www.bafin.de/EN/Aufsicht/BoersenMaerkte/Massnahmen/massnahmen_sanktionen_node.html [Accessed 12th August 2023].

2019a. Advisory on duty to supervise - amendment to Rule 4.01. ICE Futures U.S. .

2019b. ICE Futures Europe position transfers policy. ICE Futures Europe.

2019c. The world's leading electronic platform. CME Globex.: Chicago Mercantile Exchange.

2020. Decision notice: pre-trade transparency and miscellaneous amendments to the LME Rulebook. London Metal Exchange.

2021a. *Javier Blas and Jack Farchy, Chief Energy Correspondent and Senior Reporter Energy and Commodities, Bloomberg News* [Online]. Smarter Markets. Available: https://abaxx-stage.smartermarkets.media/javier-blas-and-jack-farchy-co-authors-of-the-world-for-sale/#:~:text=Javier%20Blas%20and%20Jack%20Farchy%20are%20two%20of%20the%20world's,energy%2C%20commodities%20and%20trading%20houses. [Accessed 30th July 2023].

2021b. Wholesale markets review: consultation. HM Treasury.

2022a. Annual report and financial statements. Companies House: London Metal Exchange.

2022b. EF English Proficiency Index: a ranking of 112 countries and regions by English skills Education First.

2022c. *Joint statement from UK Financial Regulation Authorities on London Metal Exchange and LME Clear* [Online]. Financial Conduct Authority. Available: https://www.fca.org.uk/news/statements/uk-financial-regulation-authorities-london-metal-exchange-lme-clear [Accessed 30th July 2023].

2022d. LME group position transfer procedure. London Metal Exchange.

2022e. Rules and regulations. London Metal Exchange.

2022f. *Violation Tracker: good jobs first* [Online]. Available: https://violationtracker.goodjobsfirst.org/ [Accessed 7th May 2023 2023].

2023a. Appendix to DP1/23 Review of the Senior Managers and Certification Regime (SM&CR). Bank of England.

2023b. Disciplinary action: Sucden Financial Limited. 23/071 ed.

2023c. *Latest from the LME* [Online]. London Metal Exchange. Available: https://www.lme.com/News?page=1 [Accessed 7th May 2023 2023].

2023d. *Leading financial centers globally as of March 2023* [Online]. Statista. Available: https://www.statista.com/statistics/270228/top-financial-centers-on-the-global-financial-centres-index/ [Accessed 14th August 2023].

2023e. *Lexis Nexis* [Online]. London Metal Exchange. Available: https://www.lme.com/en/about/Regulation/Rules/Lexis-Nexis [Accessed 7th May 2023 2023].

2023f. *MiFIR Large in Scale ('LIS') thresholds for block trades per June 2023* [Online]. ICE Futures Europe. Available: https://www.ice.com/publicdocs/endex/LIS_Threshold.pdf [Accessed 26th August 2023].

Undated-a. *Annual reports on Form 10-K* [Online]. CME Group. Available: https://www.cmegroup.com/investor-relations/annual-report-10-k.html [Accessed 24th August 2023].

Undated-b. *Annual volumes* [Online]. London Metal Exchange. Available: https://www.lme.com/en/market-data/reports-and-data/volumes/annual-volumes#:~:text=There%20were%20253%20trading%20days,for%202022%20was%20down%207.6%25. [Accessed 24th August 2023].
Undated-c. *Behaviour cluster analysis* [Online]. Financial Markets Standards Board. Available: https://bca.fmsb.com/ [Accessed 7th May 2023 2023].
Undated-d. *Behavioural cluster analysis* [Online]. Financial Markets Standards Board. Available: https://bca.fmsb.com/ [Accessed 12th August 2023].
Undated-e. *Circulars* [Online]. ICE Futures Europe. Available: https://www.ice.com/futures-europe/circulars [Accessed 13th August 2023].
Undated-f. *Historical monthly volumes - Europe* [Online]. Report Center: ICE Futures Europe. Available: https://www.ice.com/report/7 [Accessed 24th August 2023].
Undated-g. *Historical monthly volumes - US* [Online]. Report Center: ICE Futures U.S. Available: https://www.ice.com/marketdata/reports/8 [Accessed 24th August 2023].
Undated-h. *Key compliance notices* [Online]. London Metal Exchange. Available: https://www.lme.com/en/about/regulation/rules/key-compliance-notices [Accessed 13th August 2023].
Undated-i. *Machine readable* [Online]. Available: https://opendatahandbook.org/glossary/en/terms/machine-readable/ [Accessed 12th August 2023].
Undated-j. *Notices* [Online]. CME Group. Available: https://www.cmegroup.com/notices.html#filters=Business-Conduct-Committee&fromDate=2022-08-13&toDate=2023-08-20 [Accessed 13th August 2023].
Undated-k. *Readability test* [Online]. Web FX. Available: https://www.webfx.com/tools/read-able/ [Accessed 8th May 2023].
Undated-l. *Recognised Investment Exchanges* [Online]. Financial Conduct Authority. Available: https://register.fca.org.uk/s/search?predefined=RIE [Accessed 13th August 2023].
Undated-m. *Recognised Overseas Investment Exchanges* [Online]. Available: https://register.fca.org.uk/s/search?predefined=ROIE [Accessed 12th August 2023].
AITKEN, M., CUMMING, D. & ZHAN, F. 2015. Exchange trading rules, surveillance and suspected insider trading. *Journal of Corporate Finance,* 34(C)**,** 311-330.
ANAGNOSTOPOULOS, I. 2018. Fintech and regtech: Impact on regulators and banks. *Journal of Economics and Business,* 100**,** 7-25.
ARNER, D. W., BARBERIS, J. & BUCKLEY, R. P. 2017. FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business,* 37(3)**,** 371-413.
AZZUTTI, A. 2022. AI trading and the limits of EU law enforcement in deterring market manipulation. *Computer Law & Security Review,* 45(1)**,** 105690.
AZZUTTI, A., RINGE, W.-G. & STIEHL, H. S. 2021. Machine learning, market manipulation and collusion on capital markets: why the "black box" matters. *University of Pennsylvania Journal of International Law,* 43(1)**,** 79-138.
BARRIÈRE, F. 2021. Financial law in the era of artificial intelligence: key topics and themes. *Law and Financial Markets Review,* 15(3-4)**,** 312-322.
BAUERFEIND, T. & DI PRIMA, P. 2019. Banking supervision at a crossroads - RegTech as the regulators' toolbox. *The RegTech Book.* John Wiley & Sons, Ltd : United Kingdom.
BLACK, B. 2013. Punishing bad brokers: self-regulation and FINRA sanctions. *Brooklyn Journal of Corporate, Financial & Commercial Law,* 8(1)**,** 23-55.
BLAS, J. & FARCHY, J. 2021. *The World for Sale*, Penguin Random House.
BORCH, C. & LANGE, A. C. 2017. High-frequency trader subjectivity: emotional attachment and discipline in an era of algorithms. *Socio-Economic Review,* 15(2)**,** 283-306.
BOYD, N. E., HARRIS, J. H. & LI, B. 2018. An update on speculation and financialization in commodity markets. *Journal of Commodity Markets,* 10**,** 91-104.

BRADLEY, C. 2000. Demutualization of financial exchanges: business as usual. *Northwestern Journal of International Law & Business,* 21(3)**,** 657-702.

BROGAARD, J., RINGGENBERG, M. C. & ROESCH, D. 2023. Does floor trading matter? *Journal of Finance, Forthcoming*.

BROWN, L. C. 2013. Rise of intercontinental exchange and implications of its merger with NYSE Euronext. *Journal of Law and Commerce,* 32(1)**,** 109-134.

BURTON, M. 2021. *LME floor trade volume plunged 85% on reopening day* [Online]. Mining.com: Bloomberg News. Available: https://www.mining.com/web/lme-floor-trade-volume-plunged-85-on-reopening-day/ [Accessed 6th August 2023].

BUSCH, D. 2016. MiFID II: regulating high frequency trading, other forms of algorithmic trading and direct electronic market access. *Law & Financial Markets Review,* 10(2)**,** 72-82.

CARSON, J. 2011. Self-regulation in securities markets. Washington, D.C.: The World Bank.

CARTER, C. A. & POWER, G. J. 2018. Introduction to the special issue on the financialization of commodities. *Journal of Commodity Markets,* 10(C)**,** 1-2.

CLAUSEN, N. J. & SØRENSEN, K. E. 2012. Reforming the regulation of trading venues in the EU under the proposed MiFID II – levelling the playing field and overcoming market fragmentation? *European Company and Financial Law Review,* 9(3)**,** 275-306.

COFFEE JR, J. C. 2021. Crime and the corporation: making the punishment fit the corporation. *J. Corp. L.,* 47**,** 963.

CROALL, H. 2004. Combating financial crime: regulatory versus crime control approaches. *Journal of Financial Crime,* 11(1)**,** 45-55.

