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*March 30, 2023* *via Electronic Mail (WholesaleDataMarketStudy@fca.org.uk)*

Mr. Sheldon Mills – Executive Director, Consumers and Competition
Ms. Sarah Pritchard – Executive Director, Markets
Mr. Stephen Hanks – Manager, Markets Policy Division

**Financial Conduct Authority**
12 Endeavour Square, London E20 1JN

**Re: Wholesale data market study: benchmarks, credit ratings data and market data vendors (MS23/1)**[1]

Dear Director Mills, Director Pritchard, and Mr. Hanks,

On behalf of Data Boiler Technologies, I am pleased to provide the U.K. Financial Conduct Authority (FCA) with our comments on the MS23/1 Market Study concerning the competition in the provision of benchmarks, credit ratings data and Market Data Vendor (MDV) services. We applaud the FCA for a holistic review of issues and potential competition concerns in the wholesale data landscape, which are critical for innovators like us. We at Data Boiler are market reformers with patented solutions in the US (approved in Canada, pending in the EPO and other jurisdictions) that address the aggregation distance/ location differential issues in market data distribution and other challenges. We aspire to serve the global markets and welcome opportunities in the UK and other areas.

Reference to our 2022 comment letter[2] to the FCA (FS22/1), we believe the UK or British Commonwealth Countries are better off differentiating from the US Decentralized Competing Model (DCM)[3] and the EU Capital Markets Union (CMU)[4]. The value proposition will both compete against and complement the EU and the US for a new equilibrium in growing the overall pie and countering the rise of China's capital markets[5]. For that, we applaud the FCA for taking the stand to deviate from the US DCM in consideration of a consolidated tape.

Meanwhile, we understand this Market Study emphasized these 6 themes of wholesale market data: (1) Barriers to Entry and Expansion; (2) Network Effects; (3) Vertical Integration; (4) Suppliers' Commercial Practices; (5) Behaviour of Data Users; (6) Incentives for innovation. Here our thoughts and recommendations:

## Context of the problem:

### *Competing to be More Equal in Animal Farm where Rights and Obligations are NOT Aligned*

As the FCA illustrated in diagram on 2.2 of FS23/1, there are interesting dynamics among different constituents in provision of benchmarks and indices, Credit Rating Agency (CRA) data, market and reference data. Some of these data providers are owned by or affiliated with Exchanges, Bulge Brackets, and other elites. New entrances struggled to challenge the top providers before they are merged away or burn out. In turn, the large becomes larger in scale with broadened scope and networks. Reinforcing a paradigm that serves the elites well, but undermines the others and/or is shortsighted which tends to overlook sustainable growth opportunities.

[1] https://www.fca.org.uk/publication/market-studies/ms23-1-2.pdf
[2] https://www.databoiler.com/index_htm_files/DataBoiler FCA Wholesale Data.pdf
[3] https://www.linkedin.com/pulse/competing-decentralized-consolidation-model-impractical-kelvin-to/
[4] https://commission.europa.eu/system/files/2021-11/211125-capital-markets-union-package-consolidated-tape-factsheet_en.pdf
[5] https://www.marketwatch.com/story/ray-dalio-chinas-ascension-u-s-challenges-pose-a-very-special-moment-for-global-market-shift-11605377679

Consider composing a trade strategy or developing a financial product, like making music. The difference in the end product (i.e. money or financial assets versus songs or other "contents") should not preclude algorithm developers, traders and their respective financial institutions from having their composition and production works be recognized as copyrighted materials. Therefore, **who owns the data**, **what gets paid** and **who gets what** are at the core of all these market data, reference data, benchmark indices, and CRA data issues. The clear delineation of rights to control the "**use**" and "**distribution**" of copyright work requires a mechanism to confer appropriate rights upon creators. These rights include but are not limited to:

a. **Reproduce** and make copies of the original work;
b. Prepare **derivative works** based on the original work;
c. **Distribute** copyrighted work to the public;
d. **Perform** copyrighted work publicly;
e. **Disclose** the copyright work publicly.

Thankfully, if we heed the lesson learnt, there is no need for the Capital Markets to go through what has taken the music sector several decades to straighten out most if not all arguments about: who are the "publishers" versus "distributors" of data ("contents") (or sometimes a publisher can also be, or own, or affiliate with a "streaming platform"), their **relevant rights, obligations, and corresponding liabilities** if there is any. Please see Appendix 1.

## 1. Barriers to entry and expansion

*Whether there are market features, behaviours or practices that support or create structural or strategic barriers to entry and expansion.*

The industry craving for evermore data and the race to have the fastest speed have caused infrastructure costs to increase exponentially for both data suppliers and buyers. Very often we hear data vault and cloud vendors promoting the "more data the better". Telecom companies would say that you need the fastest proprietary feed to preserve competitive edge, regardless if it means upgrade from 40G to 100G, 400G, 800G, or even 1.6T speed.[6] However, we doubt if any of these myths truly deliver any economic benefits to our capital markets. Somehow, we wonder if our trading community has become subservient to these infrastructure providers overtime.[7]

Please do not get us wrong, we are NOT trying to defy technological advancements. We believe using time-lock encryption[8] (TLE) for a secured and synchronized starting line in data distribution plus corresponding measures and regulatory policies would save the industry from unnecessary wastage of infrastructure investment.

Regardless of aggregation distance/ location differential issues in Europe or the US, it does not matter if anyone using Microwave or Hollow-Core-Fiber Cable[9] for Low Latency data transmission, TLE is able to protect data from being decrypted prematurely in accordance to an atomic clock. Rest assured this is not another speed bump. Pre-Trade consolidated tape is possible. Indeed TLE has been adopted in other industries to promote fairness. Other use cases of TLE include CRA data and economic news announcements.

[6] https://www.datacenterdynamics.com/en/marketwatch/gearing-the-data-center-network-all-the-way-up-to-16tb/
[7] https://www.ft.com/content/d81f96ea-d43c-11e7-a303-9060cb1e5f44
[8] https://www.linkedin.com/pulse/market-data-available-securely-synchronized-time-kelvin-to/
[9] https://arxiv.org/ftp/arxiv/papers/2106/2106.05343.pdf

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**Collocation[10] ≠ Latency Equalization (LEQ)[11] ≠ Market Data Available SECURELY in Synchronized Time[8]**

It is a shame that even the online gaming industry uses LEQ, while electronified markets[12] adopt a lower standard. Without putting the right parameters to bound performance, the "*same manner same method*" provision in the US SEC's Market Data Infrastructure Rule (MDIR) it is merely a "standard price list". We applaud the FCA for taking the stand to deviate from the US DCM in consideration of a consolidated tape.

