
# The Study on the Creation of an EU Consolidated Tape

FINAL REPORT

Executive Summary

Market Structure Partners
September 2020

**EUROPEAN COMMISSION**

Directorate-General for Financial Stability, Financial Services and Capital Markets Union
Directorate C — Financial Markets
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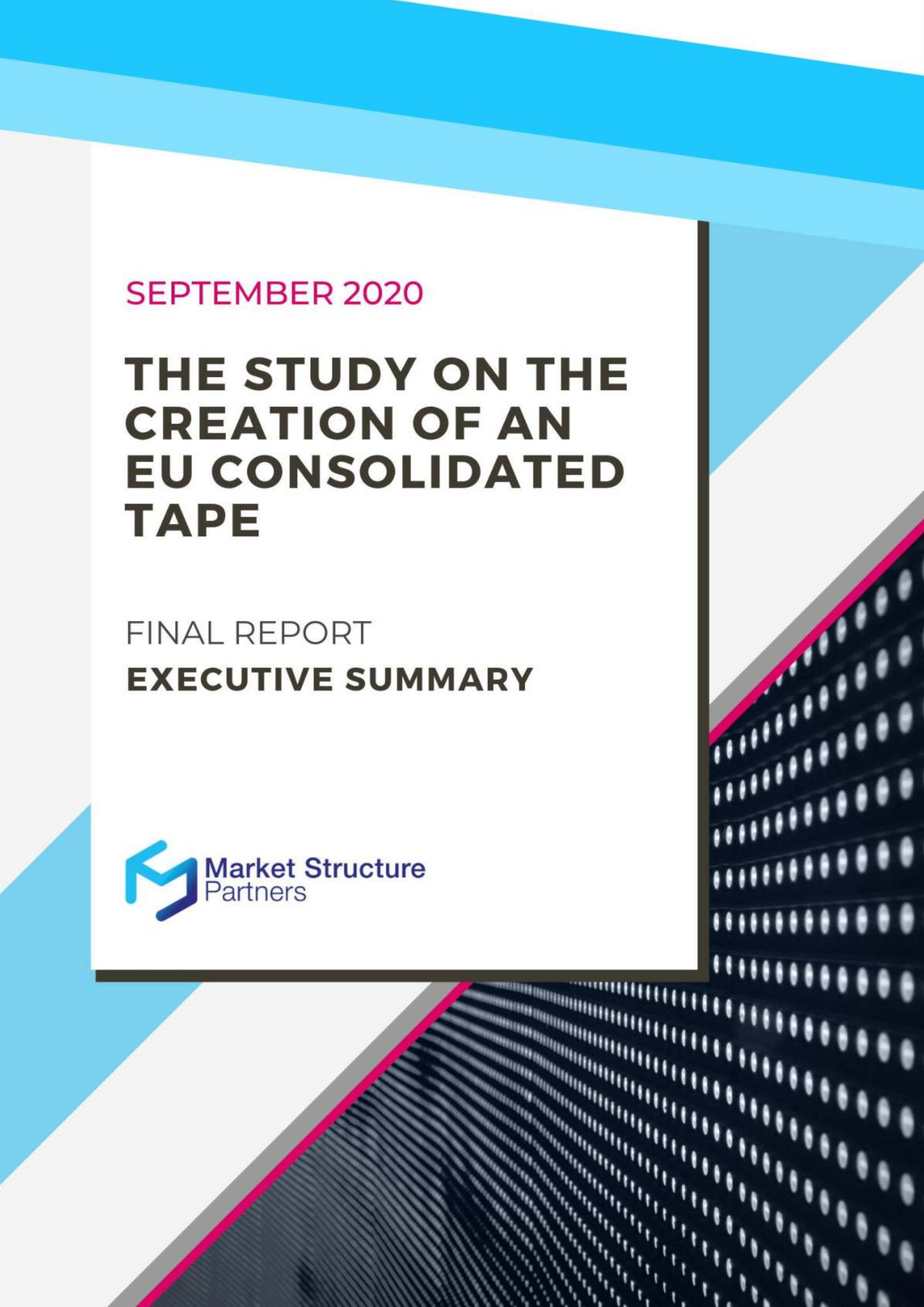
## EXECUTIVE SUMMARY



Market Structure Partners

# ABOUT MARKET STRUCTURE PARTNERS

Market Structure Partners is an independent consulting firm specialising in global capital markets structure.

We aim to deliver real benefit to society by providing valuable, non-biased, strategic advice and consultancy services with the utmost integrity to help enhance and develop capital market structures.

The Market Structure Partners (MSP) team undertaking this work is entirely made up of experienced industry practitioners who have broad geographic, asset class and cross-functional knowledge. Team members are based in Europe and North America.

# FINAL REPORT EXECUTIVE SUMMARY (EN)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# INTRODUCTION

This study analyses the demand and potential use cases for consolidated market data delivered via a consolidated tape for European financial markets. The study also considers the benefits that would arise from it and the challenges to creating it. It also recommends the optimal architecture for consolidation. It is composed of the following 12 Chapters, which examine in turn:

1. **The study scope, background and approach**
2. **What is market data and how is it consolidated?**
3. **Data feeds and data consumption**
4. **The demand and potential use cases for consolidated data**
5. **The benefits that would arise from consolidated data**
6. **The challenges to delivering consolidated data**
7. **Lessons learnt from literature review and field research into North American data consolidation frameworks**
8. **The optimal architecture for successful data consolidation in Europe**
9. **Operational and technical design feasibility, costs and funding**
10. **Consolidated data in the context of the EU 27 markets (Ex UK)**
11. **What can be achieved under the current legal and regulatory framework?**
12. **Conclusions and recommended actions**

# 1. STUDY SCOPE, BACKGROUND AND APPROACH

European Financial Markets Regulators had hoped that the Markets in Financial Instruments Directive and Regulation (MiFID II/MiFIR, hereafter jointly referred to as MiFID II) would create a regulatory environment in which commercial competing consolidated tape providers (CTPs) would emerge. However, no CTP in any asset class has materialised. In case this occurred, a provision was made in the law for the European Commission (EC) to request The European Securities and Markets Authority (ESMA) to create a CTP through a public procurement process.

The scope of this study was to consider the need for consolidated pre- and post-trade data in equities and equity-linked instruments (hereafter summarised as equities) and post-trade data in fixed income securities, whether issued by governments, supranationals or corporates (hereafter summarised as bonds). All statements in the study are applied to both asset classes unless otherwise specified.

The study also had to research US and Canadian data consolidation frameworks and propose an architecture and design for European data consolidation based on the findings and user feedback.

The study approach involved field and literature research as well as interviews and workshops with 189 data users and stakeholders and 11 industry associations. Most of these users and stakeholders are active across the majority of European markets (EU 27 & UK) in their respective asset classes.

# 2. WHAT IS MARKET DATA AND HOW IS IT CONSOLIDATED?

**Consolidated Tape Data (CT data)** refers to the collection of pre- and post-trade data derived from multiple sources across financial markets that is disseminated through a single, standardised, data feed.

**Pre-trade data** comprises the visible prices and volumes of orders that are placed in order-driven markets and the visible quotes that are advertised in quote-driven markets.

Under MiFID II rules, firms classified as **Qualified Investment Firms (QIFs)** create and handle orders on behalf of investors and must forward equity orders to **Trading Venues (TVs)**. However, if an order meets certain exceptions criteria, such as being large in scale, it can be withheld. QIFs can also deal on their own account but, if they do so frequently, they become **Systematic Internalisers (SIs)** and must quote the prices at which they are prepared to deal publicly, either on a TV or through another channel.

TVs **match** orders on Central Limit Order Books (CLOBs) and clear through a central counterparty that manages **counterparty risk**. All orders that can be **seen** are considered **firm** as participants can interact with them via the matching system. Where **quotes** are made public in equity or bond markets, they are typically firm up to the **advertised size.** However, further negotiation may be required between participants for reasons such as the creditworthiness of each counterparty or for a larger size trade.

**Post-trade data** comprises the **prices** and **volumes** of trades that have been executed against both the orders and quotes that were visible, as well as trades executed against orders and quotes that were not visible to the entire market. It also includes **end-of-day statistics**.

Participants define the visible orders and quotes that they can interact with as **"addressable liquidity"**. It is very important for measuring market liquidity and the success of trading strategies. Post-trade data is expected to hold **sufficient information** in the form of **flags** to ascertain whether the liquidity was addressable at the time of the trade.

Under MiFID II, trades in any instrument (including EU and non-EU) that are traded on a trading venue (TOTV) must be made transparent to the market, subject to deferrals which allow for delayed publication of some trades.

**TVs aggregate and publish pre- and post-trade data** captured from the matching of orders on their systems. If QIFs and SIs **negotiate trades off-venue** they must be reported to **Approved Publication Arrangements (APAs) for aggregation and publication**. APAs often handle deferral **calculations and publication for their customers.** MiFID II allows competing aggregators. **Hundreds of TVs and APAs** already exist across asset classes.

TVs and APAs are obliged to **publish** their aggregated **post-trade data** to CTPs when they exist**.** The law envisages **multiple competing CTPs** but there are currently none.

TVs, APAs and CTPs are all regulated entities under MiFID II. However, **TVs can self-regulate** by setting their own rules and sanctioning their **members** without requiring other regulatory intervention whereas **APAs and CTPs are dependent on their clients to adhere to EU regulatory standards and enforcement,** which can only be moderated by National Competent Authorities (NCAs).

# 3. DATA FEEDS AND DATA CONSUMPTION

Market data feeds are the medium by which pre-trade and post-trade data for each market are disseminated.

Pre-trade data can be shown at **individual price levels** or **aggregated** to show the interest at each price level. The simplest approach is to take the top-level best bid and best offer, known as the **BBO.** If data is aggregated, then the depth of information that is shown needs to be decided. The most detailed approach is to show the entire depth of the book. Alternatives are to take a subset of data down to a certain level (e.g. **3 or 5 levels)**, for which a **volume-weighted BBO** could be calculated if required.

Data can be taken via a **real-time streaming data feed,** which also contains important **administrational event information** (e.g. trading halts). Such a feed can be delivered in speeds of nanosecond-level accuracy, known as **low latency**. It can also be taken in static files or clips of data.

**Historical data** is a record of pre- and post-trade data that is **stored** and available for analysis.

Firms that publish data often do so for **economic profit** and put contracts in place to govern how data is paid for, what levels of data are seen and who can access and use the data. The pricing and contractual terms can have many variations that lead to **multiple contractual complexities.**

A prospective European CTP must collect data from all TVs and APAs in many different formats and negotiate at least **one contract,** but **often many more**, with each individual TV and APA.

# 4. DEMAND FOR CONSOLIDATED TAPE DATA

Multiple-use cases exist for CT data, across a broad set of financial market stakeholders, undertaking many different functions through the value chain. Broad use cases for CT data can be summarised as:

- Issuance
- Asset Allocation
- Portfolio/Investment Management
- Pre-Trade Analysis
- In-flight Monitoring of trades
- Post-Trade Analysis/ Best Execution
- Middle and Back Office Processes/Valuations
- Funding and Collateral Management/Securities Lending
- Market Surveillance
- Risk Management
- Performance Measurement
- Regulatory Oversight
- Audit
- Contributing to environmental improvement practices (reducing data processing)

- Many of these functions involve risk management activity. For example, CT data would be used across all **three lines of defence** that companies typically deploy to manage risk: front-line functions that **own and manage risk**, functions that exist to **challenge** the front-line and functions that provide **assurance** to the wider market.
- The critical requirements identified for European CT data in these use cases are:
    - **Real-time, pre-trade equity order** data with **5 levels** of order book depth from each TV (pre-trade quotes are not critical) and **auction imbalance data**. A volume-weighted BBO taken from the 5 levels may help some users.
    - **Depth** of data in equities is more important **than nanosecond speed**. Provided that 5 levels of depth are visible, then data delivered in milliseconds is sufficient.
    - **Real-time, post-trade** data feeds in equities (milliseconds) and bonds (5 minutes).
    - Dissemination of **session administration** event information such as trading halts.
    - **End-of-Day** or **Session Statistics**.
    - **Historical data**, which is important for ad hoc post-trade analysis by many functions.
    - A **comprehensive data** set of everything TOTV but an ability to **delineate** the data between EU and non-EU instruments or subsets thereof would be useful.
- All elements of the CT data are desired but **post-trade** and **historical data** are priorities.
- If this CT data was readily available, it is estimated that **tens of thousands** of **professional participants** and many more **retail investors** would be likely to use it.

# 5. THE BENEFITS OF CONSOLIDATED DATA

The total benefits of CT data cannot be quantified. Nevertheless, it is known that many firms that are responsible for managing and trading **trillions of euros of assets** on behalf of investors report that the current lack of CT data means they have to rely on **sub-optimal data** when seeking to do their jobs for those investors.

If CT data existed, then a **small subset of financial intermediaries** who currently gain a potential advantage from the **data asymmetries** in the market would lose out. This subset includes firms that can use their scale or technology to overcome the current challenges in compiling accurate data to gain a competitive advantage or those who profit from selling their data. However, other participants including retail and institutional investors, issuers, regulators and third-party firms providing oversight services would all clearly benefit from all of the following:

**a)** **Improved trade outcomes**: More accurate forecasting of trading costs and broadening awareness of liquidity options.

b) **Independent and accurate data for detecting errors and misdeeds:** Helping uncover issues, which may otherwise remain undetected.

c) **Increased pricing accuracy:**

   i. Leading to improved portfolio valuations for investors who are often misled by inaccurate data.

   ii. Improving the quality of benchmark calculations, which are used to judge performance.

   iii. Supporting better derivative pricing.

d) **Improved liquidity risk management and capital allocation processes:**

   i. Under-estimations of liquidity risks come at the expense of end investors who may get trapped in failing funds.

   ii. Over-estimations of liquidity risks come at the expense of the capital raiser as capital may be allocated too conservatively.

e) **Promotion of innovation, competition and lit markets**: Without visibility of all available liquidity:

   i. The primary and secondary market models of incumbent TVs are being forced on the market and different liquidity provision and listing models cannot emerge.

   ii. Brokers are not held accountable by their clients for their smart-order routing decisions because clients cannot easily see the flow and create an audit trail

   iii. Inaccurate and over-inflated figures about the amount of off-venue liquidity are misleading participants to route trades away from lit markets.

   iv. The increasing cost of processing data is creating barriers to entry in all parts of the industry, which leads to industry concentration.

f) **Improved regulatory calculations and regulatory policymaking:**

   i. Regulators are currently implementing policy, monitoring compliance and designing new regulation with inadequate data sets.

   ii. Without one official source of pan-European data, firms with vested interests and the largest resources can use sub-sets of data to lobby for or against change that may not benefit the broader market.

Additionally, a single CT data infrastructure would be more cost and energy-efficient than the current multi-layered and multi-lateral processing arrangements thus **reducing impact on the environment.**

# 6. CHALLENGES TO CONSOLIDATING DATA

The **technology** required to consolidate market data is **not considered a challenge** as it is already proven and widely used in the market. The **challenges** for individual firms or potential European CTPs wanting to consolidate data **are structural, organisational and economic** and are as follows:

a) **The price of data is not determined by market forces, which makes CT data unviable:**

- The current **direct** and **indirect cost** of consuming and managing multiple data feeds **drives users to economise** by taking a subset of the available market data as a **proxy for the whole market**. This subset is typically sourced from the **dominant TV or APA** in each market.
- This **reinforces** the **pricing power** and market models of the largest TVs and APAs and allows them to **price their data as if it represented the entire market**.
- These TVs and APAs have **no requirement or commercial incentive** to price data at a value that reflects its worth in the context of consolidation or for the purposes of facilitating CT data. To do so would not only show competing TVs' liquidity, which is currently obscured by the lack of CT data, but also potentially **take away profit** as some firms may replace their current sub-set of pre- and/or post-trade data from the incumbent with the CT data if it was available.

- Currently, a data consolidator has **no control over the cost** being ascribed by each TV or APA. The liquidity provision models of the largest equity TVs generate huge quantities of data, which increases processing costs but may not always be useful to many participants. The price a TV puts on its data (especially where it is used as a proxy for the whole market) may not be the same as the value that the market puts on it when the data is consolidated, and the worth of the contribution from each TV is assessed.
- A consolidator must either **absorb** all the costs or pass them on. If a consolidator **passes all the costs and contracts**, as prescribed by each aggregator, directly to users, then these users will **continue to economise** by taking subsets of data, rendering consolidation a **waste of time and resource** for the CTP. The **dominance** of the largest TVs and APAs continues to be reinforced.

**b) Data Quality and Complexity**

- TVs and APAs have **bespoke data standards,** which must be translated by a CTP.
- Data submissions by QIFs and SIs are of poor quality. Issues identified include **ambiguities or inconsistencies** in the rules, **subjective interpretation** of the rules, **abuse** of the rules or **misuse** of flags as well as a **lack of mandated market-wide technical operating standards** for the reporting of trades**.**
- Complex and low-quality data **requires significant effort and resources** to clean and compile and consolidators may not have resources or the incentive to clean it.

**c) Lack of Data Governance and Enforcement of Data Standards:**

- Issues relating to **completeness**, **timeliness** and **quality** need **immediate resolution** for data to be of value to users. **ESMA** and the **NCAs** are **too far removed** from the technical interfaces in the market where the data is submitted to be able to identify and address the issues that arise in real-time.
- If issues span more than one market, **NCAs manually** seek cross-market information from each other, resulting in **time lags** for identifying and fixing issues. A true picture of the market may be lost for some time, possibly **months or years.**
- There is currently **no centrally agreed penalty mechanism** for poor data submissions to aggregators and consolidators or agreement about how such a regime might be implemented across different jurisdictions.
- At present, data **quality** is **best at TVs**, as they can enforce standards on their **members** and use **matched data** for immediate reconciliations. It is **worst at APAs** which do not have such members, are **not empowered** to enforce penalties and may not see two sides of a trade to help reconciliations. APAs may also have **conflicts of interest** if their parent company is also operating a TV or data vendor.

**d) Other Factors that Make Data Less Viable for Consolidation**

- A **lack of harmonised rules**. Examples are **NCAs** which can **determine** their own **deferral periods** for publishing post-trade bond data and SIs being treated differently to TVs which results in **different tick size and clock synchronisation** obligations.
- The requirement to report everything that is traded on a trading venue (TOTV) leads to both **EU** and **non-EU** instruments being included in the data. This creates considerable “noise” when trying to establish what is EU instrument data.
- ESMA’s phased approach to reporting bond trades based on their liquidity means that the current **population of bond** instruments available for publication **is low**.

These problems are cumulative; each user makes multiple discretionary decisions about the data sets they use based on commercial factors and subjective judgements about the data. As a result, participants in Europe are not guaranteed to have the same data for any instrument as their peers.

# 7. LESSONS LEARNT FROM LITERATURE REVIEW AND FIELD RESEARCH INTO NORTH AMERICAN DATA CONSOLIDATION FRAMEWORKS

North American market data frameworks are not a panacea or an exact model for European CT data but, along with the academic and industry literature available, they offer some important insights, particularly about organisational, economic and legal arrangements that are needed at different points of market evolution. Many of these insights resonate with European participants. These are:

- **Optimum data quality** occurs when there is **no competition at either aggregation or consolidation level a**nd exclusive aggregators and consolidators can **use self-regulation to mandate standards** and **uniformly enforce rules** on their members.
- An entity that has the exclusive responsibility for enforcing rules and standards for CT data should be recognised in the law so that it can enforce its own rules as well as any relevant laws. The **regulatory authorisation** of any data contributor to that entity should **depend** on its membership of the entity and **willingness to abide by its rules.**
- Entities with **exclusive responsibilities** should **not be conflicted** and their **governance** requires **balanced** consideration of data user and stakeholder needs**.** Otherwise, they may pursue **business models** that are **not in the best interests of the broader market.**
- An **exclusive consolidator** may be a priority (for Europe) because a consolidator can start by **working with all the stakeholders** in the market, including the different aggregators, whereas aggregators only work in the interest of a subset of stakeholders.

The widest use of consolidated data occurs when:

- There is a **single technical, contractual and pricing interface** for **receiving data** from the aggregators and also for the consolidator to **disseminate the data** to the consumer.
- The underlying data is **not acquired or passed on** by the consolidator **at prices set by each aggregator**. Instead, CT data is sold at one price and the revenue generated is **shared** between aggregators based on the value of each data set to the overall CT data.

Sufficient detail must be provided in the CT data for users to ascertain current liquidity and trading intentions. This data should be defined in the law but with the flexibility to provide for future enhancements. It includes:

- **Depth of data (3-5 levels),** which is **more important than a single BBO.**
- **Administrational event information** and **auction imbalance data.**

**Without depth** of data, the **introduction of lot sizes** would have to be considered. Otherwise the BBO could be determined by a single share which may not be meaningful.

**Shared revenue** allocation models, based on the value of data, can be used to facilitate competition and drive changes in trading behaviour and liquidity provision. These must be carefully calibrated and monitored to incentivise the right behaviours and allow for flexibility to adapt.

**Mandated use** of a tape for **best execution may not be suitable for Europe** due to the underlying market structure (e.g. lack of homogenous clearing and settlement across the region). It also requires trade-offs between the benefits for retail size orders and disadvantages for institutional size orders.

**Mandated use** of a tape to display CT data **to independent retail investors** is beneficial and should be available to them for free in order to prevent inferior products from being developed and used.

The **data constituents** of CT data need to be clearly defined and understood to allow for the correct interpretation of the data and to incentivise optimum behaviours. For example, If TVs have differences in the way they report orders versus trades then the data may not be easily comparable. Similarly, if minimum lot sizes exist, then care is required to ensure that they do not adversely impact trading behaviour.

Aggregators and/or consolidators need to have **strong reconciliation processes** and capabilities to be able to clean data. This includes visibility of both sides of unmatched, off-venue trades.

**CT data increases transparency and reduces costs.** However, consideration must also be given to the effect of transparency when trying to execute large orders in illiquid markets, as transparency may result in market makers being less willing to commit risk capital to facilitate a trade.

# 8. THE OPTIMAL ARCHITECTURE FOR SUCCESSFUL DATA CONSOLIDATION IN EUROPE

In order to successfully deliver the critical requirements described in Chapter 4, the following architecture is recommended as the optimal and holistic foundation (compromises are likely to limit the successful development of CT data) on which to build European CT data:

- An **exclusive** consolidated tape provider (ECTP) that is not subject to competition and is run as a utility should be created. It should have **no conflicting business interests**.
- The ECTP must be **regulated and empowered by ESMA** to establish and **enforce market-wide operating standards** and a **harmonized set of rules, including penalties** and other sanctions that have a sufficient impact on behaviour. It should also be **recognised in the law** and be able to enforce market data regulations.
- All data aggregators should be **obligatory members**, should contribute to its funding and follow its rules. QIFs and SIs should be allowed to **self-aggregate** and also become members of the ECTP.
- **Authorisation** of an aggregator's on-going business should be **directly linked** to its membership of the ECTP and its willingness to abide by the rules.
- **Balanced governance** of the ECTP with representation and input from all users is required. No single stakeholder or stakeholder group should have undue influence. A majority of independent directors is required at the Board level.
- The ECTP must be able to **acquire** and **store** all pre-, post-trade, end-of-day and historical data freely without contractual obligations and at the same speed as proprietary offerings A **revenue sharing mechanism** to share the revenue between contributors **based on the value** of the quality of each of their data sets to the overall consolidated data should be established.
- **Sufficient pre-trade** order and **administrational event** data must be provided to the tape and this must be defined in the law.
- The ECTP must be able to **monitor data quality**, **resolve issues** and **reconcile** data quickly. Reporting to the ECTP should be in real-time **(no deferral management elsewhere)** and **double-sided trade reporting,** with an identifier attached by both parties, should be introduced for **unmatched trades.**

Other **ancillary issues**, which could also be addressed to enhance the viability of CT data include increasing the population of **eligible bonds** for consolidation, harmonising bond deferral publication rules **and separating the bond and derivative RTS data formats**. Display of free CT data **to independent retail investors** should be mandated.

An ECTP could deliver other advantages such as creating a **dynamic deferral regime** for temporary liquidity spikes in bonds and **calculating and disseminating reference data** for ESMA. A **volume-weighted** official European **BBO** for equities could be implemented if required.

# 9. OPERATIONAL AND TECHNICAL DESIGN FEASIBILITY, COSTS AND FUNDING

CT data **for both equities and bonds can be delivered via the same ECTP organisational structure and high-level technical design.** This allows economies of scale to be achieved and provides **flexibility** for phasing in of different instruments and functionality over time.

The ECTP would have a **permanent executive and staff** and a Board made up of stakeholder representatives and independent directors. Additional advice would be sought through industry

committees focusing on product, technical requirements and rules. The organisational detail and operating model of the ECTP would be determined through the governance structure and would need to address:

- **Its terms of reference, corporate and commercial structure, the strategic direction, business plan,** and **priorities**, as well as the **standards, inputs, outputs, obligations, rules, responsibilities and technical requirements.**
- Creation and management of **membership categories.** These would exist for different stakeholder types and each category would have different rights and obligations.
- Enforcement of its **rules** and management of **appeals** processes.
- Determination of the **reasonable commercial cost** at which data should be sold and the **appropriate allocation and contractual mechanism for revenue sharing** between contributors.
- Decisions about how any **profits** from other activities should **be distributed.**
- Selecting the **outsourced technology** provider/s through a competitive **tender process**.

It is assumed that the technology would be **outsourced.** However, the high-level technical design to deliver the CT data is possible using established technology solutions and is expected to contain:

- Multiple **"engines" with core processing logic,** which would be used to interact with other components and provide "plug and play" **flexibility** in the overall architecture. This allows for **scalability** and for different functional elements or asset classes to be added over time**.**
- **Machine learning** algorithms for identifying data anomalies.
- Use of the **cloud** for the storage of historical data.
- Operations across **two data centres** in Europe, which could be expanded as required. The choice of where to situate the data centres would be determined by the ECTP stakeholders. The combined technology would allow data to be processed in **tens of milliseconds**, but users will experience differences in latency depending on their location and so a technical design that assures **accurate time stamping will be critical**.