CULLEY, A. C. 2022. Does the deployment of algorithms combined with direct electronic access increase conduct risk? Evidence from the LME. *Journal of Financial Regulation and Compliance,* 31(2)**,** 220-236.

CULLEY, A. C. 2023. Insights into UK investment firms' efforts to comply with MiFID II RTS 6 that governs the conduct of algorithmic trading. *Journal of Financial Regulation and Compliance,* 31(5)**,** 607-629.

CUMMING, D., DANNHAUSER, R. & JOHAN, S. 2015. Financial market misconduct and agency conflicts: a synthesis and future directions. *Journal of Corporate Finance,* 34(C)**,** 150-168.

CUMMING, D., GROH, A. P. & JOHAN, S. 2018. Same rules, different enforcement: market abuse in Europe. *Journal of International Financial Markets, Institutions and Money,* 54(C)**,** 130-151.

CUMMING, D. & JOHAN, S. 2008. Global market surveillance. *American Law and Economics Review,* 10(2)**,** 454-506.

DE MEIJER, C. R. W. 2009. The new trading environment post-MiFID: one year later. *Journal of Securities Operations & Custody,* 2(1)**,** 7-23.

DEMARZO, P. M., FISHMAN, M. J. & HAGERTY, K. M. 2001. Contracting and enforcement with a self-regulatory organization. *Available at SSRN 297302*.

DIAZ, D. & THEODOULIDIS, B. 2012. Cross-border challenges in financial markets monitoring and surveillance. *Available at SSRN 2187598*.

EARL, N. 2023. LME compliance chief called FCA nickel queries 'ridiculous'. *Cityam.com*, 22nd June 2023.

EISENBERG, P. 2017. Financial crime–is there any way out of the theoretical deadlock? *Journal of Financial Crime,* 24(4)**,** 529-540.

ENGLER, H. 2018. Global regulators: limits on what they can do. *Remaking Culture on Wall Street: A Behavioral Science Approach for Building Trust from the Bottom Up***,** 47-58.

FARCHY, J. 2022. *LME faces U.K. regulatory review over nickel market turmoil* [Online]. Bloomberg. Available: https://www.bloomberg.com/news/articles/2022-04-04/u-k-to-review-lme-operations-after-nickel-market-turmoil [Accessed 30th July 2023].

FELDMAN, Y. 2018. The law of good people : challenging states' ability to regulate human behavior. Cambridge, United Kingdom: Cambridge University Press.

FRANCIS, A. & RYDER, N. 2019. Preventing and intervening in white collar crimes: the role of regulatory agencies. *The Handbook of White-Collar Crime***,** 262-278.

FRÖHLICH, M. & CHAPIN, D. 2019. Enabling RegTech up front: Unambiguous machine-readable regulation. *The RegTech Book.* John Wiley & Sons, Ltd : United Kingdom.
GADINIS, S. & JACKSON, H. E. 2007. Markets as regulators: a survey. *Southern California Law Review,* 80(6)**,** 1239-1382.
GILBERT, C. L. 1997. *Manipulation of metals futures: lessons from Sumitomo*, Centre for Economic Policy Research.
GORHAM, M. & SINGH, N. 2009. *Electronic exchanges: the global transformation from pits to bits*, Elsevier.
GOTTSCHALK, P. & GLASØ, L. 2013. Corporate crime does pay! The relationship between financial crime and imprisonment in white-collar crime. *International Letters of Social and Humanistic Sciences,* 5**,** 63-78.
GRASSI, L. & LANFRANCHI, D. 2022. RegTech in public and private sectors: the nexus between data, technology and regulation. *Journal of Industrial and Business Economics : Economia e Politica Industriale,* 49(3)**,** 441-479.
GULLY-HART, P. 2005. The risk of being sued by those damaged by regulatory or enforcement action: over-regulation of financial services? *Journal of Financial Crime,* 12(3)**,** 246-250.
GUNNINGHAM, N. 1991. Private ordering, self-regulation and futures markets: a comparative study of informal social control. *Law & Policy,* 13(4)**,** 297-326.
HARDOUIN, P. 2017. Too big to fail, too big to jail: restoring liability a lesson from HSBC case. *Journal of Financial Crime,* 24(4)**,** 513-519.
HELLEINER, E., PAGLIARI, S. & SPAGNA, I. 2018. *Governing the world's biggest market: the politics of derivatives regulation after the 2008 crisis*, Oxford University Press.
HELM, S. 2023. MiFID II and the regulation of multilateral trading in OTC Derivatives: is the OTF fit for purpose? *Journal of Financial Regulation,* 9(1)**,** 72-99.
HUNT, C. 2023. Humanizing rules bringing behavioural science to ethics and compliance. Newark: John Wiley & Sons, Incorporated.
JONES, A. 2022. *The nickel short squeeze: what happened?* [Online]. International Banker. Available: https://internationalbanker.com/brokerage/the-nickel-short-squeeze-what-happened/ [Accessed 30th July 2023].
JORDANOSKA, A. 2021. Regulatory enforcement against organizational insiders: Interactions in the pursuit of individual accountability. *Regulation & Governance,* 15(2)**,** 298-316.
KARMEL, R. S. 2008. Should securities industry self-regulatory organizations be considered government agencies. *Stan. JL Bus. & Fin.,* 14(1)**,** 151-197.
KEAVENY, J. 2004. In defense of market self-regulation-an analysis of the history of futures regulation and the trend toward demutualization. *Brooklyn Law Review,* 70(4)**,** 1419.
KELLERMAN, M. 2021. Market structure and disempowering regulatory intermediaries: Insights from US trade surveillance. *Regulation & Governance,* 15(4)**,** 1350-1369.
KEMPA, M. 2010. Combating white-collar crime in Canada: serving victim needs and market integrity. *Journal of Financial Crime,* 17(2)**,** 251-264.
KOZINN, B. E. 2000. The great copper caper: Is market manipulation really a problem in the wake of the Sumitomo debacle? *Fordham Law Review,* 69(1)**,** 243-285.
LABROSSE, J. R. 2008. Time to fix the plumbing: Improving the UK framework following the collapse of Northern Rock. *Journal of Banking Regulation,* 9(4)**,** 293-301.
LARSSON, P. 2007. Soft and hard strategies of regulating economic crime. *Journal of Financial Crime,* 14(2)**,** 208-220.
LEE, R. 2000. Governance: law and regulation. *In:* LEE, R. (ed.) *What is an exchange? Automation, management, and regulation of financial markets.* Oxford University Press.
LEISING, M. 2013. *CME orders trader to pay $2.1 million in trade-manipulation case* [Online]. Bloomberg. Available: https://www.bloomberg.com/news/articles/2013-07-22/cme-orders-trader-to-pay-2-1-million-in-trade-manipulation-case#xj4y7vzkg [Accessed 9th July 2023].

LORD, N. & VAN WINGERDE, K. 2019. Preventing and intervening in white-collar crimes: the role of law enforcement. *The Handbook of White-Collar Crime*, 246-261.
MACEY, J. & NOVOGROD, C. 2011. Enforcing self-regulatory organization's penalties and the nature of self-regulation. *Hofstra Law Review,* 40(4), 963-1003.
MACKENZIE, D. 2021. *Trading at the speed of light: how ultrafast algorithms are transforming financial markets*, Princeton University Press.
MAGALHÃES BATISTA, P. & RINGE, W.-G. 2020. Dynamism in financial market regulation harnessing regulatory and supervisory technologies. [Hamburg]: Universität Hamburg, Fakultät für Rechtswissenschaft.
MAHONEY, P. G. 1997. The exchange as regulator. *Virginia Law Review,* 83(7), 1453-1500.
MARK, G. 2019. Spoofing and layering. *Journal of Corporation Law,* 45, 399-469.
MARKHAM, J. W. & HARTY, D. J. 2008. For whom the bell tolls: the demise of exchange trading floors and the growth of ECNs. *The Journal of Corporation Law,* 33(4), 865-939.
MCNULTY, L. 2012. The East fights back. *International Financial Law Review,* 31(10), 26-28.
MILES, R. 2017. *Conduct risk management* London, Kogan Page Limited
O'CONNOR, G. T., NIKKI. 1999. Merrill Lynch fined over copper scandal. *Financial Times*, 1st July 1999.
OLSON, E. S. 2010. *Zero-sum game: the rise of the world's largest derivatives exchange*, John Wiley & Sons.
OMAROVA, S. T. 2010. Rethinking the future of self-regulation in the financial industry. *Brooklyn. Journal of International Law,* 35(3), 665-706.
PETRY, J. 2021. From national marketplaces to global providers of financial infrastructures: exchanges, infrastructures and structural power in global finance. *New Political Economy,* 26(4), 574-597.
PIRRONG, S. C. 1995. The self-regulation of commodity exchanges: the case of market manipulation. *Journal of Law and Economics,* 38(1), 141-206.
POLANSEK, T. 2016. *Rule breakers face bigger possible fines from CME Group* [Online]. Reuters. Available: https://www.reuters.com/article/us-cme-group-crime-fines-idUSKBN13Q5ZB [Accessed 13th August 2023].
POSNICK, S. D. 2015. A merry-go-round of metal and manipulation: toward a new framework for commodity exchange self-regulation. *Minnesota Law Review,* 100(1), 441-480.
RAMPTON, R. 2011. *ICE says algo traders get bad rap in softs markets* [Online]. Available: https://www.reuters.com/article/us-futures-softs-idUSTRE72F8RV20110316 [Accessed 30th July 2023].
REIFFEN, D. & ROBE, M. 2011. Demutualization and customer protection at self-regulatory financial exchanges. *Journal of Futures Markets,* 31(2), 126-164.
SCANNELL, K., BULLOCK, N. & MEYER, G. 2015. CME faces scrutiny over warning signs on 'flash crash trader'. *Financial Times*, 23rd April 2015.
SEDDON, J. 2020. Merchants against the bankers: the financialization of a commodity market. *Review of International Political Economy,* 27(3), 525-555.
SLAVOV, S. T. 2001. Manipulation, monopoly, and the Chicago Board of Trade's transition from self-regulation to government regulation. *Journal of Law and Economics,* 37, 329-336.
SOLTES, E. 2019. The frequency of corporate misconduct: Public enforcement versus private reality. *Journal of Financial Crime,* 26(4), 923-937.
STRINGHAM, E. 2016. The past and future of exchanges as regulators. *In:* PEIRCE, H. & KLUTSEY, B. (eds.) *Reframing financial regulation: enhancing stability and protecting consumers.* Arlington, Virginia: Mercatus Center at George Mason University.
STRINGHAM, E. & CHEN, I. 2012. The alternative of private regulation: the London Stock Exchange's Alternative Investment Market as a model. *Economic Affairs,* 32(3), 37-43.
STRINGHAM, E. P. 2002. The emergence of the London stock exchange as a self-policing club. *Journal of Private Enterprise,* 17(2), 1-19.