According to a comment regarding Exchange connectivity fees during the 2018 SEC's market data roundtable[13], the HFT was "*paying nearly US$1.2 million* [GBP 0.98 million] *a year for a 328-feet cable that cost US$88* [GBP 71.7] *at Amazon*". Using the cost base of a small US stock exchange[14] as basis for a consolidated tape cost estimation, it cited that their annual market data infrastructure cost is US$1,791,403; plus, physical connectivity for primary and secondary access layers, data center space, power, physical security, administrative access, monitoring of US$795,448; plus, we estimate software and hardware depreciation of US$400,000, equipment maintenance, information security, clock synch and compliance costs of US$680,000. Yet, there are the subscriptions to other exchanges' data feeds, redistribution fee, connectivity, co-location and ticker plant, that is about US$3.52 million. These add up to a total of US$7.3 million or GBP 5.98 million.

**Barriers of entry are extremely high. Aside from the huge initial investment and on-going cost**, a new participant has to consider the competitive landscape whether the market can afford another vendor with enough subscriptions to survive, or cannibalize the weakest player. For non-display market data vendors, we are aware that:

McKay Brothers (Quincy Data) got their investment from Susquehanna International Group (SIG), XR Trading, and Jane Street Group. PICO/ Redline Trading has close ties with Goldman Sachs, JPMorgan, Wells Fargo, UBS, Nomura, DRW, CTC, CMT Capital and Simplex Invest. Exergy acquired Vela and is affiliated with IPC. Quodd recently acquired Xignite is connected with Apex. BlackRock is behind SpiderRock Gateway Technologies. Colt is acquired by Fidelity. And then, there is the London Stock Exchange Group (LSEG) that owns FTSE Russell, Refinitiv and Maystreet; SIX Group is owned by 130 financial institutions; ICE Data Services that acquired Interactive Data some years ago; the list can go on and on.

Therefore, **the hurdle before a MDV new entrance can hit the ground running is gathering a consortium of financial institutions willing to commit and financially back the venture for X number of years**.

For Indices Benchmark and CRA data, it is a regulated space where a license is required to operate. Shaking up the licensing process to encourage new participants is not going to displace the leading players. There are network effects, vertical integration and suppliers' practices issues; please see points 2, 3, and 4 for an elaborated discussion.

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[10] For co-location at same data center, speed performance can vary significantly depends on connectivity, kilowatts and equipment cabinet, as well as other configuration and firmware parameters. Some connectivity options offered by Exchanges as of today include: 1G/ 10G/ 40G/ 100G. However, 400G is already being offered commercially in other industry, 800G is already achieved in late 2019 to early 2020, and the Ethernet Alliance projects 1.6Tbit would become standard possibly between year 2023 and 2025.

[11] "Under Articles 48(8) and (9) of Directive 2014/65/EU in MiFID II, trading venues are required to provide "transparent, fair and non-discriminatory" colocation services that "do not create incentives for disorderly trading conditions or market abuse." https://www.interxion.com/blogs/2018/082/latency-equalisation-the-need-for-fair-and-non-discriminatory-colocation-services; "Latency equalization is a very different perspective to 'low latency' in the fact that latency may need to be increased to ensure fairness of trade." https://www.datacenterdynamics.com/en/opinions/mifid-ii-changing-the-way-traders-do-colocation/ "Although LEQ could be performed by the client or the server, end-system techniques for estimating network conditions are often inaccurate" https://www.cs.yale.edu/homes/yu-minlan/writeup/presto08.pdf There can be: programmable routing service approach, adaptive equalizers, advance linear equalization, etc. which different techniques have different pros and cons impacting performance.

[12] https://www.amazon.com/Market-Mover-Lessons-Decade-Change/dp/1538745135

[13] https://www.sec.gov/spotlight/equity-market-structure-roundtables/roundtable-market-data-market-access-102518-transcript.pdf

[14] https://www.sec.gov/comments/4-729/4729-4845907-177246.pdf

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## 2. Network effects

*If barriers to entry for new suppliers or barriers to switching for users are high, the likelihood of displacing a leading supplier may become low. This can result in market power and low incentives for incumbent providers to compete on price, quality and innovation.*

Network effects can be both positive and negative. Externality can stem from either the production or consumption of a good or service. Positive externalities are desirable because there is a positive gain on both the private level and social level. Sadly, many network effects we face today are negative – i.e., social costs outweigh the private costs.

We agree with the observations by the FCA about "two-sided markets" and its pros and cons. Externality attributed to their success, whilst reinforced clients' **lock-in to oligopoly networks** that goes against the social interest. We came across this research[15], entitled "*Two-sided Markets, Pricing, and Network Effects*" that studied the pricing and the complex interactions between different platform's users, multi-homing, price discrimination, and social spillovers. Yet, we do not think price control intervention is conducive to an appropriate regulatory response to the dilemma.

We can comprehend why certain activist groups are attempting to lobby for using the existing advisory rules as a quick way in tightening the oversight of benchmark indices and CRA firms in view of the 2008 and other financial crisis, such as the digital asset crash. The controversy of whether "*certain information providers may or may not be acting as investment advisers*"[16] has stirred up much debate in the US. Those who work at FTSE Russell, S&P Dow Jones, MSCI and the like feel the US Securities and Exchange Commission (SEC) proposal is a huge disrespect to them because many hold CFA or higher qualifications than the Financial Planners with CFP employed by investment advisory firms.

If we picture the 'index providers', benchmark or 'model portfolio providers', pricing services or CRA as either 'Algo Publishing' (artists) or 'DJ Mixing Engineers' (aggregate and push upstream), it is not hard to see that their "derivative works" may or may not have significant difference from the original "songs" or trade strategies. If the SEC's advisor proposal is adopted, it would implies that these CRAs, Benchmark Indices firms are not artistic enough to "create" original "contents" that uniquely different from others. Hence, they cannot be held liable for the "contents" that they did not create, unless these firms knowingly are in cahoots with those engaged in manipulation, greenwashing of ESG securities, or other misbehaviours.

So, in respecting the professionalism of CRA, benchmark indices firms, their **higher pay must accompany higher responsibilities to the society**. This justifies their earning of 45% instead of the 5% copyright royalty under our hypothetic model in Appendix 1, which rate setting is objectively based on 4-Part Test[17] and Free Market rather than regulatory price control. Grouping them under "algo publishing/ index benchmark" category better reflects how they would become **liable if their conduct might result in conflicts of interest, market chaos, or manipulation scandals**.