The costs and funding of the organisation, including the setting up and running of the outsourced technology described above, are estimated as follows:

- The **set-up** costs of the ECTP would be in the order of **€11 million** (€9 million for post-trade data in equities and bonds and an additional €2 million for pre-trade data in equities).
- This **set-up funding** could be raised and covered by levying a one-off joining fee from current data aggregators and SIs with an average contribution of **€25,000 per member**.
- **Annual running costs** of the ECTP for all asset classes in scope are estimated in the range of **€6 million to €7 million**.
- Recurring funding of over **€7 million per annum** could be obtained with a membership fee levied on current data aggregators and SIs of an average of **€16,000** per entity per annum. Other revenues may be generated through additional services and fines.
- If the ECTP is being run on a not-for-profit basis, any **profits not required** for future investment could be **returned to the members**. Revenues from data sales would be allocated back to data users and aggregators based on the agreed revenue share scheme.

## 10. CONSOLIDATED DATA FOR THE EU 27 MARKETS (EX. UK)

The impact of the UK's departure from the EU cannot yet be fully assessed but the **need for CT data within the EU 27 markets** will be **equally important** without the UK because:

- There is **no discernible difference** between the **data requirements** and issues raised by participants **within the EU 27** and **outside of the EU 27**. Investors who want to in-

vest in EU 27 markets **still need quality CT data** to manage their portfolios, risk and regulatory obligations.

- If the UK is not granted equivalence, there will be a **proliferation of EU-based TVs, SIs, QIFs and APAs**, as UK based firms seek an EU presence. This will not only **increase the number of data sources** and but also **increase the number of trades** because QIFs and SIs may undertake back-to-back trading between their EU and non-EU entities in order to manage client orders and risk.
- Specifically for equities, MiFID II's Share Trading Obligation (STO), which ensures that EU investment firms must direct their trades in EU equities to a TV or SI within the EU, means that **liquidity pools are likely to be split** between the UK and the EU. This may generate **arbitrage opportunities** and potentially **reduce trade sizes on lit markets**. This will contribute to **larger volumes of trade reports** and an even greater requirement for **quality pre- and post-trade data** to provide a **complete picture** of market liquidity.
- Overall, these **data complexities will increase costs** and further highlight the need for CT data.
- In the event that the UK, or another third country, creates **competing off-shore pools** of liquidity in EU instruments for non-EU 27 Investors, CT data will be critical to help the EU compete for capital and liquidity from those investors.

# 11. LEGAL ANALYSIS OF THE PROPOSED ARCHITECTURE/DESIGN

The current legislative framework **does not allow the full implementation** of the proposed architecture and design, particularly **in relation to pre-trade data**. However, some significant steps could be taken under the **current legislative framework**. These are:

- The EC can exercise its power to request ESMA to use its **public procurement process** to establish an ECTP, clearly specifying that it should be run as a non-conflicted utility with balanced governance and allowed to develop its own rule book (including standards) and compliance framework (including sanctions and penalties) under ESMA's oversight. Using this process, steps can also be undertaken to ensure that:
    - TVs and APAs could be **mandated to be members** of the ECTP.
    - Real-time **post-trade** data could be freely obtained from members and stored for **historical** purposes. The price at which CT data could be sold to end-users (after 15 mins it would be free) could be determined and an **agreed revenue allocation** model could be created to share revenues amongst those that contribute the data.

A number of other enhancements could also be achieved to improve data usability and quality:

- With political goodwill, the current rules for **bond deferrals could be harmonised.**
- ESMA could i**ncrease the population of bonds** in scope for post-trade reporting.
- Regulatory Technical Standards **(RTSs) could be amended and enriched** to specify data formats and double-sided trade reporting with identifiers could be introduced for unmatched trades.

However, the following cannot be achieved without further legislative **amendments** or **new legislation:**

- Consolidation of **pre-trade** data because TVs are not currently mandated to submit pre-trade data to any CTP and pre-trade data is not defined in the law.
- Full ECTP **recognition and delegation** of powers to allow it to enforce market data laws.
- Legally **linking the authorisation** of the data aggregators to a requirement that they are members of the ECTP.
- **Mandating data generators** such as SIs to be members of the ECTP (although they could become voluntary members or the ECTP could also become an APA).
- Achieving **full consistency** in the data submitted by **TVs and SIs,** as they are not subject to the same pre- and post-trade transparency regimes.
- Introducing a **vendor display rule** for retail investors.

- Formal **delineation between EU and non-EU instruments.**

**To move forward the EC is faced with two possible alternatives, both of which have advantages and disadvantages:**

**Option 1: Commence the creation of an ECTP under the current legislation**

+ The initial development and implementation of CT data could progress but would **require very clear specifications and careful management** of the procurement process. Clear milestones would be needed to measure progress and finalise decisions.
+ Stakeholders should gain **valuable practical experience** in implementing CT data and resolving issues. This experience could be used as a proof-of-concept for a fully recognised ECTP in future legislation. However, the ECTP may not have the full powers needed to improve data quality and stakeholders may not cooperate or be unable to agree on some issues.
– The **equity** market would have to **adapt to a hybrid state** and may find it hard to establish and consume post-trade CT data whilst pre-trade data is still being taken via direct feeds.
– There is a **risk** that the **legislation** required to deliver the full CT data and the ECTP is **not achieved** or is achieved in a manner that is **inconsistent** with the initial design.

**Option 2: Defer any development until the full legislative framework is in place**

+ The delivery of any form of CT data would be **delayed** but eventually, the tape could be created and designed with **more regulatory certainty**.
– The practical **experience** and knowledge gained under Option 1 would be **foregone.**
– Market participants need data improvements as soon as possible. Legislative change **could take too long** or **lobbying and vested interests** could impact the proposed design of the tape and **undermine its integrity, usefulness and viability**.

# 12. CONCLUSIONS AND RECOMMENDED ACTIONS

There is **high demand** for CT data and the **benefits of delivering the data clearly outweigh the cost of implementing it.** An official source of CT data for the EU 27 markets may be even more important once the UK leaves the EU.

It is **impractical to expect multiple competing commercial consolidators** of data to emerge at this point of the market's evolution. This is because the underlying data that needs to be consolidated resides across many competing commercial entities, some with disproportionate economic leverage and conflicts of interest. These entities have inconsistent quality checks, data models and interfaces and operate under a federated model of supervision and enforcement in multiple jurisdictions.

The **optimum design and delivery** of such data is through an **exclusive consolidated tape provider** that is run as a **utility** and brings data stakeholders together to resolve the current challenges in consolidation.

The full solution cannot be implemented without further legislative change and there are clear advantages and disadvantages to commencing the development under the current legislative framework versus waiting for new legislation. However, the delivery of CT data for the EU is already **long overdue**. Enough stakeholders appear ready to **engage** to help bring it to fruition and to **delay further** raises the **risk** that it may not be delivered at all. The recommended action is:

- The EC should move forward under Option 1. It should pursue its power in MiFID II to request ESMA to use its public procurement process to follow clearly specified parameters and establish an ECTP for post-trade data as soon as possible.
- ESMA and the NCAs should be encouraged to review government bond deferral rules and to reconsider the phased approach on assessing liquidity in bonds.
- The EC should also seek to introduce further legislative changes to fully support the ECTP for consolidation of pre- and post-trade data.

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# The Study on the Creation of an EU Consolidated Tape

FINAL REPORT

Market Structure Partners
September 2020

**EUROPEAN COMMISSION**

Directorate-General for Financial Stability, Financial Services and Capital Markets Union
Directorate C — Financial Markets
Unit C.3 — Securities Markets

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*European Commission*
*B-1049 Brussels*

EUROPEAN COMMISSION

# The Study on the Creation of an EU Consolidated Tape

FINAL REPORT

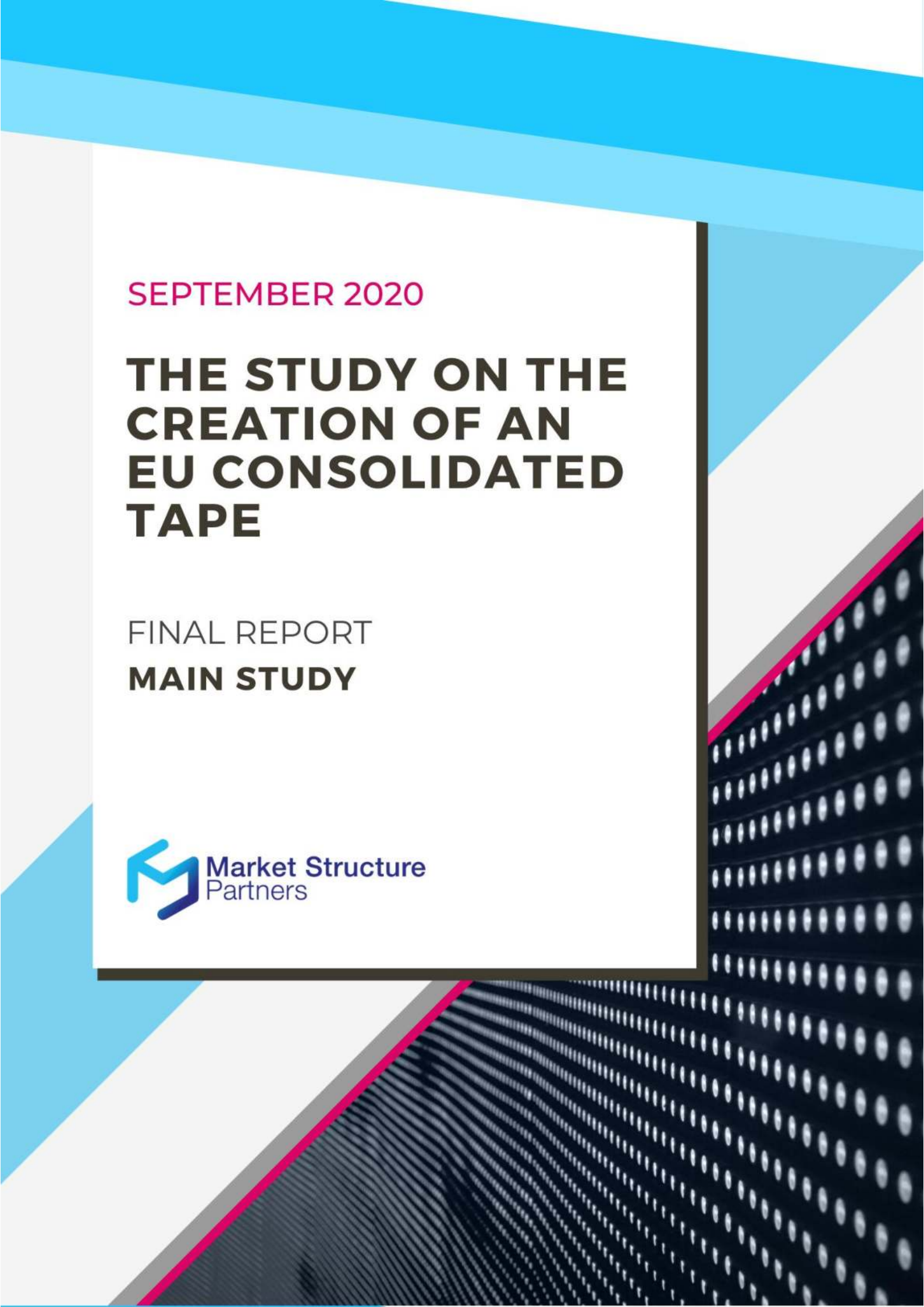
Directorate-General for Financial Stability, Financial Services and Capital Markets Union

SEPTEMBER 2020

# THE STUDY ON THE CREATION OF AN EU CONSOLIDATED TAPE

FINAL REPORT

**MAIN STUDY**



Market Structure Partners

# ABOUT MARKET STRUCTURE PARTNERS

Market Structure Partners is an independent consulting firm specialising in global capital markets structure.

We aim to deliver real benefit to society by providing valuable, non-biased, strategic advice and consultancy services with the utmost integrity to help enhance and develop capital market structures.

The Market Structure Partners (MSP) team undertaking this work is entirely made up of experienced industry practitioners who have broad geographic, asset class and cross-functional knowledge. Team members are based in Europe and North America.

# ABSTRACT / L'ABSTRAIT

This study analyses the demand for consolidated European financial market data in equities and bonds. It examines the benefits that would arise from such data, the challenges to creating it and recommends an architecture for future data consolidation.

The study is based on the input of 200 data stakeholders and research into North American consolidation frameworks.

It finds that:

- There is high demand for consolidated data and it would be of significant benefit to market participants, including investors, issuers, and regulators.
- Consolidation is prevented by legal, organisational and economic challenges. Technology is not a constraint.
- These challenges could be overcome by the creation of an exclusive consolidated data provider that is overseen by the regulator, run by data stakeholders and empowered to set rules for data contributors.
- The benefits of creating consolidated data outweigh the costs of implementing the organisational and technical frameworks needed to deliver it.
- Significant progress can be made towards a solution by regulators and stakeholders working together under the current legal framework. However, full data consolidation and resolution of all the challenges require further legislative change.

It is recommended that the European Commission pursues its current powers to create an exclusive consolidated tape provider that is run as a utility whilst seeking to introduce further legislative changes to support the full solution.

---

Cette étude analyse la demande de données consolidées pour les actions et obligations sur les marchés financiers européens. Elle examine les avantages qui résulteraient de telles données, les défis pour les créer et recommande une architecture pour le futur de la consolidation des données.

L'étude est basée sur l'apport de 200 professionnels et études nord-américaines des méthodes de consolidation.

Elle constate que:

- Il existe une forte demande pour les données consolidées qui bénéficieraient considérablement aux professionnels, y compris les investisseurs, émetteurs et régulateurs.
- La consolidation fait face à des obstacles juridiques, organisationnels et économiques. L'aspect technologique n'est pas une contrainte.
- Ces défis pourraient être surmontés par la création d'un fournisseur exclusif de données consolidées supervisé par le régulateur, géré par les parties prenantes et habilité à fixer les règles pour les fournisseurs de données.
- Les avantages de la création de données consolidées sont supérieurs aux coûts opérationnels et techniques nécessaires.
- Des progrès significatifs peuvent être accomplis ensemble par les régulateurs et les parties prenantes travaillant sous la juridiction actuelle. Cependant, la consolidation complète des données et la résolution des enjeux nécessite des changements législatifs.

Il est recommandé que la commission européenne exerce ses pouvoirs actuels pour créer un fournisseur exclusif de compilation des données géré comme un service tout en cherchant à introduire certaines modifications législatives pour soutenir une solution intégrale.

# MAIN STUDY

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# GLOSSARY

| | |
|---|---|
| APA | Approved Publication Arrangement |
| ATS | Alternative Trading System |
| BBO | Best Bid and Offer |
| CCP | Central Counterparty |
| CLOB | Central Limit Order Book |
| CMU | Capital Market Union |
| CSD | Central Securities Depository |
| CTA | Consolidated Tape Association |
| CTA Plan | Consolidated Tape Association Plan |
| CTP | Consolidated Tape Provider |
| DVC | Double Volume Cap |
| EBBO | European Best Bid and Offer |
| EC | European Commission |
| ECTP | Exclusive Consolidated Tape Provider |
| EMIR | European Market Infrastructure Regulation |
| ESMA | European Securities and Markets Authority |
| ETF | Exchange-Traded Fund |
| FCA | Financial Conduct Authority (UK) |
| FINRA | Financial Industry Regulatory Authority |
| FRTB | Fundamental Review of the Trading Book |
| IIROC | Investment Industry Regulatory Organization of Canada |
| IP | Information Processor |
| ISIN | International Securities Identification Number |
| MAR | Market Abuse Regulation |
| MiFID II | Markets in Financial Instruments Directive II |
| MiFIR | Markets in Financial Instruments Regulation |
| MTF | Multilateral Trading Facility |
| NASD | National Association of Security Dealers |
| NBBO | National Best Bid and Offer |
| NCA | National Competent Authority |
| OPR | Order Protection Rule |
| OSC | Ontario Securities Commission |
| OTF | Organized Trading Facility |
| QIF | Qualified Investment Firms |
| RM | Regulated Market |
| RTS | Regulatory Technical Standard |
| SEC | Securities and Exchange Commission |
| SI | Systematic Internaliser |
| SIP | Securities Information Processor |
| SRO | Self-Regulatory Organization |
| TOTV | Traded on a Trading Venue |
| TRACE | Trade Reporting and Compliance Engine |
| TRF | Trade Reporting Facility |
| TV | Trading Venue |

# 1 / STUDY OVERVIEW

*This Chapter explains the background, scope and approach to the study and how the participants and stakeholders were identified and engaged with.*

CHAPTER SUMMARY

1. The study is set against the background of the Capital Markets Union's objectives and the underlying regulations (mainly MiFID II/MiFIR and MAR) which serve to meet those objectives by increasing market transparency and integrity and improve competition.
2. MiFID II aimed to improve the quality and availability of market data and included provisions and arrangements for the consolidation of data through competing consolidated tape providers. It also provided for a public procurement process to be put in place if a consolidated tape provider does not materialise, which it has not.
3. The aim of the study is to consider the demand for consolidated pre- and post-trade data in equities and post-trade data in equities and bonds and the demand for that data, as well as to make a recommendation for the future architecture of a consolidated tape for Europe.
4. The study had to take into account at least the 11 largest markets in Europe and consider both US and Canadian experiences in data consolidation.
5. The study methodology included desk and field research using interviews and group meetings in North America and Europe.
6. Market data stakeholders were identified in a functional framework and interviews were sought with representatives from a broad representation of stakeholders.

## 1.1. STUDY AIMS AND BACKGROUND

The requirements for financial market participants to acquire and maintain complete and accurate data records upon which to base their decisions is becoming more urgent due to new regulations and the increasing proliferation of data.

This study considers the possible establishment of European consolidated tape data (CT data) in the context of the European Union's (EU's) strategic objectives, and the underlying financial markets regulation that has been implemented to achieve these objectives. The aims of the study are to:

- *Provide a clear picture of the demand for an EU consolidated tape/s by determining potential use cases across equity, equity-like instruments and corporate and government bond instruments including the need for pre- and post-trade data and any additional requirements.*
- *Design and recommend a future tape architecture for European consolidated data, taking into account current data aggregation issues, field research of North American markets, consideration of academic and industry literature and European participant feedback.*

### 1.1.1. EU Strategic Objectives: Capital Markets Union

The Capital Markets Union (CMU)[1] is a major initiative to help stimulate economic growth across Europe and has recently been deepened to enhance access to finance for EU businesses with 5 key objectives:

1. remove structural and legal barriers to increase cross-border capital flows.
2. provide incentives and remove obstacles for well-informed retail savers to invest.
3. support the transition to sustainable economies.
4. embrace technological progress and digitalization.
5. strengthen global competitiveness.

### 1.1.2. MiFID II, MiFIR & MAR

The Markets in Financial Instruments Directive II (MiFID II)[2] and Markets in Financial Instruments Regulation (MiFIR)[3] (hereafter jointly referred to as MiFID II) are part of a long-term plan to harmonise financial markets across the EU, which includes improving pre- and post-trade transparency and the protection of investors and ensuring overall market integrity.

#### *Market Transparency under MiFID I and II*

MiFID I enabled cross-border competition between trading venues in equities. It also harmonised equity pre- and post-trade transparency rules and created the concept of data aggregators of trade reports. The result was the fragmentation of markets for trading and also of trade reporting of data, as well as an increase in the amount of data being generated. Despite some attempts to create it, CT data that the whole equity market could refer to did not emerge.

MiFID II introduced a similar pre-and post-trade data transparency regime for non-equity asset classes and a more stringent definition of trading venues across all asset classes. As a result, more data is being created and processed across all asset classes than before, and market participants are now grappling with increased data fragmentation and quality issues.

#### *Data Consolidation under MiFID II*

Regulators recognised that CT data should be the principal tool for addressing these issues and for providing a more transparent and complete picture of equity and non-equity market activity. As a result, MiFID II formally introduced data consolidation into the law by recognising consolidated tape providers[4] (CTPs) as entities to consolidate data and providing rules about the data that should be sent to them. It assumed that competing commercial solutions for consolidating equity instruments would emerge and that other asset classes would learn from that experience and follow suit.[5]

However, to date, no solution has materialised. In the event that this occurred, the Directive allowed for steps[6] to be taken by the European Commission (EC) to request ESMA to launch a negotiated procedure for the appointment, through a public procurement process run by ESMA, of a commercial entity operating a consolidated tape. The EC can also specify the conditions for this procedure. This study will contribute to the Commission's considerations on consolidated tape requirements and potential development across a broad set of asset classes.

#### *MAR*

The Market Abuse Regulation (MAR)[7] is designed to work in tandem with MiFID II by bringing integrity and public confidence to markets across all asset classes. It aims to establish a stronger framework for the markets, avoid potential regulatory arbitrage and ensure accountability in the event of attempted market abuse. Market participants across asset classes are very reliant on good data to enforce it.

### 1.1.3. Other Legislation Linked to Data

Other legislation, which is heavily reliant on data, has been introduced to strengthen capital markets. Examples of such legislation are the Fundamental Review of the Trading Book (FRTB)[8] and the initial margin rules in the European Market Infrastructure Regulation (EMIR).[9] These require clear, unambiguous trade prices and accurate historical data to calculate all required sensitivities, correlations and valuations. Such critical calculations will only be as good as the data from which they are derived.

## 1.2. STUDY SCOPE

### 1.2.1. Instruments and Type of Data Covered

The scope of the study was to review use cases for:

- Pre- and post-trade consolidated data for equity and equity-linked instruments (hereafter summarised as equities unless otherwise stated).
- Post-trade data for corporate and government bonds (hereafter summarised as bonds unless otherwise stated).

The study also explored whether it would be useful to include other information alongside the CT data that would be of value for analytical purposes.

### 1.2.2. Geographical Coverage

The study was required to cover a representative sample of Member States (inc UK) that:

- Constitutes at least 80% of the total amount outstanding of equity listed on regulated markets or MTFs at the end of 2018 (see Appendix 1), and,
- Includes the following 11 countries: France, Germany, Italy, the Netherlands, Belgium, Ireland, Poland, Sweden, Spain, Denmark and the UK.[10] The outcome of the UK's departure from the EU is unknown but has been considered further in Chapter 10.

It also required an analysis of existing consolidated data frameworks in the US and Canada.

## 1.3. APPROACH AND METHODOLOGY

The study took place over a five-month period between October 2019 and March 2020.

Four high-level steps to the overall project approach were used in the study (described in Appendix 2).

- Collecting background information about European and North American data consolidation frameworks.
- Creating a structured framework for data gathering and analysis from a cross-section of the identified data stakeholders (see Figure 1 below) in Europe and North America.
- Identifying, screening, and obtaining data from relevant stakeholders
- Defining and validating recommendations.

## 1.4. IDENTIFICATION OF MARKET DATA STAKEHOLDERS

A stakeholder framework of potential data users (Figure 1) was developed at the outset of the study and was used throughout to help ensure that the inputs of all potential users of consolidated data were captured.

High-level groups of stakeholders were mapped into industry groups and then into granular entity types along with an estimate of the numbers behind each European industry group. More detailed descriptions of what each stakeholder entity type does are given in Appendix 3 and the sources and calculations behind the numbers of users are given in Appendix 4.

The analysis showed that data is used by a broad set of stakeholders performing many different industry functions. Interviews were sought with representatives from each group to verify the functions and use cases associated with the stakeholders and refinements and additions were made during the study.

## Figure 1: Market Data Stakeholder Group Descriptions

| Stakeholder Group | Industry Grouping | Estimated Minimum Number of Entities that use Data in Europe, inc. UK, (Source of Data) | Stakeholder Entity Type |
|---|---|---|---|
| **Issuers** | **Issuers** | 40 (est.) | Government Issuers<br>Supranational Issuers<br>Agency Issuers |
| | | 9,321 (WFE) | Corporate Issuers |
| | | 69 ETF (ETFGI) | Issuers of Funds including ETFs |
| **End Investors** | **End Investors** | 15,500,000 (users not entities) (ECB+UKHMRC) | Direct Retail Customers |
| **Financial Intermediaries** | **Buy-Side** | 4,366 (ESMA) | Asset Managers & Portfolio Managers<br>OEICs/SICAVs (inc. ManCos and Fund Administrators)<br>Insurance Companies<br>Pension Funds<br>Endowments<br>Wealth Managers |
| | **Sell-Side** | 10,576 (ESMA) | Investment Banks (inc. SIs)<br>Commercial / Retail Banks<br>Development Banks<br>Institutional Agency Brokers<br>Inter-dealer Brokers<br>Retail Brokers<br>Proprietary Traders (inc. SIs)<br>Originators / Advisors |
| | **Trading Venues/APAs** | 136 (ESMA) | Regulated Markets |
| | | 220 (ESMA) | MTFs (Multilateral Trading Facility) |
| | | 74 (ESMA) | OTFs (Organised Trading Facility) |
| | | 20 (ESMA) | APAs (Approved Publication Arrangements) |
| **Custodians/ Risk Managers** | **Custody, Clearing & Settlement** | 20 (est.) | Custodian Banks |
| | | 15 (ESMA) | CCPs (Central Counterparty) |
| | | Not sourced or estimated | 3rd Party Clearers (GCMs) |
| | | 30 (ECSDA) | CSDs/ICSDs (Central Securities Depository / International Central Securities Depository) |
| **Regulators** | **Regulators** | 57 (FCA) | Regulators |
| **Data Analytics & Benchmark Providers** | **Data Analytics & Benchmark Providers** | Not sourced or estimated | Benchmark Providers |
| | | Not sourced or estimated | Data Analytics Providers |
| **Other** | **Other** | Not sourced or estimated | Research Providers |
| | | Not sourced or estimated | Chartered Financial Planners |
| | | Not sourced or estimated | Independent Financial Advisors |

## 1.5. STAKEHOLDER ENGAGEMENT

**In total 189 entities and 11 trade associations were consulted with using one on one interviews, small group discussions with industry associations and some group sessions** held at the Alpha Forum Conference in February 2020 for European buy-side traders in both equities and bonds.

39 interviews took place in North America and the remainder were in Europe. Most of the interviews in Europe took place with European headquartered organisations.

