



February 26, 2021

Via Electronic Mail (consultation-03-2020@iosco.org)

Mr. Giles Ward, Senior Policy Advisor
International Organization of Securities Commissions (IOSCO)
Calle Oquendo 12, 28006 Madrid, Spain

Re: A Public Comment on Market Data in the Secondary Equity Markets¹ (CR03/2020)

Dear Mr. Ward:

Data Boiler Technologies, LLC welcomes the opportunity to provide the IOSCO with our comments concerning issues relating to access to Market Data in the Secondary Equity Markets. Data Boiler is a pioneer in patented trade processing and analytic solutions. We have engaged with regulatory agencies in the U.S. and in Europe regarding market data infrastructure and related governance controls.² We applaud the IOSCO for taking steps to address this long-standing problem in a global scale, at around time the U.S. Securities and Exchange Commission (SEC) approved Rule 614³ in December 2020. At this turnkey moment, it may be beneficial to consider adopting any refined wisdoms/ lessons learnt out of the U.S. policy development experience; then, harmonize the international rules as suitable and tailoring the other Jurisdictions' rules to fill any gaps. So that the global market system collectively advances its goal to uphold the fair, reasonable, and non-discriminatory (FRAND) principle.

Two things we like to highlight about **the need for consolidated data** when securities are trading on multiple trading venues:

- (1) Markets exist for the purpose of delineating securities ownership rights in the most efficient way at the lowest possible cost. Without a transparent market, bi-lateral/ multi-lateral dealings typically take a longer time to transact in a less protected environment, resulting in contentious fights that are a detriment to economic development.
- (2) Market data reform should be about the divergence between private and social costs.⁴ Data ownership rights do not mean usage of private property without restrictions; policy makers should discourage constituents from inflicting damage on others ('rent seeking' behaviors⁵), or ecosystem degradation⁶ that works in counter to point (1).

Per our May 2020 comment letter⁷ to the SEC, we pointed out that the electrified of the U.S. equity market with the National Market System (NMS) had attributed to tremendous improvements in market efficiency. This in turn, lowered transaction costs in the last decade and a half. We also feel blessed about the resiliency of our marketplaces amid the Coronavirus lock-down. Yet, the old NMS plan over emphasized speed as a key to trading success⁸ and its inadvertent

¹ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD667.pdf>

² https://www.databoiler.com/index_htm_files/DataBoiler202012.pdf

³ <https://www.sec.gov/rules/final/2020/34-90610.pdf>

⁴ <https://iea.org.uk/wp-content/uploads/2016/07/THE%20MYTH%20OF%20SOCIAL%20COST.pdf>

⁵ Market data price increases serves no wealth creation or capital formation purpose for the overall economy. It is a 'rent-seeking' behavior of the exchanges, and an added cost to market participants. Problem of 'rent-seeking' behavior as pointed out by an empirical research – [Sale of Price Information by Exchanges: Does it Promote Price Discovery](#) – “Exchanges optimally restrict access to price information by charging a high fee so that only a fraction of speculators buy their proprietary products.” Would that constitutes as unreasonably, unfair and/or discriminatory?

⁶ <https://www.sec.gov/comments/4-757/4757-8038490-225613.pdf>

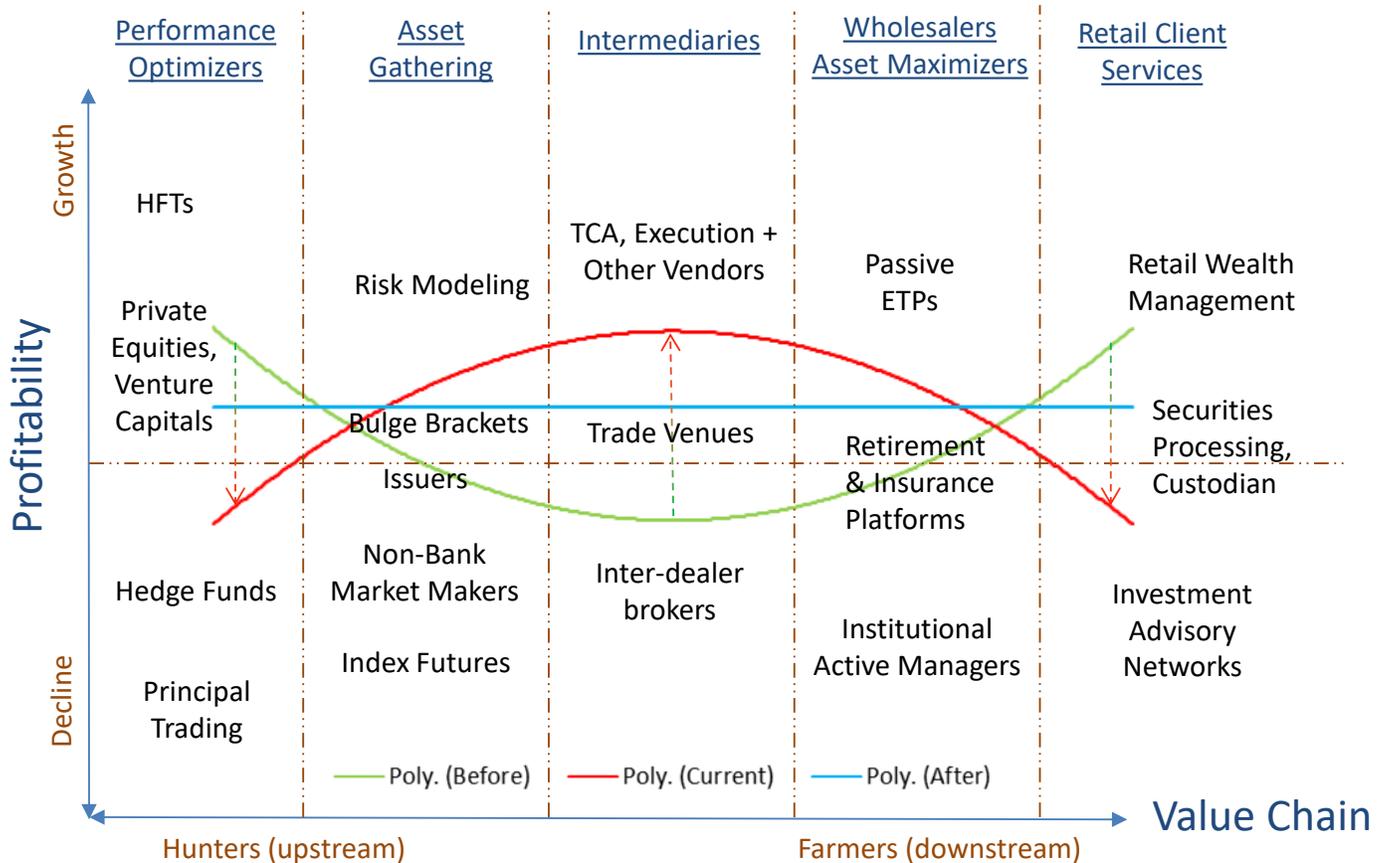
⁷ https://www.databoiler.com/index_htm_files/DataBoiler%20SEC%20Market%20Data%20Infrastructure.pdf

⁸ <https://www.sec.gov/news/speech/2014-spch060514mjw>



consequences (e.g. access fee rebate controversy⁹, the fairness issue, plateauing of cost reduction, etc.) have reached a critical point, where the ecosystem’s equilibrium must shift again.