Another **alternative regulatory approach** is to break them down, mandating them to "**split**".[18] Spinoff a portion of their business is fair because it relies on market mechanisms to determine a settlement price for rights that players may willingly give up. However, turning a blind eye is easy, because I'll be gone and you'll be gone (IBG/ YBG). It is lucrative through the "revolving door".[19] Policy makers may not have the guts to make such bold moves.

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15 https://faculty.wcas.northwestern.edu/apa522/Two-Sided-Market-and-Network-Effects.pdf
16 https://www.sec.gov/rules/other/2022/ia-6050.pdf
17 https://www.govinfo.gov/content/pkg/FR-2016-05-02/pdf/2016-09707.pdf
18 https://www.linkedin.com/pulse/split-told-how-govern-kelvin-to/
19 https://www0.gsb.columbia.edu/mygsb/faculty/research/pubfiles/13981/DKKR july20_text.pdf

## 3. Vertical integration

*Potential concerns about vertical integration … causing competitive distortions at different points of the supply chain, for example through the inability of competing firms to access necessary data inputs or bundling of data services with other products and services … also assess the bargaining power … will evaluate how these relationships affect the way firms compete with one another.*

Consolidated tape is not cheap by any means. Although the amount of data and trade messages keep growing every year, MDVs are in fact consolidating both vertically (see examples in point 1) and horizontally (QuantHouse is part of IRESS; Options Technologies acquired Activ Financial and got Finetix from DXC in 2021; BMLL series B is funded by NASDAQ Ventures, FactSet, and IQ Capital's Growth Fund).

If a self-aggregator or consolidated tape provider adding an 'Order Entry' component of about US$1.6 million or GBP 1.31 million per annum with necessary switches, servers, software license, some personnel cost plus a little extra, it can start matching trades for additional revenue. Therefore, it makes sense commercially for MDVs to vertically integrate and become a trading venue, or liquidity sourcing, outsourced execution vendor for a broader economy of scope than a pure play data redistributor.

Given one size does not fit all, these data vendors, inward looking OMS/ bulletin boards, transaction cost analyzers, liquidity sourcing, outsourced execution vendors, ATSs/ MTFs, SDPs, bilateral trading or other communication protocol systems[20] does serve to **fabricate** the fragmented markets. However, they also become **layers of intermediary costs** causing the U-shaped value chain smile curve[21] to turn into an upside down "frown".

Vertical integration along the value chain, with combinations of trading venues, benchmark administrators, MDVs and ratings providers being part of the same corporate group is nothing new. The motive could simply be trading venues face competition globally. It allows these large conglomerates to bundle their products and achieve a better economy of scale and scope in operations. However, if one may recall the time when copyrights are not enforced for MP3 music, plagiarized copies were everywhere exploiting the rights of the original content creators. Letting "streaming platforms" divide the cake by selectively paying rebates and other perks to the elites hurts the other "content" creators.

Integrated conglomerates use their position in one part of the value chain to cause competitive distortions in another part. We will discuss various commercial practices of suppliers in point 4, where they booster bargaining power and limiting alternatives for data buyers. In short, dominant players' practices exacerbate the problem with barriers to entry or expansion, while reducing competition.


Using an analogy from the game Monopoly, players would keep capturing all of the spaces of the same color to grow their vertically integrated conglomerates. Partially, it is the game rules that aid or encourages their becoming **Oligopoly** until there is one player left. Scooping up "same color" spaces in essence is "herding" a vast amount of data exclusively available only at one conglomerate. Over time, each conglomerate builds houses on their own turf to rent seek. Different conglomerates become echo-chambers to broadcast a subset version of the whole truth. Hence, their **products are complementary rather than competing with each other.**

Ending up with nobody seeing the big picture, unless a buyer subscribes to all oligopoly data providers.

[20] https://www.linkedin.com/pulse/trading-venue-perimeter-between-rock-hard-place-kelvin-to/

[21] https://www.linkedin.com/pulse/smile-curve-changes-securities-value-chain-evolves-kelvin-to/

## 4. Commercial practices of suppliers

*Concerns about complexity and transparency of contracts across all three markets within scope … examine suppliers' licensing practices to assess.*

Please refer to the Exchanges' publicly disclosed price lists[22] for other products or services related to market data. In general, there are the following types of charges by Exchanges or other Regulated Data Providers (RDPs):

- Access Fee (general and per user/ month)
- Professional User Fee (Per User $/ month)
- Non-Professional User Fee (Per User $/ month) absorbed by Broker-Dealers
- Non-Display Fee (by different categories $/ month)
- Redistribution Fee: $/ month
- Multiple Data Feed Fee, Digital Media Enterprise Fee: $/ month and/or Enterprise Fee: $/ month … etc.

… plus a whole host of "not hidden" but often oversighted costs of upgrading and downgrading to ensure lock-in, and constant changes in market data licensing fees, audits by market data vendors and/or exchanges, and broker-dealers internally incurred costs for data aggregation, integration with trading algorithms/ other systems, re-piping, testing, etc. Please also see this analysis[23] conducted by the Security Industry/Financial Market Association (SIFMA).

The FCA does not need to spend time diving into the complex, granular license contracts or opaque fees, this Waters Technology article[24] already unveiled that one could be paying 2,632% more than other firms for the same market data. W3C ODRL[25] merely standardize, automate a machine-readable way of describing data licenses. It will not solve the 'who owns the data' question. Do not fall for the familiarity of quote and trade revenues that the large exchange groups may want to stick to their pursuit of 'SIP Accounting 101'[26]. Measurement of social costs is an **economic problem rather than a technical accounting or lack of transparency matter** (see diagram on page 4 of our Feb 2021 comments to IOSCO).[27]

The IOSCO standards[28] about "*market data is made available on a 'reasonable commercial basis'*" may be difficult to determine from a pure cost basis accounting perspective. Adding a preceding condition of "subject to competitive forces" may help. Keep in mind that rights' entitlements must accompany corresponding obligations and/or potential liabilities to be fair, so the mechanism to confer rights should embrace the concept of equivalent exchange. For that, "4-Part Test"[17] deems an agreeable principle universally – (1) willing seller willing buyer standard; (2) same parties test; (3) statutory license ["effective competition"] test; and (4) same rights test.

Bloomberg and LSEG Refinitiv dominated the MDV space.[29] If any existing MDVs can spread their fixed cost across a larger base of consumers (in benefiting the industry to strike for a "fairer and non-discriminatory" outcomes), it would have succeeded a long time ago. **Maximize life of aged technologies beyond 10 years' amortization period** is in existing MDVs' best self-interest.