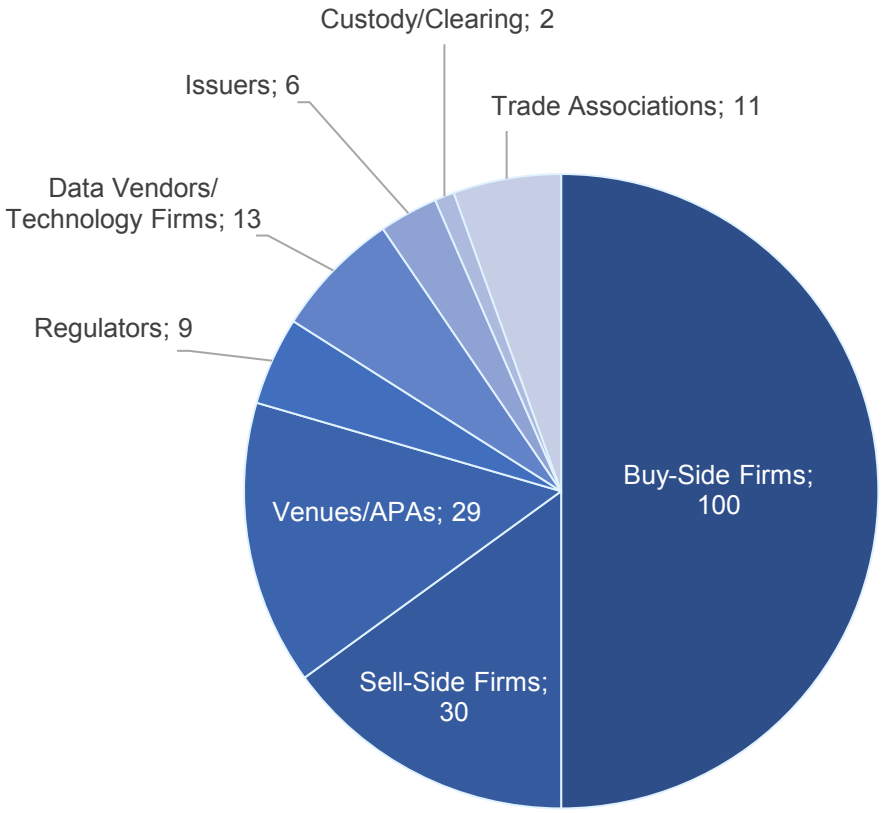
The majority of the secondary market interviewees in bonds, regardless of their location in Europe, covered investment processes and trading in the complete set of pan-European markets.

Interviews with secondary markets equity participants regardless of their location covered investment processes and trading in an extensive range of the largest 11 European markets and many covered most of the smaller markets.

Interviews with primary market participants and issuers took place in Holland, France, and Ireland.

A final workshop was held with some of the participating stakeholders to validate the feedback. Some of these stakeholders had been previously interviewed and some had not. This was held with a cross-section of stakeholders from all over Europe.

Figure 2: Categories of Stakeholders (By Industry Group) Engaged with For This Study



# 2 / WHAT IS MARKET DATA AND HOW IS IT CONSOLIDATED?

*This Chapter discusses how pre- and post-trade data is determined, who generates that data and how the MiFID II rules apply to the transparency, aggregation, and consolidation of that data.*

## CHAPTER SUMMARY

1. **Consolidated data** is the collection of pre- and post-trade data from multiple sources of trading data across an entire financial market that is disseminated through a single, standardised, market data feed.

2. **Pre-trade data** comprises the visible prices and volumes of orders placed in order-driven markets or visible quotes advertised in quote-driven markets.

3. **Orders** are firm and participants can interact with every order that they can see. **Quotes** may only be firm up to the advertised size but, even then, may have to be negotiated. Participants are not guaranteed to be able to interact with orders and quotes that are not visible to the market such as for large-sized trades or trades that are subject to other special conditions.

4. **Post-trade data** comprises the prices and volumes of trades that have been executed against those visible orders or quotes, as well as trades executed against orders and quotes that were not visible to the entire market. It also includes end-of-day statistics.

5. Participants define the orders and quotes that are visible and that they can interact with as **"addressable liquidity"**. Post-trade data is expected to hold sufficient information in the form of flags to ascertain whether the liquidity was addressable at the time of the trade.

6. Order and quote data is generated by **Qualified Investment Firms (QIFs) and Systematic Internalisers (SIs)**. These are all regulated entities managing orders, quotes, and trade executions either for investors or dealing on their own accounts.

7. **Trading Venues (TVs)** aggregate on-venue pre- and post-trade data captured from their systems and **Approved Publication Arrangements (APAs)** aggregate off-venue post-trade data for equities and bonds from QIFs and SIs that must report to them.

   The law envisages **multiple competing aggregators** and there are already hundreds of TVs and APAs across asset classes in Europe.

8. MiFID II only considers the consolidation of post-trade data which must be collected from the TVs and APAs and consolidated by Consolidated Tape Providers (CTPs). The law envisages **multiple competing consolidators** but there are none.

9. TVs, APAs and CTPs are all regulated entities but TVs can self-regulate by setting rules and sanctioning their members without requiring intervention from the regulator whereas APAs and CTPs are dependent on their clients to adhere to regulatory standards and enforcement.

## 2.1. WHAT IS CONSOLIDATED DATA?

The term consolidated data or a consolidated tape (CT data) is broadly used to describe the collection of various data feeds from multiple sources associated with trading activity across an entire financial market, and the dissemination of that data, through a single, market data feed in a "standardised" format.

It can include both pre-trade and post-trade information and may be provided and consumed in real-time, or on a delayed time basis.

## 2.2. WHY IS IT IMPORTANT?

Information is the lifeblood of financial markets. Each piece of information creates data, which has a rippling effect throughout the market. It drives behaviour and leaves a permanent record or footprint that derives from the original data itself. Incomplete or incorrect data drives behaviours and outcomes that are different and may be suboptimal compared to those that would have prevailed had full and accurate data been available. Incomplete data also means that a true picture of the market at any point in time is lost and hence the value of any subsequent analysis or comparison will be reduced.

A complete and accurate picture of the entire market at all times is therefore important for all investors and those who act on their behalf. If information asymmetries exist, then some participants or investors will be at a disadvantage.

## 2.3. HOW IS MARKET DATA GENERATED?

The trading models and mechanisms used in financial markets directly impacts the data that is delivered to users and their ability to manage and use the data in real-time and after the event. The market models in European and North American markets share similarities and tend to be classified either as order-driven markets or quote-driven markets.

Trading Venues (TVs) exist to facilitate most trading. In Europe, under MiFID II, there are different types of TVs which are defined as:

1. Regulated Markets (RMs) which offer primary and secondary markets trading. In both Europe and North America these are more simply known as exchanges.
2. Multilateral Trading Facilities (MTFs) which offer secondary markets trading only. In North America, the equivalent would be Alternative Trading Systems (ATSs).
3. Organised Trading Facilities (OTFs), which are a new venue for non-equities only and are similar to MTFs except that they can have more discretion over the management of orders. North American markets do not make such distinctions with their ATS systems.

These markets may be order or quote-driven or a hybrid of both.

### 2.3.1. Pre-Trade Data

Market data begins its journey when an investment firm, which could be a buy-side or a sell-side firm as described in Figure 1, Chapter 1, creates and/or handles orders on behalf of investors or other investment firms. Under MiFID II, investment firms are known as Qualified investment firms (QIFs), which are defined as "any legal person whose regular occupation or business is the provision of one or more investment services to third parties and/or the performance of one or more investment activities on a professional basis".[11]

#### *Order-Driven Markets*

Order-driven markets are most prevalent in liquid instruments, such as equities and, under MiFID II, QIFs must send all equity orders to TVs so that they contribute to the price discovery process. TVs must make the current bid and offer prices of orders continuously available during normal trading hours, along with the depth of trading interests at the prices advertised.

However, some exception waivers exist which allow QIFs or TVs to withhold orders from publication. For example, if an order is large in scale, it may require more careful management because the market impact would be too great if it were published immediately.

TVs operate Central Limit Order Books (CLOBS) where buyers' and sellers' orders are gathered and displayed to all participants. CLOBs allow multilateral interaction and continuous matching between all participants' orders, subject to each TV's pre-defined rules. If the right conditions are present, two orders can result immediately in a matched trade, thus all orders are considered "firm" when they are sent to the CLOB, as no further intermediation is required. This is also facilitated by clearing through a central counterparty (CCP), which serves to eliminate concern about the risk of a counterparty defaulting on the trade, meaning that a counterparty's identity and creditworthiness is not a consideration prior to trading.

A number of other trading systems and protocols have been developed by equity TVs as an extension or a complement to their CLOBs to help manage orders. For example, the system sometimes moves from offering continuous matching of orders to offering different types of auction processes such as frequent batch or a closing auction. When viewing the market, participants need to know which system or segment a TV is operating at any time so that they know what trading protocols and choices that are available to them. TVs transmit trading status codes to identify the system and protocol being used

However, under certain protocols, orders and prices are not always transparent to the market prior to execution or during the auction period and so are not contributing to price discovery. (A list of market models and underlying protocols is given in Appendix 5). Pre-trade market prices in order-driven markets are therefore determined only by the visible prices and orders that all participants can interact with and which are published by TVs.

### *Quote-Driven Markets*

Quote-driven markets are most prevalent in less liquid instruments such as bonds. This is because there may not be enough natural liquidity for orders to be matched immediately and the markets need to be intermediated by firms that are willing to risk their capital to supplement liquidity in the market.

Under MiFID II, QIFs can deal on their own account by risking their capital and QIFs that do this are usually sell-side firms only, as described in Figure 1, Chapter 1. If a QIF deals on its own account on an organised, frequent systematic and substantial basis when executing client orders outside of a TV then it must become a Systematic Internaliser (SI).[12]

SIs, in both equities and bonds, are obliged to make the prices at which they are willing to deal for trades up to a certain standard size public. They can advertise their quotes either through a TV or through a private channel.

However, participants in quote-driven markets are not always guaranteed of being able to execute a trade even when a quote is visible. Quotes are disseminated electronically but automatic execution is not always offered and, if it is, it is usually restricted to trades up to the quoted size. Otherwise further manual or electronic negotiation is required because, for example, the price for a larger size trade will be different from the advertised price.

Quote-driven markets also tend to be bilateral with no centralised clearing and settlement, thus the identity of the counterparty is very important, and firms will likely undertake credit assessments and establish credit limits for each trading counterparty before trading. Most firms maintain lists of approved counterparties with corresponding credit limits and will only trade outside these limits on an exceptions basis.

Pre-trade quote data is therefore limited by the visibility of the on-screen quotes that dealers are obliged or willing to make public to the entire market through a variety of TVs or private channels. It is these quotes that constitute pre-trade data, but counterparty considerations may further reduce the pool of liquidity available to each participant.

TVs that operate quote-driven markets also offer different trading protocols, for example where two-sided quoting is not mandatory then one-sided quoting is possible, or participants can send different types of requests for quotes to certain counterparties. (A list of bond market models and underlying protocols is given in Appendix 5).

### *Hybrid Markets*

In practice, even the more liquid markets, such as equities, operate a hybrid system of order-driven and quote-driven markets. For example, quoting is frequently used to support liquidity in small and medium capitalised firm's shares which are less liquid. Conversely, there are examples of more liquid bonds (e.g. treasuries) starting to migrate to CLOBs.

In each instance, orders and quote data can be made publicly available via the same market data feeds but would be consolidated separately because they have different characteristics.

### 2.3.2. Post-Trade Data

Once a trade has been executed, whether as a result of an order or a quote that is visible to the market or as a result of non-visible negotiations that may occur through a different TV protocol or outside of a TV, it simply becomes an executed trade.

TVs, SIs and QIFs must publish the volume and price of any trade in a financial instrument that is defined as traded on a trading venue (TOTV) within one minute of execution for equity and equity-like products. For non-equity products publication must occur within fifteen minutes of execution, falling to five minutes in 2020. Both equity and bond trade publications are subject to deferral regimes where trade publication may be deferred depending on the size or liquidity of the instrument.

#### *Addressable Liquidity*

Market participants call the liquidity that is visible, and that they can fully interact with, "addressable liquidity". When looking at post-trade data they need to separate out the addressable liquidity, that they could have interacted with, from the non-addressable liquidity, that they could not have known about because it was not public at the time. As discussed above, non-addressable liquidity could include trades that were negotiated away from the quote advertised, special technical trades or possibly trades with counterparties that are not approved by the firm wishing to execute the trade.

This is especially important information when measuring the success of a trading strategy or when making decisions about the potential liquidity of an instrument. Post-trade data, therefore, needs to hold qualifying data to help participants determine whether the trade contributed to addressable liquidity that the participant could have accessed. This data should include indicators such as the trading protocol that was used for the trade, where the trade was executed, why it was executed, when it was executed, how large it was and whether it was above the size being advertised.

## 2.4. DATA AGGREGATION UNDER MIFID II/MIFIR

MiFID II only addresses the aggregation of post-trade data. The intention is for data to be gathered into larger pools of data for ease of access. Aggregation is undertaken either by:

1. TVs, which naturally capture the post-trade data resulting from the trading undertaken on their systems, **or,**
2. Approved Publication Arrangements (APAs), which are responsible for aggregating and publishing details of trades executed off-venue by QIFs and SIs. In bond markets, even when quotes are advertised on a TV, they are often executed bilaterally and reported to APAs.

Both types of aggregators must publish data as close to real-time as possible, on a reasonable commercial basis. Data should be made available for free 15 minutes after publication and should be disseminated in a manner that ensures fast market-wide access on a non-discriminatory basis. Aggregators should check trade messages for accuracy and completeness. Some APAs calculate and manage the publication of deferred trades as an added value service for their clients.

MiFID II envisages multiple competing data aggregators[13] and there are many already functioning.

According to ESMA, in European equity markets, there are 178 TVs (67 RMs, 111 MTFs) that aggregate pre- and post-trade information and a further 17 APAs that aggregate post-trade data (see Figure 3). In

bond markets, there are 96 RMs, 147 MTFs and 50 OTFs and 20 APAs, although much of the post-trade reporting would be routed to the APAs (see Figure 4).

### 2.4.1. Regulatory Characteristics of Data Aggregators

TVs and APAs are authorised and regulated by their National Competent Authorities (NCAs). However, there are organisational differences between the two entity types. TVs have an additional layer of their own regulation that supplements any formal legislation and does not require the direct involvement of the regulator.

TVs achieve this through the self-regulation of their members or participants upon whom they can enforce their own rules and standards. If a member violates the rules, a TV can restrict or fully retract its membership. This may have serious consequences for a member's business; if a trading member found itself excluded from a venue, particularly one with large market share, then it may not be able to fully conduct its own or its clients' business because that TV cannot be simply swapped for another.

APAs do not have members and so cannot easily enforce their rules in the same way as TVs. A firm that decides to move from one APA to another can do so with little consequence to its business.

TVs and APAs can both set data standards but they both have a commercial incentive to set their own proprietary standards. Neither has the legal authority nor obligation to enforce European data laws and rules.

## 2.5. DATA CONSOLIDATORS UNDER MIFID II/MIFIR

Data consolidators were introduced under the rules of MiFID II/MiFIR as Consolidated Tape Providers (CTPs). CTPs are authorised to collect post-trade data from the data aggregators, namely TVs and APAs, but not directly from QIFs or SIs.

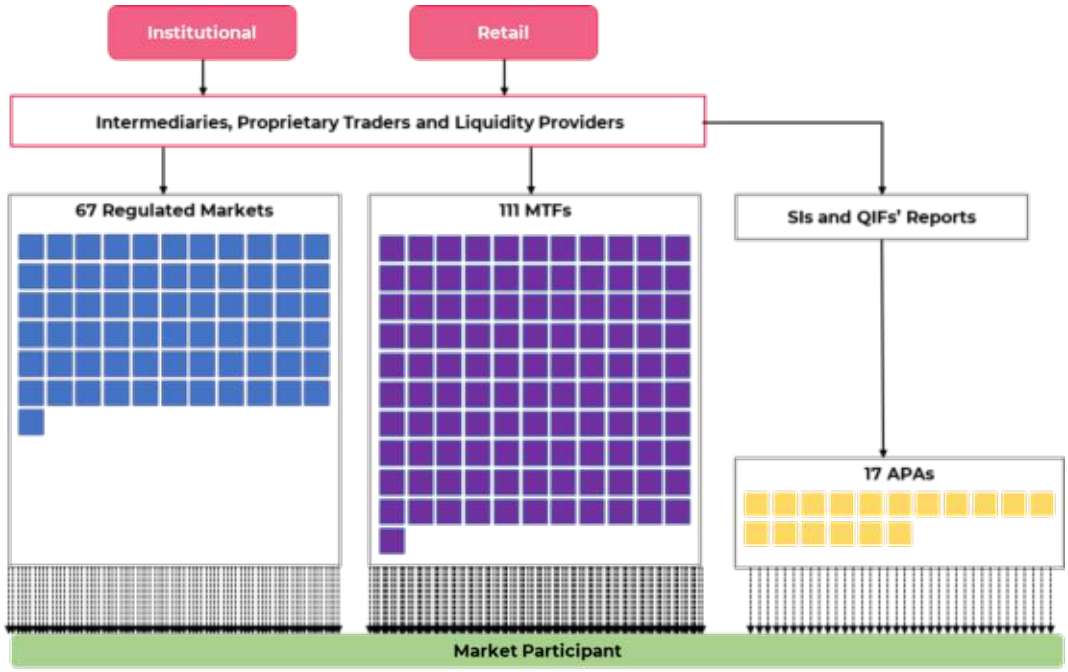
CTPs can specialize in different asset classes. An equity CTP is expected to consolidate 100% of the market and a non-equity CTP must consolidate at least 80% of the total volume and transactions for each asset class published by all trading venues and APAs in the EU. Any CTP would have to consolidate data from hundreds of aggregators as illustrated in Figure 3 and Figure 4 below. There is currently no consolidator in equities or bonds.

### 2.5.1. Regulatory Characteristics of Consolidators

MiFID II envisaged that multiple CTPs would exist and compete with each other whilst regulated and overseen by their NCAs.

Like APAs, CTPs were conceived in the legislation with no concept of membership, ability to set rules or apply sanctions, nor the ability to set market-wide standards or enforce data laws. Such responsibilities would not fit easily with the idea of competition.

## Figure 3: European Equities Reporting Flow Post-Trade Aggregators

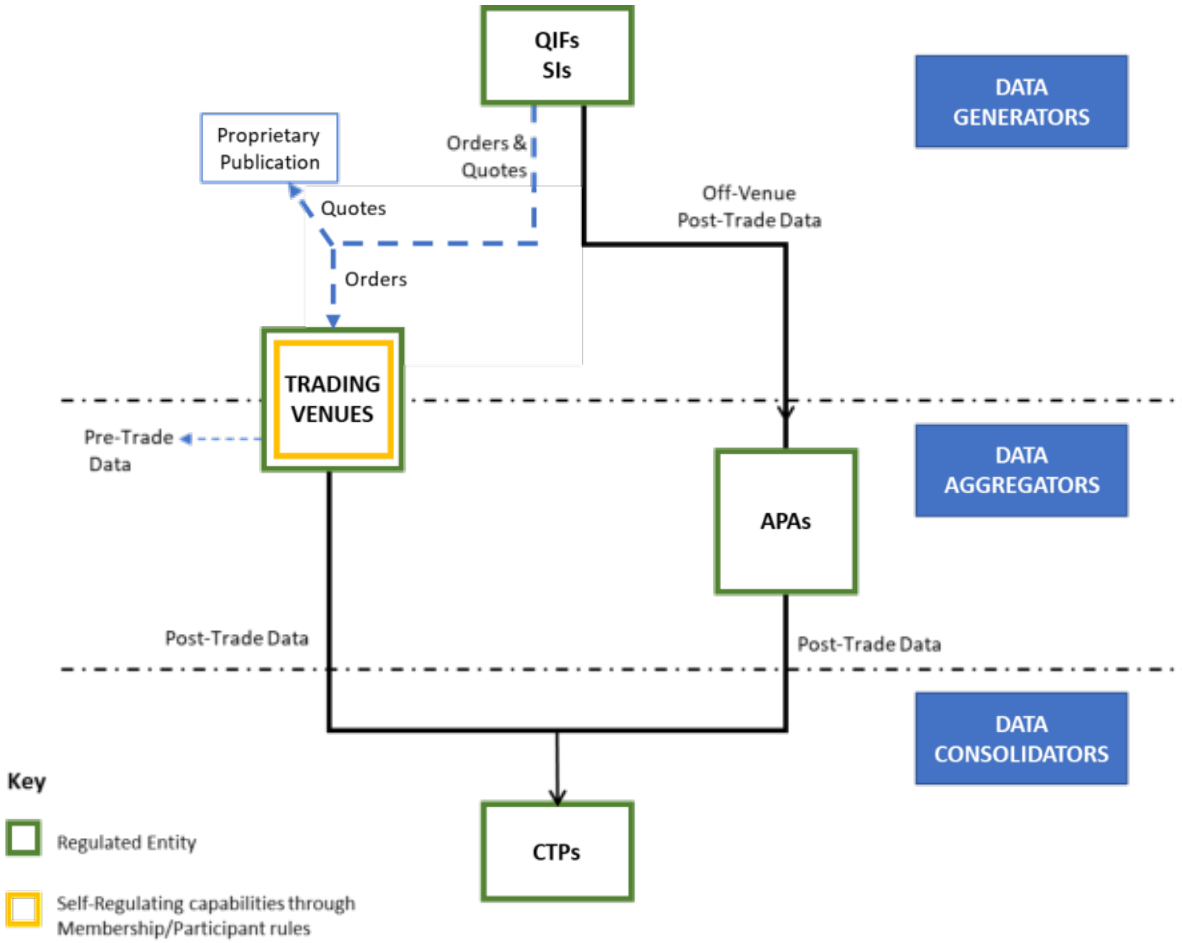



*Source: MSP Research, ESMA*

## Figure 4: European Bond Trade Reporting Flow Post-Trade


*Source: ESMA - (Note the number of venues includes derivatives venues, but the number of bond markets alone is not provided)*

Figure 5: Flow of Data and Regulatory Characteristics of Data Generators and Aggregators under MiFID II/MiFIR




*Source: Market Structure Partners*

## 2.6. CONCLUSIONS

Pre- and post-trade data are important components of consolidated market data. Both types of data need to carry sufficient, accurate and complete information for correct interpretation, and this is particularly important to help market participants accurately assess what is addressable liquidity.

MiFID II considers the aggregation of both pre- and post-trade data in equities, but it only considers the consolidation of post-trade data in equities and bonds. Multiple firms generate data, but only APAs and TVs can aggregate data. APAs and TVs are the only entities that can send data directly to CTPs. There are many aggregators from which a CTP would need to consolidate data, but no CTP exists.

TVs, APAs and CTPs have different characteristics. Only TVs can set rules and sanction their members without relying on regulatory support.

# 3 / DATA: FEEDS, INTERFACES AND CONSUMPTION

*This Chapter explains the data feeds and interfaces, the constituents of data feeds and how end-users consume market data.*

## CHAPTER SUMMARY

1. Data engagement occurs via three main types of data interfaces: 1) order or quote entry interfaces, 2) market data feeds and 3) reference data feeds. These are operationally independent of each other.

2. Order/quote entry feeds are used to send a firm's orders or quotes to a trading venue. Market data feeds disseminate all the pre-trade and post-trade data for that market and are the most important in relation to consolidation. Reference data feeds are static and used to communicate important information such as instrument data at the start of the day.

3. Pre-trade data can be shown at individual price levels or aggregated to show the interest at each price level. If data is aggregated, then the depth of information to be shown needs to be decided. The simplest approach is to take the best bid and best offer, which is known as the BBO. The most detailed approach is to show the entire depth of the book. Alternatives are to take a subset of data down to a certain level e.g. 3 or 5 levels.

4. Other data that is disseminated in the market data feed includes session statistics for order-driven markets and important administrational event information about the trading session e.g. a trading halt.

5. There are different ways of transmitting market data depending on the volumes that may have to be disseminated. Some TVs and APAs have different delivery mechanisms depending on the requirements of the recipients. Data in very liquid markets can be delivered at high speed, often within nanoseconds, which gives rise to the term 'low latency'.

6. Historical market data is data that is stored and may be available for analysis on an ex-post basis.

7. Firms that provide data will often do so for economic profit and put contracts and licenses in place to govern how data is paid for and who can access and use the data. The pricing and contractual terms have many variations depending, for example, on whether data is used by a human or machine or a professional or non-professional investor.

   This leads to many contractual complexities. Any CTP would have to negotiate multiple contracts and licenses with each of the hundreds of aggregators that exist in Europe.

## 3.1. DATA INTERFACES AND FEEDS

Data engagement occurs through three main types of data application programming interfaces (APIs) and feeds; order or quote entry interfaces, market data feeds and reference data feeds. These are described below.

Figure 6: Data Feeds and Interfaces

| Order Quote or Entry Feeds | Market Data Feeds | Reference Data Feeds |
|---|---|---|
| • Orders or quotes originate at an individual participant that uses the order or quote entry interface to transmit buy/sell interest to a trading venue. The trading venue then transmits execution messages and acknowledgements back to the member.<br>• These feeds are also called "private" feeds because they carry data that is specific only to the individual member. | • These feeds disseminate all the order, quote and trade activity emanating from the buy/sell interest received via the order entry interfaces, along with the associated prices and volumes.<br>• They are also called "public" feeds because they are based on all the aggregated orders and quotes available for execution at a venue.<br>• They may also include other messages that are required for the correct interpretation of the information, such as administrational update data, statistics or intra-day reference data updates. | • Venues disseminate data relating to their universe of tradeable instruments, e.g. trading session-related parameters, (start and end times, static and dynamic price bands), connectivity settings (IP address and ports) and business-related parameters (ISIN, quoting currency, etc.).<br>• These feeds are static in nature and uploaded at the beginning of the day. It is important data that is fed to front, middle & back-office systems of the participants interacting with a venue. |

*Source: Market Structure Partners*

**The most important of these feeds and interfaces for consolidation purposes is the market data feed and this chapter mostly focuses on this feed.** However, it is important to understand that all three feeds are closely related to each other but from an operational point of view, they can be independent of each other. For example, an order entry interface may have technical issues, whilst a market data interface is operating perfectly.

## 3.2. THE COMPONENTS OF THE MARKET DATA FEED

Market data feeds have different components which are all important when assessing the viability and use cases for CT data. There are five key components: pre-trade data, post-trade data, statistics, session administration messages and intraday reference data updates. Each is examined in turn below.