The market data issue on hand is like the **Animal Farm**,¹⁰ i.e. every constituent wants to negotiate to be “more equal”. Per our November comments to the SEC,¹¹ we used the **smile curve** (a graphical depiction of an **industry’s value chain**) to objectively and holistically assessed and explained the impending market phenomena. Allow us to re-share the illustrating figure below (please refer to [Appendix I](#) for our substantiation of this analysis).



The **green line** above represents the time before digitization disrupted the inter-dealer brokers’ floor based trading model. The **red line** represents today’s structure of a pure speed “drag race”. A healthy industry should have, any significant market reform ought to look at the curve in a U-shape. The beginning (the rarely found strategies/ engineering skills/ intellectual properties) and the tail-end (multi-facets fulfillment/ services/ user experience) of a smile curve are supposed to command the highest values-added than the middle part (assembly/ matching/ intermediate). The emphasis is: respective constituents along the value chain should be able to earn profits in accordance to value they contribute. Unfortunately, our capital markets’ smile curve has turned into a frown, an upside down U-Shape.¹²

Exchanges as for-profit companies no longer enjoy their ‘**economy of scale**’. They relied on ‘**economy of scope**’ to discover new revenue streams. When the market is a “drag race” overemphasizing speed, it causes a ‘swell up’ in the middle part

⁹ https://www.databoiler.com/index_htm_files/DataBoiler%20FeePilot610%20Comments.pdf
¹⁰ <https://www.linkedin.com/pulse/animal-farm-market-data-negotiate-more-equal-kelvin-to/>
¹¹ https://www.databoiler.com/index_htm_files/DataBoiler%20SEC%20Market%20Data%20CTPlan.pdf
¹² <https://www.linkedin.com/pulse/smile-curve-changes-securities-value-chain-evolves-kelvin-to/>



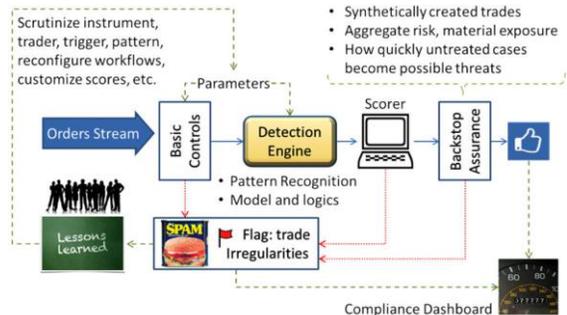
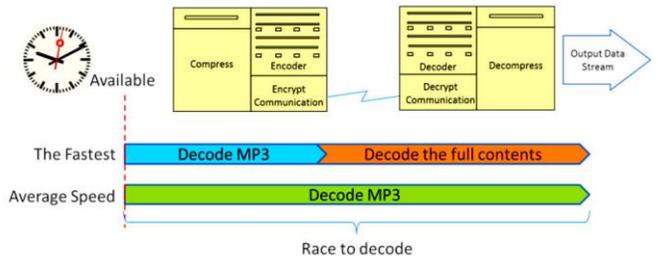
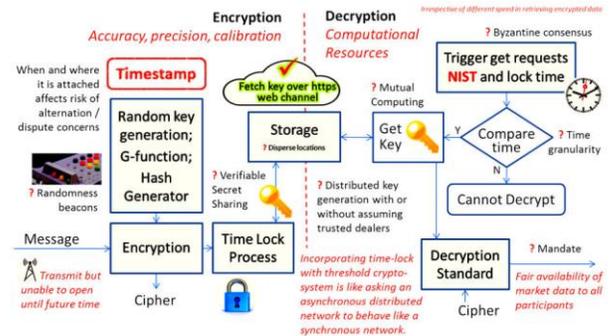
of the smile curve. One must rely on many liquidity sourcing, execution services, transaction cost analyzer and other tools to navigate in the fragmented markets. Indeed these all become **barriers of entry**. Over time, many fled the market,¹³ some undergo consolidation, and more seek ties with trading venues and other players in the market causing a convolution of rebates and potential conflicts of interest. If this market structure problem is not addressed as a **top priority now**, it will exacerbate the further “frowning” of smile curve.

Our suggestions to “flatten” the frowned smile curve (i.e. the blue line) and return to a more healthy industry’s value chain, consist of an injection of **innovative technologies to spur new economic opportunities**. For that, we advocate for:

(a) Using time-lock encryption (TLE) to make market data available securely in synchronized time¹⁴ (rest assured this is not another speed bump; TLE is a method to encrypt data such that it can only be decrypted after a certain deadline has passed. The goal is to protect data from being decrypted prematurely – cybersecurity of real-time market data must be protected¹⁵);

(b) Policy makers should require trading venues to maintain a maximum connectivity disparity ratio (e.g. of 2.5 times) and give the Regulated Data Provider (RDP – the public consolidated feed) the fastest connection to ensure core data evolves along with the broader ecosystem¹⁶. So, instead of racing on ever faster microwave,¹⁷ laser,¹⁸ or quantum¹⁹ techs, those who subscribe to the RDP public feed with the “extra-hop” would have a reasonable chance to catch up via RDP streaming of a higher compressed ratio core data.

(c) Democratize technologies (see Appendix II) so that different constituents may realign incentives based on the information value they contribute versus extract in the market, as well as add new incentives based on firms helping the market to reduce “unknown unknowns”,²⁰ such as deciphering the GameStop phenomena,²¹ early warning to prevent a flash crash,²² etc.).