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[22] www.nyse.com/publicdocs/nyse/data/NYSE_Market_Data_Pricing.pdf ; www.nasdaqtrader.com/Trader.aspx?id=DPPriceListAll
[23] https://www.sifma.org/wp-content/uploads/2019/01/Expand-and-SIFMA-An-Analysis-of-Market-Data-Fees-08-2018.pdf
[24] https://www.waterstechnology.com/data-management/7950727/market-data-consumers-buy-the-same-products-at-massively-different-price-points
[25] https://www.w3.org/community/odrl/
[26] https://www.nasdaq.com/articles/sip-accounting-101-2021-03-25
[27] https://www.databoiler.com/index_htm_files/DataBoiler%20IOSCO%20Market%20Data.pdf
[28] https://www.iosco.org/library/pubdocs/pdf/IOSCOPD667.pdf
[29] https://www.greenwich.com/market-structure-technology/consolidated-market-data-feeds-thrive-despite-rising-data-fees

**Another tactic is inflicting damage on others or ecosystem degradation**. For example, uncontracted marginal value of the adverse effect turning into a nuisance affecting the general public that does not have a direct stake in the public market equity trading - such as foreign/private markets, OTC, Options, futures, derivatives trades, and academia.

As mentioned in point 3, selectively paying rebates and other perks to the elites is a form of **price discrimination**. Also, integrated conglomerates scooping up smaller firms and rivals reinforced their **oligopoly** power.

Nevertheless, there is a race to **lure firms into higher dependency on more data** versus provision of better analytics**. Either way, vendors profit** from it regardless of their clients receiving more noise, or **clients buying ever more tools to handle and/or analyze these data.**

Existing players may buy-in to the US DCM because they have almost no incremental cost to become Competing Consolidators (CCs). Their revenue upside depends on how hard the US SEC and industry beat up the Exchanges on their behalf. Per our May 2020 comment letter to the US SEC,[30] we pointed out that CC is indeed an intermediary between suppliers and users adding a layer of cost to the overall system if it does not perform any value-added function. The rich may be allowed to access connectivity that is not reasonably affordable to average investors.

**The hype about heightening of "governance" and disclosure to regulate data suppliers' practices would FAIL.** Per our July 2021 further comments to the SEC,[31] we compared the US market data "governance" CT-Plan with the copyright licensing mechanism in the music industry. Our findings show the US CT-Plan is worse than the repealed §116 of the 1976 Copyright Act[32] that gave equal footing (50/50) to the Performance Rights Organizations (PROs) representing the artists (traders) and musicians (algorithm developers) against the dominant Jukebox operators (Stock Exchanges). If the US CT-Plan were adopted rather than being struck down by the US Court of Appeals[33], the two-third (SROs) and one-third (non-SROs) voting rights would result in a divide along partisan line and only passing trivia matters. The division or bureaucracy would lead the US Securities Information Processor (SIP) to run astray.

It is not wrong for vendors to bundle products and gain efficiency through improving economies of scale and/or scope. However, acts to dampen competition, or create barriers to entry or expansion, price discrimination, and inflicting unnecessary social cost burdens on others are a detriment to the healthy development of markets and the economy.

**Breakthroughs require fresh innovations from someone new** to challenge the Oligopoly. Market reform should allocate most rewards and provide a reasonable return for those who are able to innovate, contribute to reduce unknowns[34], and grow the number of diversified market participants (see point 6). If there is insufficient incentives, reformers may hesitate to invest, or use "FREE" alternatives to overcome switching cost (see point 5) to accelerate client acquisition while cover their expense through other means.

[30] https://www.databoiler.com/index_htm_files/DataBoiler%20SEC%20Market%20Data%20Infrastructure.pdf

[31] https://www.sec.gov/comments/4-757/4757-9071101-246534.pdf

[32] https://en.wikisource.org/wiki/United_States_Code/Title_17/Chapter_1/Section_116

[33] https://www.cadc.uscourts.gov/internet/opinions.nsf/265FAD4E1FDE293F85258876004F2CF9/$file/21-1167-1953361.pdf

[34] https://www.pmi.org/learning/library/characterizing-unknown-unknowns-6077

## 5. Behaviour of data users

*Investigate how data users' behaviour affects the competitive dynamics in wholesale data markets … will assess if there is evidence of users switching and the extent to which they can negotiate important factors (such as the price and quality of what they get) with benchmark administrators, credit ratings data suppliers and market data vendors*

Given suppliers product bundling and two-sided markets as mentioned earlier, modern systems are intertwined, re-piping requires thorough testing of all interfaces. Clients usually have a hard time justifying the half-million to a million US dollar (GBP 0.41-0.82 million) cost for the switch and related tests. **Reliability is usually prioritized over novelty** because adverse consequences for system failure are costly.

Procurement rather believes larger vendors that have **wider shoulders to bear the blame if anything may go wrong** with the switch, than spend time with a smaller innovator to carry out a seamless implementation. Silos and the mentality of IBG/ YBG are unfortunately the norm.

Can customers identify their own needs – certainly they can but often are **not willing**. Why go through the hustle bustle to review all the fine print on countless licensing agreements and worry that another department(s) may be impacted by changing a small item in one area. Those who actually carry out the implementation tasks in operations often get squeezed in budget and time. In turn, that nurtures the behaviour of **"do less" for "less chance of mistakes"**.

Comparing products across suppliers to determine which would "best" meet their needs is much harder than those naïve who falsely believe that better transparency would address structural market problems. We are not sure the reliance on "fire and replace the execution vendor" approach to hold market makers' feet to the fire as being effective. Yet, the US SEC's proposals on modernize rule 605[35] and BestEx[36] requirements would definitely fail to objectively discern if there may or may not be conflicts or other misbehaviours.[37]

There are **too many nuances** for dynamic price shopping like "Booking.com" or "Ticketmaster". It is a burden that the US SEC themselves would struggle to perform, but they push it on the broker-dealers. Individual effort by the broker-dealer is not sufficient to take on this industrywide market structure challenge. Blindly trusting those well-articulated policies and procedures, another downfall like the 2008 Société Générale US$ 7.2 billion loss[38] would happen again.

Customers do not need to better assess the Broker-Dealers' potential conflicts, the Policy Makers do**.** The public relies on market regulators to assure that they are not scammed in open market. Heightened disclosure in the **beautified name of "improve transparency" may indeed be bad policies for an uneven playing field**. Malicious targeting or selective enforcement only benefits the middlemen, big law and consulting firms.