TARBERT, H. P. 2021. Self-regulation in the derivatives markets: stability through collaboration. *Northwestern Journal of International Law & Business,* 41(2)**,** 175(212).
VAUGHAN, L. 2021. *Flash Crash*, Leya.
WALKER, G. A. 2021. Regulatory technology (regtech) - construction of a new regulatory policy and model. *International Lawyer* [Online], 54.
WIGGLESWORTH, R. & STAFFORD, P. 2021. *Market veterans mourn slow death of historic trading pits* [Online]. Financial Times. Available: https://www.ft.com/content/2e401cd8-12b3-4832-8036-3db5fe4a3ee3 [Accessed 25th June 2023].
WILLIAMS, N. 2012. *Modern trading killing off "barrow boy" market slang* [Online]. Reuters. Available: https://www.reuters.com/article/us-markets-slang-forex-idINTRE80C0LH20120116 [Accessed 8th May 2023].
WOLF, S. 2022. How the Legal Entity Identifier supports the digitisation of business transactions. *Journal of Payments Strategy & Systems,* 16(2)**,** 148-159.
YADAV, Y. 2016. The failure of liability in modern markets. *Virginia Law Review,* 102(4)**,** 1031-1100.
ZALOOM, C. 2006. *Out of the pits*, University of Chicago Press.
ZARING, D. 2019. Regulating banking ethics: a toolkit. *Seattle University Law Review,* 43(2)**,** 555-577.

Figure One: ICE EU (Undated-g) and ICE US (Undated-h) total annual volume in contracts traded

	ICE EU	ICE US
2007	138,471,006	53,616,158
2008	152,950,133	80,954,837
2009	165,725,488	93,025,024
2010	217,192,000	107,297,161
2011	268,994,000	107,287,467
2012	295,824,000	182,680,647
2013	315,711,000	423,639,713
2014	391,135,000	358,123,407
2015	896,311,000	365,433,350
2016	966,239,000	370,166,155
2017	1,158,498,000	354,504,852
2018	1,295,448,000	339,098,657
2019	1,105,057,000	324,806,936
2020	1,110,075,000	365,537,704
2021	1,147,573,000	329,120,972
2022	1,081,870,000	390,489,984

Figure Two: COMEX (Undated-a) and LME (Undated-b) average daily volume

	COMEX	LME
2007	Unknown	Unknown
2008	Unknown	Unknown
2009	Unknown	Unknown
2010	316,000	Unknown
2011	387,000	Unknown
2012	352,000	Unknown
2013	386,000	Unknown
2014	337,000	Unknown
2015	344,000	Unknown
2016	460,000	618,627
2017	460,000	624,480
2018	639,000	730,498
2019	668,000	696,567
2020	699,000	Unknown
2021	488,000	573,271
2022	521,000	534,478

Figure Three: Annual revenue generated from enforcement activities since 2007 (USD)

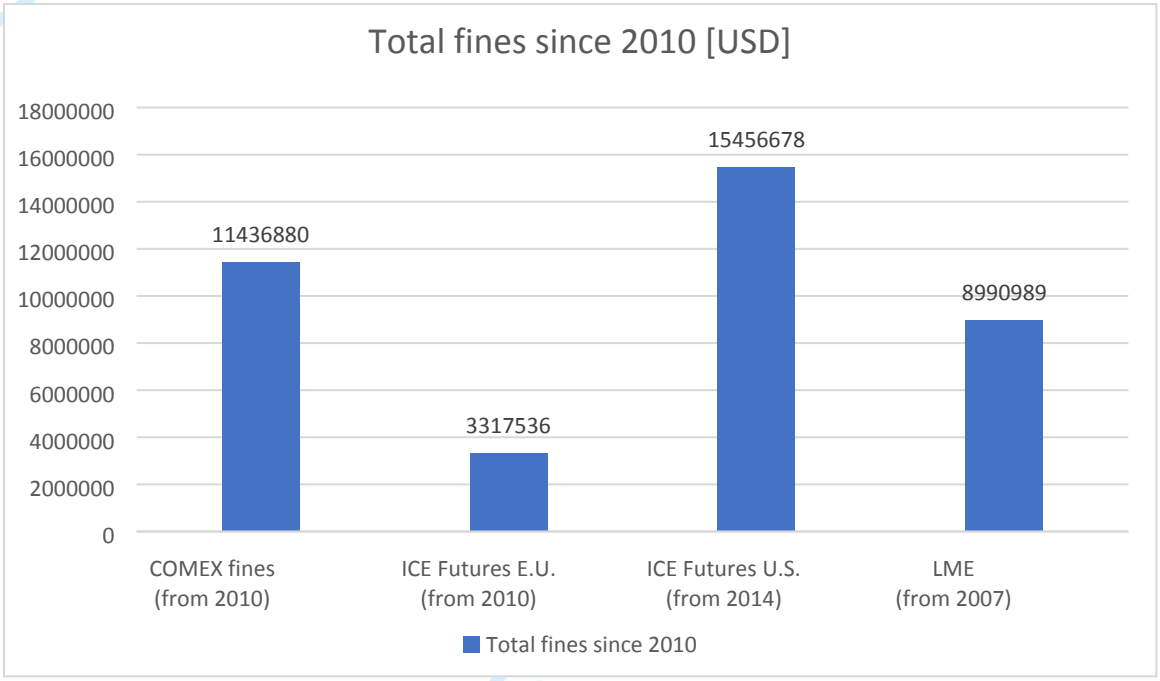

Figure Four: "If I settle my conscience is clear"

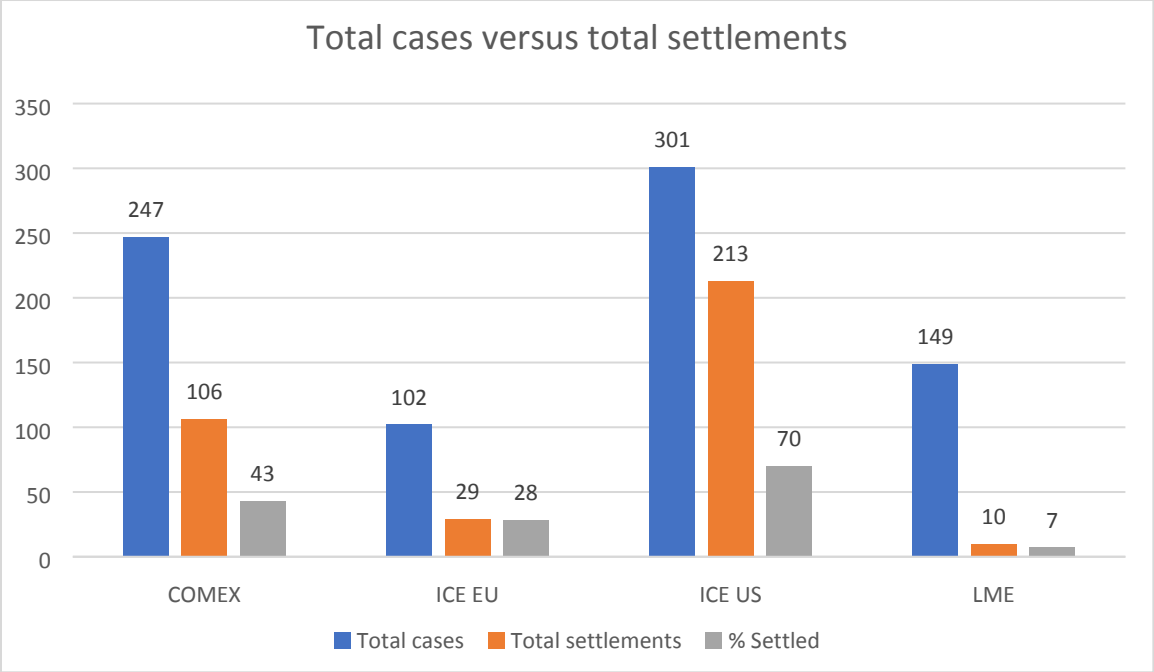

Figure Five: Instances of failure to appear by respondents to enforcement actions per exchange since 2007