### 3.2.1. Pre-Trade Data: Order and Quote Events

This refers to the dissemination of the buy and sell interest resting in an order book. The word "interest" is used because order book or quote information can be disseminated in multiple ways, which may or may not include a breakdown of individual orders.

**Order Book and Quote Events** (includes new orders and quotes being inserted into the order book or quoting venue, as well as cancellations and amendments.).

- Order book and quote dissemination are defined by two key attributes: 1) "Aggregation" (Y/N) and 2) "Depth" (number of levels).

- **Aggregation**: Events may be disseminated to show individual orders or aggregated to show total interest by individual price level.
- **Depth:** Different levels of depth can be defined for aggregated feeds. A full depth-of-book feed includes all available buy/sell interest at each available price level on either side of the book but not everyone viewing data needs to see the full depth. The simplest alternative is to take only the first level (Level 1) which generates a single best bid and best offer, known as the BBO. This is the basic offering that most TVs offer. Alternatively, participants may take a number of levels of best orders available, such as 3 or 5 levels of depth. In this case, a volume-weighted BBO could be calculated if required.

A more detailed explanation of the different types of order event feeds and their pros and cons are given in Figure 7 below.

### 3.2.2. Post-Trade Data: Trade Events

Trade events (executions, cancellations/amendments, trade reports, etc.) are usually included in the same "channel" as the order and quote book feed, meaning that regardless of the type of order and quote book feed being consumed, all executions and other trade-related event data will be included.

### 3.2.3. Statistics

This refers to key statistics related to the current trading session for each instrument. These usually include:

- Previous day's closing price and current day's opening price which remain static during the day.
- The current session's high and low prices (updated dynamically as they are breached).
- The cumulative volume (updated dynamically every time a trade has been executed).
- The current day's closing price (which will be updated immediately after the closing auction or based on the trading venue's alternative methodology, as the case may be).

The inclusion of session statistics is usually inversely related to the complexity of the market data feed:

- Low latency feeds (discussed below) may exclude this functionality because it adds latency due to a higher volume of traffic and also consumers of those feeds typically have the technical knowledge to track the statistics they require.
- Less complex feeds (such as Level 1 or Aggregated Level 2) are likely to include the additional statistics to facilitate the consumption of all data to clients that are less concerned with latency.

### 3.2.4. Session Administration Messages

This refers to messages that may be required for the proper interpretation or handling of the market data and could include, for example:

| | | | |
|---|---|---|---|
| *Order book status updates* | *Trading halts* | *Declaration of fast markets* | *"Other"* |

The exact scope of the messages required will depend, to a large extent, on factors such as trading systems architecture, the type of products traded, product offering etc. These administration messages are usually included in the same "channel" as the order book updates and the post trade data. It is not uncommon for different types of order book feeds to contain different subsets of these administration messages.

## Figure 7: Most Common Types of Order Book Feed (By Depth and Aggregation)

*Red Box denotes User Requirements explained in Chapter 4.2.1.*

| | Type of Pre-Trade Data Feed Design | | | | |
|---|---|---|---|---|---|
| | **Market by Order** | **Market by Level Full Depth** | **Market by Level e.g. 5 Levels** | **Level 1** | **VWAP** |
| **Key Features** | • A breakdown of all individual orders on each side of the order book; includes all orders and all price levels. | • Sum of all liquidity available at all individual price levels on each side.<br>• Also includes the number of orders at each price level. | • Sum of all liquidity available per individual price level and side, up to the 5th best price level on each side.<br>• Also includes the number of orders at each price level. | • Sum of all available liquidity per at the best price level of each side of the book<br>• Also includes the number of orders at each price level. | • The weighted average price which a "typical" order with a pre-defined value (e.g. 7K EUR) could be filled on each side of the book, based on the liquidity available at each price point, as well as the number of shares that would be included in the trade. |
| **Depth** | Full Depth | Full Depth | 5 Levels | 1 Level | Example 7000 EUR size |
| **Aggregation** | Dis-aggregated | Aggregated | Aggregated | Aggregated | Aggregated |
| **Hypothetical Example of Rendering Based on Number of Shares Available at Different Prices** | **Bid**<br>100 x 10.00<br>300 x 10.00<br>100 x 9.98<br>150 x 9.98<br>100 x 9.95<br>200 x 9.91<br>200 x 9.90<br>200 x 9.90<br>200 x 9.90<br>200 x 9.89<br>200 x 7.88<br>200 x 5.00 | **Offer**<br>100 x 10.10<br>200 x 10.10<br>50 x 10.10<br>100 x 10.10<br>100 x 10.15<br>100 x 10.15<br>100 x 10.20<br>200 x 10.25<br>100 x 10.30<br>100 x 12.00<br>100 x 18.50 | **Bid**<br>(2) 400 x10.00<br>(2) 250 x 9.98<br>(1) 100 x 9.95<br>(1) 200 x 9.91<br>(3) 600 x 9.90<br>(1) 200 x 9.89<br>(1) 200 x 7.88<br>(1) 200 x 5.00 | **Offer**<br>450 x 10.10 (4)<br>200 x 10.15 (2)<br>100 x 10.20 (1)<br>200 x 10.25 (1)<br>100 x 10.30 (1)<br>100 x 12.00 (1)<br>100 x 18.50 (1) | **Bid**<br>(2) 400 x 10.00<br>(2) 250 x 9.98<br>(1) 100 x 9.95<br>(1) 200 x 9.91<br>(3) 600 x 9.90 | **Offer**<br>450 x 10.10 (4)<br>200 x 10.15 (2)<br>100 x 10.20 (1)<br>200 x 10.25 (1)<br>100 x 10.30 (1) | **Bid**<br>(2) 400 x 10.00 | **Offer**<br>450 x 10.10 (4) | **Bid**<br>700 x 9.9892 | **Offer**<br>691 x 10.1204 |

| | Type of Pre-Trade Data Feed Design | | | | |
|---|---|---|---|---|---|
| | **Market by Order** | **Market by Level Full Depth** | **Market by Level e.g. 5 Levels** | **Level 1** | **VWAP** |
| **Pros/Cons of the Different Types of Feeds** | + Price-time priority of each order is known, so allows for more accurate routing and modelling.<br>- Requires individual monitoring of all order-related events on an order-by-order basis.<br>- May include irrelevant information (i.e. orders priced very far from touch levels). | + Simpler processing of order book events as they are disseminated at an aggregated level.<br>- Offers the same view of overall liquidity as market by order but offers less granular routing and modelling.<br>- May include irrelevant information (i.e. liquidity priced very far from touch levels). | + Simpler processing of order book events as they are disseminated at the aggregated level<br>+ Provides assurance regarding price formation.<br>- Assumes that only the first *n (in this case 5)* levels of liquidity are relevant for pricing and discards any "noise" from price levels that are too far from the Best Bid/Offer. | + Very low bandwidth and processing requirements.<br>+ Provides an indication of current Best Bid/Offer prices.<br>- Can be misleading, especially for less liquid instruments, where meaningful liquidity may be at price levels that are further down the order book.<br>- Reliability decreases in markets where there are no minimum lot size requirements (i.e. best price can be available only for 1 share). | + Addresses the weakness of a Level 1 feed by calculating Best Bid and Offer prices that will be available for a "typical" order size. |
| **Latency and Technical Implications** | • Lowest latency.<br>• Highest level of granularity with the most market detail.<br>• Usually enriched with non-functional details such as latency timestamps.<br>• High bandwidth requirements due to the volume of information. | • Increased latency as a result of the aggregation process.<br>• Lower granularity but still detailed<br>• Usually excludes any details that are not functional in nature (e.g. latency measurements)<br>• Slightly lower complexity<br>• Lower bandwidth requirements | • Added latency as a result of the aggregation process.<br>• Less granularity with some detail.<br>• Usually excludes any details that are not functional in nature (e.g. latency measurements).<br>• Lower complexity than Market by Order.<br>• Lower bandwidth requirements. | • Added latency as a result of the aggregation process.<br>• Very low bandwidth requirements as less volume.<br>• Very low complexity as no underlying detail is included. | • Added latency as a result of VWAP calculation.<br>• Very low bandwidth requirements.<br>• Low complexity. |

### 3.2.5. Intraday Reference Data Updates

Reference data updates may or may not be included in a market data feed. For example, TVs that offer derivatives trading tend to have more advanced capabilities for broadcasting reference data updates via a market data API. This is because intraday instrument creation is a relatively frequent event in derivatives markets, whereas equities and bond trading platforms tend to follow a more static approach towards intra-day reference data creation.

## 3.3. TECHNICAL CONSIDERATIONS REGARDING DATA APIS

### 3.3.1. Latency

Data delivered in real-time should be delivered instantly to the market, but some participants have different requirements even in "real-time". Latency is the speed at which a trader can source market information, place an order on the market and execute an order. It can be especially important in very liquid markets, and TVs have adapted by providing multiple market data and order entry APIs aimed at different types of users based on their latency sensitivity. The lower the latency the higher the speed.

As trading technology has evolved, the focus on whether a trader is gaining a competitive advantage or disadvantage due to latency issues has intensified. However, from the use case analysis, discussed in the next chapter, it is most important to note that only a very small sub-section of market makers who are taking risk in the market, and hoping to profit from that risk, are focused on latency.

### 3.3.2. Time-Delayed Data

Market data can be provided on a time-delayed basis, typically anything from a few seconds to fifteen minutes. The information provided on this basis may not include the full data set that is provided in a real-time data feed. For these reasons, a delayed time data feed will be less valuable and cheaper.

### 3.3.3. Transmission Protocols

Due to the large volumes of data involved, market data APIs are based on **multicast transmission protocols**. The advantage of these protocols is that a stream of data can be broadcast simultaneously to a large number of consumers (as opposed to streaming the data to each consumer individually). This allows much faster transmission and fewer resources to handle it on the side of the broadcaster.

The disadvantage of this technology is that it is asynchronous, meaning that there is no concept of acknowledgement and that receipt of data packages by all listeners is not guaranteed. Neither is the concept of a "retransmission" or "re-send request".

Data packages can and do, get "lost". Market data protocols include certain features to deal with this:

- **Snapshot and Incremental Channels:**
  - Snapshot channels: broadcast a "snapshot" of the order book at pre-set frequencies (e.g. every few minutes).
  - Incremental channels: broadcast individual order updates as they are taking place. It can also include other data such as "admin" messages (i.e. session status changes, declaration of fast markets etc.), reference data updates, etc.
- **Incremental Feed Arbitration Mechanism:**
  - For additional safety, the incremental feed is broadcast via "A" and "B" services, so that in the event of a package is lost in the "A" service, the same package can be obtained in from the "B" service. If the data package is lost in both, then a recovery process would start via the Snapshot Channel.

## 3.4. HISTORICAL MARKET DATA

Historical market data can also be sourced from a market data feed but is different from real-time data, as it is not continuously streamed to the market. It refers to past market data, including pre-trade order and quote information, and post-trade information that needs to be stored if it is to be used for analysis. This data may include information about orders that were in an order book but were never transacted or cancellations and amendments that were made to order book data.

## 3.5. MARKET DATA CONSUMPTION

Market data is used in many different ways as shown in the use case analysis in this study (Chapter 4).

Those firms that provide data will often do so for economic profit, so when selling market data they will put contracts and licenses in place to govern how it is paid for and who can access and use the data. The ways in which data is used or consumed impacts upon contractual agreements and data management.

- Data feeds can be taken as 'displayed' (for human consumption) or 'non-displayed' (for machine consumption) data. There may be different fees for each type of use.
- Users may be defined as 'professional' or 'commercial' versus 'non-professional' or 'private' users. These users are usually subjected to different terms under data provider contracts and have to be identified.
- Data may be provided under an enterprise license or charged to each individual user.
- Data feeds may be combined by vendors into a bundled monthly fee for a data terminal.
- Data redistribution to other entities, e.g. clients, can require permission and incur a fee.
- Each data provider creates its own unique contracts to govern the use of data and imposes audits on the firms that use the data to ensure that they are making the right declarations of usage.

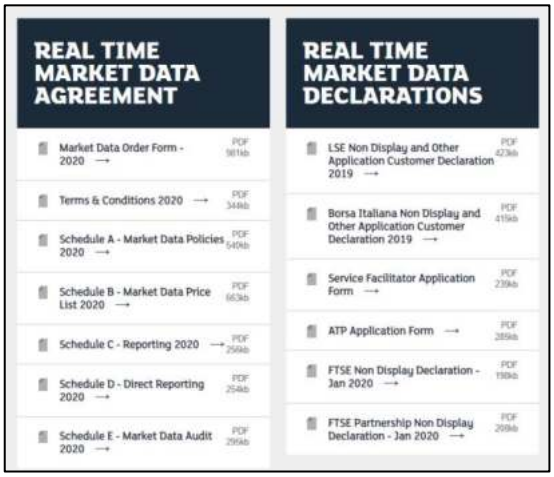
Whether data is consumed direct or via a third party, the individual provider or consumer of data will incur its own additional costs to store, transport and format that data.

As the sources, uses and complexities of data consumption increase, a firm or user may take the same data through multiple systems and thus may be charged for the same data multiple times. To counter this, a voluntary industry principle of '**Multiple Instance Single Use'** (MISU) has been established but few European TVs apply it.

The factors above contribute to making market data contracts particularly complex to manage. ESMA states that an equity CTP would have to negotiate with over 170 entities[14]. However, each venue may have multiple contracts and declarations that have to be managed and monitored (see the example below in Figure 8). If this is multiplied by the number of aggregators in Europe there are thousands of contracts or declarations that must be managed by a CTP. Even the very large firms interviewed for this study report on the difficulties in managing these contracts and controlling the resultant costs.

Figure 8: Examples of the Number of Data Contract Documents To Be Negotiated and Monitored With Individual EU Trading Venues

**London Stock Exchange**




**Deutsche Börse**


*Source: London Stock Exchange Group and Deutsche Börse*

## 3.6. CONCLUSIONS

The design of CT data needs to take many aspects of data constituents and feeds into consideration and it is important that, in assessing the viability and use cases for CT data, consideration be given not just to order, quote book and trade events, but to any other messages that are required for a correct interpretation of those events.

Latency is only an issue for a small subset of market participants, but large volumes of data need to be processed as efficiently as possible.

Data consumption is complex and requires contractual arrangements that expose potential consolidators to legal risk and additional monitoring responsibilities which must be managed for each entity that the data is taken from.

# 4 / USE CASES AND REQUIREMENTS FOR CT DATA

*This chapter summarises the overall demand for CT data including the high-level functional use cases for a consolidated tape, the type of data required by each function and the likely numbers of users. It also provides some background context from the interviews.*

## CHAPTER SUMMARY

**The study identifies multiple use cases for CT data across many different functions:**

**1.** In most financial markets firms, groups of users can be broadly split into functions that align with the three lines of defence risk management principles. CT Data is therefore required by these different functions in each organisation's lifecycle:

- Functions that own and manage risk.
- Functions that oversee risks and challenge the front line.
- Functions that provide independent assurance.

**2.** Functions are similar across asset classes and there are multiple underlying use cases for CT data within each function:

- Issuing
- Asset Allocation
- Portfolio/Investment Management
- Pre-Trade Analysis
- In-flight Monitoring of trades
- Post-Trade Analysis/ Best Execution
- Middle and Back Office Processes/Valuations
- Funding and Collateral Management/Securities Lending
- Market Surveillance
- Risk Management
- Performance Measurement
- Regulatory Oversight
- Audit

**3.** The key data required is:

- Pre-trade order data with 5 levels of depth and session administration data in equities.
- Real-time post-trade data across all asset classes.
- Historical data with pre-trade and post-trade event information.

Ultra-low latency data is not required.

**4** The scope of the data required depends on the user. Most participants want a comprehensive view of all trades TOTV, but some would like a subset.

**5.** It is estimated that tens of thousands of market participants would use the data if it were available.

**6.** Some context to the use cases is given from the interviews.

## 4.1. USE CASES

### 4.1.1. Three Lines of Defence

The study finds that financial market firms typically arrange their functions along the three lines of defence risk management principle:

1. **Functions that own and manage risk.**
2. **Functions that oversee risks and challenge the front line.**
3. **Functions that provide independent assurance.**

As a result, multiple functions across organisations require data. Each function and each line of defence may use different sets of data or different calculations, at different times, to create, monitor and challenge processes or results. CT data would reduce the need for each function and then each line of defence to process and clean data for their use, which currently requires considerable resources.

Figure 9: Use of Consolidated Data by Functions Organised by the Three Lines of Defence

| Role | | Consolidated data would be used to: | |
|---|---|---|---|
| **Front-Line Roles** | Own and manage risk | • Help make better investment and trading decisions.<br>• Increase the accuracy of information to investors.<br>• optimise capital usage. | Reduce reliance by **all functions** on the need for multiple, expensive, technical solutions or cumbersome manual processes to consume, manipulate, clean, and manage data across pan-European markets.<br><br>This takes skill and resources that many stakeholders do not have. |
| **Second-Line Roles** | Oversee and challenge the front line | • Support challenge of the front line through risk management models and improved cross-market surveillance. | |
| **Third-Line Roles** | Provide wider independent assurance to the market | • Improve regulatory oversight.<br>• Support policy decisions.<br>• Simplify audit processes. | |

*Source: Market Structure Partners*

### 4.1.2. Functional Uses

A framework to identify the functions within each stakeholder firm that would use CT data was established at the start of the study and then validated and refined during the interviews. Figure 10 below shows those functional uses, which is found to be the same across asset classes and the table is structured as follows:

- **Use Case Function**: The high-level functions making use of CT data are detailed in each row, along with their role in providing first, second and third-line risk management.
- **Stakeholder Type**: the stakeholders making use of CT data are detailed in each column according to their organisation type.

Multiple underlying use cases exist within each function and the use cases described by all the interviewees have been mapped into a normalised set of use cases per function with more detailed granularity given to the different types of requirements in equities and bonds within each use case function. A generic description of each function and detail of the underlying use cases are described in Appendix 6.

Figure 10: High-Level Descriptions of Use Case Functions for CT Data and Likely Usage by Stakeholders Based on Interview Feedback

| | |
|---|---|
| ● | Green: Large number of users that might subscribe to the tape (actual end-users not the number of firms) = High |
| ◑ | Blue: Limited number of users that might subscribe to the tape = Low |
| ○ | Grey: No users that would subscribe to the tape = None |

| # | Use Case Function | No. Use Cases Identified | Risk Management Line of Defence | Stakeholder Type: Issuers | End Investors | Buy-Side | Sell-Side | Trading Venues | Custody, Clearing & Settlement | Regulators | Data Analytics & Benchmark Providers* | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Indicative Number of Entities Europe inc. UK) | | | | | | | | |
| | | | | 9,430 | 15,500,000 | 4,366 | 10,576 | 430 | 64 | 57 | Not estimated | Not estimated |
| 1 | Issuance | 5 | 1st Line | ● | ○ | ◑ | ● | ◑ | ○ | ◑ | ● | ◑ |
| 2 | Asset Allocation | 2 | | ○ | ◑ | ● | ◑ | ○ | ○ | ○ | ● | ○ |
| 3 | Portfolio / Invest Management | 3 | | ○ | ◑ | ● | ● | ○ | ○ | ○ | ● | ○ |
| 4 | Pre-trade Analysis | 6 | | ○ | ● | ● | ● | ○ | ○ | ○ | ● | ○ |
| 5 | In-flight Management | 5 | | ○ | ◑ | ● | ● | ● | ○ | ● | ● | ○ |
| 6 | Post-trade Analysis | 3 | | ○ | ● | ● | ● | ● | ○ | ● | ● | ● |
| 7 | Middle/Back Office & Valuations | 4 | | ○ | ○ | ● | ● | ○ | ● | ○ | ● | ○ |
| 8 | Funding & Collateral Management | 5 | | ○ | ○ | ● | ● | ○ | ● | ○ | ● | ○ |
| 9 | Market Surveillance | 3 | 2nd Line | ○ | ○ | ● | ● | ● | ○ | ● | ● | ● |
| 10 | Risk Management | 7 | | ◑ | ◑ | ● | ● | ● | ● | ● | ● | ● |
| 11 | Performance Measurement | 5 | | ○ | ○ | ● | ● | ○ | ○ | ○ | ● | ● |
| 12 | Regulatory Oversight | 6 | 3rd Line | ○ | ○ | ● | ● | ● | ● | ● | ○ | ○ |
| 13 | Audit | 1 | | ◑ | ○ | ● | ● | ● | ● | ○ | ○ | ○ |
| 14 | Helping to achieve environmental action policies – reduced data processing | 1 | N/A | ○ | ○ | ◑ | ◑ | ○ | ○ | ○ | ◑ | ○ |

*It is noted that some data analytics firms and vendors would simply distribute the data whilst others may use the data to create products to support the different stakeholder functions.

## 4.2. TYPE OF DATA REQUIRED

Users cited the following elements as critical for the success of CT data:

### 4.2.1. Pre-Trade Tape Design Requirements (Equities)

Participants who require pre-trade data are mostly focused on the consolidation of order event information. Consolidating quotes may be useful in the future but is not currently a priority.

- **Depth of Book to 5 Levels (explained in more detail in Chapter 3, Figure 7)**
  - This supports the ability to assess the liquidity profile of a particular security.
  - Liquidity is increasingly provided in small sizes at an increasingly fast pace and so a Level 1 BBO as a gauge for liquidity/ price is increasingly meaningless.
  - Individual firms or the CTP can calculate a volume-weighted BBO as required**.**
  - If 5 levels of depth are not given, then consideration should be given to defining minimum lot sizes for inclusion in the data to avoid a crossed book[15] of one share.
- **Detailed Auction Data:**
  - CT data should include the indicative auction price, plus the indicative volume and imbalance data during any scheduled auction call processes.
- **Inclusion of Session Administration messages:**
  - CT data should include any other types of messages that are required for the proper interpretation or handling of the consolidated data. For example, order book status updates (e.g. continuous trading, auction call, etc.), declaration of trading halts, fast markets, etc. All session data codes should be normalised.
  - Firms also require an indicator showing what type of halt is occurring. For example, a technical outage versus another reason.

### 4.2.2. Post-Trade Tape Design Requirements (Equities and Bonds)

- **A Real-Time Trade Events Feed** (applicable to equities and bonds)
  - This should include all trade events regardless of their source (i.e., TVs, SIs, APAs) and/or any other OTC trades subject to post-trade transparency under MiFID II.
- **Session Statistics for Exchange-Traded Instruments** *(applicable to liquid instruments that trade on a CLOB)*
  - Dissemination in real-time of a number of session-related statistics including the previous day's closing price, the opening price, the closing price, the high and low prices, the cumulative volume, and values traded. This data should be disseminated on a per venue basis as well as on a consolidated basis.
- **Historical Market Data** *(applicable to all asset classes)*
  - Data captured, stored, and made available for analysis on an ex-post basis as required. This should include pre-trade order event tick data for CLOB traded instruments.

### 4.2.3. Speed of Delivery and Access Requirements to the CT Data

The very low latency of equity CT data is not an issue for the use cases identified. If 5 levels of order book depth are provided, then a speed in the order of 100-200 milliseconds for equity data is sufficient. For bonds, it is 5 minutes.

Different functions identified different needs for real-time pre- and post-trade consolidated data at different times. Access to consistently available historical data is critical for many functions.

For example, pre-trade data is mostly required by users responsible for the trading functions in pre- and post-trade analysis and in-flight execution management. Other functions such as issuing and asset allocation mostly rely on historical data but at the time of an issue, capital restructuring or asset transfer, real-time data can become more important. Participants who require pre-trade data are mostly focused on the consolidation of order event information. Consolidating quotes may be useful in the future but not currently a priority.

Figure 11 below summarises the emphasis each function puts on the need for pre- and post-trade CT data.

## 4.3. SCOPE OF DATA REQUIRED

Overall, participants would like as comprehensive a view of the relevant market data for all the transactions in all the instruments related to equity and bond markets as possible. This includes both EU and non-EU instruments that are traded on a trading venue (TOTV). This is also important for regulators who have to oversee the markets. However, some other participants acknowledge that non-EU instruments can only be a subset of what is traded globally and so the data is less meaningful.

Some equity market participants put greater priority on the data for the most liquid instruments in the 11 largest markets where fragmentation has occurred across the EU. However, equity issuers, particularly smaller ones, want to ensure that their data is easily found in CT data, as it is not easily visible today. Bond participants are more focused on the entire European market.

In each case, participants would like to be able to delineate between the data for EU and non-EU instruments, which is currently not possible due to the lack of an official EU instrument list.

## 4.4. NUMBER OF USERS

Publicly available statistics, interview findings and numbers of known data users provided by data vendors during this study suggest there are hundreds of thousands of users of data across the various functions within stakeholder firms. Given the demand expressed by interviewees, it seems reasonable to estimate that tens of thousands of professional users would use a consolidated tape/s if it existed. Many more retail investors are also likely to use it. This estimate is based on three considerations:

1. **The publicly available high-level numbers about each of the stakeholders** (given in the table above and explained in Appendix 4). Even if only one individual at each of the entities above used the data, there would be 25,000 or more users of the data.
2. The information gathered from the interviews suggests that **many stakeholder entities have multiple users of data**, which can sometimes be hundreds or even thousands of individuals across one entity.
3. **The publicly available data about the US consolidated tape and the number of data users of the tape provided by data vendors.** In the US there are over 280,000 professional users of one consolidated tape (Tape A) and 2,669,941 non-professional users of data of the same tape. It is estimated that the tape reaches 145,776,063 households. It, therefore, seems a conservative estimate to assume that 25-50,000 professional users of European consolidated tape data may exist and that a greater number of non-professional investors may use the tape.[16]

## 4.5. CONTEXT TO THE USE CASES

Figure 12 below provides some additional context to the use cases that were identified during the interviews.