¹³ http://public.econ.duke.edu/~boller/Econ.471-571.F18/Hedge_Funds_Retreat_WSJ_100818.pdf

¹⁴ <https://www.linkedin.com/pulse/market-data-available-securely-synchronized-time-kelvin-to/>

¹⁵ <https://www.sec.gov/comments/s7-03-20/s70320-7229975-217069.pdf>

¹⁶ <https://www.sec.gov/news/speech/clayton-redfearn-equity-market-structure-2019>

¹⁷ https://www.six-group.com/exchanges/participants/participation/connectivity/microwave_network_en.html

¹⁸ <https://www.quora.com/Why-is-laser-communication-faster-than-microwave-or-radio-communication>

¹⁹ <https://windowsontheory.files.wordpress.com/2017/06/cnsa-suite-and-quantum-computing-faq.pdf>

²⁰ <https://www.pmi.org/learning/library/characterizing-unknown-unknowns-6077>

²¹ https://www.linkedin.com/posts/kelvin-to-9125955_gamestop-activity-6761047933476499456-wLy

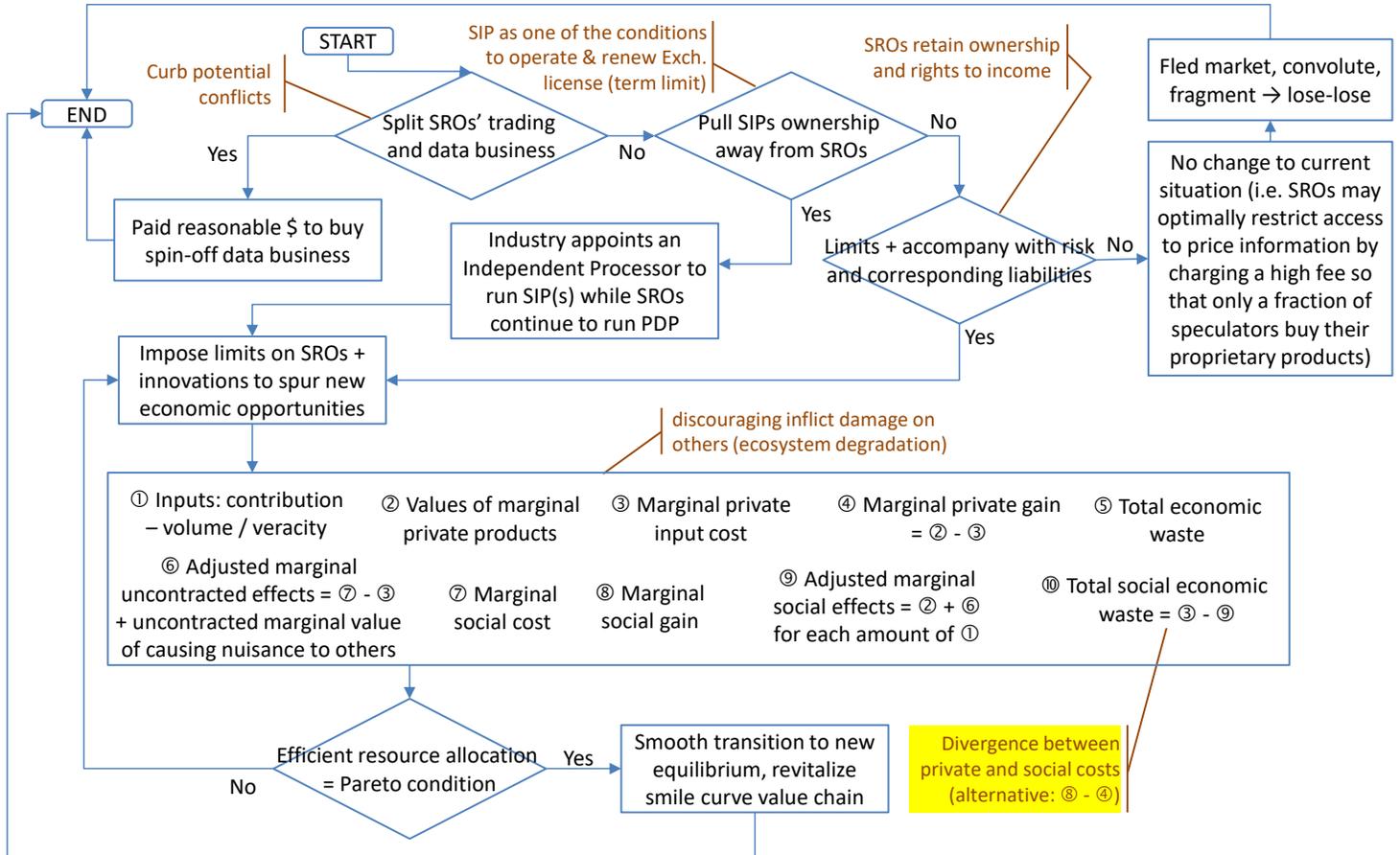
²² <https://youtu.be/dlq16IZBnDY>



We envisage the value-chain dynamics would build upon our idea of “grow the pie”. The premises of growth will not be just about expanding core data contents, but also:

- (i) **Reducing** inequality, complexity in a fragmented market, encouraging participation in the market, advancing trade modeling techniques, and in turn, reducing the amount of unknown unknowns in the market;
- (ii) **Eliminating** conflicts of interest, latency gap, gaps in trading skills between the professional/ institutional and non-professional/ retail, the gap in accessing A.I. or other sophisticated tools between the ‘haves’ and ‘haves not’;
- (iii) **Raising** the standards in streaming data, recognizing patterns, learning/ unlearning/ relearning the new era’s stock valuation/ price discovery/ surveillance and trade control approaches;
- (iv) **Creating** second profit opportunities, so that it’ll be worthwhile to discover hidden trade patterns and gauging the right market timing even though the related alpha may be short lived due to latency arbitrage (this can be achieved through creating new/ reshuffling existing incentives, nurturing the next-gen investors whom are accustomed to a crowd and shared economy, etc.)

To achieve a new equilibrium in the market (i.e. ‘Pareto condition’ – a state where it is no longer possible to re-allocate the use of resources so that one individual will gain without loss to another), policy makers should consider **weeding out potential conflicts, discouraging constituents from inflicting damage on others or ecosystem degradation**. Please see below flow-diagram and Section E of our November 2020 comment letter¹¹ to the SEC regarding our assessment of the divergence between private and social costs in the U.S. market.



In the following sections, we'll response to specific questions raised by IOSCO.

Defining Core Market Data

Q1: Please identify the data elements that are necessary for investors and/or market participants to participate effectively and competitively and make informed trading decisions in today's markets. In your response, please consider:

- The type of investor (e.g. retail or institutional) that uses the data;
- How orders are sent to a trading venue (e.g. electronic, manual, direct access by clients; and
- How orders are routed

Please provide the reasons why each element is necessary.

We think the core data as defined under the U.S. Market Data Infrastructure Rule³ may be a good starting point, so that investors around the world would have harmonized experience wherever and whenever they trade. Obviously the desire for more and more data would have no end. Please be reminded that “no fish can swim when the water is too clear”, letting arguments between trading venues and the industry to proliferate harms the advancement of market. The U.S. definition of core data (including first five price levels of depth-of-book, odds lots, and auction information) have already gone through intensive debates to hash out balance (if not the perfect balance) between due respect of Exchanges' private property rights over market data and RDP serving public interest.

Other than the expanded core data, we would argue that what the industry and investor communities lacked the most are upgrades to their risk measurements. Value-at-Risk (VaR) have been fully automated and widely used throughout the industry for decades. Yet, despite understanding of the shortcomings of VaR (e.g. overfitting model, not able to tell when, not situational) and more advanced models²³ being developed in recent years. These newer techniques, agent based models, A.I. machine learning, etc. are often being employed only by elite players. If the “haves not” do not have access/ cannot afford these techniques/ measurements, then it would be like driving without the brake pedal. To make the market more equitable, appropriate democratization of these techniques/ measurements would help narrow the gap between the “haves” and “haves not” for a safer and sounder market benefiting everyone.