Nevertheless, **demand for wholesale data is inelastic**. Data providers may bid up the price and selectively give the most favorable terms and/or exclusive access of certain information to the elites. Buyers have little to no bargaining power to negotiate with the big oligopoly echo-chambers (see point 3). Luminex ATS was a buy-side attempt to increase their bargaining power. It did not last long before it merged with Level ATS on the sell-side.[39] So, **if you cannot win them over, join or be subservient to them**.

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35 https://www.sec.gov/rules/proposed/2022/34-96493.pdf
36 https://www.sec.gov/rules/proposed/2022/34-96496.pdf
37 https://www.databoiler.com/index_htm_files/DataBoiler SEC Market Structure 202303.pdf
38 telegraph.co.uk/finance/newsbysector/banksandfinance/5241263/Societe-Generale-chairman-Daniel-Bouton-to-step-down.html
39 https://www.tradersmagazine.com/am/level-ats-luminex-merger/

Not every investor or portfolio managers would requires low-latency equity market data but choosing to trade in the fixed income markets one is also faced with the harsh realities of dealing with the big 3 CRAs. To comply with investment mandates, one must obtain licensing data from all 3 suppliers in order to get the full near-universal coverage of debt instrument ratings (i.e. **products are complementary rather than compete with each other**).

This is like the warring states period[40] before Qin dynasty unified currencies with Ban Liang. Without a consistent copyright licensing mechanism[41] which aligns and addresses the economic viability of a constituent to exploit its economy of scope and/or economy of scale, there is NO harmonization of the different market centers.

## 6. Incentives for innovation

*Concerns over a low level of meaningful innovation from users of CRAs and MDVs … will look at the incentives that exist for innovation by firms in each of the markets in scope and what barriers might exist to further or faster-paced innovation … also consider emerging and potential future trends and developments that could affect how competition in these markets works.*

The prior mentioned 5 themes affirmed that the established wholesale data vendors or the integrated conglomerates are unlikely to lose customers to their competitors. Their **manner** in usage of technologies, product delivery, and pricing methodologies are questionable. The way their products or platforms are designed may gear toward addictiveness rather than captivating. In our opinion, 'rent seeking' cannot, and should not, be equated to the true essence of "innovations" – i.e., **unlocks new values**.[42]

Although established vendors do invest in new products to broaden their economy of scope and up keep with policy trends to offer, for example ESG services. However, we agree with the FCA that benchmark administrators need improvements in ESG benchmarks.[43]

Competing on hardware components/ connectivity subscriptions that anyone can go buy and replicate is indeed substitutable or is a commodity product that adds little to no value. Policy makers should encourage innovations using proprietary tech. **Patents and intellectual properties deserve proper respect**. Instead of requiring innovators to unveil their secret sauce in a well-articulated disclosure, benchmark tests would reflect its true performance.

Recall my sharing at the Financial Services Roundtable/ BITS (now renamed as Banking Policy Institute) in Jan 2017,[44] the secret of **how innovation happens** involve these 4Bs:

i. Be dissatisfied with the status quo
ii. Boils down the empirical into workable clues
iii. Brings in the non-conventional thoughts
iv. Bridges the invention with market reality

Inspirations come from all walks of life; cross referencing, mind mapping, etc. The more **diverse** the richer the analogies one can draw to solve the puzzle. Yet, reality can be humbling as well as pushes one to consider possible evolutions (see diagram on the next page regarding **paths towards competition** and other directions).

[40] https://www.linkedin.com/pulse/warring-states-period-finding-new-equilibrium-kelvin-to/
[41] https://www.databoiler.com/index_htm_files/DataBoiler Copyright Licensing.pdf
[42] https://www.forbes.com/sites/forbescoachescouncil/2021/01/12/how-to-build-a-culture-of-innovation/
[43] https://www.fca.org.uk/news/news-stories/fca-outlines-improvements-needed-esg-benchmarks
[44] https://www.databoiler.com/index_htm_files/DataBoiler%20FinTechIdeasFestival.pdf

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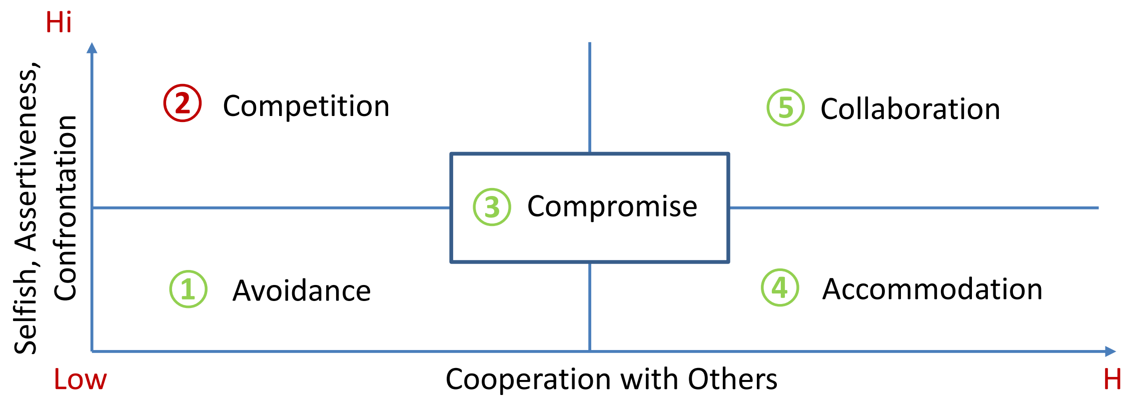


Sufficient "incentives" are needed to innovate, improve quality, improve efficiency or share the benefit of efficiencies with customers in the form of lower prices. Monetary incentive is one thing, favorable environment is indeed more critical. The table below describes the "should" and "should not" about Wholesale Data reform:

| It is about | It is NOT about |
|---|---|
| divergence between private and social costs[45] | forcefully taking something away from the Exchanges |
| ownership rights, usage rights, exclusivity (IP), term limits, transferrable/ alienable rights, conflicts of interest, etc. | adding bureaucratic processes |
| discourage inflicting damage on others (ecosystem degradation), and rewarding provision of public goods | whether HFTs are good or bad, pros/ cons of passive vs active management, favoring new/ old venues |
| evaluating one state of resource allocation with another, ensure core data evolves alongside broader ecosystem | continuous arguments, litigation fights, or other wastes of economic resources |
| grow the overall pie, avoid further "frowning" of the smile curve, + innovation to spur new economic opportunities | destructive behaviors against rivalries, who occupies more voting seats or dictate the agendas/ info access |
| striking covenants with constituents across tiers | private party among elites |
| enforcing covenants without constant policing by regulators, equality between "Haves" and "Haves Not" | distrust among constituents, calling the regulator to baby sit every dispute |

Often, innovators' requests are NOT about asking for special treatment. If policy makers can just do their job to address issues across the prior mentioned 5 themes, all will be happy competing in a fair, reasonable, and non-discriminative (FRNAD) environment. Unfortunately, we seldom see successful antitrust cases. No or delayed enforcement hurt both the innovators and general public.