Figure 11: Demand and Priorities for The Establishment of Pre-, Post-Trade and Historical CT Data by Use Case Function (Based on Interview Feedback)

| | |
|---|---|
| ● | **Red: Functions that have the greatest need of the data on a regular basis = Critical** |
| ◕ | **Orange: Functions where the data can be important = Important** |
| ◑ | **Yellow: Functions that may occasionally use the data or where CT data is a nice to have = Low** |
| ○ | **Grey: Functions that do not require the data = None** |

| # | Use Case Function | No. Use Cases | Risk Management Line of Defence | Stakeholder Type: Pre-Trade Order Events (Equities Only) | Pre-Trade Quotes (Equities Only) | Administrational Events | Post-trade Real-time | Post-Trade EOD/Session Statistics | Historical Data (including pre-trade order event data) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **Issuance** | 4 | 1st Line | ◕ | ◕ | ◑ | ◑ | ◑ | ● |
| 2 | **Asset Allocation** | 2 | | ◑ | ◑ | ◑ | ◑ | ● | ◕ |
| 3 | **Portfolio / Invest Management** | 3 | | ◑ | ◑ | ◑ | ◑ | ● | ◕ |
| 4 | **Pre-trade Analysis** | 6 | | ● | ◑ | ● | ● | ● | ◕ |
| 5 | **In-flight Management** | 4 | | ● | ◑ | ● | ● | ◕ | ◑ |
| 6 | **Post-trade Analysis** | 4 | | ◕ | ◑ | ◕ | ● | ● | ● |
| 7 | **Middle/Back Office & Valuations** | 3 | | ○ | ○ | ○ | ◑ | ● | ◕ |
| 8 | **Funding & Collateral Management** | 2 | | ○ | ○ | ○ | ○ | ● | ◕ |
| 9 | **Market Surveillance** | 4 | 2nd Line | ◑ | ◑ | ◑ | ◑ | ● | ● |
| 10 | **Risk Management** | 8 | | ○ | ○ | ○ | ○ | ● | ● |
| 11 | **Performance Measurement** | 5 | | ○ | ○ | ○ | ○ | ● | ◕ |
| 12 | **Regulatory Oversight** | 6 | 3rd Line | ◑ | ◑ | ◕ | ◕ | ● | ● |
| 13 | **Audit** | 1 | | ○ | ○ | ○ | ○ | ◕ | ◕ |
| 14 | **Helping to achieve environmental change policies – reduced data processing** | 1 | N/A | ◕ | ◕ | ◕ | ◕ | ○ | ● |

Figure 12: High-Level Use Case Contextual Feedback from Interviewees

| Ref. | Use Case Function | Use Cases Described | Contextual Comments from Interviews |
|---|---|---|---|
| 1 | **Issuance** | a) Pre-Issuance Analytics & Pricing<br>b) Improved visibility of Small and Mid-Cap Issuer Instruments<br>c) Publication of Issuer Yield Curves<br>d) Decisions and Disclosures<br>e) Cash and Capital Structure Management | • Most issuers rely on their advisors and do not have access to data to challenge the advice they receive.<br>• Corporates monitor prices for performance, employee share schemes and share buy-backs.<br>• Some corporates are unaware of the underlying equity market structure; two large issuers in the small sample for this study were completely unaware that their shares were traded on more than one market.<br>• Accurate data is critical for pricing of bond new issues where both the issuer and the buyer are heavily reliant on accurate pricing for benchmark bonds and credit spreads.<br>• Post-issue, debt issuers generally rely on data provided by their primary dealers. Some would like broader market-wide information and identifiers to understand where liquidity is and who is providing it.<br>• Smaller issuers' data is not easily discoverable as it is often excluded from data feeds for economic reasons.<br>• ETF and fund issuers need detailed historical data to analyse product costs (rebalancing, creating/redeeming units) and the lifespan of a fund. Significant complexities exist in obtaining and cleaning the data for this.<br>• Portfolio managers emphasise the importance of good data to ensure that product information (e.g. Key Investor Documents (KIDS – for UCITS wrappers) gives an accurate assessment of a fund's risks. |
| 2 | **Asset Allocation** | a) Asset Allocation<br>b) Transition Management | • The lack of good underlying data for benchmarks makes it very hard to assess the performance of asset classes and asset managers.<br>• Poor data makes it hard to estimate the cost of moving large amounts of assets or indeed whether they should be moved and/or re-allocated. Errors can result in poor outcomes for investors.<br>• If a fund must be liquidated, then the cost must be estimated, and current data sets make it very difficult.<br>• Good historical consolidated data over a 12-18-month period is needed.<br>• Many assets are now being switched into ETFs – due to poor data it is very hard to know that you are getting the correct price when you submit assets in return for an ETF. |
| 3 | **Portfolio/ Investment Management** | a) Portfolio Construction<br>b) On-Going Monitoring<br>c) Portfolio Rebalancing | • Portfolio managers are some of the largest consumers of real-time data feeds in order to manage and monitor their portfolios.<br>• CT data would help funds to define and achieve their investment objectives and reduce build and maintenance costs.<br>• Understanding liquidity – how quickly positions can be unwound – is essential. A lack of information means that funds will be conservative with the allocation of capital, particularly to small and mid-cap |

| Ref. | Use Case Function | Use Cases Described | Contextual Comments from Interviews |
|---|---|---|---|
| | | | businesses.<br>• Most portfolio management work is done using historical data. However real-time data becomes much more important during times of market stress. |
| **4.** | **Pre-Trade Analysis** | a) Pre-Trade Analytics<br>b) Pre-Trade Analytics for Smart Order Routers (Sell-side Agency)<br>c) Price Formation and Transparency (Buy and Sell-side trading desks)<br>d) Block-size liquidity provision (Sell-side Trading Desk)<br>e) Trading Strategy Research<br>f) Trade idea generation | • One of the biggest data issues is the information asymmetry that exists between buy-side trader calculations and the calculations of brokers due, particularly in relation to lack of CT data volume information.<br>• This mismatch leads to under or overestimations in the trading strategy by either party and a different result to what was expected and incorrect trade forecasting calculations.<br>• The larger the order, the more important the volume information to help determine how to manage the order and where to trade it. Current processes are very cumbersome – most of the industry does not have a good picture of all the liquidity. Moving large blocks or asset transfers requires constant calculations about the realised and unrealised costs.<br>• Firms committing capital also need very good volume data to know how quickly they can unwind risk or how much capital to commit. Without good volume data, they may over or under commit.<br>• Retail investors only see the equity prices their retail brokers give them, which is usually the domestic exchange price, even if their order is then executed on a different venue. Retail size orders for bonds are very hard to find and must be requested manually.<br>• Price discovery of ETFs is at the index level vs the level of the underlying constituents which is not good enough. |
| **5.** | **In-Flight Execution Management** | a) Investor's In-Flight Execution Management (Buy-side Trading Desk)<br>b) Sell-Side In-Flight Execution Management (Sell-side Agency and Proprietary Trading Desks)<br>c) Harmonised taxonomies<br>d) Utility data for monitoring and risk checks<br>e) Front Line Support | • Retail investors cannot monitor the execution of their orders as they only see the domestic market, but the trade may be being executed on other markets or against SI prices.<br>• A CT is essential for controlling the execution and delivering best execution in real-time. Without good data, it is hard to challenge brokers whilst it is still possible to change the outcome.<br>• Liquidity spikes that would change the trading strategy to speed up or slow down orders are often missed.<br>• Algorithms need standardised administrative session statistics to prevent errors that come from each recipient having to normalise them.<br>• Bond markets have no confidence for knowing when to halt a market in a bond.<br>• It would be extremely helpful to have flags indicating reasons for a trading outage that can be disseminated to the whole market as today they are sent to direct members of an exchange but often have no information about outage reasons. |

| Ref. | Use Case Function | Use Cases Described | Contextual Comments from Interviews |
|---|---|---|---|
| **6.** | **Post-trade Analysis** | a) Transaction Cost Analysis (TCA)<br>b) Post-Trade Analytics, block trades<br>c) Provision of Best Execution | • Most retail investors appear to be unaware of the concept of best execution and rarely challenge their brokers or have the right information to do so.<br>• Retail brokers do not provide their clients with the depth of information they would need to challenge execution because it is too expensive to do so.<br>• Institutional investors are struggling to get the data they need to build a consolidated view of both the order and trade events across the entire market. This makes it hard for them to challenge their brokers about transaction costs.<br>• Consolidated data would help venues to publish their quarterly reports on the execution quality achieved and investment firms, including retail brokers, to publish their annual disclosures on why they have selected their top 5 execution venues.<br>• Closing prices in the bond market often bear no relationship to the trade price.<br>• Issuers undertake best execution analysis on share buy-backs. Data vendors see frequent price reversions during these times. |
| **7** | **Middle and Back Office Processing and Administration** | a) Valuations and Fair Price Adjustments<br>b) Reconciliations<br>c) CSDR Penalties Calculation<br>d) Initial Consistency checks/Product Improvements | • Consolidated data would be used every day to calculate Net Asset Values of funds and position management for firms that commit capital. Everyone has different valuation data. The same portfolio can have three different valuations as the custodian and asset manager have different numbers. A bond asset manager's administrative department can spend up to a month trying to reconcile the differences.<br>• The ManCo/Depository challenge on NAV pricing data is evidenced by the recent Woodford / Way Fund Manager scenarios where funds were suspended because of exposure to illiquid stocks.<br>• There is concern that the data being used to validate prices is not accurate and/or independent.<br>• The potential scale of valuation errors was highlighted. It was also flagged that these errors may not be identified until the assets are offered for sale and the resulting costs can run into billions.<br>• Firms want to validate their CSDR Penalties invoices. It is not yet always clear which price they should use to match that being used by the CSD calculating the fine and once this is resolved this could be a source that they are not currently paying for. A standard price would make the validation process much simpler and avoid the need to buy new price feeds. |
| **8** | **Funding and Collateral Management (including non-cash collateral)** | a) Initial and Variation Margin calculations<br>b) Securities Lending and Collateral Management<br>c) Less Liquid Instruments e.g. ETFs for lending and use as collateral | • CCPs use instrument price and liquidity for their initial and variation margin calculations. OTC counterparties also use the same data to determine collateral requirements. A full set of post-trade data for all instruments cleared would provide better data and improve the valuations for less liquid assets. It would also help to assess other instruments that could potentially also be centrally cleared.<br>• Securities lending processes are designed for equities, not ETFs. Lenders use data from primary listing venues to provide a proxy for the total market. ETFs do not work this way – EMEA ETF liquidity is distributed across multiple trading venues. The current infrastructure does not work effectively for ETFs. |

| Ref. | Use Case Function | Use Cases Described | Contextual Comments from Interviews |
|---|---|---|---|
| | | d) Standardised Collateral Agreements<br>e) Credit / Counterparty Risk, OTC Derivatives | • The same applies to the use of ETFs as collateral. The amount of an asset that can be used as collateral is determined in part by the daily trading volume. If the collateral receiver is only seeing a subset of the volume this will significantly restrict the amount that can be deployed, thereby potentially increasing funding costs for the asset class. And this assumes that the ETF has been approved for use as collateral - minimum liquidity levels may be a prerequisite and only met if full access to data is available. |
| **9.** | **Market Surveillance** | a) Detection of Insider Trading<br>b) Detection of Market Abuse/Manipulation by the market<br>c) Detection of Insider Trading/ Manipulation (Regulatory Bodies) | • Market surveillance needs confidence in the data it is using – it cannot just replicate what has happened in the front office and needs to challenge through its own data sets. It is extremely hard to replay cross-market scenarios without consolidation of data. Reconstruction of historical order and event data is also critical.<br>• Market abuse rarely occurs in one venue. It is usually across multiple venues and often in multiple, linked instruments. Financial intermediaries and regulators need a complete set of data to discharge their obligations. CT data would help by providing a single source of data for Europe.<br>• Good historical data is needed to be able to reconstruct scenarios, but many exchanges cannot provide good historical data when requested or keep data in inconsistent formats. Comparing current data sets is hard. |
| **10** | **Risk Management** | a) Liquidity Risk Management (Buy-side)<br>f) Fund Manager Oversight<br>g) Liquidity Risk Management (Sell-Side)<br>h) Liquidity Risk Management (Buy-Side)<br>i) Market Risk Management<br>j) Market Risk - Fundamental Review of the Trading Book (FRTB)<br>k) Credit / Counterparty Risk, OTC Derivatives<br>l) Operational Risk - Back-up Source of Market Data | • The industry increasingly runs on models. Independent risk oversight of these models depends on access to independent, complete, and accurate data sets.<br>• Models increasingly need years of detailed historical data. Historical data is often not available or consistently stored by TVs.<br>• Liquidity risk management is critical and feeds back into portfolio construction and monitoring processes or into the capital commitment processes of the sell-side.<br>• Second-line challenge requires good data to ensure errors are identified or operational behaviours can be challenged.<br>• FRTB is a huge cost to market firms and regulators. If CT data existed now it would significantly reduce the project cost and complexity for both firms and regulators.<br>• Without good, easily accessible cross-market data, managing risk is often a manual process. This becomes very difficult in stressed market conditions. |

| Ref. | Use Case Function | Use Cases Described | Contextual Comments from Interviews |
|---|---|---|---|
| 11 | **Performance Measurement, Evaluation, and Attribution** | a) Calculation of the rate of return<br>b) Index/benchmark creation and pricing<br>c) Macro Performance Attribution<br>d) Micro Performance Attribution - Equities<br>e) Micro Performance Attribution – Fixed Income | • Benchmarking data, particularly in non-equities is considered very poor. Equity data is considered reasonable.<br>• CT data would be an additional data constituent to give more confidence in a benchmark.<br>• Some providers collate market prices all day long from their sponsors, but the quality of the data is bad. Consolidated data for credit markets would be particularly helpful.<br>• A portfolio can often have three different valuations - a custodian can have one value and a fund manager can have a different value and a different return based on prices from a different set of data.<br>• A bond manager's portfolio accounting department can spend months reconciling data differences.<br>• CT data would contribute to assessments of a fund manager's skills and help improve measurement. |
| 12. | **Regulatory Oversight / Policy** | a) Update of regulatory metrics/ thresholds and obligations<br>b) Ongoing monitoring of regulatory requirements<br>c) Cross-market scenarios involving NCAs<br>d) Forthcoming regulatory proposals<br>e) Harmonised implementation of regulatory requirements<br>f) Regulatory oversight | • It would have been helpful if ESMA had access to CT data before it implemented the liquidity thresholds for bonds and restrictions on dark volumes.<br>• CT data would better help ESMA perform calculations for the many RTSs and make improvements in future.<br>• NCAs rely on phone calls between each other for regulatory trading halts and have to manually request data for cross-market issues. The amount of data they can request from each other may be limited due to time and resources.<br>• It is virtually impossible for regulators to fully undertake cross-market surveillance on a pan European basis. Market abuse across venues in multiple jurisdictions is very hard to detect.<br>• NCAs find it hard to access and/or create a complete picture of the market |
| 13 | **Audit** | a) Audit oversight | • CT data would simplify the audit process, particularly for reconciling data using an independent source. |
| 14 | **Environment** | a) Reducing Duplication of Processing | • A CT would reduce duplication of processing across multiple organisations and data centres across Europe. |

## 4.6. CONCLUSIONS

The use cases described by participants make clear that there is an urgent need for both pre- and post-trade consolidated data across asset classes in many different functions. Front line users note that it would help them to make well-founded and better investment decisions, provide accurate information to investors and optimise the use of capital. Second-line defence personnel, such as surveillance and risk managers, speak of the benefits arising from having more accurate and consistent data to challenge the front line. Third line functions report that access to better data is key to performing oversight roles, whilst regulators would benefit from having improved and comprehensive data to aid policy decisions and help monitor the market.

Demand is therefore high, and tens of thousands of users are likely to use CT data if it is delivered to meet their specified requirements. The design of CT data needs to take into consideration all of the user requirements outlined in this chapter or they may not be able to use it, which would undermine the value of any consolidation efforts.

Consolidated post-trade data and good historical data are an absolute priority but consolidated pre-trade equity data is also very important. This CT data would provide users with better data and result in improved processes and outcomes for all the use cases identified in this chapter. Low latency data, which is only relevant to equities, is not critical for most participants.

# 5 / THE BENEFITS OF CONSOLIDATED DATA

*This Chapter describes the benefits that would accrue to a broad set of stakeholders, including end investors, if CT data were readily available in Europe. This is based on user feedback and research.*

## CHAPTER SUMMARY

**1.** The total benefits of CT data cannot be quantified but the **firms that are responsible for managing and trading trillions of euros of assets on behalf of investors report that the lack of CT data means they currently have to rely on sub-optimal data** when seeking to do their jobs for those investors.

Examples of the benefits of CT data that could result in savings to end investors and improve the functioning of capital markets are:

**Improved trade outcomes:** More accurate forecasting of trading costs and broadening awareness of liquidity options.

a) **Independent data for detecting errors and misdeeds**. Helping uncover issues, which may otherwise remain undetected.

b) **Increased pricing accuracy:**

- Improved **portfolio valuations** for investors who are often misled by inaccurate data.
- Improved **benchmark calculations**, which are used to judge performance.
- Better **derivative pricing**.

c) **Improved liquidity risk management and capital allocation** processes:

- Underestimates of liquidity risk can cause harm to end investors who may get trapped in failing funds.
- Overestimates of liquidity risk may also come at the expense of the capital raiser if capital is allocated too conservatively.

d) **Promotion of innovation, competition and lit markets** would all be greatly facilitated by CT data providing visibility of all available liquidity:

- The liquidity provision and listing models of incumbent trading venues are being forced on the market and alternative liquidity provision and listing models cannot emerge.
- Brokers are not being held accountable for their smart order routing decisions and innovative venues may lose out.
- Lack of clean data is misleading participants to trade away from lit markets.
- Data processing costs are leading to industry concentration.

## 5.1. THE IMPORTANCE AND MATERIALITY OF GOOD DATA

As described in the previous chapter, market participants and end-users have highlighted a multitude of use cases where they would benefit from CT data.

Quantifying the total value of these benefits to investors is impossible. However, it is known that the firms that are responsible for managing and trading trillions of euros of assets on behalf of investors report that the lack of CT data means they currently have to rely on sub-optimal data when seeking to do their jobs for those investors.

Some key examples that further illustrate and quantify the benefits of CT data are set out below.

## 5.2. IMPROVED TRADE OUTCOMES

A key use case identified for CT data is the pre-trade analysis function, which is used to forecast the estimated cost of a trade and hence helps to determine the appropriate trading strategy.

### 5.2.1. Benefits of CT data for Pre-Trade Analysis in Equities

Liquidity is not always immediately available in the market, particularly for larger orders (i.e. for most institutional investor orders), basket orders (i.e. orders in multiple instruments) or even small orders for illiquid instruments. In this case, the trader or investor will use pre-trade analysis to determine how best execute the order.

The analysis draws upon a number of key data points. These include the current price and bid-offer spread (pre-trade data) plus a view of the prices and volumes that have been recently executed in the market and where they have been executed (post-trade data). A sophisticated trading strategy will also consider the risk of the instrument(s) to be traded, which is typically measured by comparing the prices at which the instrument has historically traded relative to a benchmark index to determine its volatility (historic data).

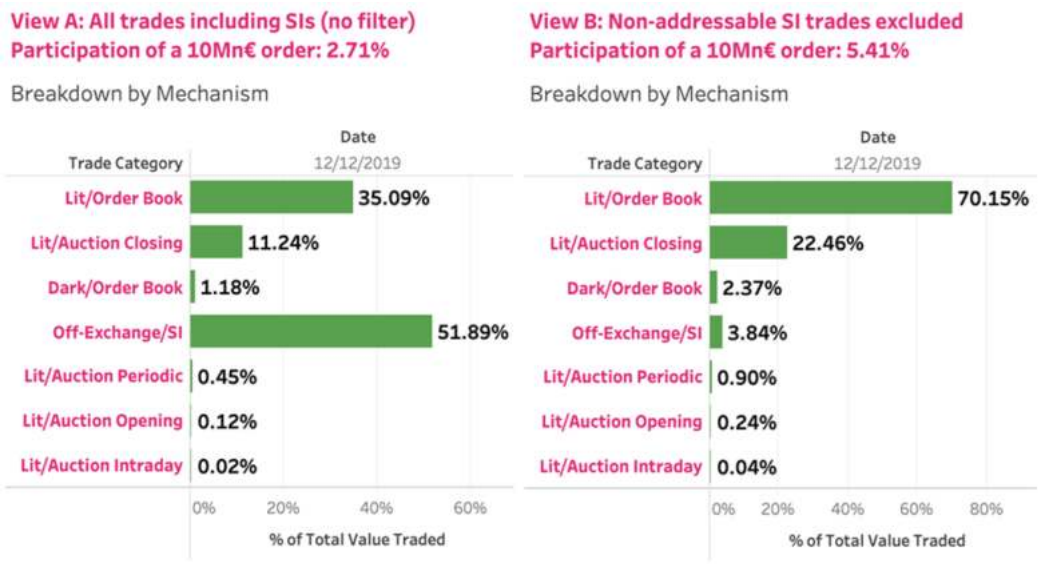
Therefore, pre-trade analysis requires a complete and accurate consolidated data set. With this information, the trader or investor can forecast, and thus optimise, the expected cost and risk of the trade versus the timeframe required to complete the trade. Traders also report increasing their use of automated and algorithmic trading strategies to determine their trading strategy and complete their orders. These strategies are almost wholly dependent on data and therefore are only as good as the data that goes into them. When the data is poor or incomplete then the forecast will be inaccurate. The likely outcome will be a sub-optimal result as the trade is executed at the wrong speed; price and/or volume and the additional cost or risk is borne by the end investor.

An example of the impact of sub-optimal data is given in Figure 13 below. This examines the impact on a single German stock, Munich Reinsurance Company, on 12/12/2019 which was considered a relatively “normal” day in the markets.

Under View A, an investor with a typical institutional sized order of €10 million is presented with a gross (uncleaned and unfiltered) set of data that show liquidity available to the market. The order appears to represent 2.71% of the day’s reported turnover in the stock and the data suggests that the trading strategy should be to route 35.09% of an order to the lit markets continuous trading, 11.24% to the auction, 1.18% into a dark book and 51.89% to a SI.

For View B, billions of rows of data have been filtered, cleaned, and manipulated under a series of subjective interpretations (described in Chapter 6) to establish a truer picture of where the instrument typically trades. Under this view, the order represents 5.41% of the adjusted volumes and the investor is presented with a very different picture that suggests that 70.15% of the order (vs. 35.09%) should be routed to the lit order book and only 3.84% (vs. 51.89%) to an SI.

Figure 13: Analysis of Total vs. Adjusted Volumes Traded for Munich Reinsurance Company on 12/12/2019




*Source: Big XYT*

In this example, an investor with View A would likely find that a large portion of the trade routed to the SI has not completed and they may have missed good liquidity on the lit market.

The use of a poorly informed trading strategy has also increased the risk of the trade. The reasons are two-fold. First, liquidity providers with more efficient data processing and cleaner data may detect and trade against the order. Second, by taking longer to complete there is an increased risk that the price moves against the order. This is a common complaint that traders say occurs daily.

This example also shows that complete and accurate CT data would increase the likelihood that more trading activity is channelled to lit markets and thus more investors could participate in the price discovery process.

### 5.2.2. Estimates of Cost Savings to the End Investor from Accurate Equity Data

Interviewees at equity asset managers were asked to estimate the cost to their annual trading strategies of not having complete and accurate CT data to forecast trading costs. Whilst it is not possible to give an exact number most were happy to give a range estimate. The majority estimated costs or slippage in the range of 0 to 1.0 basis points although some rated it even higher with one or two putting the figure above 5.0 bps.

Significantly, each respondent's perspective was based on **how clean they thought their own data was**. The larger the firm and the more extensive the resources to compile and clean the data, the lower the estimate might be.
By applying these estimates to the annual traded value of European equities, the total adverse cost can be calculated. The table below shows that there are substantial amounts that can be potentially saved by giving investors and traders access to complete and accurate CT data.

Figure 14: Estimated Cost in Basis Points of not having a Consolidated Tape in Equities

| **Basis Point Estimate of Slippage** | **Number of Asset Management Trading Desks Responding in Each Category** | **Cost In €billions** (Based on Annual Value Traded In 2019) |
|---|---|---|
| Impossible to estimate | 1 | - |
| 0 – 0.25 bps | 15 | 0 - 0.53 |
| 0.25 – 0.5 bps | 12 | 0.53 - 1.06 |
| 0.5 – 1 bps | 5 | 1.06 - 2.12 |
| 1 -1.5 bps | 3 | 2.12 - 3.18 |
| 1.5 bps – 2 bps | 4 | 3.18 - 4.24 |
| 2-3 bps | 0 | 4.24 - 6.36 |
| 3-5 bps | 1 | 6.36 - 10.61 |
| Above 5 bps | 2 | 10.61 |

*Source: MSP Interviews and Alpha Forum Conference, Feb 2020*

### 5.2.3. Benefits of a Consolidated Tape for Pre-Trade Analysis in Bond Markets

The pre-trade analysis process for bonds follows a very similar process as for equities.

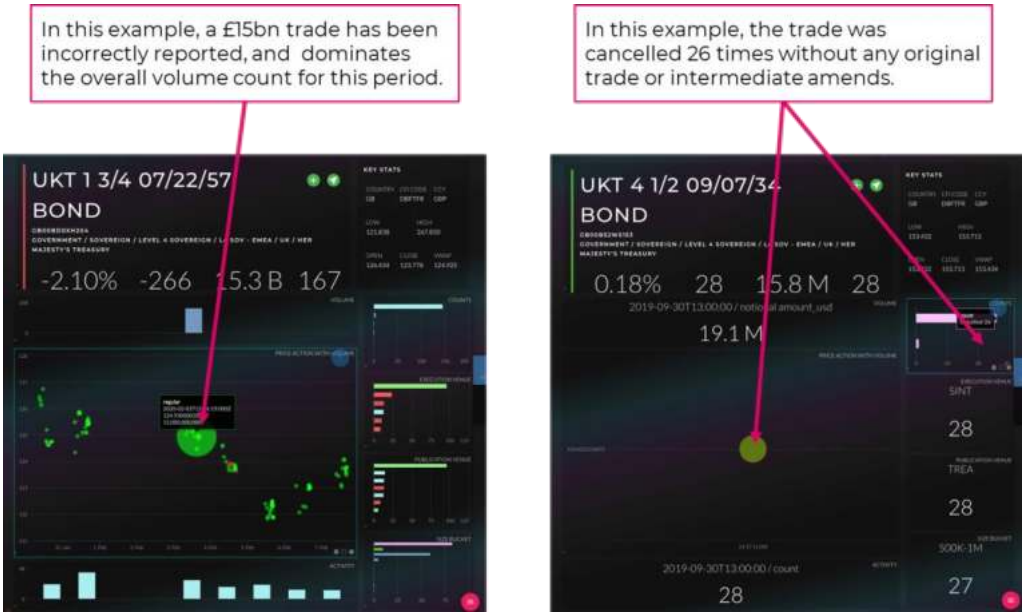
Generally, there is less data available for a bond than for an equity as they can be less liquid, and the market is mainly quote-driven where quotes are not firm. This means that the prices reported 'on-screen' or in a data tape may not represent the prices at which the instrument can be traded.