Q2: Are there other data elements that, while not necessary to all market participants, may be necessary for some market participants or business models? Please provide the reasons for your answer.

If there are other data points the public would like to ask for, then we will say the long holding disclosure in Form 13F and short interest data disclosed in aggregate to FINRA in the U.S. should be revisited and make it more timely available²⁴ in view of the GameStop phenomena.²¹

Regarding non-public data elements, we think Market Makers would need to subscribe to Exchanges' proprietary feeds anyway. There are currently so many Market Makers, is their existence merely to not miss out on market intelligence as compared to their competition, or are they truly performing the market making function – i.e. providing liquidity in both good and bad times? In our humble opinion, the current market structure sided with top-tier market makers. Tier 2 market makers face a hard time to survive unless they match up on order flow rebates and join the (or form separate) inner-circle. One would never be satisfied if they know others have “market maker” information but do not bear market making responsibilities. It is the accountability and interdependency of different constituents to perform their suitable roles in the market, rather than the data elements per se being the root of the problem.

²³ <http://repository.essex.ac.uk/21296/1/Convolutional%20Neural%20Networks%20Applied%20to%20High-Frequency%20Market%20Microstructure%20Forecasting.pdf>

²⁴ <https://www.nasdaq.com/articles/the-lowdown-on-high-flying-stocks-2021-02-18>



Q3: Please share your view on defining Core Market Data and how such a definition can be used (for example, for compliance purposes or as a mechanism to make routing decisions, etc.).

Securities Information Processor (SIP) in the U.S. lack behind in both latency and contents to the proprietary feeds. Many are currently subscribing to the SIP for compliance purpose only, while their trading algorithms and order routing decisions are based on the Exchanges' proprietary feeds. If policy makers want to regulate the market data space to enhance the creditability of information in equity markets and attempt to lowering the market data cost for subscribers, then holistic assessments of the followings would be prudent:

- Whether the expected positive effect from breaking up RDPs' alleged monopoly/ oligopoly would be sustainable in the long-term, or would it only yield a short-term relief that the status quo remains unchanged?
- Would RDPs exploit the disparity between core data and proprietary products, and/or the rich may be allowed to access connectivity that is not reasonably affordable to average investor?⁵
- Would demand for non-core data be inelastic, so trading venues may exploit disparity between non-core and core data (e.g. raise price on level 2 depth-of-book, OTC, non-equity data in the U.S.) to recover loss profits?
- Given that the trading venues' proprietary feeds may consist of core and non-core data, where is the bright-line that redistributors of such don't fall within the RDP regime, or is it that all redistributors must be regulated under RDP regime when "publicly" sharing any subset of core-data in either consolidated or non-consolidated format?

Uses of Market Data

Q4: How is market data used by different types of investors or different functions of your firm? Consider, for example:

- Type of investor (e.g. retail or institutional)
- Trading Desks (proprietary or client-servicing including retail and institutional), Institutional, proprietary)
- Compliance
- Risk-Management
- Back office functions

Retail versus Institutional, this inadvertently created a 2 Tier market. Payment for order flow as a subsidy to encourage retail participating in the market would only work up to a certain optimal point. It introduces implicit conflicts in that a broker may not act in the best fiduciary interest of its clients when routing client orders to whoever can provide the broker the highest rebates/ incentives. While we acknowledge that "one size does not fit all", policy makers considering renewal of market structure should design the markets so that it will provide incentives to eliminate gap in trading skills between the professional/ institutional and non-professional/ retail, eliminate latency gap, eliminate gap in accessing A.I. or other sophisticated tools between the 'haves' and 'haves not'.

Q5: What impact does different uses have on the need to access data? How can these impacts be managed or addressed?

Every function asks for slightly different information but it should all be easy and vastly available for anyone to assess. Trading desks are all about "market-timing"; portfolio trading versus high-frequency arbitrage may look at such timing differently (second versus nanosecond). If one cannot sequence trade activities properly, one would have difficulty identifying trade irregularities. How does risk-management, compliance, and back office when not looking at the same information and only relying on daily VaR to determine control limits (see second paragraph of our response to Q1). To correct such unsafe and unsounded practice, policy makers should mandate any firms that conduct high-frequency trading must use corresponding surveillance/ trade controls enforcement mechanisms that operate at the same speed.



Access to Market Data

Q6: What factors should be considered in the context of evaluating “fair, equitable and timely access”? How should these factors be considered?

We agree that differences in product type, means of distribution, access technology requirements, fee charged for market data, and geographic location are factors to be considered in the context of evaluating “fair, equitable and timely access”. Yet, among which, the most important of all is the “access”.

Collocation²⁵ ≠ Latency Equalization (LEQ)²⁶ ≠ Market Data Available SECURELY in Synchronized Time using TLE¹⁴

It is a shame that even online gaming industry uses LEQ/ TLE, while electrified markets adopt a lower standard. Geography latency and/or any “extra-hop” disparity can be addressed via TLE. As mentioned earlier, rest assured that time lock encryption is not another speed bump; TLE is a method to encrypt data such that it can only be decrypted after a certain deadline has passed. The goal is to protect data from being decrypted prematurely.

Academia concurs that cybersecurity of real-time market data must be protected.¹⁵ It is similar to the labor statistics provided by the U.S. Bureau, the information is time sensitive, disseminating it in an insecure and non-synchronized time may lead to unfair advantage, or what we refer as “benchmark reference price arbitrage” due to multi-National Best Bid Offers (NBBOs) in the context of capital market. Do keep in mind that diversified trading venues rely on a de facto NBBO to work collectively as one to effectively delineate securities ownership rights in the most efficient way at the lowest possible cost in order to best serve the market needs. Although the U.S. SEC believes that the multi-NBBOs situation is non-novel or insurmountable, but we think a pan-European best bid-and-offer price may benefit the broader broker-dealers community around the World, given the European markets are uniquely positioned in between the U.S. and Asia time zones. Per our January 2021 comments to ESMA²⁷, by adopting a single securities information processor (SIP) approach in Europe and creating a de-facto reference price (rather than replicating the U.S. Decentralized Consolidation Model (DCM) per U.S. SEC rule 614 of multiple NBBOs calculated by different competing consolidators), it would positively differentiate and strengthen the European markets and enhance the price discovery process in the global ecosystem.

Q7: What types of access do trading venues and RDPs provide? Are some forms of access provided only to specific market participants?

Reference to an empirical research – “Sale of Price Information by Exchanges: Does it Promote Price Discovery?” by Giovanni Cespa and Thierry Foucault, it confirmed that, “Exchanges optimally restrict access to price information by charging a high fee so that only a fraction of speculators buy their proprietary products.”⁵

²⁵ 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 as of last year, [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.

²⁶ “Under Articles 48(8) and (9) of Directive 2014/65/EU in MiFID II, trading venues are required to provide “transparent, fair and nondiscriminatory” collocation 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.