Gains in market efficiency will only be achieved by Pareto improvement[46] (someone better off without anybody worst off or win-win for all). As mentioned in point 2, social costs should not outweigh the private costs. Healthy markets need both farmers and hunters. Variety helps reach a wider audience, reduce unknowns, [34] and grow the overall pie. It is better to have some level of order protection[47] than the false hope of BestEx[35] or disclosure[36] rules. Please see our suggestions for wholesale data reform in Appendix 1.

[45] https://iea.org.uk/wp-content/uploads/2016/07/THE%20MYTH%20OF%20SOCIAL%20COST.pdf
[46] https://ecampusontario.pressbooks.pub/uvicmicroeconomics/chapter/5-1-externalities/
[47] https://www.law.cornell.edu/cfr/text/17/242.611

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## Other Remarks and Conclusions

When all data is important, then no data is useful. When every nanosecond is counted, then no market is observable. **Accessing wholesale data** does not mean everyone would require full depth-of-book data. Making all 'streamers'[48] the same is detriment to the variety factor of the 4Vs (the other 3Vs are: volume, velocity, and veracity), because it undermines the different roles they play and the frienemy dynamics they have in fabricating the fragmented markets. **Using wholesale data** does not mean paying for a gigantic data vault or cloud. Lining up all the data in perfect exactitude and measuring vectors graphically have over/ under-fitting problems and would consume too many computing resources. Instead, one should focus on the hierarchy of data rather than overemphasize on data structure.

Giving away vast amounts of information to free riders (e.g., activists, MEME stock insurgents, and foreign adversaries) increases vulnerabilities. These free riders have no skin in the game while they use market modeling for mischief. Increasing MEME events and other irrational exuberance is detrimental to rational price discovery (i.e. worsen the veracity outcomes). Policy and market incentives should direct creative efforts to decipher "outliers".

Today's market is too fast and things dynamically change, a **good decision made now and pursued aggressively is substantially better than a perfect decision made too late**. Golden source of data is too costly and may never be achieved. So, let's analyze data at its source with RTAP and minimize data-in-motion[49]. To solve the surveillance challenges identified by the IOSCO[50] and prevent Flash Crash[51], we suggest leveraging the crowd to discover the unknown unknowns.[34]
98% → 99.9% incremental improvement is better than 85% → 90% because it is 95% error reductions vs just 33%
**Discovery of unknowns[34] and timely warning of irregularities make the market safer**.

All 6 themes about wholesale market data: (1) Barriers to Entry and Expansion; (2) Network Effects; (3) Vertical Integration; (4) Suppliers' Commercial Practices; (5) Behaviour of Data Users; (6) Incentives for innovation, indicate structural issues. Better transparency would NOT address the problems. The market will not fix itself.[52] The obligation to provide wholesale data on a non-discriminatory basis will not happen unless the regulator provides the appropriate nudging.

Rather than attempt to price control or inadvertently calibrate the wrong prescriptions, the FCA should **go ahead to make a market investigation** reference to the Competition and Markets Authority (CMA) about all 3 wholesale data markets (market data, benchmarks indices, and CRA data services), as well as consider principle-based rules, like the **4-Part Test**[17] that uplifts the "willing seller willing buyer standard".

We look forward to the FCA and CMA completing the market study with concrete actions by 1 September 2023 and seeing the report by 1 March 2024. Feel free to contact us with any questions. We look forward to engaging in any discussions and/or opportunities where our expertise might be helpful.

Sincerely,

***Kelvin To***
Founder and President
**Data Boiler Technologies, LLC**

This letter is also available at: https://www.DataBoiler.com/index_htm_files/DataBoiler%20FCA%20202303%20Wholesale%20Data.pdf

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48 https://www.linkedin.com/pulse/trading-venue-perimeter-related-market-data-issue-kelvin-to/
49 https://www.databoiler.com/index_htm_files/DataBoilerInMotion.pdf
50 https://www.iosco.org/library/pubdocs/pdf/IOSCOPD389.pdf
51 https://www.fnlondon.com/articles/investment-banks-not-hfts-fuel-flash-crashes-fca-research-20170803
52 https://robinlee.sites.fas.harvard.edu/papers/ExchangeComp.pdf

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## Appendix 1 – Suggestions

### Realign according to 4Vs

~ $4.5 billion a year in market data and connectivity for US equity and options + $2.5 billion in access fee rebate + $3.6 billion in payment for order flow = over $10.6 billion. Realign for more effective and Efficient use – i.e. ↑ # of diversified market participants, ↓ unknowns, weed out any conflicts, fund investor education and enrichment programs, partially off-loading cost, promoting FRAND

Enable real-time risk control, auto-detect irregular activities + early warnings to modernize CAT's outdated design

*Rate set by Free Market*

**Mechanical Royalty** – Obtain algo license to accelerate own development, new use case (treasure hunt others' trash)

Crowd intelligence

**Sound library**

**Algorithms** – 80% of algo-wheel no longer generate Alpha & become sunk cost, license out unused algo to earn 2nd profit

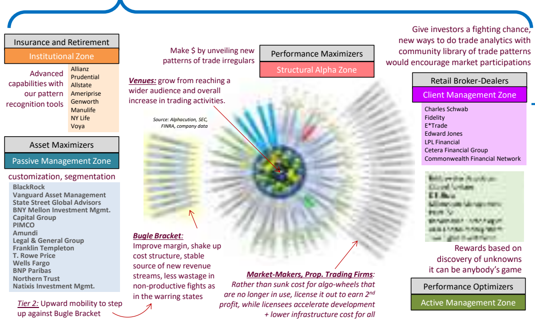
Alpha

Shared lessons to benefit the community while earn $$$

**Discovery and reduce unknowns make markets safer** (98% → 99.9% incremental improvement is better than 85% → 90% because it is 95% error reductions vs just 33%)

**Varieties ↑** – Decentralize → more resilient, mass customization, better reach, field knowledge, equips next-gen investors, sustainable

**Veracity ↑** – ↓ MEME/irrational exuberance, deter insurgent/ adversaries, contribute to price discovery




## Copyright Licensing Mechanism

Discretion of different agents to allocate (w/ require disclosure)