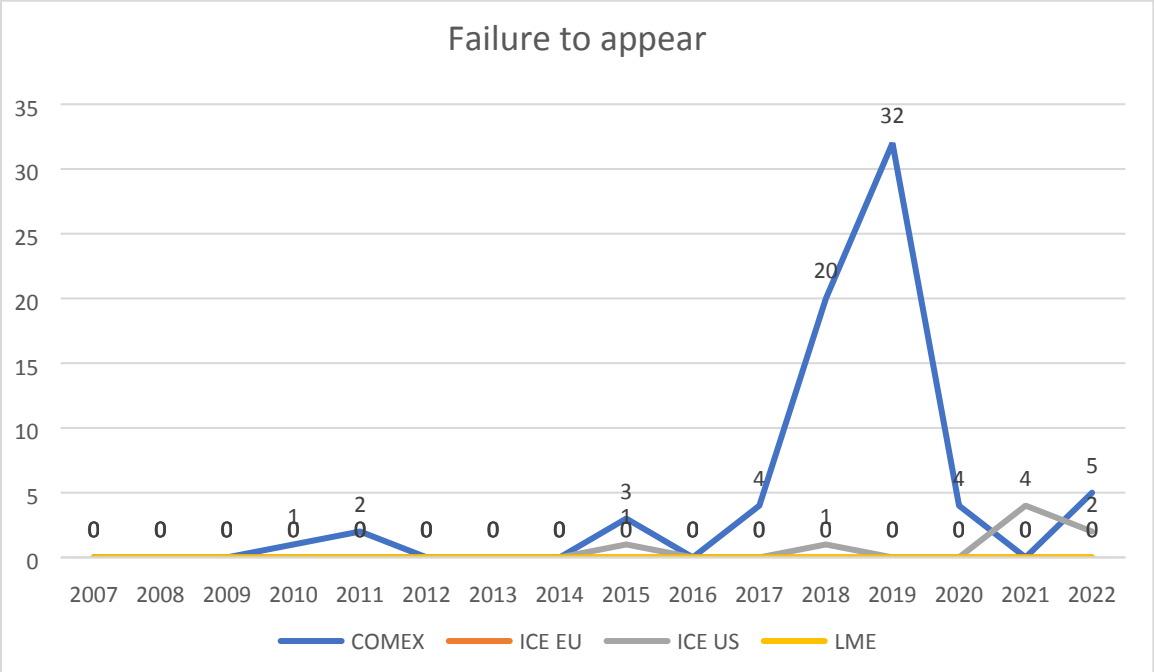

Figure Six: Instances of disrespect towards exchange staff and environment since 2007

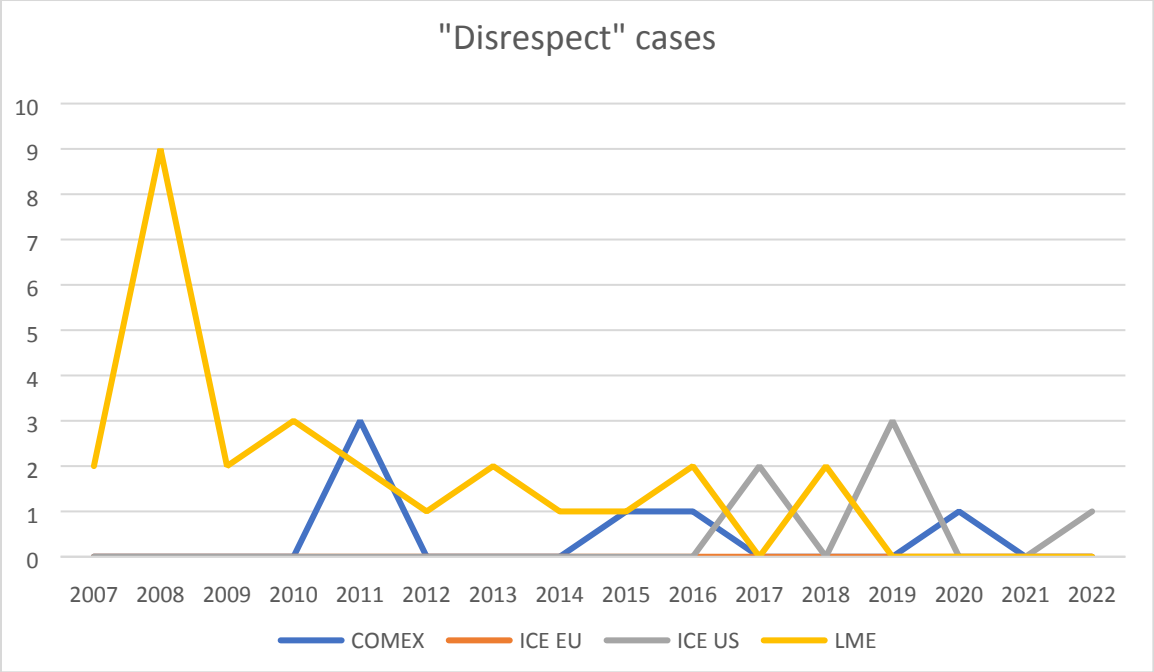

Figure Seven: Balance of floor versus non-floor related enforcement actions brought by the LME since 2007

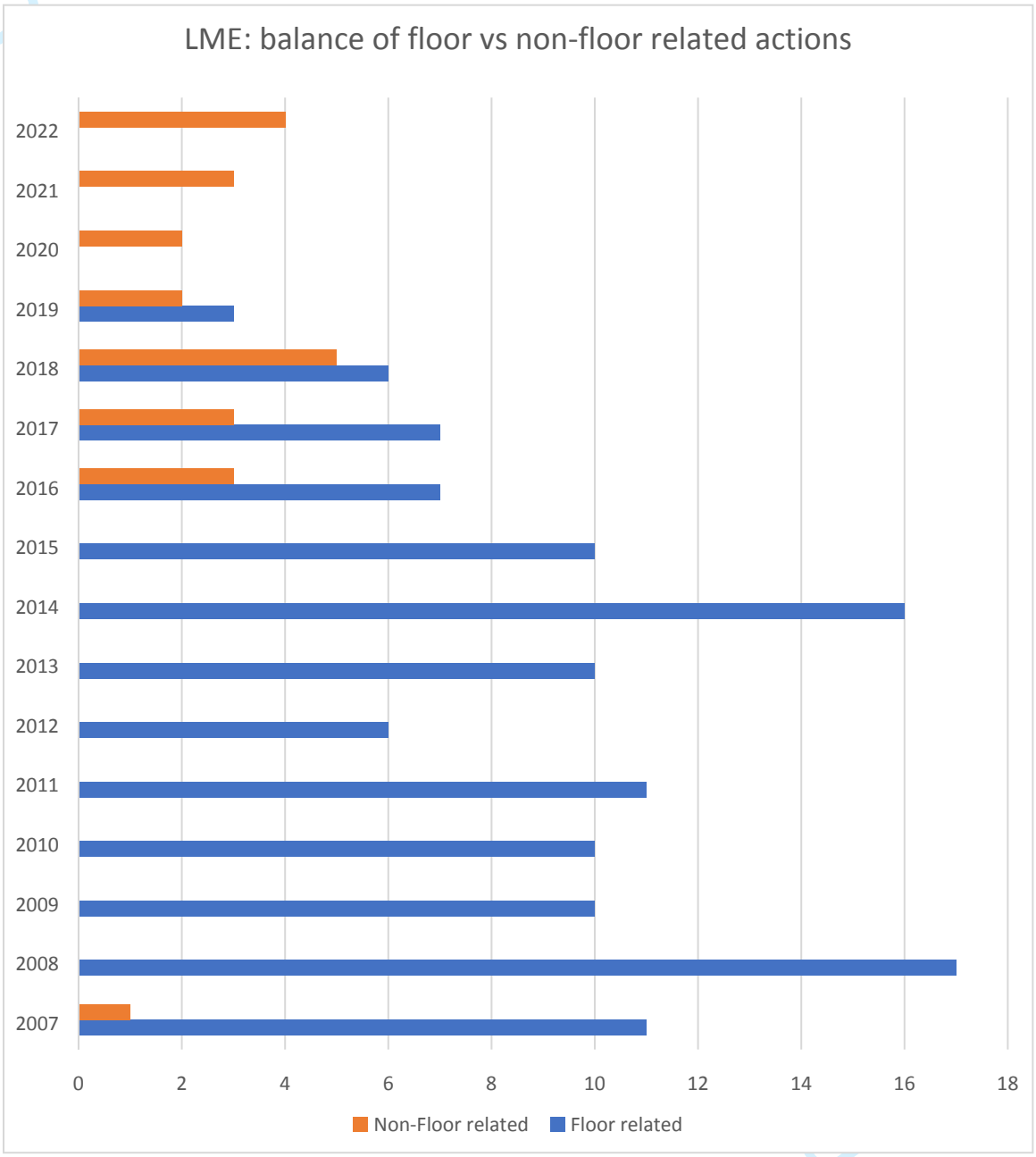

Figure Eight: Breakdown of cases between member and non-member participants at COMEX and ICE US