However, just because there is less data, this does not mean that there is less need for it. Respondents to this study frequently commented on the difficulties in sourcing good bond data.

The analysis for bonds often looks at an asset class or the sector level. For example, the price of a bond can be estimated by looking at the credit spread of similar bonds over the equivalent benchmark bond. Additionally, as the 'on-screen' prices may not represent the price at which the bond can be traded, there can be less focus on pre-trade data and more reliance on post-trade data. The analysis for bonds is also very sensitive to the accuracy of the data and **a single data inaccuracy has the potential to completely distort the picture of the market**.

For example, an independent technology provider noted that they regularly see trade reports that are ten times the actual volume due to the wrong notional flag being used. Further examples are highlighted in the diagram below. The trade on the left was incorrectly reported and displayed to the market as a £15 billion trade. Whereas the trade on the right was cancelled 26 times without any original underlying trade report being submitted. These examples show how incorrectly reported trades significantly distort the real volumes in the market and the data used for forecasting by traders. CT data with stricter data quality controls and enforced technical protocols could avoid such costly errors.

Figure 15: Examples of Incorrect Trade Reports or Trade Cancellations that have Impacted the Market Volumes and Value Traded




*Source: Ediphy*

## 5.2.4. Estimates of Adverse Costs to the End Investor from Inaccurate Bond Data

Interview respondents at bond asset managers were also asked to estimate the cost in basis points to their annual trading strategies of not having complete and accurate data to properly size orders. These estimates are included in the table below although the absence of any reliable data for the traded value in bonds only serves to highlight the need for CT data and makes it impossible to quantify the cost in absolute terms.

Figure 16: Estimated Cost in Basis Points of Not Having a Consolidated Tape in Bonds

| Basis Point Estimate of slippage | Number of Asset Management trading desks responding in each category |
|---|---|
| Impossible to estimate | 0 |
| 0 – 5 bps | 10 |
| 5-10 bps | 4 |
| 30-50 bps | 2 |
| 50 -1 bps | 1 |

*Source: MSP Interviews and Alpha Forum Conference*

## 5.3. MORE ACCURATE PRICING, VALUATIONS AND BENCHMARKING

### 5.3.1. Portfolio Valuations

Reconciliations are a daily requirement across the industry. For example, asset managers will reconcile their positions and prices to their custodians and fund administrators for good governance and to ensure that fund market values are fair and accurate. However, these reconciliations are only as good as the data used to reconcile against. If data is poor or inaccurate then fund values could be calculated incorrectly, and differences can take weeks to resolve.

This is particularly problematic if investors have invested or disinvested from a fund at the wrong market value, which is very likely if, for example, the fund is priced daily.

The examples below highlight the potential impacts on both retail and institutional investors arising from incorrect bond prices.

Figure 17:

Example of The Impact on Retail Investors

***Two brokers*** *that aggregate and execute retail orders were interviewed for this project. They both* ***identified an issue with accurate end-of-day bond valuations for retail customers*** *and both independently stated that the order of magnitude of* ***the error on valuations could be around 5%.*** *This means that a bond investor with bonds that appear worth €100,000 may be able to only get €95,000 euros or could get €105,000 euros on liquidating their portfolio.*

*One of these retail aggregators holds €40 billion euros of assets for retail customers. Even if only 10% of the holdings were in bonds, the 5% variation on the value of their total investments could be €200 million.*

Figure 18:

Example of The Impact on Institutional Investors

***An investment advisor*** *that was interviewed for this study* ***cited an actual transition of assets*** *that was undertaken* ***where the wrong valuations had a significant impact*** *on the end value of the fund. At the outset, the total fund was valued at approximately €15 billion in assets which included a tranche of corporate bonds valued at €2 billion based on the data at the time.*

***These corporate bonds turned out to be completely illiquid, were not saleable and thus the value was in fact zero.*** *The fund was therefore only worth €13 billion when it was actually realised.*

These impacts could be avoided if robust CT data were available to support timely and accurate pricing, analysis, and valuations.

### 5.3.2. Better Quality Benchmark Calculations

Benchmarks are used to measure and assess the performance of investment strategies and investment products. These benchmarks are often viewed at the top, or index level, but many users would also like CT data to provide greater visibility of the data for the underlying components of the index. This would allow them to better assess, or understand the reasons for the benchmark index's performance, and the scope for potential improvements.

Ultimately the benchmarks are only as good as the data that is used to create them. Many users consider this poor, particularly in bonds.

CT data would greatly improve the pricing of benchmarks and increase their usefulness in assessing investment returns.

### 5.3.3. Improved Derivative Pricing

Derivative pricing is based on the price and certain key data points of the instruments or securities underlying the derivative. Complete and accurate CT data would, therefore, improve pricing processes, transparency, and accuracy. This applies particularly to OTC derivatives where counterparties need to agree on derivative pricing to determine any collateral requirements.

## 5.4. INDEPENDENT DATA FOR DETECTING ERRORS & MISDEEDS

A robust system of checks and balances is in place across financial services firms to minimise potential errors and identify any misdeeds. This activity is typically undertaken by second and third-line functions that are partially or fully independent of the front-line asset management or trading process. However, these functions are one step removed from any direct involvement in financial markets and, as such, they are fully reliant on sourcing good data to perform their checks. If the data is poor, then errors or misdeeds may not be spotted until a later date or in extreme cases may not be spotted at all.

The example below relates to an enforcement action taken by a European NCA. In this example, a transition manager, trading on behalf of multiple clients, over a period of time, applied unauthorised mark-ups (i.e. charges) to certain bond transactions. The clients were not aware that the transition manager was applying these mark-ups and ultimately the misdeed was only discovered when a third party compared the prices being applied to the bond transactions against the independent CT data that is available in the United States. As there is currently no European equivalent of this CT data it is possible that the misdeed would not have been discovered if the transition manager had only traded European bonds.

Figure 19: Example of the Benefits of Independently Prepared Consolidated Data – UK Transition Manager fined £32 million+ by National Regulator[17]

***In 2014, the FCA fined a large UK-based transition manager £32,692,800*** *(which was discounted to £22,885,000 for early settlement)* ***for overcharging six clients a total of US$20,169,603 during a 14-month period.***

*Transition managers assist clients to support structural changes to asset portfolios with the intention of managing risk and increasing portfolio returns. They may be required when a client needs a large portfolio of securities to be restructured, or when a client decides to remove or replace asset managers. In this case, the transition manager in question applied a series of substantial and unauthorised mark-ups to the transitions which included assets in both equities and bonds.*

***The discovery of this overcharging was only made possible through the existence of the US consolidated bond data tool TRACE.*** *When one of the six clients used an independent consultant to verify the US trades, the consultant could see the differential between the publicly available bond pricing information in TRACE and the mark-ups on the client's trades which had not been expressly agreed. It was impossible to reconcile such data in Europe because there was no consolidated tape of trades but once the TRACE data had highlighted the problem, the investigation showed that the mark-ups had been applied on both US and European transactions.*

*The transition manager's second-line defence systems and controls were also subject to criticism. The findings were that the annual Compliance Monitoring and Testing Programme failed to identify any of the control issues in respect of the transition management business during that period. Also, the risk management function did not identify the operational control weaknesses which existed during the relevant period, such as the lack of adequate processes overseeing the correct application of commission rates and spreads for TM trading.*

***A lack of accessible, external independent data may have made the internal information available harder to challenge.*** *Compliance and risk managers interviewed for this report have repeatedly highlighted the importance of easy access to independent data to enable them to do their jobs more effectively.*

Similarly, a recent US class-action case[18] alleges that a number of banks unreasonably restrained the trade of odd-lots of corporate bonds in the secondary market in order to maintain wider odd-lot spreads, and thus higher profits for themselves collectively. It also alleges that these banks deliberately boycotted market evolutions that would increase pre-trade pricing transparency for retail investors through electronic platforms. The evidence being used to support this case is from TRACE data.

## 5.5. IMPROVED LIQUIDITY RISK AND CAPITAL ALLOCATION

This study especially highlights liquidity risk management as a priority use case for CT data.

Firstly, managers in front line functions should assess the short and long-term liquidity of the assets in a fund or on their balance sheet to understand how quickly they may be able to buy and sell assets. For asset managers, this trading is in response to inflows and outflows or a change in their investment views. The analysis requires a good knowledge of both the historic and projected liquidity in each individual instrument to ensure the right calibration at a total fund level. If these calculations are wrong, it can have significant consequences for investors or result in opportunity costs for issuers.

Furthermore, this analysis is dynamic because asset managers constantly need a clear and on-going picture of liquidity. For example, if a fund experiences unexpectedly large withdrawals, the impact can be immediate and severe. In some cases, the fund may be forced to sell its most liquid assets first so that the remaining investors are left owning the least liquid assets in the fund. In an extreme scenario, this can even threaten the viability of the fund.

One example is the UK-based £3 billion Woodford Equity Income Fund. This fund was ultimately suspended in June 2019 after being overwhelmed by a series of large withdrawals, which left the remaining investors trapped in the fund. Prior to this, the fund was considered one of the most successful launches since the financial markets crash in 2008 and had attracted billions of assets from both retail and institutional investors. However, in an attempt to generate the returns expected on the fund, the asset manager had increasingly invested in less liquid securities. This quickly became problematic when the inflows turned to outflows and the asset manager was forced to sell positions.

The internal and external risk functions failed to mitigate this liquidity risk. One of the reasons given for this failure was the apparent difficulty in sourcing good pricing data for the illiquid holdings in the fund, given their very large size.

The cost of this failure was significant. In the period between the fund's launch in June 2014 and the announcement of its wind-up, hundreds of thousands of investors lost 18%, whilst the FTSE All-Share rose 33%. Moreover, the fund's value continued to fall post-suspension, until specialists were called in to close the fund. This closure is not yet complete but modelling, conducted by private equity specialists PJT Park Hill in November 2019 forecast a base case loss of 32.5% and a worst-case loss of 42.6%.[19]

Whilst CT data would not have prevented the fund's collapse, this example highlights the importance of good data to understand and manage liquidity and mitigate risk. Operators of venues that cover less liquid markets highlight the difficulty of getting their data seen without CT data.

If Woodford is an example of an asset manager being too aggressive then it is also possible that asset managers can be too conservative and thus miss out on investment returns. For example, some asset managers report a lack of confidence in liquidity data that leads to lower levels of investment in small and mid-cap securities. This not only deprives end investors of returns but ultimately leads to a lower allocation of capital to small and mid-cap issuers.

## 5.6. THE PROMOTION OF INNOVATION, COMPETITION AND LIT MARKETS

### 5.6.1. Remove Barriers to Entry for Innovators and Reduce Concentration

For equities, interviewees generally noted that valuations of liquid instruments are less of an issue as firm prices are constantly available. As such, many only take their data from the domestic incumbent TV as a reasonable, if incomplete, source of prices and volumes for the market as a whole.

These TVs are, therefore, in the advantageous position of being able to sell their data to end-users as a proxy for the entire market, which effectively means that their liquidity provision, listing and data provision models are by default also being forced onto the market.

Competitors who offer, or would like to offer, alternative models for listings and secondary market liquidity struggle to get their prices and volumes seen and may lose the incentive to invest resources to innovate. To compound the issue, data vendors may not distribute their data even if it is free because the data vendors still have to spend money on the data interfaces and are not guaranteed a return for their efforts.

This dynamic is a barrier to competition and innovation and the overall effect is to perpetuate the existing structures as the only meaningful liquidity provision, listing and data models.

Investors and issuers are often not aware of the underlying market structure and the choice of primary and secondary market options available. During this study, some extreme examples were given, whereby two issuers were unaware that their shares were traded on other markets away from the main exchange. Additionally, retail brokers report that their customers are also unaware that shares can be traded away from the main exchanges even though any reasonable definition of best execution would require that other trading venues be in scope for execution.

### 5.6.2. Promoting Lit Markets

The examples given in Figure 13 above and Figures 24 and 25 in Chapter 6 show that current market statistics can provide a distorted and misleading view of market liquidity. In these examples, the liquidity provided by the SI was significantly overstated when in fact there was more liquidity available on the lit venues. Based on current market statistics, if data is cleaner and CT data was more readily available then more trades would likely be routed to lit books.

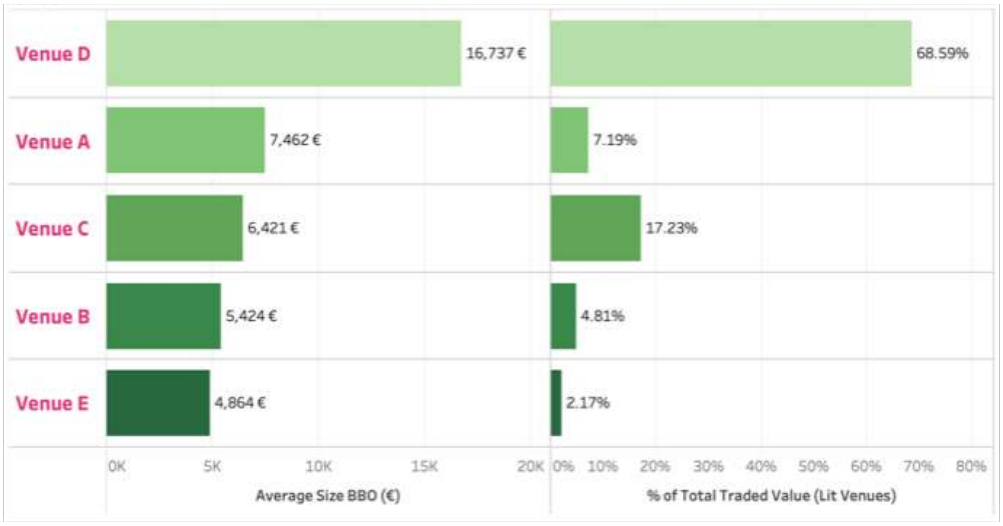
### 5.6.3. Stronger Data and Accountability for Smart Order Routing Decisions

Institutional and retail investors are increasingly likely to execute their orders through a broker or a broker's automated or algorithmic trading platform. As a result, almost all investors depend heavily on their broker to seek out the best prices and venues to achieve best execution.

However, even large institutional investors report that they cannot see all markets and therefore cannot audit or challenge brokers to ensure that their order routing decisions are in the investor's best interest.

For example, Figure 20 below shows the average liquidity available at the BBO at various TVs versus the actual turnover at those TVs for the main Danish index in December 2019 across completely fungible venues (i.e. where clearing and settlement are exactly the same). Venue D had the highest average liquidity available at the BBO and consequently, the largest value of transactions was executed there. However, Venue A, which had the next highest average liquidity available, accounted for a much smaller share of the turnover than Venue C. In other words, Venue C had less liquidity but secured considerably more turnover. There can be other factors that brokers consider when making smart order routing decisions but without good CT data clients are unable to challenge or assess these decisions or outcomes.

Figure 20: Liquidity vs. Turnover for DK25 Index in Dec 2019




*Source: Big XYT*

## 5.7. INCREASED ACCESS TO LOW-COST INVESTMENTS FOR SAVERS

Exchange-Traded Funds (ETFs) have become increasingly popular with both institutional and retail investors in recent years and now represent one of the fastest-growing segments of the investment and savings market. Originally developed in the US, they were initially focussed on equities but have since expanded to include government, investment grade and high yield bonds across all major financial markets. Additionally, because the underlying securities are usually managed on a passive basis, the fees to end investors are typically much lower than for similar actively managed products.

An ETF is a hybrid instrument that can be traded in two ways.

1) **Primary liquidity:** similar to a unit trust, the units are created or redeemed in response to investors either investing or disinvesting from the ETF. This process is managed by Authorised Participants (e.g. broker-dealers) who effectively buy or sell baskets of the securities held by the ETF in coordination with the creation or redemption of shares in the ETF.

2) **Secondary liquidity:** similar to equities, the shares in an ETF are traded on an exchange or other trading venue.

The combination of both primary and secondary liquidity is innovative and critical to the success of an ETF. It not only provides investors with two avenues for sourcing liquidity but trading in the secondary market effectively acts as an arbitrage mechanism to ensure that the price moves in line with the value of the underlying securities throughout the trading day.

Despite their success, the absence of CT data impacts the secondary market pricing and liquidity of ETFs. By their nature, ETFs are broad investment products that are made available across multiple exchanges and trading venues to improve their accessibility to end investors. As such they do not have a link to a home exchange in the same way that a listed company is usually linked to the main exchange in its country of domicile.

This can be problematic if participants economise by only taking data from the main domestic exchange as a proxy for the whole market. The result is that different investors may have a very different picture of the pricing and liquidity available to them. This not only reduces the attractiveness of these products to potential investors but also creates inefficiencies in trading costs and the arbitrage mechanism that helps keep the price of the ETF in line with its underlying securities. The information below shows how the

average spread (from daily time-weighted aggregations) varied across venues for the same iShares Stoxx 50 ETF from the start of 2020 to May 2020. It also shows how it changed dramatically with volatility quarter on quarter. Investors in Italy, the UK, Germany, or Switzerland would have very different information to inform their investment decisions.

Figure 21: Example of ETF Spread Difference in Basis Points for iShares Stoxx 50 ETF, EUR.DIST across European Trading Venues during Q1 2020 and Q2 (to May 2020)

Spreads Across Trading Venues

| Venue | AtTouch VWAS in bps 2020-Q1 | 2020-Q2 |
|---|---|---|
| Aquis Exchange | 8.58 | 24.23 |
| Borsa Italiana | 5.33 | 8.34 |
| Cboe BXE | 10.76 | 28.42 |
| Cboe CXE | 10.28 | 25.44 |
| Euronext Amsterdam | 6.67 | 12.38 |
| LSE | 7.39 | 14.61 |
| SIX Swiss Exchange | 14.33 | 27.21 |
| Turquoise | 14.15 | 28.58 |
| Xetra | 3.75 | 7.25 |

*Source: Big XYT*

The absence of CT data also contributes to concentration in ETF providers. This can result from individual ETFs appearing to be less liquid and more expensive to trade (as shown in the example above) and from the large-scale data processing capabilities required to be an ETF provider. The result is that market share is highly concentrated. Of the companies that issue ETFs globally almost 75%[20] of the market is captured by 3 US ETF providers. In Europe, there are other issuers offering ETF products, but the market is still concentrated with the 3 largest providers accounting for 65.9% market share.

## 5.8. IMPROVED REGULATORY CALCULATIONS AND REGULATORY POLICY MAKING

To fulfil its supervisory obligations ESMA has to source, cleanse and manipulate significant amounts of data to make certain regulatory calculations. This requires considerable resources, effort, and time delay to complete. Alternatively, if this information were available from CT data then ESMA would not have to cleanse the data and could focus its limited resources elsewhere.

The example below highlights the effort required to cleanse non-consolidated data and the discrepancies that currently exist.

The RTSs[21] in MiFID II specify that a non-equity CTP must cover both:

- 80% of the cumulated volume of transactions as defined within Annex II of RTS 2 reported by all APAs and/or trading venues in the Union over the previous 6-month for the relevant non-equity asset class; and
- 80% of the cumulated number of transactions reported by APAs and/or trading venues in the Union over the previous 6-month period for the relevant non-equity asset class.

ESMA does not currently calculate the CTP threshold requirements but recently voluntarily aggregated data[22] from the NCAs to help market participants in the performance of the SI test[23]. This calculation is

integral to the SI regime, but it is also the only data available to assess whether a potential consolidator could meet the 80% coverage requirement for non-equity CTP.

Ediphy, an independent data analytics provider in bond markets, interviewed for this study, is interested in providing a CT service. It compared the aggregate numbers as published by ESMA to its own aggreged data, which was taken directly from the data sources. Its analysis found the following discrepancies:

- ESMA's data showed that 57,000 ISINs out of a total of 334,000 ISINs in the ESMA file appear to have some activity but Ediphy's results suggest only 41,000 of those 57,000 ISINs had activity during the same period.
- Ediphy also noted trading activity in 1,300 ISINs where ESMA did not note any activity
- To calculate whether it could consolidate 80% of the data for the CTP coverage, Ediphy sums the number of trades it records for individual ISINs and divides that by the number of trades that ESMA records in the same ISIN. The result is that Ediphy believes they can consolidate approximately 70% of the market on 50% of the ISINs. However, it does not know where to get the remaining 30% of data from on the instruments where it already has 70% of the data or where to get the data for the 50% of instruments that it has less than 70%. ESMA says they would need to ask each individual NCA for more information about where the data came from to build the picture and ascertain what is missing.

On the analysis above **it is possible that ESMA's numbers are not accurate and are not capturing all the data**. In the absence of CT data, this is understandable. Nevertheless, it is therefore unlikely that any CTP can be confident that they have met the 80% threshold requirement. There is also a risk that other important regulatory calculations that ESMA is required to undertake may not be accurate.

Where there are discrepancies in the data there is also a danger that, without official data, interested parties can fill the vacuum with their own interpretations of data, particularly those with the largest resources for lobbying and data manipulation.

Finally, poor data can also lead to badly designed legislation or regulatory policy. For example, regulators may seek to amend existing legislation because the available data suggests it is not achieving its intended purpose or regulators may lack objective data to help decide between competing interests and outcomes when framing new legislation.

## 5.9. CONCLUSIONS

There are many direct and indirect benefits to a broad array of market participants and stakeholders that would result from the establishment of CT data. The direct cost savings from CT data could potentially save end-users billions of euros but it could also bring benefits to market transparency, competition and regulatory oversight and provide greater confidence and market integrity for issuers and investors.

There are small subsets of financial intermediaries who would be disadvantaged by the establishment of CT data. These are primarily those firms that have sufficient economic and technical power to process and profit from the current information asymmetries in European market data and the large incumbent data vendor firms who profit from the data that they sell.

# 6 / CHALLENGES TO DATA CONSOLIDATION

*This Chapter summarises the issues identified with respect to consolidating data in the current environment, whether consolidating data for own use or consolidating it for commercial reasons. A CTP would have to deal with these issues to create a viable tape.*

## CHAPTER SUMMARY

**The study identified the following barriers to data consolidation**:

1. **Price of Data Not Determined by Market Forces Making Consolidation Unviable:**
   - Legacy market structure and cost drive users to economise by taking a subset of market data as a proxy, usually from the dominant venue. This reinforces the pricing power and liquidity provision models of the largest venues.
   - These venues have no incentive to price data at the value that the market would put on it when the data is consolidated, and the quality of each venue's contribution is assessed.
   - Unless this is addressed, consolidators will pass the costs from TVs and APAs directly to participants who will continue to economise by taking subsets of data, rendering consolidation efforts a waste of time for the CTP.
2. **Data Quality and Complexity**
   - Poor data requires considerable effort and resources to clean so that it can be properly compiled and used effectively. Issues result from ambiguities and inconsistencies in the rules, subjective interpretation of the rules, abuse of the rules or misuse of flags and a lack of mandated technical operating standards for data submissions.
3. **Poor Governance and Lack of Enforcement of Rules**
   - Issues arising need an immediate resolution for CT data to be of value to the market. ESMA and the NCAs are not close to the technical interfaces in the market where the data is submitted and cannot immediately identify and address issues.
   - NCAs must manually seek cross-market information from each other resulting in time lags for identifying and fixing data issues. A true picture of the market may be lost for a considerable time, possibly months or years.
   - There is also no centrally agreed penalty mechanism for poor data submissions or agreement about how one should be implemented.
   - TVs have better quality data than APAs because they have members who must follow their rules. APAs have worse quality data because they who do not have members, are not empowered to enforce penalties on their clients and do not always see both sides of a trade.
4. **Other Factors That Would Make CT Data More Useful and Viable**
   - Harmonising rules such as the deferral regime for bonds, the treatment of SIs as trading venues, more clearly defining what is an EU instrument and increasing the number of bonds available for publication would also improve the viability of the data.

## 6.1. PARTICIPANT FEEDBACK

The main concerns that participants raised as data consolidation issues were:

- Cost
- Data quality and complexity
- Governance and enforcement of rules
- Lack of harmonised rules on data
- The population of instruments that are currently included in the data

The following table highlights the significance that different stakeholders put on different issues. It demonstrates that the further away the stakeholder is from the point of execution, the fewer concerns they raised. However, the interviews also revealed that these stakeholders had a lower grasp of the potential incompleteness or inaccuracies of data and that they rely more heavily on advisors or data vendors for the accuracy of that information.