Original "content" creator/ retail investors for

DJ Mixing Engineers

**Agency trading, Retail, Order router** – NOT liable unless in cahoots / known, of manipulative attempt

Original "content" creators/ retail investors for quotes contribution

Investor education enrichment programs – Restricted purposes, Periodic audits

50% | 4 Part-Test | 5% | *Rate NOT set by any group or FCA* | 45%

**Performance Royalty** in replacements of today's incentives

- Willing seller willing buyer standard 75 FR 3597
- Same parties
- Same rights
- Effective competition

**Bonus Pool**

Healthy markets need both farmers and hunters

Value Chain
- Performance Optimizers
- Asset Gathering
- Intermediaries
- Asset Maximizers
- Retail and Client Services

**Royalty cover 50% + unlimited upside** – Partially off-loading BDs cost to be paid for by the mechanism

**Broker-Dealers "Publishers"**

**No change to today's pay**

**Base pay 50% of today's total package**

Non-Featured

Supporting Team employed by publishers

Featured Artists

Algo Publishing Index Benchmark

Record Trade/ Order Sequence

**Velocity** – Time-lock Encryption (TLE) to make market data available securely in synchronized time

**Consolidated Tape and Self-Aggregators**

**Proprietary data feeds**

Pick & Choose, Pay for Channel Subscription(s)

Secured Synchronized Starting Line

Order Flow

**Volume ↑**
(1) Fairness ↑ # of participants
(2) ↓ unknowns ↑ transparency
(3) New econ opportunities spur by innovations/ patented tech.

**12-20 Algo or "Songs" per annum**

**20 Days' trade/ order sequence per month**

Trade Match

Share liabilities w/ Publishers if caused market chaos/ manipulation

Reach wider audience

**Exchanges** – → Online radios or cable TVs, timeless classics, big liquidity pool big royalty burden

**ATSs Dark Pools** – → Disney+ as an analogy for an established Bulge Bracket that also owns an ATS; Netflix

**Wholesalers** – → The broader the "catalog", the platform would pay a wider range of BDs artists in royalties.

**SDPs** – → Single Dealer Platforms/ Comm. Protocols; niche(s) may incl. profane content; Showtime

Non-Interactive

Interactive

**Immunity up to certain limit** – Passive distributors actively curate, moderate contents

FCA FINANCIAL CONDUCT AUTHORITY

**Catalog to disclose served segment(s)** – Whose order-flow typically stream on the platform

Different "streamers" based on who they want to serve, how many subscriptions they are going to get and determine whether to carry a broader or narrower "catalog", which align and address the economic viability of a constituent to exploit its economy of scope and/or economy of scale, hence weed out potential conflicts

Give average investors a fighting chance

TLE protects data from being decrypted prematurely



Accelerate process speed, savings from compression Optimize contents' richness, balance diverse interests

Machine learning A.I. shouldn't be exclusive to the elite groups.

Accelerate learning-curve: trade pattern recognition for every investor would enable the crowd to trade competitively

**Pareto Improvement** – Market efficiency gain

Rights | Obligations | Pass through | Liabilities

*By Kelvin To, Founder and President of Data Boiler Technologies*

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Picture the broker-dealers, and their algo developers/ traders as "record labels/ publishers", and "featured composers/ artists" in the music industry. "Streaming platforms" (trade venues, market centers) are exploiting on trading firms' worry that their trade algorithms or strategies may get exposed. Instead of paying for the use of others' intellectual property (trade strategies, order flows), 'streamers' can rent seek on market data and connectivity. Such phenomenon is like the coin collecting jukebox operators prior to the 70s.

We argue that for-profit exchanges / integrated conglomerates are operating a "Jukebox model" to extract rent, hurting all, but mostly the smaller players. Policy makers should consider Market Makers (MM), Alternative Trading Systems (ATSs)/ Multilateral Trading Facilities (MTFs), single dealer platforms (SDPs), and Exchanges as different streaming platforms in order to have the right focus. Letting these "streamers" divide the cake in "Animal Farm"[53] by selectively paying rebates and other perks to the elites hurts the other "content" creators.

Per Chris Steiner, *"Algorithms have come to rule our World"*. Many are using algo wheels. Reverse engineering to unveil others' trade secrets is inevitable. When risk cannot be fully mitigated, it is better to protect it via active monitoring. Tech advancement overcame the challenges in preserving the confidentiality of trade strategies through appropriate obfuscation, while rights to claim ownership of data by broker-dealers can be asserted.

Reckoning the above, it is possible to crossover apply the music sector's copyright licensing mechanism[41] to our Capital Markets. As illustrated in our diagram on page 12, order flows would be like "songs" streaming on different platforms. Broker-dealers would earn "performance royalty" on top of their trading revenue, whereas "performance royalty" in today's term would be equivalent to access fee rebates or PFOF, except the incentives being standardized and available to all "content" creators.

Using the prevailing rates in the music industry as a hypothetical case study, and assuming algo developers and traders play the role of "featured artists" for their respective broker-dealers or "publishers", 50% of performance royalty is allocated to the "publishers", 45% is allocated to the "featured artists", and 5% is allocated to the non-featured supporting team. Next, the agency trading, retail brokerage, order routers or other non-algorithm market participants to some extents are functioned like the "non-featured" musicians or "DJ mixing engineers"[54], which they typically earn the 5% in the music industry, and the remaining 95% would be a "pass through" payment to the original "content" creators. Unless the "**derivative work**" of a "DJ mixing engineer" is able to avert the original "song" or trade strategy into another new "song" (such as Exchange Traded Products, benchmarks and indices), their "remix" deems to be a "reproduction" or a "covered" song where they are compensated at 5% rather than the higher bracket of a "featured artist" at 45%.

In the case of agency trading, retail brokerage, order routers or other non-algorithm market participants, they function like the "DJ mixing engineers", where aggregating order flow upstream would record trade/ order sequence into songs daily. Their efforts as supporting team in songs production should get compensated with appropriate 'pass through'. If we picture the 'index providers', benchmark or 'model portfolio providers', pricing services or CRA as either 'Algo Publishing' (artists) or 'DJ Mixing Engineers' (aggregate and push upstream), it is not hard to see that their "derivative works"

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[53] https://www.linkedin.com/pulse/animal-farm-market-data-negotiate-more-equal-kelvin-to/
[54] https://djtechtools.com/2017/06/05/basics-dj-copyright-laws/

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may or may not have significant difference from the original "songs" or trade strategies. So, the deterministic factor is whether these CRAs, Benchmark Indices firms are artistic enough to "create" original "contents" that uniquely different from the underlying securities and the rivalries.