²⁷ https://www.databoiler.com/index_htm_files/DataBoiler%20ESMA%20Market%20Data.pdf



Q8: Please identify the type of access necessary for different investors and/or market participants to participate and make informed trading decisions in today's markets and the rationale for the type of access and identified differences. In your response, please consider:

- Type of investor (e.g. retail or institutional)
- Trading Desk (Proprietary or client-servicing including retail and institutional)
- How orders are sent to a trading venue (e.g. electronic, manual, direct access by clients)
- Order routing
- Business models
- Compliance and regulatory issues

Please refer to our response to Q4 and Q5.

We are aware that even the same category of constituent, for example dark pools (alternate trading systems, ATSS) in the U.S., their choice for subscribing to Exchanges' proprietary feeds, the public SIP feed, or a mix of both may vary depending on their size/ business practices.²⁸ What may be considered as "necessary" would likely not be universal. Yet, we urge policy makers to mandate any firms that conduct high-frequency trading, match trades, or execute orders in microsecond granularity must be accompanied with corresponding surveillance/ trade controls enforcement mechanisms operate at the same speed.

Just another point we like to add, some market participants focus on trading during opening and/or closing hours, some focus on a subset of blue-chip or thinly traded securities, etc. Current market data subscriptions offered by Exchanges are on a monthly basis rather than customized to these needs. This may be an area of improvement to allow for more choices and possibly some savings to the subscribers.

Q9: What issues or concerns arise in the context of fair, equitable and timely access to market data?

Ecosystem degradation happens when damage is **inflicted on others**. Such damage can be in form of delayed access to information by subscribers of the public SIP feeds while unreasonably priced Exchange proprietary data products (PDP) optimally allow access⁵ to only by few elite players. It can also take the form of under developing the public SIP feeds in favor of self-interest to promote PDP. Ecosystem degradation can also result in high **barriers of entry**, in which one must rely on certain tools (e.g. smart order routers, transaction cost analyzers, liquidity/ execution services) to have reasonable chance to survive in the market. Damage onto "others", may also refer to **uncontracted marginal value of the adverse effects that turn into nuisances that affect the general public** with no direct stake in the US equity market (e.g. foreign/ private markets, OTC, option, futures, and derivatives trades, as well as academia).

Please refer to page 3 of this letter regarding our suggestions to improve the fairness, equitable and timely access to market data.

Interchangeability

Q10: Please share your view on interchangeability of market data between trading venues. If concerns are identified, please provide suggested mechanisms to address them.

Again, reference to an empirical research – "Sale of Price Information by Exchanges: Does it Promote Price Discovery?" by Giovanni Cespa and Thierry Foucault, it confirmed that, "Exchanges optimally restrict access to price information by charging a high fee so that only a fraction of speculators buy their proprietary products."⁵ We think the U.S. NMS's goal

²⁸ <https://www.nasdaq.com/articles/dispelling-the-complementary-product-theory-for-market-data-2020-08-20>



should be having diversified trading venues **working collectively as one** to best serve the market needs in an effective, fair, and non-discriminatory way to delineate securities ownership rights in the most efficient way at the lowest possible cost. There may be opportunity to use our patented propagation approach to **let Broker-Dealers NOT connect with all trading venues and still achieving “BestEx”** technically. But it is all up to the Exchanges to decide how they would best handle Intermarket Sweep Orders. Getting them into a **consensus is the biggest challenge**.

“Same manner same method” as required by the U.S. Market Data Infrastructure rule³ appears to be an improvement from the old Rule 603(a) that said, “transmitting or releasing data no sooner than to a Network processor (SIP)”. Unfortunately, it would not enable market data about securities traded on a particular venue to be substituted by, or be “interchangeable” with, market data about the same securities traded on another venue. The U.S. SEC new requirement “prohibits a Self-Regulatory Organization (SRO) from making NMS information available to any person on a more timely basis”, and the concept of “make available” incorporates the requirements of latency neutralization. To achieve this requirement, we advocate the use of time-lock encryption (TLE) to ensure no premature decryption of data. Yet, we await clarification on whether making core data available to a machine is the equivalent to making it available to a person. If yes, and the scope of “same manner same method” are covering from point of transmitting to the point of Competing Consolidators or Self-Aggregators or Proprietary Feeds Subscribers receiving the data are in synch, then it deserves the merit of improving the fairness, equitability and timely access of market data. If the scope merely refers to a “standard price list” offer by the Exchange, then it will not solve the problem of “Exchanges optimally restrict access to price information by charging a high fee so that only a fraction of speculators buy their proprietary products”.⁵

Fees Associated with Market Data

Q11: How should market data fees be assessed? How could this be implemented in practice? What factors should be considered and how can they be defined or applied?

Market data provisioned on the basis of costs is impractical. In the past, two U.S. Exchanges (IEX²⁹ and NASDAQ³⁰) had provided drastically different pictures on their respective market data costs. We are concerned that there is not a cost basis accounting method that would settle the industry's disputes and disagreements. Regulators should refrain from prescribing a commercial pricing scheme for private entities. Private entities should be permitted to freely set its own price and bundle their products as long as the practice does not inflict damage on others and there is no violation of FRAND principle/ anti-trust rules. Yet, there is no FREE lunch. One may use its economy of scope to solicit revenues from other sources to cover the cost of any free product offer. Exploitation of economy of scope may trigger potential conflicts of interest situations. Market data reform involves the divergence between private and social costs. The measurement of social costs is an economic problem rather than a technical accounting matter.

Please see page 4 of this letter and Section E of our November 2020 comment letter¹¹ to the SEC for our recommended framework alternate to cost basis accounting method to guide the appropriate delineation of data ownership rights and suggest essential limits on how data may be used. It will help avoid trading venues from inflicting potential damage on others (others may refer to it as the 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). Please see pages 2-3 regarding the industry's value chain smile curve¹² which policy makers should consider how market data reform may have different impacts to different constituents and the general public.

²⁹ <https://iextrading.com/docs/The%20Cost%20of%20Exchange%20Services.pdf>

³⁰ <https://www.sec.gov/comments/4-729/4729-4560081-176209.pdf>; <https://www.nasdaq.com/articles/is-free-fair-to-all-2019-01-29>



Connected Services

Q12: Please provide details of other products or services related to market data that are provided by trading venues or other RDPs.

The following standards stated by IOSCO are synchronized with what we observed in North America and Europe markets:

- market data is made available on a “reasonable commercial basis”;
- the fees do not impose an unreasonable condition to accessing the data;
- the fees do not permit unreasonable discrimination among clients, issuers and marketplace participants;
- the fees do not impose a burden on competition that is not reasonably necessary and appropriate; and/or
- the fees are reasonably related to the costs of producing the data.