Figure 22: Matrix of Stakeholders and Barriers to Data Consolidation Raised by Interview Participants

| | | | |
|---|---|---|---|
| ● | Red: Raised often and seen as a critical issue impeding consolidation | ◑ | Yellow: Raised occasionally but not seen as a big issue |
| ◕ | Orange: Raised often and seen as an important issue to add value to the data | ○ | Grey: Stakeholders did not raise this problem or it is not relevant to them |

| | | Barriers to Data Consolidation Raised by Participants | | | | |
|---|---|---|---|---|---|---|
| **Stakeholder Group** | **Industry Grouping** | **Cost** | **Governance and Enforcement** | **Data Quality** | **Harmonisation of the Deferral Regime** | **Population of Instruments** |
| **Issuers** | **Issuers** (Corporate and Government/Funds) | ◑ / ● | ◑ / ● | ◑ / ● | ◕ | ◑ |
| **End Investors** | **End Investors*** | ● | ● | ● | ◕ | ◕ |
| **Financial Intermediaries** | **Buy-Side** | ● | ● | ● | ◕ | ◕ |
| | **Sell-Side** | ● | ● | ● | ◕ | ◕ |
| | **Trading Venues** (Largest) Equities/Bonds | ○ | ◕** / ● | ◕ / ● | ◕ | ◑ / ● |
| | **Trading Venues** (Alternative competitors) Equities/Bonds | ● | ● | ● | ○ / ◕ | ◕ |
| **Custodians/ Risk Managers** | **Custody, Clearing & Settlement** | ◑ | ◑ | ◑ | ◑ | ◑ |
| **Regulators** | **Regulators** | ● | ● | ● | ◕ | ◕ |
| **Data Analytics & Benchmark Providers** | **Data Analytics & Benchmark Providers** | ● | ● | ● | ◕ | ◕ |

*Based on retail broker feedback*

***Equity venues mainly raised issues about OTC data and adoption of standards rather than on venue data. Bond venues were concerned with the broader issues impacting OTC data.*

## 6.2. EXAMINATION OF THE CHALLENGES TO CONSOLIDATION

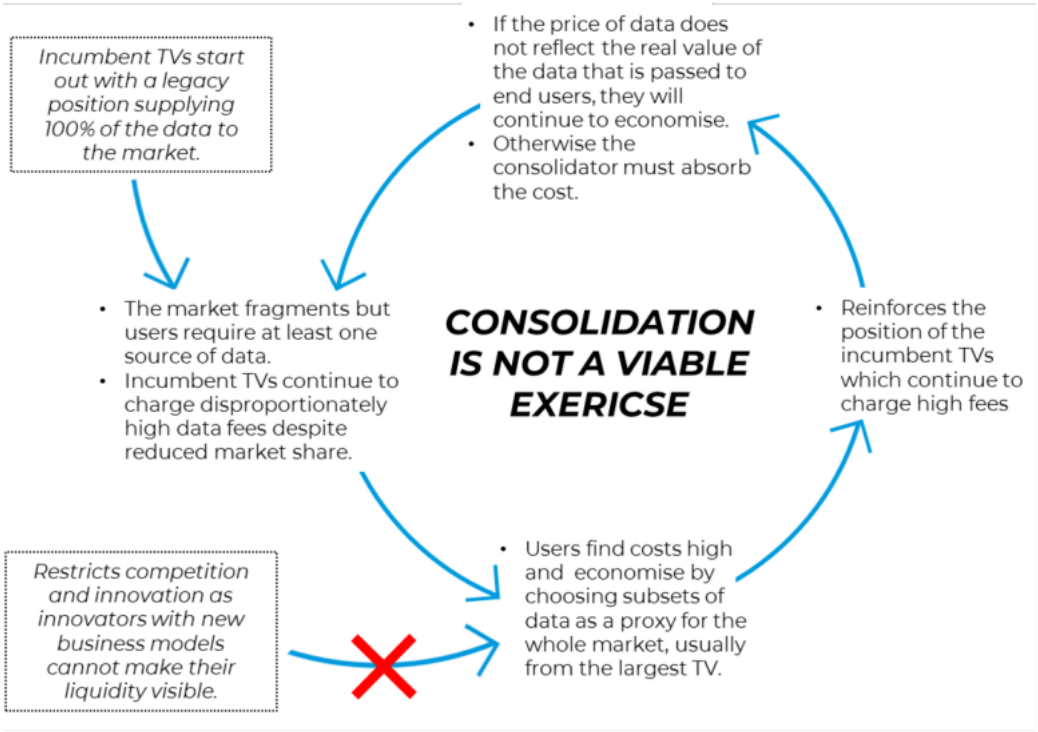
The tables below explain the background to the challenges and the issues that current participants and potential consolidators describe when considering consolidation of data.

### 6.2.1. Price of Data

| **Problem: The price of market data is not being shaped by competitive forces.** | |
|---|---|
| **Background** | **Impact** |
| • Most incumbent (i.e. pre-existing) equity TVs already had a dominant position when MiFID I was implemented. As the market fragmented, the share of market liquidity captured by the incumbent TVs reduced.<br>• Nevertheless, these TVs could still impose their legacy contractual terms and prices for data because the participants still needed at least one market reference point, even if they traded elsewhere.<br>• In effect, these TVs continued to price their data according to what participants had previously been paying despite these TVs now accounting for a smaller market share of the total market.<br>• As a result, participants that want to take data for the whole market (i.e. from other TVs and APAs) now have to find more budget plus they also have to expend resources on legal negotiations and cleaning of data across multiple venues. Alternatively, they can elect to receive less data (in terms of market share) from the incumbent TVs.<br>• APAs, particularly those with TVs, are now behaving in a similar way in bond markets. | • The perceived high direct and indirect cost of taking and managing data feeds drives users to economise by taking a subset of market data as a proxy, usually from the dominant trading venue.<br>• The pricing power and primary and secondary market models of the largest venues are reinforced.<br>• The competition provided by smaller or new primary and secondary market models is restricted even if they provide data for free (because it takes time and effort to compile it and many consolidators will not or cannot expend resource on this |

| **Problem: A consolidator has no control over the cost being ascribed by each TV or APA versus the value of the overall CT data to the consumer.** | |
|---|---|
| **Background** | **Impact** |
| • The price that the dominant TVs and APAs put on their data may not reflect the true worth of their data, or the proportionate market share of their data when data is consolidated and the value of all data contributions is across the market is properly assessed.<br>• TVs and APAs that own TVs and that currently profit from data revenues and the reinforcement of their primary and secondary market models have no desire to allow a competitor's data to be seen or to be consolidated as it might reduce their profit. | • Data consolidators must either absorb the data costs set by aggregators or pass them on to users.<br>• If each aggregator's costs are simply passed on then users will continue to economise by taking a subset of the data, which effectively reinforces the pricing and business models of incumbent TVs and APAs.<br>• Data vendors are not incentivised to compile data that users are not willing to pay for.<br>• In these circumstances a viable CTP cannot be established, rendering any consolidation effort a waste of time. |

Figure 23: The Impact of The Current Pricing of Data on Consolidation - Equity Example




## 6.2.2. Data Quality and Complexity

| **Problem: There are no technical operating standards for data submissions, data delivery formats and data storage.** | |
|---|---|
| **Background** | **Impact** |
| • Significant efforts have been made by the industry to get voluntary standards/flags adopted to help reporting interpretations. For example, the Market Model Typology (MMT) which is an offshoot of the FIX Protocol industry association. MMT is meant to be an operational solution/tool to help organizations fulfil their trade flagging requirements and began in 2011.<br>• Trading venues have their own bespoke codes for different trading systems, segments, and sessions such as opening or closing auctions, frequent batch auctions etc. These are not harmonised across venues making interpretation of cross-market data difficult.<br>• Some aggregators are not supplying data in machine-readable formats.<br>• Historical data requirements were not envisaged in the law. TVs currently store data in different formats over different periods of time. | • Pre-, post-trade and historical data is extremely hard to normalise and clean, making it hard to analyse and compile across the entire market.<br>• Efforts to implement voluntary industry standards cannot easily move forward and time and effort are wasted.<br>• Key information about trading status of a venue is not communicated to all market participants at the same time (e.g. trading halts) and TVs often obfuscate the reason for a trading halt, particularly if it is a technical issue.<br>• It is very expensive and difficult to download data. Members of venues might have more access to data because they pay for a screen but non-members who wish to consolidate do not. |

| Problem: Poor quality data of off-venue data | |
|---|---|
| **Background** | **Impact** |
| **Subjective interpretations of the RTSs vary from firm to firm. Original Level 2 text needed further guidance to correct misinterpretations:**<br>• Bonds and derivative data requirements are all in one RTS, creating confusion (e.g. a futures or a derivative contract would use "quantity", but a bond would use "notional" - notional figures are meaningless in certain contexts.<br>• Specifications do not include reference data for identifying the instrument/issuer.<br>• Confusion exists over the 'issuer and operator of the trading venue identifier'.<br><br>**Flags are being used incorrectly:**<br>• Amendments occur without cancellations of the original trade, which results in valid transactions being discarded and invalid transactions being included.<br>• Equity flags are being used for bond transactions e.g. 'TNCP'.<br>• Widespread misuse of deferral flags for equities and bonds is occurring.<br>**Abuse of the rules includes:**<br>• Double counting or no reporting.<br>• Incremental bond data information that is due for publication post-additional deferral periods expiring is not being published (mainly by APAs).<br>• Banks may systemically withhold trade reports until the absolute last moment of their obligation, rather than publishing at the moment of execution.<br>**Ambiguities and inconsistencies allow:**<br>• Firms can avoid being SIs (which brings undesired transparency requirements) by being registered liquidity providers on TVs and using the TV quoting mechanisms to provide very wide quotes on-venue whilst dealing inside the quote off-exchange. Then they report the trade to the exchange so that the post-trade data is flagged as on-venue.<br>• Different interpretations of the "free after 15 minutes" rule. It is not clear if data can be stored and used once it becomes free and TVs charge for the data. | • Data fields are not being used as expected from firm to firm, formats are not being followed and reporting times are not being adhered to.<br>• It is impossible to correctly calculate volume information.<br>• It is impossible to build a true picture of the market.<br>• Quality market transparency is unattainable.<br>• Post-trade data is not easily interpreted as on or off-venue.<br>• Data often disappears immediately after 15 minutes and venues charge for historical data.<br>• Data cannot be consistently interpreted, even when from the same group company.<br>• Firms are not able to consistently and easily able to source historical data from exchanges. This has implications for regulators, risk managers, compliance, and market surveillance teams as well as traders and analysts.<br>• It is not possible to scroll back a few minutes or a few days and see what the prices were. |

### 6.2.3. Governance and Accountability

Data governance needs centralised oversight without which the current data quality threatens the viability of a CTP.

| **Problem: There is no single body to oversee data submissions and mandate standards.** | |
|---|---|
| **Background** | **Impact** |
| **ESMA is expected to enforce data rules but ESMA relies on a federated model of regulation:**<br>• NCAs oversee APAs and TVs in their home markets. TVs and APAs collect subsets of data from participants, often in other markets. CTPs consolidate data from all these different markets.<br>• Each TV can enforce its own rules. APAs cannot enforce rules.<br>• No central penalty mechanism exists for poor data submissions or agreement about how a regime may be enforced, particularly under competing CTPs.<br>• ESMA and the NCAs have no technical interfaces to see the data that is submitted so that they could immediately identify and address issues.<br>• ESMA and the NCAs also economise and choose subsets of data to see - they do not receive CT data as it does not exist, particularly in real-time.<br>• If issues occur in another market, NCAs must manually seek data from other NCAs. (Some regulators get their free domestic market information free from TVs, but they do not get consolidated cross-market data).<br>• TVs can deny and restrict other regulators' access to their data, irrespective of formal requests.<br>• TVs can reconcile trades because they have both sides of a trade. APAs do not.<br>• MiFID II/MiFIR only specified single-sided trade reporting. Reconciliation is therefore difficult.<br>• Many firms already consolidate data voluntarily, but each must make its own subjective interpretation of what the right volume numbers are and what might constitute addressable liquidity. | • Errors are undetected or take too long to resolve.<br>• The manual nature of the oversight is not aligned with real-time data submissions<br>• TV data is of a higher quality than APA data.<br>• Market abuse oversight is hard to implement and detect across different jurisdictions and investigations are hindered.<br>• No single entity can take responsibility for assuring data accuracy as the official source of data.<br>• APAs have no incentive to penalise clients that could move their business elsewhere without repercussions. APAs also have no incentive to penalise clients who may also be clients of a TV or vendor business owned by the APA's parent company.<br>• Mismatches between buy-side and sell-side data are frequent and often contribute to unexpected results and arguments as a result of slippage of trading strategies and costs for the end investor.<br>• Whilst cost and centralisation of data governance remain an issue, it is preferable for data vendors/potential consolidators to remain unofficial consolidators of certain subsets of data without incurring other liabilities in relation to the accuracy or completeness of the data or to be subjected to regulatory oversight.<br>• Different lobby groups use data sets selectively to their advantage, as there is no official source of data. |

| Problem: Conflicts of interest incentivise poor behaviour. | |
|---|---|
| **Background** | **Impact** |
| • The parent companies of APAs also run other businesses such as TVs and/or data vending businesses.<br>• Some APAs, which are also running OTFs or MTFs, are withholding data from their OTF/MTF competitors and from other data vendors but freely incorporating the data into their own offerings. This is a particular issue in bond and ETF markets.<br>• Group entities are not applying the same data standards to their APAs, MTFs and OTFs. | • It is very difficult for a CTP to access all the data needed on agreeable terms.<br>• Currently, a CTP would need to speak to the regulator where each APA resides in order to find a resolution.<br>• APAs, MTFs and OTFs often report information about the same instruments in different ways. |

### 6.2.4. Lack of Harmonised Rules

The lack of harmonised rules applied to TVs and SIs and across jurisdictions for deferral publications makes data consolidation less viable.

| Problem: SIs are treated differently to trading venues | |
|---|---|
| **Background** | **Impact** |
| • SIs are exempt from the tick size and clock synchronisation regime that trading venues must follow.<br>• (Note that the SI tick size regime is changing in June 2020) | • SIs can attract flow by quoting just inside the spread of a trading venue. However, this price improvement may be *de minimis* whilst creating a significant amount of data that needs to be managed and may not, on the whole, be very valuable to the market.<br>• It is possible that SI quotes and trade reports may not be synchronised with the TVs. |

| Problem: Bond deferrals are not harmonised | |
|---|---|
| **Background** | **Impact** |
| • Under the MiFID II rules, NCAs can determine their own rules for deferring publication about bonds. | • This creates regulatory arbitrage as participants may select where to report their trades, giving some EU countries an advantage over others. It may also hinder competition between TVs in different markets as liquidity may shift to markets where deferrals are longer and liquidity providers have more protection.<br>• Real-time data cannot easily be used for data comparisons as bonds information becomes available at different times. This prevents useful consolidation. |

### 6.2.5. Population of Instruments

The population of instruments that might be included in a tape is not easily defined and is also low in numbers for some asset classes.

| **Problem: The population of bonds eligible for the tape is very small.** | |
|---|---|
| **Background** | **Impact** |
| • ESMA decided to take a phased approach for the liquidity assessment of bonds, gradually decreasing the average daily number of transactions in a bond needed for determining a market as liquid (and thus reportable - only the most liquid bonds are reportable). This is assessed on a quarterly basis taking into account the daily average trading activity (trades and notional amount) and percentage of days traded per quarter. | • Consolidation of bond data is less viable because there is very little data that can be consolidated and of use to participants |

| **Problem: There is no way to clearly define an EU instrument.** | |
|---|---|
| **Background** | **Impact** |
| • All trades that are traded on a trading venue TOTV must be reported regardless of whether they are for EU instruments or non-EU instruments. | • A significant amount of trades for non-EU instruments are being reported but cannot easily be filtered out of the data due to the resources required to adjust substantial numbers of records with incohesive identifiers. |

## 6.3. THE CUMULATIVE PROBLEM

These issues create significant barriers to consolidation but also, they contribute to the problems that market participants have in dealing with data every day.

Each entity that compiles a set of data makes multiple discretionary decisions about whether it will pay for all data or a subset of that data, whether they will take the data from the source or from a vendor and how much additional cleaning of the data they will do. Data vendors that consolidate data pass on the indirect costs for managing and cleaning the data as well as the direct cost of the data feeds. Each customer of a data vendor may see different data, depending on what they are willing to pay for.

Many interpretations of data exist depending on the ability of each firm to clean and interpret data. The results, depending on the technical resources available to clean the data, vary significantly.

As a result, no one has the same set of data for any instrument. When one party refers to its own set of data, it is likely to be different from another's.

## 6.4. PRACTICAL IMPLICATIONS OF THE CHALLENGES THAT ARISE

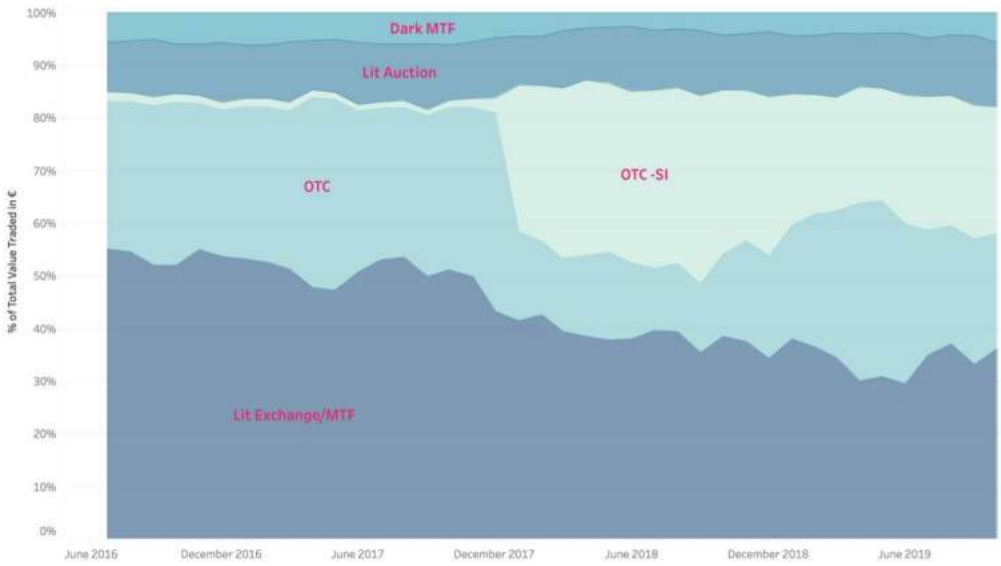
One of the key data points users need is an average daily trading volume figure for each instrument.

Big XYT is a sophisticated, independent data analytics firm interviewed for this study. The question Big XYT's customers want to know is, 'what was the actual addressable liquidity in the market at the time of trading? As described in Chapter 2, this is the liquidity that customers can actually interact with, rather than trades that are non-price forming or do not contribute to market liquidity, such as technical trades, duplicates, give-ups, or special dividend trades and after-hours trades. Without an official source of data, vendors and firms must try and establish this for themselves.

To answer this question, Big XYT must first assemble the data. In one month, it processes over 13 billion rows of trades from TVs, which is on average 15,000 rows of data per second. These must be matched with over 800 bespoke trade condition codes that are not standardised by the TVs.

At first, Big XYT takes the unfiltered view of the gross volumes of the entire market data (See Figure 24 below). At this stage, it shows that off-exchange data accounts for approximately 45% of the total market volumes, with SIs accounting for 30% and the rest of the off-venue trades accounting for 15%. Lit exchange markets appear to be declining. This is the picture of the market that anyone who takes uncleansed data or who cannot afford to clean the data would see.

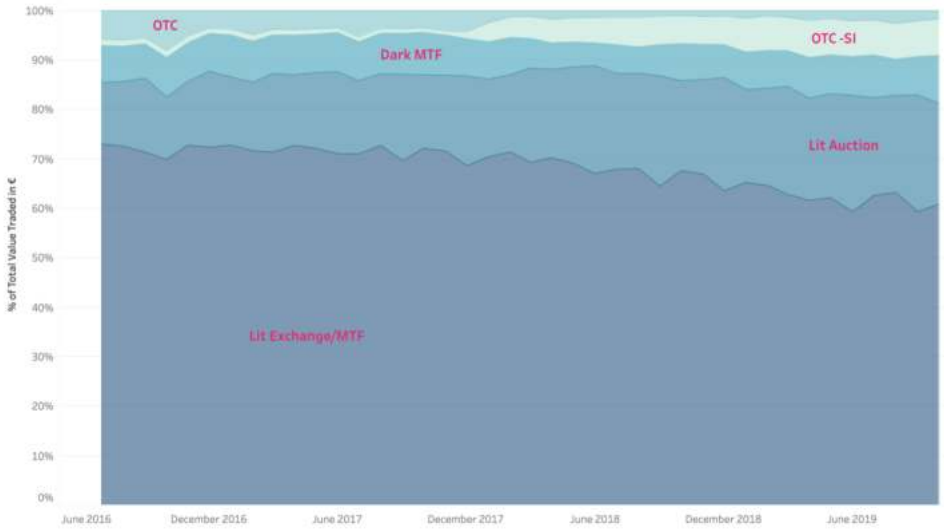
Figure 24: Unfiltered View of Gross Post-Trade Volumes (for instruments TOTV) by Trading Protocol over a 3 Year Period.




*Source: Big XYT*

Once it has this data, Big XYT goes through a series of steps. First, it filters out non-price forming trades and then it filters out block trades on the basis that anything large in scale is most likely a result of a bilateral negotiation that was a specific bespoke trade for a customer and not addressable. At this point, the picture of liquidity appears completely different. Lit trading is a much larger proportion of the market and appears relatively steady as an overall percentage of the market (see Figure 25).

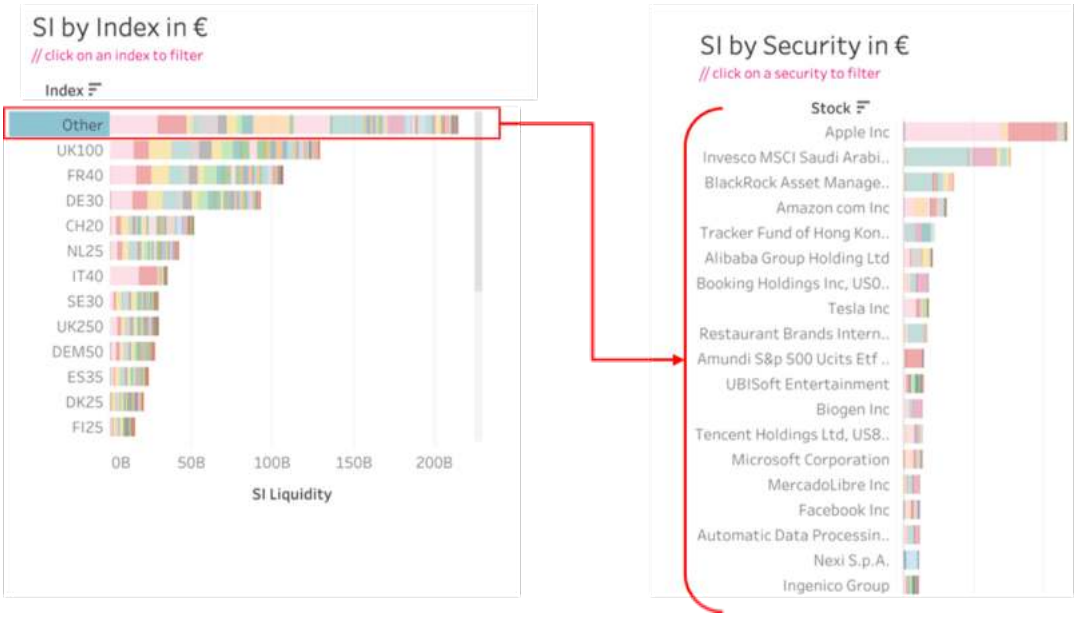
Figure 25: View of European Post-Trade Volumes (for instruments TOTV) by Trading Protocol with Filters Applied.




*Source: Big XYT*

Even then this data is further complicated by the scope of what must be reported under MiFID II. This is defined as any financial instrument that is traded on a trading venue (TOTV), which includes non-EU listed equities that further distort numbers. The above numbers include vast numbers of trades in non-EU instruments such as Apple or Microsoft. Further analysis by Big XYT shows that this category of "other" stocks is larger by notional traded value than any other EU index.

Figure 26: Number of SI Reported Trades by Index including Non-EU Instruments




*Source Big XYT*

This experience of Big XYT demonstrates the complexities of data interpretation for European investors; how time-consuming it is and how much processing power it takes to compile useful data about European equity markets without an official source of CT data.

## 6.5. CONCLUSIONS

Successful data consolidation is impeded by legal, structural and economic issues. This is because the underlying data that needs to be consolidated resides across many competing commercial entities, some with disproportionate economic leverage and conflicts of interest, as well as with inconsistent quality checks, data models and interfaces, all under a federated model of supervision and enforcement in multiple jurisdictions. Technology is not a problem.

The proposition for a European CTP is less commercially attractive and more technically burdensome than the unsupervised role that unofficial data consolidators such as data vendors play today. Without changes to the way that data is valued and governed, data providers (whether individual or aggregators) will continue to pass on the direct and indirect cost of data feeds, which may not reflect the true worth of the data when consolidated and participants will continue to economise by selectively choosing which feeds they take, thus rendering consolidation a pointless exercise.

# 7 / LESSONS LEARNT FROM LITERATURE AND FIELD RESEARCH

*This Chapter explains the lessons learnt from the field research undertaken in North America and a review of the globally available literature with some observations about how Europe compares.*

## CHAPTER SUMMARY

1. There is currently no competition in data aggregation and consolidation in the North American markets. Multiple data aggregators exist, but each has exclusive responsibility to aggregate sub-sets of data. There is a single data consolidator in each asset class.
2. Optimum data quality occurs when there is an exclusive self-regulated aggregator and/or consolidator for all on and off-venue data.
3. An entity that has the exclusive responsibility for enforcing rules and standards for CT data should be recognised in the law and be able to enforce data-related laws.

   The regulatory authorisation of any data contributor to that entity should depend on its membership and willingness to abide by the entity's rules.
4. Entities with exclusive responsibilities for CT data provision should not be conflicted and their governance must require the balanced representation of data stakeholders. Otherwise, they may pursue business models that are not in the best interests of the broader market.
5. The widest use of official consolidated data occurs when:
   - A single technical, contractual, and pricing interface exists for receiving data from the aggregator and disseminating it to the consumer,
   - The underlying data is not acquired at a price set by each TV but is based on the value of each data set to the overall CT data revenue.
6. A single consolidator with balanced governance may be a priority (for Europe) because it can work with all stakeholders in the market whereas aggregators only work in the interest of a subset of stakeholders.
7. The information to be provided in the CT data should be defined in the law. For equities, this includes the depth of data and auction imbalance information.
8. The design of shared revenue allocation models can be used to facilitate competition and drive changes in trading behaviour.
9. Mandated use of a consolidated tape for best execution depends on the underlying market structure, so may not be appropriate for Europe and can be problematic for institutional participants.
10. A vendor display rule is beneficial and should be available for free to independent retail investors to prevent substitute products from being used.
11. The design and constituents of CT data can incentivise both positive and negative changes in trading behaviour and need to be clearly understood.
12. Aggregators and/or consolidators need to have strong reconciliation processes and capabilities to be able to clean data.
13. Consolidated data increases transparency and reduces costs although some participants are concerned about the impact on large, illiquid bond trades.

## 7.1. A BRIEF DESCRIPTION OF NORTH AMERICAN DATA CONSOLIDATION FRAMEWORKS

### 7.1.1. US Equities

*(A full background to US equity data consolidation is given in Appendices 7, 8, 9)*

In the US there are 17 exchanges, 32 alternative trading systems (ATSs) and numerous dealers reporting trades. There are **three aggregators** responsible for different data sets, i.e. they **do not compete to aggregate the same data**.