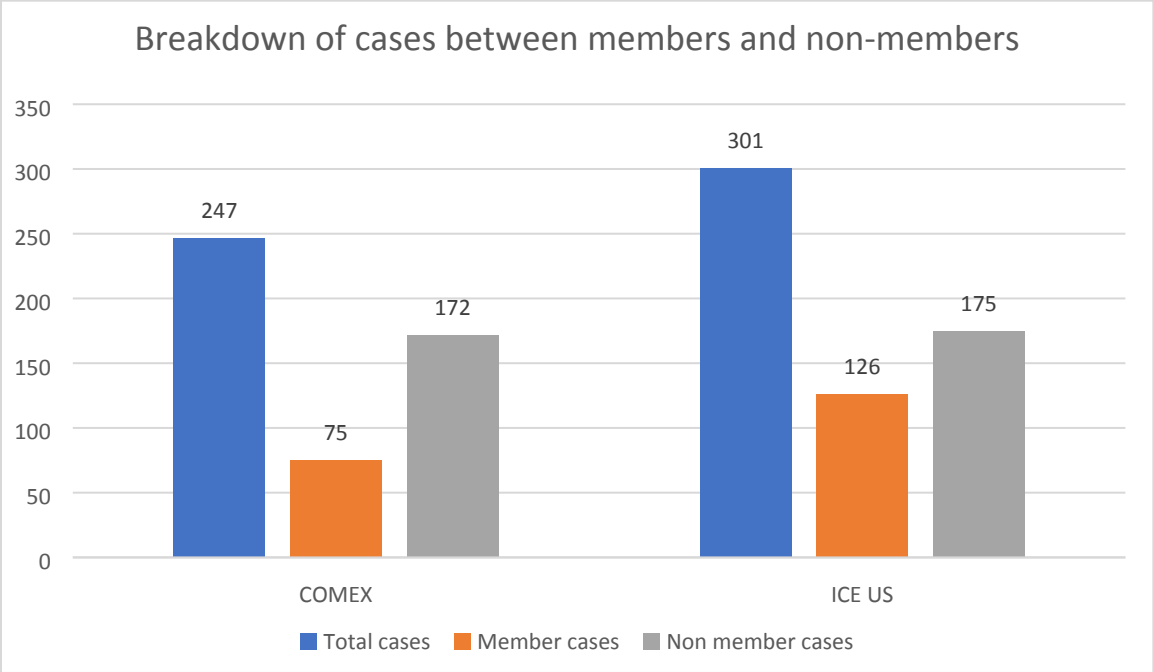

Figure Nine: Cases where permanent bans or suspensions used since 2007

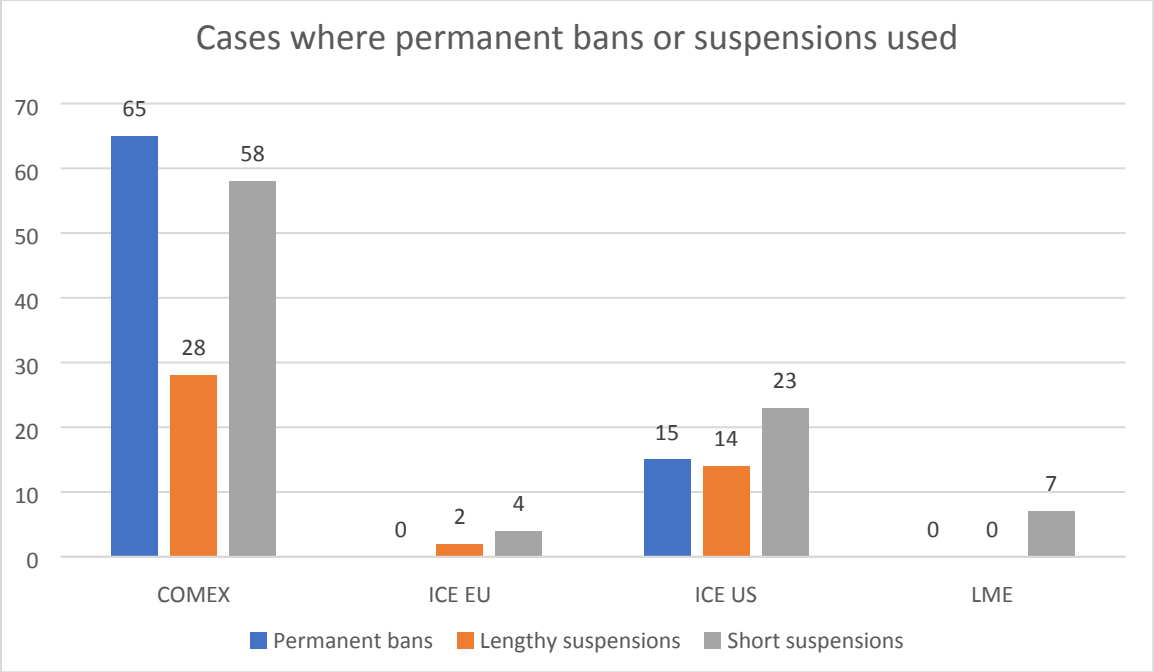

Figure Ten: notable thematic actions since 2007

DEA systems and controls (LME 2019-22)	• **Summary**: Series of significant fines given to brokerages for failing to implement adequate systems and controls to prevent market abuse from being committed by their clients using DEA channels. • **Notices**: 19/266, 19/249, 22/175. • **Response to**: Implementation of MiFID II (particularly RTS 6), criticism about surveillance failures (Sanderson et al., 2017) (deduced).
"We are on your trail" (ICE US 2019)	• **Summary**: More than a dozen entities given summary fines ranging between $2,500-$5,000 for failing to retain electronic audit trail data. • **Notices**: 2017-066, 2019-021/022 (13 entities issued fines under same reference numbers) • **Response to**: Need to demonstrate that Disruptive Trading Practices Review Programme is effective in detecting forms of abuse.
"No option but to comply" (ICE EU, 2016)	• **Summary**: An entire year's enforcement efforts focused on issuing small fines (£1,000 each) for breeches whereby firms had failed to settle options contracts by the required deadline. • **Notices:** 16155, 16154, 16153, 16152, 16151, 16150, 16149, 16148 • **Response to**: Unknown.
The "War" on layering and spoofing (COMEX 2013-19)	• **Summary**: Raft of fines and bans issued to participants for order book manipulation behaviours intended to deceive other market users. • **Notices**: 11-8581-BC, 11-8380-BC, 14-9920-BC, 13-9652-BC, 13-9598-BC, 12-9004-BC, 13-9258-BC, 13-9651-BC, 13-9391-BC, 14-0055-BC, 15-0103-BC-1, 15-0103-BC-2, 14-0059-BC, 15-0143-BC, 13-9490-BC-2, 13-9490-BC-1, 14-0050-BC, 12-8979-BC, 15-0180-BC-1, 15-0180-BC-2, 16-0434-BC-1, 16-0434-BC-2, 16-0434-BC-3, 15-0350-BC, 15-0261-BC-2, 13-9693-BC-2, 16-0522-BC-1, 16-0529-BC, 17-0646-BC-2, 16-0495-BC, 16-0425-BC-1, 16-0425-BC-2, 16-0425-BC-3, 16-0485-BC, 16-0538-DC, 16-0486-BC-1, 13-9693-BC-3, 16-0582-BC, 16-0581-BC, 16-0475-BC-1, 16-0475-BC-2, 15-0351-BC-1, 16-0554-BC-1, 16-0554-BC2, 17-0630-BC, 16-0509-BC, 16-605-BC, 15-0265-BC, 17-0705-BC, 17-0691-BC, 18-0866-BC, 17-0766-BC-1, 17-0766-BC-2, 16-0513-BC-3, 16-0513-BC-2, 17-0697-BC-1, 18-0910-BC, 17-0810-BC • **Response to**: CFTC push for CME to develop the means to detect potential layering and spoofing.
Tag50 "clamp down" (COMEX 2014)	• **Summary**: significant proportion of venue's enforcement cases for 2014 targeted member firms that had allowed order to be submitted with wrong Tag50 IDs. Tag50 IDs are used to identify trading participants which submit orders using Automated Trading Systems ("ATS"). • **Notices**: 13-7768-BC, 13-7769-BC, 13-7479-BC, 13-7480-BC, 13-7770-BC, 13-7771-BC, 13-7606-BC, 13-13-7607-BC • **Response to**: continued anxities about the misuse of Globex to conduct spoofing, for example in response to CFTC Trade Practice Rule Enforcement Review which had been conducted between 1st July 2012 to 30th June 2013 (deduced).
"Close out by the cut off" (ICE EU)	• **Summary**: A series of fines against member firms ranging from £5,000 to £50,000 for failing to close positions by 10am cut off, something which caused the exchange's calculation of open interest figures to be inaccurate. • **Notices:** 11048, 11047, 11069, 11068, 1110, 11162, 11161, 11160, 12013, 12190, 12189, 12188, 12187, 13048, 13053, 14017 D01 • **Response to**: Unknown or N/A