What constitutes as “commercially reasonable” may be difficult to determine from a pure accounting perspective, but adding a preceding condition of “subject to competitive forces” may help. Moreover, economics have well-established approaches to solve this kind of challenge. Please refer to page 4 of this letter and Section E of our November 2020 comment letter¹¹ to the SEC regarding our assessment of the divergence between private and social costs.

Regarding the other products or services related to market data that are provided by trading venues or other RDPs, please refer to Exchanges’ publicly disclosed price lists.³¹ In general, there are the following types of charges:

- 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 oversights 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 analysis³² conducted by the Security Industry/Financial Market Association (SIFMA).

Q13: Please share your views on the fees for connected services that are necessary to access essential market data. If concerns are raised, please identify mechanisms to address them.

Please see pages 1 to 4 of this letter (our suggestions are stated on pages 3). In our opinion, mandate the use of time-lock encryption (TLE) and enforce a maximum connectivity disparity ratio to give everyone a secure and synchronized start line, which prevents ‘tapping the wire’ issue. Some market participants may still want to do colocation for advantage in entering trade orders (analogy of Thomas Peterffy’s robotic arms/ keyboard). Our goal is NOT about completely denouncing ‘speed’ as one of the positive attributes to a resilience modern market ecosystem. We realign the 4Vs³³ for purpose of a healthier ecosystem. The overall pie will grow based on an increase in trade volume, easier to trade and discovering liquidity at lit venues, better price and more depth for everyone, lower transaction cost (due to less reliance on unnecessary tools), and the market would be safer as the number of unknown unknowns will be reduced. In terms of

³¹ www.nyse.com/publicdocs/nyse/data/NYSE_Market_Data_Pricing.pdf; www.nasdaqtrader.com/Trader.aspx?id=DPPriceListAll;

³² <https://www.sifma.org/wp-content/uploads/2019/01/Expand-and-SIFMA-An-Analysis-of-Market-Data-Fees-08-2018.pdf>

³³ <https://www.ibmbigdatahub.com/infographic/four-vs-big-data>



governance of RDP fees (or the CT Plan³⁴ in the U.S.), we hope there will be broader representation beyond the SROs. Ideally, the governance committee/ industry representative group should NOT be a “private party” among the exchanges and/or the top elite firms. We do not want existing encumbrances’ interest be placed above the public interest. Tier 2 or 3 firms in respective sectors of the value chain smile curve should also have appropriate says in this critical/ industrywide decision making process. Also, vendors/ service providers may help to bring-in the practical perspectives into the governance board. In addition, there may be a miscellaneous category to encompass 1 to 2 representatives from stakeholders, such as the academia, public interest observers, veteran industry gurus/ those previously fled the market and/or potential new entrants.

Data Consolidation

Q14: Please provide your view on the need for consolidated data where there are securities trading on multiple trading venues. What should be the primary objectives of consolidated data and what outcomes should it lead to? How should these objectives and outcomes inform the nature of the consolidated data made available?

As mentioned on page 1 of this letter, two things we would like to highlight regarding **the need for consolidated data** where there are securities trading on multiple trading venues:

- (1) Markets exist for the purpose of delineating securities ownership rights in the most efficient way at the lowest possible cost. Without a transparent market, bi-lateral/ multi-lateral dealings typically take a longer time to transact in a less protected environment, resulting in contentious fights that are a detriment to economic development.
- (2) Market data reform should be about the divergence between private and social costs.⁴ Data ownership rights do not mean usage of private property without restrictions; policy makers should discourage constituents from inflicting damage on others (‘rent seeking’ behaviors⁵), or ecosystem degradation⁶ that works in counter to point (1).

The prior concerns about the latency inherent in consolidating and transmitting consolidated market data and whether such latencies render existing consolidated data models inadequate for trading competitively in today’s markets, indeed can be addressed by our suggestion to use Time-Lock Encryption (TLE) in making market data available securely in synchronized time. Again, rest assured that TLE is NOT another speed bump; TLE is a method to encrypt data such that it can only be decrypted after a certain deadline has passed. The goal is to protect data from being decrypted prematurely.

Regarding the cost of the consolidation, it is very affordable and cheaper than the continuous rise in proprietary data and connectivity costs charged by RDPs or any self-aggregating efforts (because fixed cost can spread across a larger base of consumers, and if we at Data Boiler can enable, for example 10G subscribers to have 25G connectivity experience through higher data compression ratio, then it will yield additional savings for the industry).

If policy makers intend to regulate the market data space, it would enhance the creditability of information by imposing certain accuracy and integrity standards of the consolidation, as well as imposing requirements similar to the U.S. SCI rule³⁵ to ensure the integrity and reliability (including business continuity) of the systems of the consolidator.

Different jurisdictions may favor different models for consolidated data. In the U.S., the December approved rule³ is for a Decentralized Consolidation Model (DCM) with multiple Competing Consolidators (CCs). It may be beneficial to consider adopting any refined wisdoms/ lessons learnt out of the U.S. policy development experience; then, harmonize the

³⁴ <https://www.sec.gov/rules/sro/nms/2020/34-90096.pdf>

³⁵ <https://www.govinfo.gov/content/pkg/FR-2014-12-05/pdf/2014-27767.pdf>



international rules as suitable and tailoring the other Jurisdictions' rules to fill any gaps. So that the global market system will collectively advances its goal to uphold the FRAND principle.

Q15: Is a consolidated data feed the most efficient mechanism to achieve these objectives and outcomes? If not, what are the alternatives that could help achieve these objectives and outcomes? How do these alternatives affect the cost of and access to market data? How can they be addressed?

Recognizing that stock exchanges have in the past suggested a “distributed (single) SIP model” in the U.S., in which the model would mean “multiple instances of the SIP would exist at key financial data centers where each SIP would independently disseminate a consolidated NBBO, quotation and last sale information, and other important regulatory information.”³⁶ The U.S. SEC ultimately decided on DCM in the December 2020 approved rule. We indeed think the pan-European markets do not necessary have to adopt DCM, but create a single SIP with TLE and enforcing a maximum connectivity disparity ratio may yield better performance and cost savings (assuming the single SIP in Europe can be created as a public utility non-profit entity). Again, per our response to Q6 and our January 2021 comments to ESMA²⁷, a pan-European best bid-and-offer price as a de-facto reference price may benefit the broader broker-dealers community around the World, given the European markets are uniquely positioned in between the U.S. and Asia time zones. After all, jurisdictions should adopt best practices as suitable and tailoring rules to fill any gaps in the global ecosystem. Collectively overhauling and advancing the market data infrastructure is a worthwhile investment which will have lasting positive impacts for generations to come.

Other Remarks and Conclusions

Q16: Please describe any issues or concerns not raised by IOSCO in this Consultation Paper and describe any suggested mechanisms to address them.