If not, they may be treated like the advisors or aggregators to earn the 5%, while they would NOT be held liable for the "contents" that they did not create, unless these firms knowingly are in cahoots with those engaged in manipulation, greenwashing of ESG securities, or other misbehaviours.

If yes, they command respect for their professionalism and they justified their earning of 45% instead of the 5% copyright royalty under our hypothetic model. Higher pay must accompany higher responsibilities to the society. Grouping them under "algo publishing/ index benchmark" category better reflects how they would become liable if their conducts might result in conflicts of interest, market chaos, or manipulation scandals.

Copyright Licensing Mechanism[41] is NOT a drastic change. It simply asks trading platforms to pay a wider range of broker-dealers, featured traders, algo developers in royalties if they shall choose to carry a broader "catalog" of whose order flows be streamed on their platform. This levels the playing field or "harmonizes" different trading platforms. Royalty rate setting is market driven. Calibration to mimic payoff behaviors like today is possible, so there will be a seamless transition to a new equilibrium.

Using Disney+ as an analogy for an established Bulge Bracket that also owns an ATS; they have their own Disney, Pixar, Marvel, Star Wars, and National Geographic contents for interactive streaming. Using Showtime as another analogy, they are a competitive interactive streaming platform. Their crafted niche is different compared to Disney+. Equity securities that are not NMS stocks, corporate bonds, or municipal securities may just need specialized streaming platform(s) like Showtime.

For a third analogy, there are the "non-interactive" platforms such as online radios or cable TVs, which we refer to them as the "Exchanges". In contrast to Disney+ and Showtime which are interactive, they serve the broadest audience while not having a "catalog". They may pay a substantial portion of all royalties, yet they represent the biggest liquidity pool in all markets. Participants would not see "cyberpunk" or any "obscene, indecent and profane" content given these non-interactive platforms are intensely regulated. Their contents include "timeless classics" rather than new first run blockbusters; they continue to be profitable.

Viacom CBS does have MTV, Comedy Central, Paramount Network and other interactive platforms under their group. This crossover of "non-interactive" with interactive" approach, or the earlier mentioned analogies have illustrated that existing vested interests, other encumbrances, and new entrants can all flourish under our recommendations. Viewers (investors) get more choices and better content.

Our suggested 'sound library'[55] would accelerate algo development lifecycle and foster creative discovery of unknown unknowns, [34] which can be anybody's game and make the market safer. Give average investors a fighting chance, and empower the next-gen to participate with fair-play TLE.[8] Our recommendations would grow the overall pie (see the next page), achieve Pareto improvement[46] for market efficient gain, and provide tremendous values for a sustainable development of our industry and the economy.

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[55] https://www.databoiler.com/index_htm_files/DataBoiler%20SoundLibrary.pdf

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Ameriprise
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NY Life
Prudential
Voya

**Asset Maximizers**

**Passive Management Zone**

Customization, segmentation

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Vanguard Asset Management
State Street Global Advisors
BNY Mellon Investment Mgmt.
Capital Group
PIMCO
Amundi
Legal & General Group
Franklin Templeton
T. Rowe Price
Wells Fargo
BNP Paribas
Northern Trust
Natixis Investment Mgmt.

*Tier 2:* Upward mobility to step up against Bugle Bracket

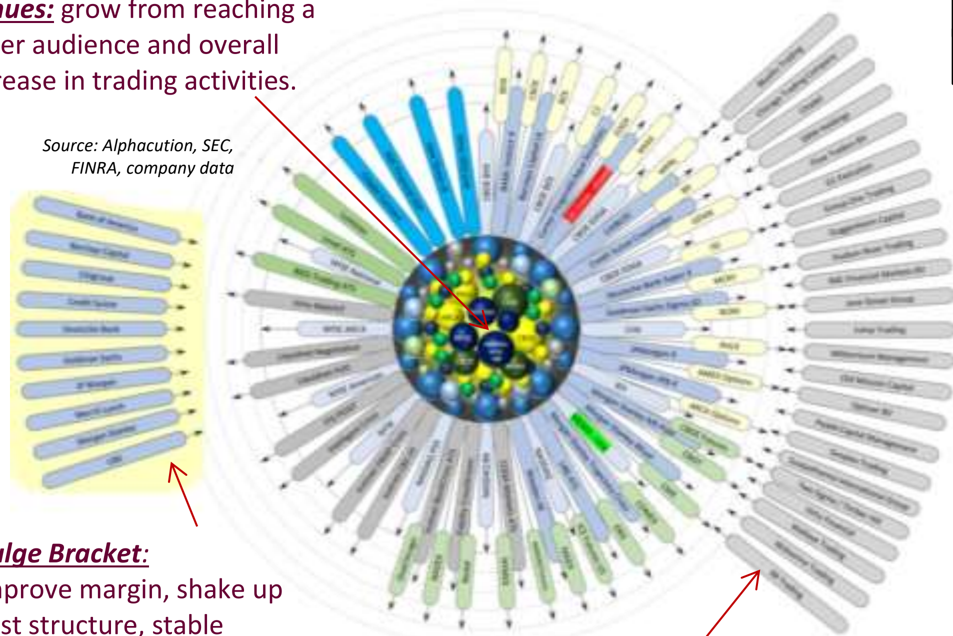
Make $ by unveiling new patterns of trade irregulars

**Performance Maximizers**

**Structural Alpha Zone**

***Venues:*** grow from reaching a wider audience and overall increase in trading activities.

*Source: Alphacution, SEC, FINRA, company data*



***Bulge Bracket:***
Improve margin, shake up cost structure, stable source of new revenue streams, less wastage in non-productive fights as in the warring states

***Market-Makers, Prop. Trading Firms:***
*Rather than sunk cost for algo-wheels that are no longer in use, license it out to earn 2nd profit, while licensees accelerate development + lower infrastructure cost for all*

Give investors a fighting chance
New ways to do trade analytics with community library of trade patterns would encourage market participations

**Retail Broker-Dealers**

**Client Management Zone**

Charles Schwab
Fidelity
E*Trade
Edward Jones
LPL Financial
Cetera Financial Group
Commonwealth Financial Network

Bridgewater Associates
Citadel Advisors
D E Shaw
Millennium Management
Point 72
Renaissance Technologies
AQR Capital Management
Two Sigma Investments

Rewards based on discovery of unknowns
It can be anybody's game

**Performance Optimizers**

**Active Management Zone**