Illustration One: "The front runner"

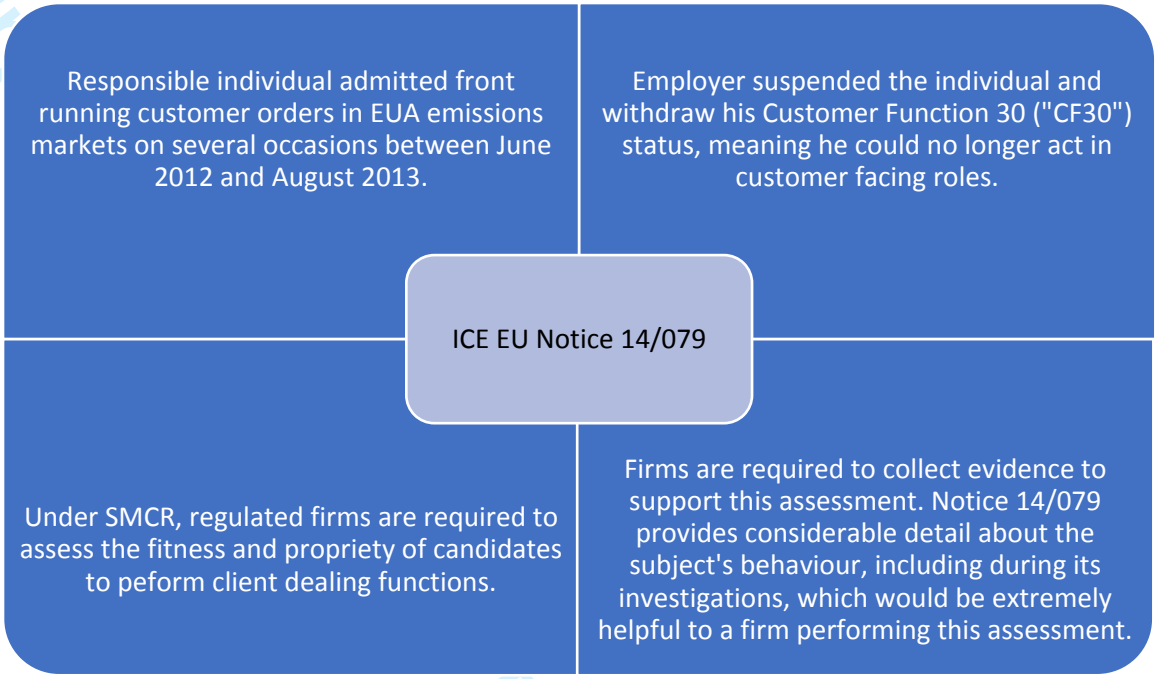

Illustration Two: “Failure to supervise or train”

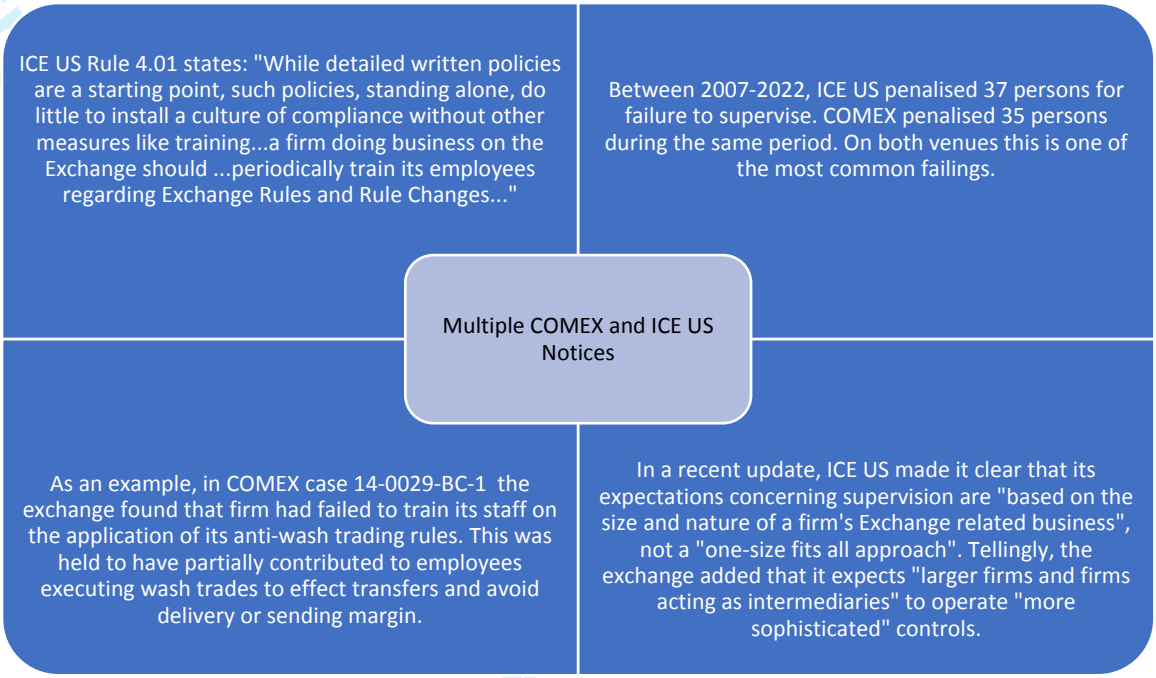

Illustration Three: "The Ringside confrontation"

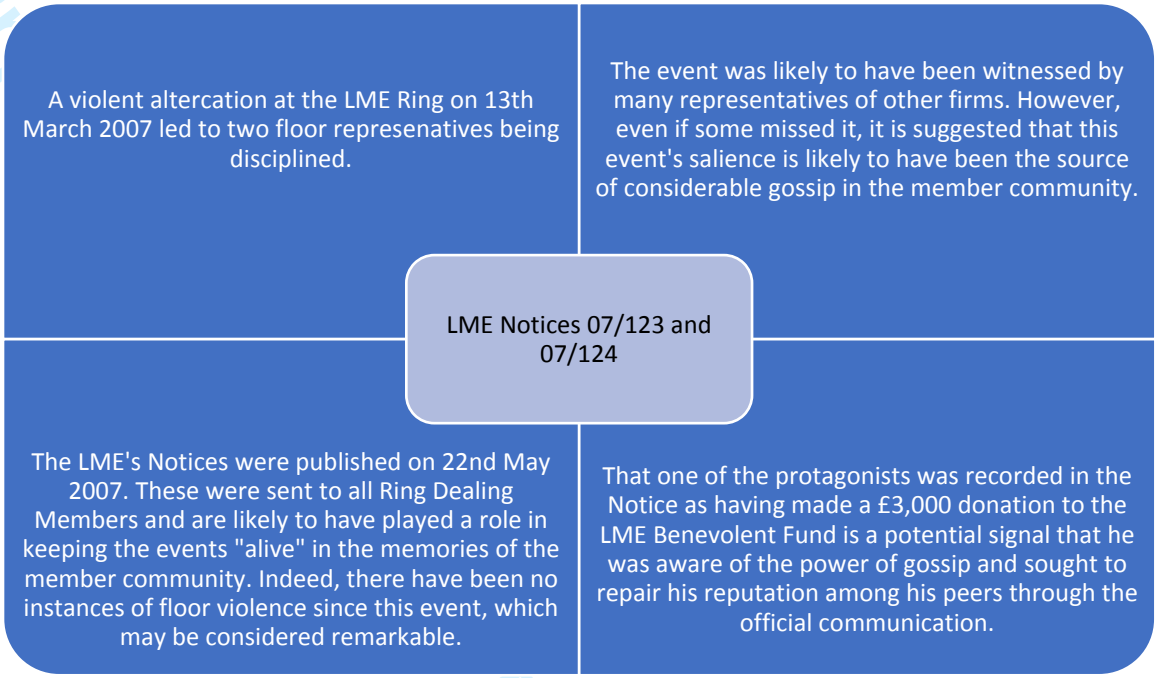

Illustration four: "The disorderly algorithmic traders"