Be skeptical of those who advocated for “Service Indirection”³⁷ (they suggest that “the services could wrap different levels of functionality, such as existing SIP and depth, including future functionality such as distributed SIP, snapshots and conflation”).³⁸ While we echo the desire for faster evolution and less client impact we are uncertain if the path as prescribed achieves the needed cure. We do understand “indirection” or “dereferencing” as way to multi-task in computing. That being said, real-time market data should still reference to an atomic clock (e.g. NIST) in order to make market data available securely in synchronized time.¹⁴ Regardless of wireless connection or ports for different proprietary feeds, or SIPs, they should all have time-lock encryption to make sure no premature decryption of data.

Besides, “wrap” may merely mean adding a header or trailer to SROs' data feeds to state which Exchange this feed is originally sourced from, before passing downstream to a subscriber or SIP user. That is one of the easiest and cheapest ways for an aggregator to pass a message from one hand to another. However, end-users would incur substantial costs before they can actually use this data.

We care about the end-users' experience and wellness of our industry value-chain¹². Telecom industry leaning middlemen do not necessarily have the best interest for our capital market. They are intermediaries between suppliers and users, adding a layer of cost to the overall system. Be mindful of their self-serving interest.

Blindly believing in competition using microwave¹⁷, laser¹⁸, and quantum¹⁹ technologies is naïve, the resulting effect only exacerbates the gap between the “haves” and “haves not”. Besides, quantum computing may require a different ‘brake

³⁶ <https://www.tradersmagazine.com/news/a-letter-from-the-sip-chairman/>

³⁷ <https://tabbforum.com/opinions/retooling-the-nms-sip-market-data-universe/>

³⁸ <https://www.sec.gov/comments/s7-03-20/s70320-7489141-221756.pdf>



paddle’ for secure market data encryption.³⁹ If the market remains a “drag race”, the rich will access connectivity that is not reasonably affordable to the average investors.

Below table describes the “should” and “should not” about this Market Data reform:

It is about	It is <u>NOT</u> about
divergence between private and social costs	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

It is a shame that even online gaming industry uses LEQ/ TLE, while electronified markets adopt a lower standard. There are a lot of good lessons learnt from the music industry. When shaping a new 2.0 version of Secondary Equity Markets ecosystem globally, it should be a full-fledged exercise like the U.S. Music Modernization Act,⁴⁰ which governs digital streaming and related copyrights and royalties issues for the music industry. What the industry needs right now is a renewal of FRAND and to make equity market interesting again with true innovations! It would attract new money into the ecosystem. For that, we have shown the high-level mock-up model/ framework towards a positive reform and transition to a new equilibrium. We hope the above comments will be helpful to the IOSCO and benefiting to the broader industry. Feel free to contact us with any questions. Thank you and we look forward to engage in any opportunities where our expertise might be required.

Sincerely,

Kelvin To

MSc Banking, MGMT, BSc

Founder and President

Data Boiler Technologies, LLC

cc: The Honorable Mr. Ashley Ian Alder, SBS, JP. Chair of the IOSCO Board
The Honorable Ms. Allison Herren Lee, Acting Chair, SEC / Presidents Committee, IOSCO
The Honorable Mr. Paul P. Andrews, Secretary General

This letter is also available at:

https://www.DataBoiler.com/index_html_files/DataBoiler%20IOSCO%20Market%20Data.pdf

³⁹ www.zdnet.com/article/quantum-computing-may-make-current-encryption-obsolete-a-quantum-internet-could-be-the-solution/

⁴⁰ <https://www.congress.gov/115/bills/hr5447/BILLS-115hr5447rds.pdf>



Appendix I – Smile Curve Supporting Analysis

• 5 Sectors in value chain – A, B, C, D, E • Each Sector has 3 Sub-Sectors (e.g. A1, A2, A3...) • Different categories of constituents rely on different information advantage, economy of scope and economy of scale to earn its profits • # before decimal point shows force ranking of Sector • # after decimal point shows force ranking among specific Sub-Sector • Please do NOT compare across Sub-Sectors • Ranking in different circumstances often suffice than measuring the actual cost in exactitude (emphasis on hierarchy of data than the structure of data) • Profitability @ Table iii is an average score (the lower #, the higher the profits) • Smile curve is plotted using the polynomial of the inverse #s of profitability scores @ Table iv • Table ii: a) Flow Vol. ~ 4Vs' Volume • b) Price Discovery ~ 4Vs' Veracity • c) Speed ~ 4Vs' Velocity • d) Breath (depth-of-book, auction, odd-lots) ~ 4Vs' Variety • e) Subsidiaries (e.g. Payment for order flow) • f) Market Data (subscription) • a) → f) are 'force ranking' • a+b-c-d+e-f is a 'score' • the cumulative 'scores' for 5 Sectors = zero • 'Versus' shows the difference if there is no redistribution effect • NOTE: Current* @ Table i = c) Speed* @ Table ii, which signifies the current market is a "drag race" over emphasized on speed as key trading success • ^ After @ Table i = ^ Info Advantage @ Table v

Table i	Constituents	Info Advantage			Economy of Scope			Economy of Scale		
		Before	Current*	^ After	Before	Current	After	Before	Current	After
A	Performance Optimizers	1.2	4.2	1.7	1.2	2.2	2.2	5.2	5.2	5.2
B	Asset Gathering	2.2	3.2	2.7	3.2	4.2	4.2	4.3	2.2	2.2
C	Intermediaries	5.2	1.2	4.7	5.2	1.2	1.2	3.2	3.2	3.2
D	Wholesalers Asset Maximizers	3.2	2.2	1.7	4.2	3.2	3.2	2.2	4.2	4.2
E	Retail Client Services	4.2	5.2	2.7	2.2	5.2	5.2	1.2	1.2	1.2
A1	HFs	1.1	4.2	1.7	1.1	2.2	2.2	5.1	5.2	5.2
A2	Principal Trading	1.2	4.3	1.8	1.2	2.3	2.3	5.2	5.3	5.3
A3	HFTs	4.1	4.1	1.7	2.1	2.1	2.1	5.1	5.1	5.1
B1	Issuers	2.3	3.3	2.8	3.3	4.3	4.3	4.4	2.2	2.2
B2	Buige Brackets	2.1	3.1	2.6	3.1	4.1	4.1	4.1	2.1	2.1
B3	Index/ Risk Modeling, Tier 2, Non-bank MM	2.2	3.2	2.8	3.2	4.2	4.2	4.3	2.3	2.3
C1	Venues (Exchanges, ATS, Internalizers)	5.2	1.2	4.2	5.2	1.2	1.2	3.1	3.1	3.1
C3	Inter-dealer brokers	5.1	1.3	4.2	5.1	1.3	1.3	3.2	3.2	3.2
C2	TCA, Liquidity Sourcing/ Execution Vendors	1.1	1.1	5.7	1.1	1.1	1.1	3.3	3.3	3.3
D1	Retirement & Insurance Platforms	3.1	2.3	1.6	4.2	3.2	3.2	2.1	4.2	4.2
D2	Institutional Active Managers	3.2	2.1	1.8	4.1	3.3	3.3	2.2	4.3	4.3
D3	Exchange Traded Products	2.2	2.2	1.8	3.1	3.1	3.1	4.1	4.1	4.1
E1	Securities Processing, Custodian	4.3	5.3	3.8	2.3	5.3	5.3	1.1	1.1	1.1
E2	Retail Wealth Management	4.1	5.1	2.1	2.1	5.1	5.1	1.2	1.2	1.2
E3	Investment Advisory Networks	4.2	5.2	2.2	2.2	5.2	5.2	1.3	1.3	1.3