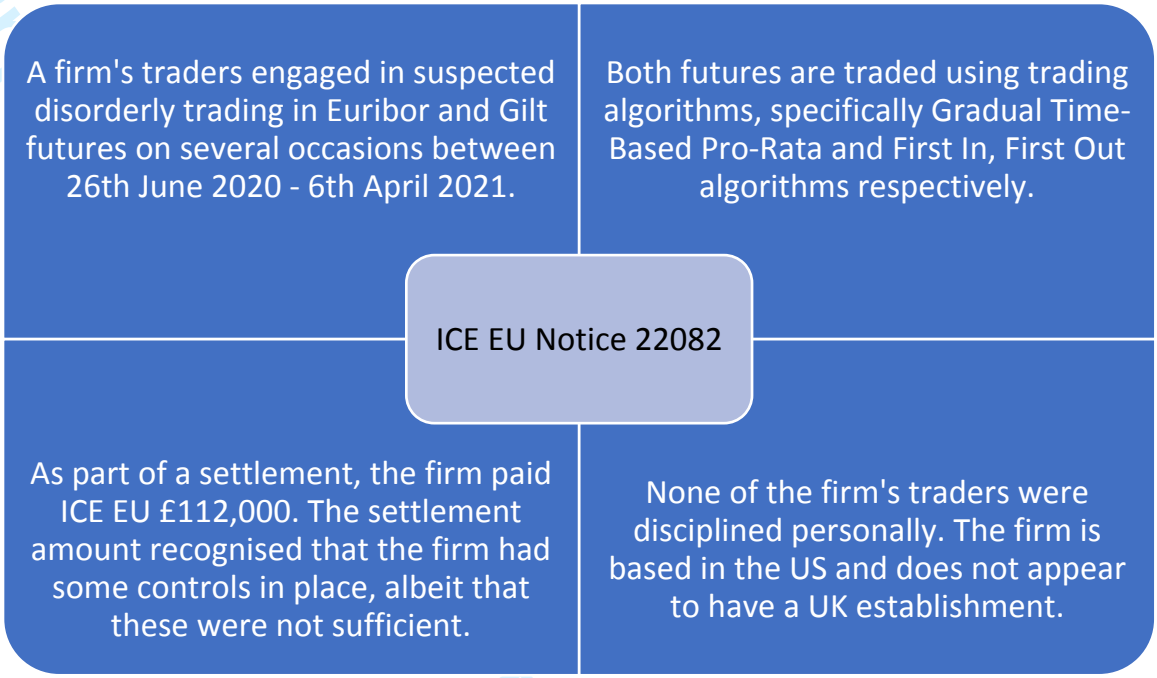

Illustration five: A trailblazing prosecution for an algorithmic spoofer

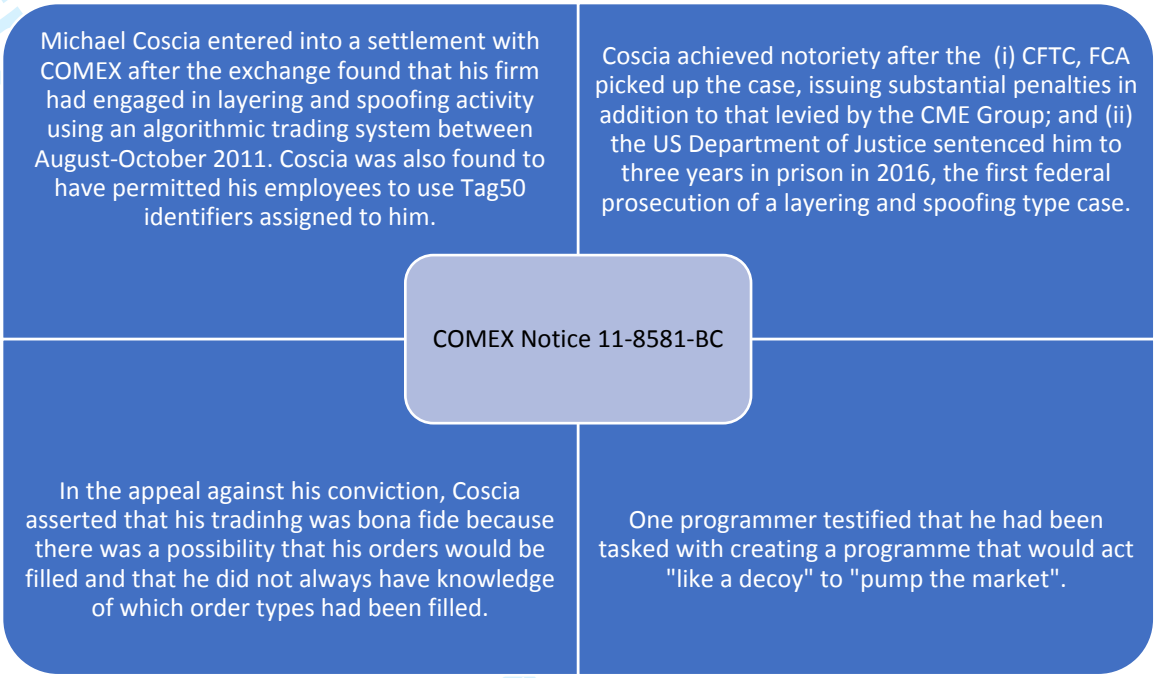

Illustration six: wash trading to circumvent position transfer rules

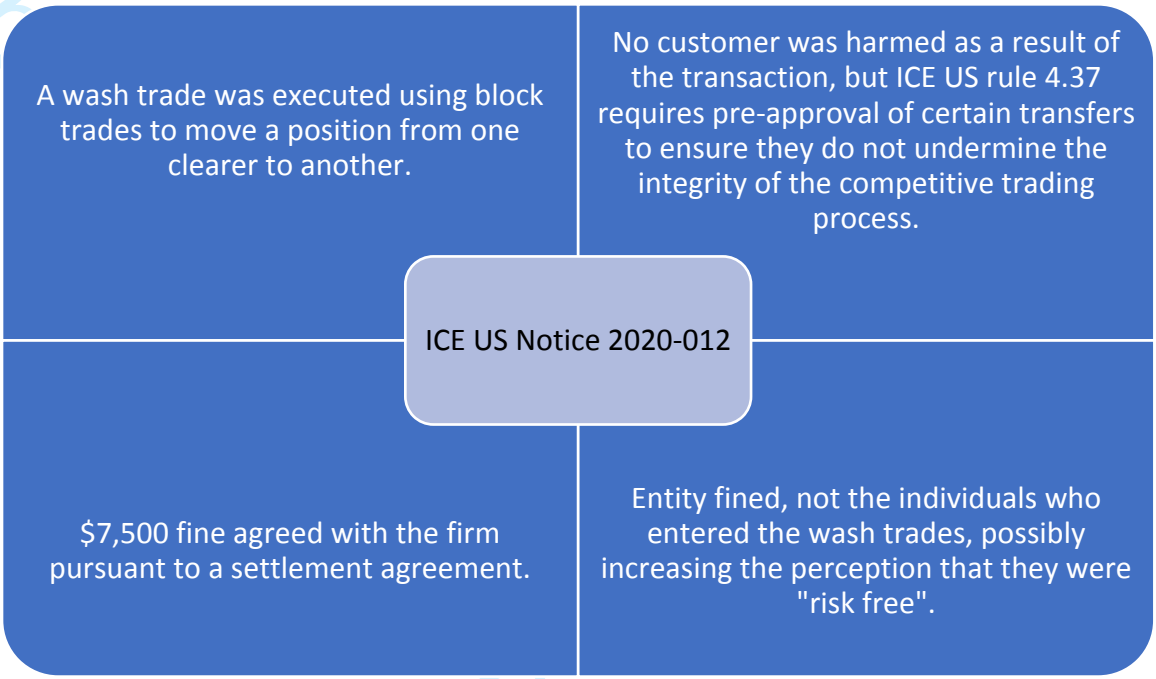

Illustration seven: "we could be put out of business"