Table ii	Constituents	Data Values Contribution			Data Values Extraction			Redistribution			Current Score a+b-c+d+e+f	Versus a+b-c-d
		a) Flow Vol.	b) Price Disc	c) Speed*	d) Breath	e) Subsidiaries	f) Market Data					
A	Performance Optimizers	1.2	4.2	4.2	3.2	2.2	1.2	1.2	-3.0	-2.0		
B	Asset Gathering	4.2	2.2	3.2	4.2	3.2	4.2	4.2	0.0	-1.0		
C	Intermediaries	5.2	3.2	1.2	1.2	5.2	5.2	5.2	6.0	6.0		
D	Wholesale Asset Maximizers	2.2	1.2	2.2	2.2	4.2	4.2	4.2	-3.0	-1.0		
E	Retail Client Services	3.2	5.2	5.2	5.2	1.2	3.2	3.2	0.0	-2.0		
A1	HFs	1.2	4.1	4.2	3.2	2.2	1.2	1.2	-3.1	-2.1		
A2	Principal Trading	1.3	4.3	4.3	3.3	2.3	1.3	1.3	-3.0	-2.0		
A3	HFTs	1.1	4.2	4.1	3.1	2.1	1.1	1.1	-2.9	-1.9		
B1	Issuers	4.3	2.2	3.3	4.2	3.3	4.3	4.3	0.0	-1.0		
B2	Buige Brackets	4.1	2.1	3.1	4.1	3.1	4.1	4.1	0.0	-1.0		
B3	Index/ Risk Modeling, Tier 2, Non-bank MM	4.2	2.3	3.2	4.3	3.2	4.2	4.2	0.0	-1.0		
C1	Venues (Exchanges, ATS, Internalizers)	5.3	3.1	1.2	1.1	5.3	5.3	5.3	6.1	6.1		
C3	Inter-dealer brokers	5.2	3.2	1.3	1.3	5.2	5.2	5.2	5.8	5.8		
C2	TCA, Liquidity Sourcing/ Execution Vendors	5.1	3.3	1.1	1.2	5.1	5.1	5.1	6.1	6.1		
D1	Retirement & Insurance Platforms	2.1	1.1	2.3	2.2	4.1	2.1	2.1	-3.3	-1.3		
D2	Institutional Active Managers	2.3	1.2	2.1	2.3	4.3	2.3	2.3	-2.9	-0.9		
D3	Exchange Traded Products	2.2	1.3	2.2	2.1	4.2	2.2	2.2	-2.8	-0.8		
E1	Securities Processing, Custodian	3.3	5.3	5.3	5.3	1.3	3.3	3.3	0.0	-2.0		
E2	Retail Wealth Management	3.1	5.1	5.1	5.1	1.1	3.1	3.1	0.0	-2.0		
E3	Investment Advisory Networks	3.2	5.2	5.2	5.2	1.2	3.2	3.2	0.0	-2.0		

Table iii - Sector's Profitability	Constituents	Before		Current		After	
		Before	Current	Before	Current	Before	Current
A	Performance Optimizers	2.5	3.9	2.5	3.9	3.0	3.0
B	Asset Gathering	3.2	3.2	3.2	3.2	3.0	3.0
C	Intermediaries	4.5	1.9	4.5	1.9	3.0	3.0
D	Wholesalers Asset Maximizers	3.2	3.2	3.2	3.2	3.0	3.0
E	Retail Client Services	2.5	3.9	2.5	3.9	3.0	3.0
A1	HFs	2.4	3.9	2.4	3.9	3.0	3.0
A2	Principal Trading	2.5	4.0	2.5	4.0	3.1	3.1
A3	HFTs	3.3	3.3	3.3	3.3	3.1	3.1
B1	Issuers	3.1	3.1	3.1	3.1	2.9	2.9
B2	Buige Brackets	3.2	3.2	3.2	3.2	3.1	3.1
B3	Index/ Risk Modeling, Tier 2, Non-bank MM	4.5	1.8	4.5	1.8	2.8	2.8
C1	Venues (Exchanges, ATS, Internalizers)	4.5	1.9	4.5	1.9	2.9	2.9
C3	Inter-dealer brokers	3.1	3.1	3.1	3.1	3.0	3.0
C2	TCA, Liquidity Sourcing/ Execution Vendors	3.1	3.2	3.1	3.2	3.0	3.0
D1	Retirement & Insurance Platforms	2.6	3.9	2.6	3.9	3.4	3.4
D2	Institutional Active Managers	2.5	3.8	2.5	3.8	2.8	2.8
D3	Exchange Traded Products	2.6	3.9	2.6	3.9	2.9	2.9
E1	Securities Processing, Custodian	4.2	3.2	4.2	3.2	2.7	2.7
E2	Retail Wealth Management	4.2	3.2	4.2	3.2	2.7	2.7
E3	Investment Advisory Networks	4.2	3.2	4.2	3.2	2.7	2.7

Table v	Constituents	Realign average(a:b)		Econ Opp spur by		^ Info Advantage
		Before	After	New Tech	Delta	
A	Performance Optimizers	2.7	1.7	-1.0	1.7	
B	Asset Gathering	4.2	0.5	-0.5	2.7	
C	Intermediaries	1.7	0.0	0.0	1.7	
D	Wholesale Asset Maximizers	4.2	-1.5	-1.5	2.7	
A1	HFs	2.7	1.7	-1.0	1.7	
A2	Principal Trading	2.8	1.8	-1.0	1.8	
A3	HFTs	2.7	1.7	-1.0	1.7	
B1	Issuers	3.3	0.5	-0.5	2.8	
B2	Buige Brackets	3.1	0.5	-0.5	2.6	
B3	Index/ Risk Modeling, Tier 2, Non-bank MM	3.3	0.5	-0.5	2.8	
C1	Venues (Exchanges, ATS, Internalizers)	4.2	0.0	0.0	4.2	
C3	Inter-dealer brokers	4.2	0.0	0.0	4.2	
C2	TCA, Liquidity Sourcing/ Execution Vendors	4.2	1.5	1.5	5.7	
D1	Retirement & Insurance Platforms	1.6	0.0	0.0	1.6	
D2	Institutional Active Managers	1.8	0.0	0.0	1.8	
D3	Exchange Traded Products	1.8	0.0	0.0	1.8	
E1	Securities Processing, Custodian	4.3	-0.5	-0.5	3.8	
E2	Retail Wealth Management	4.1	-2.0	-2.0	2.1	
E3	Investment Advisory Networks	4.2	-2.0	-2.0	2.2	