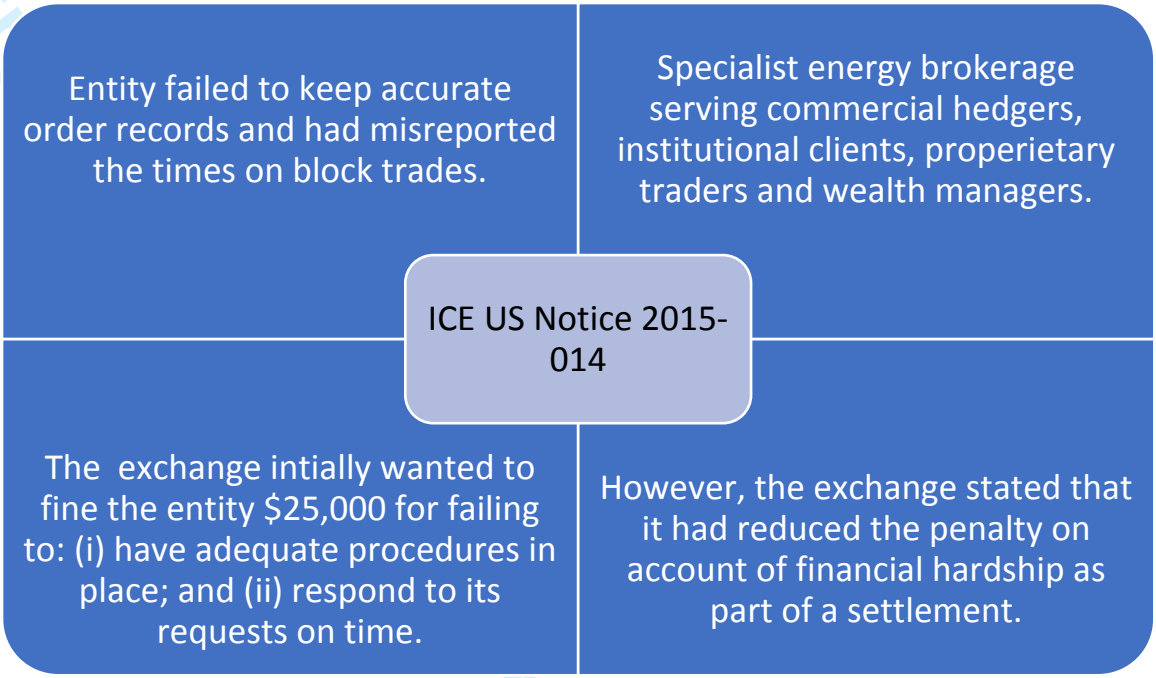

Illustration eight: "Procedural breaches aren't the same as manipulation: it's a symptom of wading through sludge"

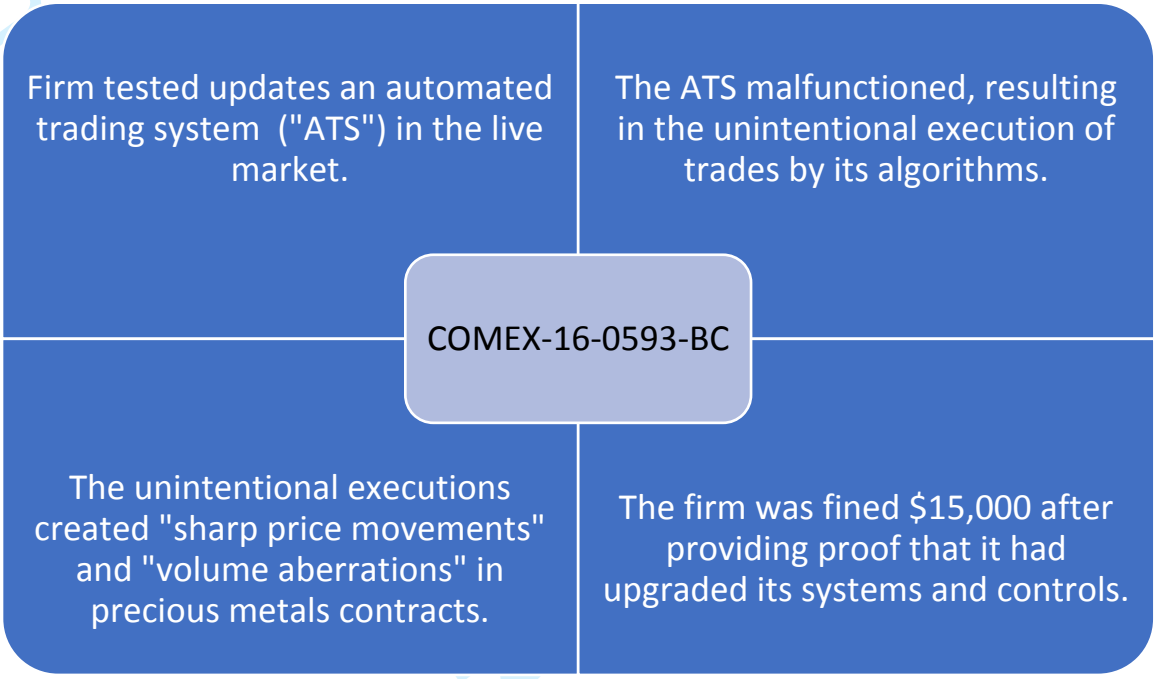

Table One: Comparison of English proficiency and access to ICE EU, ICE US and the LME (Where ranked)

Jurisdiction	Proficiency	ICE EU	ICE US	LME
Austria	Very high			
Belgium	Very high			
Brazil	Moderate			
China	Low			
Colombia	Low			
Czech Republic	High			
Denmark	High			
Finland	High			
France	Moderate			
Germany	Very high			
Greece	High			
Israel	Low			
Italy	Moderate			
Japan	Low			
Latvia	High			
Lebanon	Moderate			
Lithuania	High			
Malaysia	High			
Mexico	Very low			
Morocco	Low			
Netherlands	Very high			
Norway	Very high			
Oman	Very low			
Peru	Moderate			
Poland	Very high			
Portugal	Very high			
Qatar	Low			
Republic of Korea	Moderate			
Russia	Moderate			
Spain	Moderate			
Sweden	Very high			
Switzerland	High			
Thailand	Very low			
Turkey	Low			
UAE	Low			
Vietnam	Moderate			

Table Two: Overview of Flesch-Kincaid scale and comparison to other measures of proficiency

Score	Flesch-Kincaid ease of understanding (native speakers of American English)	Cambridge English as Foreign Language ("EFL") level (Undated-f)	% of high school students as speakers (Fleckenstein et al., 2016)
100-90	Very easy.	A1 beginners	UK: 18.5 USA: 17.7 Non-native speakers ("NNS"): 48.6
90-80	Easy.	A2 elementary	UK: 24.9 USA: 24.4 NNS: 25.7
80-70	Fairly easy.	B1 intermediate	UK: 28.8 USA: 27.6 NNS: 15.5
70-60	Plain English.	B2 upper intermediate	UK: 19.8 USA: 20.6 NNS: 9.6
60-50	Fairly difficult.	C1 advanced	UK: 8.0 USA: 9.9 NNS: 0.7
50-30	Difficult.	C2 master	Not sampled
30-10	Very difficult.		
10-0	Extremely difficult.		

Table Three: English complexity in enforcement notices publicising heaviest trading related penalties issued since 2007

Exchange notice	Summary	Year	Fine	FK	Words	%Complex	SL
COMEX 20-1305-BC	Non-member front run his employer's orders.	2022	$200k, permanent ban	50.9	497	78 (15.69%)	17.75
ICE EU 21116	Self-employed proprietary trader who was accused of gaming Liquidity Provider Programme to generate rebates.	2021	£100k fine, two year ban	41.3	667	132 (19.79%)	19.62
ICE US 2016-045	Individual engaged in layering and spoofing type activity in the Sugar No.11 contract for a sustained period .	2017	$200k	46.8	508	85 (16.73%)	21.17
LME 18/219	Floor dealer fined for misleading Quotations Committee.	2018	£20k	66	434	64 (14.5%)	13.15

Response to reviewer's recommendations

Recommendation	Response
The author should show how AI can make an impact in enforcement. More and more Regtech will play a pivotal role in enforcement moving forward. How does this framework align with AI for more effective enforcement?	Thank you for this excellent suggestion. It helped me come up with some more ideas re: how this framework could be used, this time in the context of supervisory technology or "SupTech". These can be found on pages 23-24.
What is your justification for using the HUMAN framework?	I have added some text to make my justifications for using the HUMANS framework clearer (page 10).
Please set up the methods section in a more traditional manner: data collection, sample, analysis etc. It is challenging to follow this section. For example, provide context about the notices.	I have added the sub-section headings as recommended (pages 8-9). I have added context regarding the notices (page 9).
Provide some context on the secondary data used?	I have added some additional context re: what was collected and why (page 9).
Exchange enforcement may face skepticism as an insincere attempt to avoid government intervention. Additionally, exchanges lack the authority and resources for comprehensive cross-market surveillance, potentially limiting their effectiveness. Budgetary constraints and the perceived limited influence of enforcement actions on regulatory reform are also significant issues. Furthermore, the value of market membership as a deterrent has diminished with the decline of intermediation. How do you address these concerns?	I have sought to address these in the discussion re: the potential deployment of SupTech on pages 23-24.
There are some one sentence paragraph that is not aligning well with the article.	I have merged one-sentence paragraphs on pages 9, 11, 13, 20 and 21.
I would have like to see a more nuanced discussion on the implication for practice.	I liaised with my supervisor re: how to interpret this: "I see nuanced as a toned down – strong but not too directly said. Let the reader reach the conclusion for themselves given the breadcrumbs you have laid down." I have made some tweaks between pages 21-23 accordingly.