The management of the consolidated tape, also known as the SIP (Securities Information Processor), is overseen by the Consolidated Tape Association (CTA). The CTA is run by representatives from the exchanges and The Financial Industry Regulatory Authority (FINRA), a self-regulated organisation, which is owned and funded by dealers. Nasdaq and NYSE, the most historically prominent commercial stock exchanges, were originally appointed to run the technical aggregation of different sets of listed securities pre and post-trade data from across the TVs into one official set of data for each underlying instrument and continue to do so today, although this could be changed by the CTA. FINRA aggregates and cleans off-venue post-trade data. FINRA acts as the single technical consolidator of the on and off-venue data.

FINRA also undertakes cross-market surveillance of transactions for the whole market.

Use of the tape is mandated for best execution and for display to retail investors at the point of trade.

See Figure 27 below.

### 7.1.2. Canadian Equities

*(A full description of Canadian equity data consolidation is given in Appendix 10)*

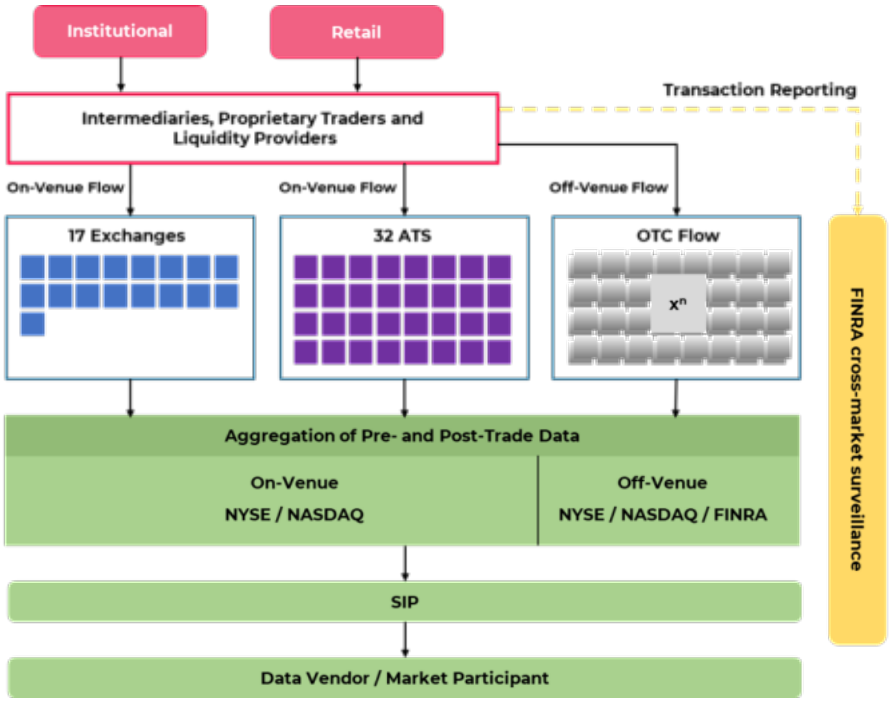
In Canada, there are 6 exchange groups and 5 ATSs.

Each TV acts as the aggregator of its own data. The legislation provides for the existence of consolidators, known as Information Processors (IP). They must satisfy certain criteria and be approved by the regulator. One IP, run by an exchange, currently exists as a consolidator of pre- and post-trade data but the use of its data by the market for best execution or other purposes is not mandated through regulation and this IP does not mandate technical standards.

The Investment Industry Regulatory Organisation of Canada (IIROC), which is a dealer-funded, self-regulated entity, undertakes cross-market surveillance for the whole market.

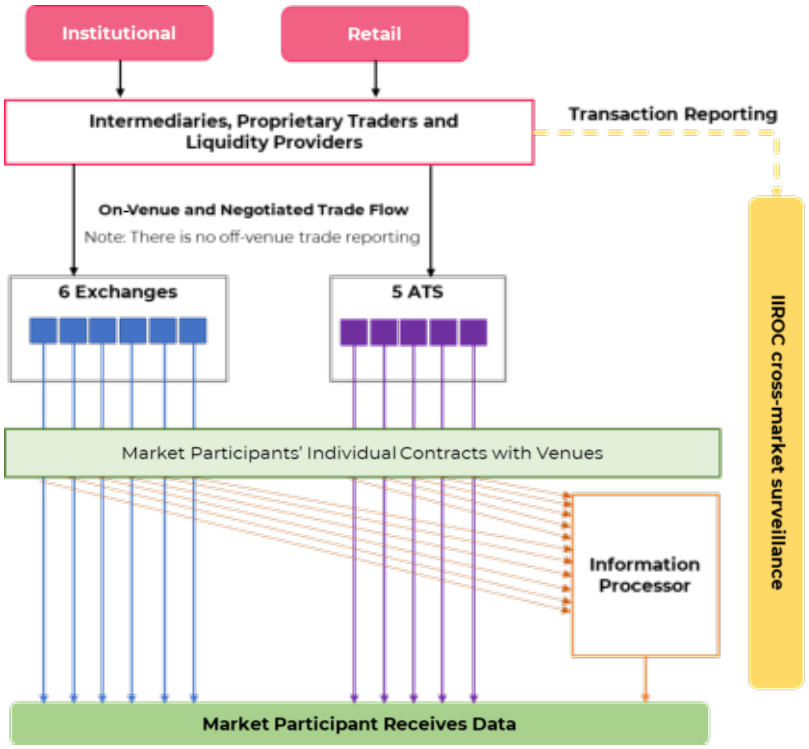
See Figure 28 below.

## Figure 27: Schematic of US Equity Data Aggregation and Consolidation




*Source: MSP research, FINRA, CTA*

## Figure 28: Schematic of Canadian Equities Data




*Source: MSP research, FINRA, IIROC, IP*

## 7.1.3. US Bonds

*(A full description of US Bond Market Consolidation is given in Appendices 7, 11)*

In the US bond market, dealers are responsible for reporting to TRACE, which is run and governed by FINRA. All data is aggregated, consolidated and disseminated by FINRA through its TRACE system.

FINRA also undertakes market surveillance for the whole market.

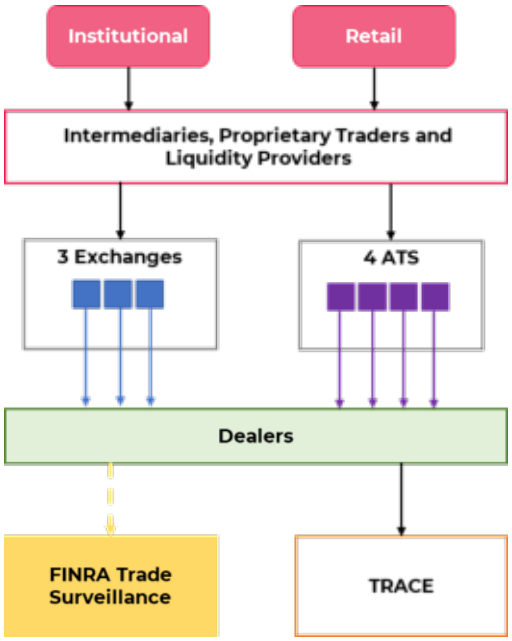



Figure 29 (right):

US Bonds Trade Reporting and Aggregation Flow Post-Trade

*Source: MSP Research, FINRA*

## 7.1.3. Canadian Bonds

*(A full description of Canadian Bond Market Consolidation is given in Appendix 12)*

In the Canadian bond market, dealers are responsible for reporting to IIROC, which is a dealer funded self-regulated entity. All data is aggregated, consolidated, and disseminated by IIROC.

IIROC also undertakes market surveillance for the whole market.

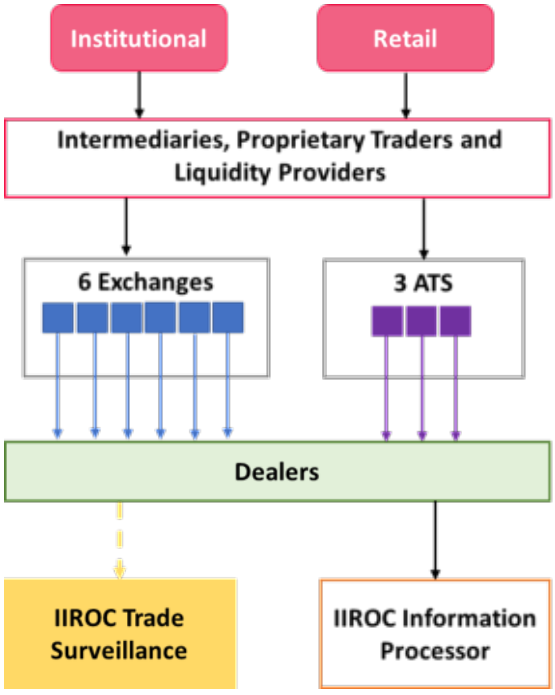



Figure 30 (right):

Canadian Bonds Trade Reporting and Aggregation Flow Post-Trade

*Source: MSP Research, IIROC*

## 7.2. LESSONS LEARNT

**1** Optimum data quality occurs when there is a single, self-regulated, aggregator for each sub-set of data and/or consolidator for all data.

### North American Field Research Findings

- Users cite few issues with data quality in North American markets.
- There is no competition for data aggregation or consolidation. Multiple aggregators exist but with exclusive rights to aggregate subsets of data that are then consolidated by a single consolidator. These exclusive aggregators and consolidators can establish and enforce rules and define the technical operating standards for its members through self-regulation. Data is cleaned before it is consolidated and disseminated.
- In Canadian equities, competition is allowed but only one consolidator exists (participants attribute this to the underlying costs and governance of the data). TVs have their own technical standards, which require translation in order to be consolidated. However, there are only 11 TVs from which to consolidate data.
- The Securities and Exchange Commission (SEC), the US equity market regulator, is proposing to introduce competing consolidators, responsible for technically collecting the data from the aggregators (e.g. the SROs) and then consolidating and disseminating the data. The proposal would also allow brokers/ dealers to self-aggregate and consolidate data for their own use.
- It is very important to note that this proposal still requires the sole aggregators of the data (FINRA and the CTA) to act in the same exclusive manner using the same methods as they do currently. This ensures that standards and rules are applied to a member's data submissions which are cleaned prior to the data being issued to consolidators.

### Global Literature Research Findings

- Europe's intention to allow competing consolidators under a market-led approach to data consolidation could risk poor data quality due to the lack of mandated technical standards.[24]
- Lack of standardisation, inconsistencies in data formats and data errors are some of the key data aggregation issues for participants post-MiFID II/MiFIR.[25]
- European participants want the confidence that there is a neutral and reliable source of the current market price.[26]
- Self-regulation may be a valuable complement[27] to regulators in achieving their objectives but some question the value of it.
- There is no universal definition of self-regulation.[28] The term may refer to formal self-regulatory organizations (SROs) or simply to standards set by industry associations.
- Self-regulation in Europe (except in the UK) was never extensive because of Europe's civil law system and cultural approach to government supervision of financial business.[29]
- The efficacy of self-regulation depends on each market's circumstances. Self-regulation should neither be adopted automatically nor rejected out of hand.[30]

### Observations About European Market Structure and User Feedback

- TVs have members and can self-regulate. Users have few issues with the TV data quality.
- APAs do not have members and cannot self-regulate. Users have many issues with off-venue data quality sourced from APAs.
- There is no single technical operating standards body and no official source of data.
- Europe (ex. UK) has not had a dealer culture for off-venue flow and regulation of this flow has been evolving.

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| **2** | An entity that has the ultimate responsibility for enforcing rules and standards for CT data should be recognised in the law so that it is empowered to enforce its rules as well as relevant laws.<br>The regulatory authorisation of any data contributor to that entity should depend on its membership and willingness to abide by its rules. |

**North American Field Research Findings**

- Self-regulatory entities that are also recognised in the law are known as Self-Regulated Organisations (SROs) (further detail is given in Appendix 7).
- Aggregators and consolidators that are recognised as SROs have a clear mandate in the law to consolidate data under defined terms. Under regulatory supervision, they can enforce their own rules as well as related laws. They can also issue fines.
- Regulatory authorisation of dealers requires membership of the SROs, FINRA and IIROC.

**Global Literature Research Findings**

- SROs have shown that they can work successfully with regulators and stakeholders to drive change in data provision (see Appendix 7) but issues arise when SROs have commercial interests.

**Observations About European Market Structure and User Feedback**

- The law does not provide for the delegation of regulatory responsibility to a TV, APA or CTP and has not provided them with a role to play in enforcing relevant data laws. TVs can enforce their own rules.
- A firm's willingness to provide quality data to a CTP is not currently linked to its authorisation and there are no sanctions for poor data submissions.

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| **3** | Entities with exclusive responsibilities for CT data should not have conflicting interests and their governance requires a balanced representation of data stakeholders. Otherwise, they may pursue business models that are not in the best interest of the broader market. |

**North American Field Research Findings**

- Users cite few issues with governance or the cost of off-venue bond data in markets where the aggregation and/or consolidation is run by a mutualised entity.
- TVs are mostly 'for profit' entities and as such must generate returns for shareholders. Stakeholders cannot influence data governance and cost at these entities.
- The prevailing liquidity provision model at the for-profit equity venues where certain market makers are very active and have been willing to pay more to receive faster data creates a two-tier system of speed where some participants are prepared to pay for access to faster data and then create high volumes of small-sized quotes in the market. These liquidity provision models generate huge amounts of data which all data users are forced to process regardless of its usefulness.
- The recent consolidation of TVs has resulted in the emergence of fewer but more powerful TV groups, which can block or sway decisions and prevent change at the CTA.
- Other venues with wider stakeholder

**Global Literature Research Findings**

- The pursuit of profit maximisation through high-speed data sales may deter TVs from innovating. This can have a negative impact on price discovery and capital allocation.[31]
- Where intense competition exists between multiple informed participants to obtain faster data to compete against others, the TVs are incentivised to charge for the different speed of signals. This can drive markets to fragment in structural ways that favour a subgroup of well-situated market participants at the expense of others.[32]
- This also drives concentration as the twin effects of the increased cost of data and the significant scale needed to process the data can outweigh the benefits of innovation at competing venues.[33]
- Exchanges have historically been shown to use weaknesses in regulation to their own economic benefit. When they demutualise, consideration should be given to creating balanced or mutual governance structures for market data particularly in relation to cost.[34] Political intervention will be needed to enable

representation are trying to compete with different liquidity provision models where tiered systems of speed are less relevant or where data is free, but they have little voting power at the CTA.

- The SEC cites concerns about the commercialisation of SROs as a driver of its proposed changes to allow competition between consolidators. It also intends to cap the voting rights of each TV group at the CTA.

this.[35]

- There is a tension between creating CT data and promoting competition between TVs. [36] This involves trade-offs which incumbents are unlikely to willingly accept and will likely require affirmative and compulsory action by the market regulator.

**Observations About European Market Structure and User Feedback**

- Similar liquidity provision models and tiered systems of speed prevail in European equity markets and users cite issues with the cost of data and processing requirements.
- Some users question the usefulness of the data generated by some TVs liquidity provision models.
- Data stakeholders do not have influence on TVs and APAs and complain about their costs.

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**4** Consolidation and dissemination work best when:

a) there is single technical, contractual and pricing interface for the users to receive the data.

b) the underlying data does not have to be acquired at a cost determined by each aggregator and the revenue generated by the consolidated data is shared between the members based on the value of each data set to the overall consolidated data.

**North American Field Research Findings**

- For US equities and Canadian and US bonds, the CTPs provide one technical interface, one price and one contract for users to consume the data.
- US equity data is submitted freely to the aggregators in return for a share of the revenue. The CTA sets the price and manner in which TVs get paid for their data through a revenue allocation model and one price is set for the consumption of the data. (A full description of the US equity revenue allocation model is given in Appendix 9).
- In Canada, the IP does not set the price of data or deal with contractual issues so that the participants must negotiate their own contracts with each underlying venue. Consequently, the Canadian consolidated tape offering is less attractive for users and many participants take subsets of data as a proxy for the whole market rather than pay for all the data. However, the smaller nature of the market makes it easier for participants to consolidate the data.
- Equally a key takeaway from research into the IP suggests that running the IP is not a particularly viable or profitable business (because there is considerable effort required but little use of the data)

**Global Literature Research Findings**

- Direct and indirect costs (e.g. contractual complexities) are considered an issue by most market participants globally and these costs are a primary reason why a European consolidated tape has not yet emerged.[37]
- The debate about the cost of data is extensive. Some participants advocate the free provision of data or marginal cost pricing as an alternative to current pricing models.[38]
- TVs argue that market data is a by-product of trading and execution, which means costs and revenues are shared and hard to separate.[39] They also say that costs for consumption of data feeds have barely changed and that their own costs are only a small portion of overall intermediary costs for the end investor.[40 & 41]
- In Canada, the cost of data has increased[42] and restrictive legal agreements exist for market data.[43] Even when differences in market characteristics and scale are taken into account, CT data fees are still significantly higher than the US.[44]
- Lack of CT data in Europe means that traders are unable to get information from anywhere but the primary exchange data products which is a worse situation than the US.[45]

**Observations About European Market Structure and User Feedback**

- There are hundreds of TVS and APAs that any CTP must interface with.

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- Potential CTPs (and users) without any control over data costs and contractual arrangements combined with unknown revenues find the commercial proposition of consolidation unattractive.

**5** A single consolidator with balanced governance may be a priority (for Europe) because it can work at the highest level with all stakeholders in the market, and aggregators only work in the interest of a subset of stakeholders.

**North American Field Research Findings**

- US participants complain about both the cost and latency of CT data, both of which are governed by the CTA.
- The latency of the CT data is not sufficient for many participants to use for trading, but they must use the NBBO for best execution in the law (see below).
- TV aggregators are believed to be investing less in the technology used to deliver data between data centres to the consolidator than on their own proprietary data feeds.
- The SEC's proposal to introduce competing consolidators is aimed at improving latency and addressing conflicts of interest about investment in the CT data technology, but it does not give the stakeholders influence over the cost of CT data which is determined by the aggregators of the data and influenced by a small number of TV groups at the CTA.
- The SEC has begun to increase oversight of data fees through review processes with each TV.

**Global Literature Research Highlights**

- The US consolidated tape processor has not benefitted from the same level of technology investment as the direct data feeds with less superior fibre optic cables for transmission, less streamlined setup, and additional processing requirements, thus causing additional latency.[46]
- In regions where there are multiple legal jurisdictions, such as Europe, there are likely to be conflicting bodies of law that will make it impossible for regulators or courts to resolve data issues alone.[47] This means that both regulators and stakeholders will need to work together to create change through practical alternative solutions.

**Observations About European Market Structure and User Feedback**

- Cost, not latency, is one of the main issues cited by participants.
- ESMA is increasing focus on market data costs but change is harder to manage and implement under a federated model of supervision and when most TVs are being run for profit.

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**6** Sufficient detail must be provided in the CT data for users to ascertain current liquidity and trading intentions. This data should be defined in the law but with the flexibility to provide for future enhancements. For equities, it includes:

- Depth of data, which is more important than a BBO and over time the concept of a market-wide BBO may breakdown.
- Administrational information and auction imbalance data.

Without depth of data, the introduction of lot sizes must be considered in Europe.

**North American Field Research Findings**

- In US equity markets, orders are increasingly in smaller sizes and using the NBBO, which flickers faster than can be seen by a naked eye, as a gauge for liquidity or even price has become meaningless.
- Many users including investment banks, asset managers and retail brokers, would prefer to see up to 5 levels of depth of the order book as

**Global Literature Research Findings**

- The focus that users have on latency is dependent on the underlying market structure, e.g. mandated rules to use the data, and it may not be an issue in jurisdictions outside the US[48].
- Latency issues in the US appear unavoidable because the use of CT data is mandated, and information cannot be propagated instantaneously across a fragmented market

an offset to the speed.

- The CT data is considered the official version of administrative events even if firms receive data faster through other feeds.
- The core data and administrational event data that must be submitted freely by the TVs for equities is defined in the law but currently, only the NBBO and a limited range of auction information is provided.
- The SEC proposes to expand core data in the law to include 5 levels of depth of book data and information about opening and closing auctions. It will also introduce several new defined terms including "consolidated market data," "core data,", "regulatory data," "administrative data," and "exchange-specific program data."
- It also intends to include any information specified by SRO rules or effective Consolidated Tape Plans that are generated by an SRO leading up to and during an auction, including opening, reopening, and closing auctions and information disseminated during the time periods and at the time intervals provided in such rules and plan.

with spatially separated matching engines. Due to this, bids and offers on different feeds may vary[49] and the concept of a consolidated BBO may break down[50]

- Time stamping precision is therefore important in creating an accurate picture of the market at any point[51 & 52], regardless of the latency experienced by each user.
- Broker-dealers, investment banks and asset managers in the US, back the SEC proposals.[53]
- A TV has proposed three different tape offerings with three different levels of depth that might appeal to the different needs of users.[54]

**Observations About European Market structure And User Feedback**

- Users would like to have similar detail in EU CT data (e.g. five levels of depth and auction imbalances).
- Pre-trade data consolidation is not envisaged in the current law. Core data is not defined.
- Trade sizes are typically divisible by one and lot sizes do not exist. However, if depth of market is not introduced to CT equity data then crossed[55] books may become an issue.

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**7** Revenue allocation models, based on the value of data, can be used to facilitate competition and drive changes in trading behaviour and liquidity provision. These must be carefully calibrated and monitored to incentivise the right behaviours.

**North American Field Research Findings**

- In the US equity market, any TV has the immediate opportunity to earn revenue from the consolidated tape based on the quality of its contribution to the overall market liquidity (see explanation in Appendix 9).
- The addition of new TVs does not by itself drive up the cost of data for the end-user. Instead, it simply means that the revenue shared by the data providers is divided or pro-rated to those that contribute to the best liquidity (subject to agreement as to what is "good liquidity").

**Global Literature Research Findings**

- The model's formulae, which allocates payment for data in the form of a share in the revenue from data sales, can change behaviour. It can have both positive and negative effects depending on how it is calibrated, e.g. revenue based only on the number of trades may result in larger numbers of smaller trades.[56]

**Observations About European Market Structure and User Feedback**

- The price of market data is not shaped by market forces.
- New TVs in Europe are very hard to establish because:
  - The market cannot see its liquidity.
  - They cannot monetise their data.

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| 8 | Mandated use of a tape for best execution depends on the underlying market structure (e.g. homogenous clearing and settlement across the region), which may not suit Europe and can be problematic for institutional participants. |
|---|---|

**North American Field Research Findings**

- In the US and Canada, equity clearing and settlement are handled by one single entity in each market. Additionally, the price for clearing and settlement paid by a participant is the same regardless of where they trade. This means that a strong emphasis can be put on price as the main factor under best execution rules.
- The US and Canadian equity markets have similar requirements on order protection rules. These rules mandate that orders must be routed to the marketplace with the best-priced orders available or executed at that price. In the US, this is linked to the consolidated NBBO.
- Many US market participants say that the order protection rule and use of the tape for best execution is problematic for institutional investors who need to deal in large sizes but are forced to access small-sized quotations and reveal their trading intentions due to the rule.
- In Canada, the core data for equities is not mandated in the law, as the data does not have to be freely given to the IP.

**Global Literature Research Findings**

- A one size fits all (both institutional and retail investors) approach to best execution may be unfair.[57]
- A threshold could be introduced into US markets (e.g. 1.5% of market share for a venue) to help reduce the fragmentation in the market and the forced connection costs.[58]
- Global market structures are not uniform and regulatory frameworks in each jurisdiction need to evolve accordingly to find the right consolidated data solution.[59]

**Observations About European Market Structure and User Feedback**

- Best execution in a European context takes into consideration many factors, including the cost of clearing and settlement, and not just price.
- Market participants typically determine their own best execution policies and TVs do not have any responsibility to onward route orders to other markets.
- Users do not want CT data to be mandated for best execution.

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| 9 | Mandated use of a tape to display CT data to independent retail investors is beneficial and should be available for free to prevent substitute products from being used. |
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**North American Field Research Findings**

- In the US, the Vendor Display Rule ensures that brokers display CT data to retail investors when a trading decision is being made. However, if the investor is using the tape for non-trading purposes (e.g. valuations), the use of the tape is not mandated.
- TVs have a key role in governing CT data and are therefore conflicted when developing substitute products of their own data to retail investors for non-trading purposes. They offer their own Level 1 data (which is a subset of the NBBO) as a proxy of the NBBO. They make this cheaper and easier to manage contractually, thus undercutting the SIP (i.e. CT data).
- Retail brokers cite the extraordinary complexities of managing the data used by

**Global Literature Research Findings**

- Various exchanges are filing programs with the SEC to allow small retail brokers to purchase their top of book market data at discounted fees.[60]

their clients. Incorrect classifications of retail investors can lead to legal risks and costs. As a result, it can often take months to onboard clients.

**Observations About European Market Structure and User Feedback**

- Some users consider a vendor display rule for independent retail investors a good idea.
- However, retail brokers are concerned that such a rule could force expenditure on smart order routers and will require clear explanations about all the factors taken into consideration in seeking best execution.

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**10** The design and constituents of CT data can have positive and negative effects that need to be well understood. Any tape design should allow flexibility should remain appropriate for the market it serves.

**North American Field Research Findings**

- In the US market, trades in odd lots are not included in the CT data. (Round lots in equities are units of at least 100 shares and odd lots for bonds are amounts that are lower than or not divisible by $1 million).
- Because only one level of depth is currently used for the equity BBO in the US, odd lots (orders below 100 shares) are excluded from the NBBO to ensure that the NBBO reflects a meaningful number of shares.
- Odd lots were historically thought to be insignificant retail orders. However, professional algorithmic traders took advantage of the odd-lot rules to avoid detection by placing a larger volume of small orders in the market.
- Additionally, some trading in heavily traded stocks is no longer part of the NBBO because the prices of stocks such as Apple and Amazon are so high that a retail investor might not be able to afford to buy 100 shares and so will be buying in odd-lots.
- SEC statistics[61] show that odd lot trading is now at historic highs and they are proposing to include odd lot information in the consolidated tape.

**Global Literature Research Findings**

- The underlying characteristics of data and how it drives market behaviour must be well understood when designing CT data. For example, the reporting of orders versus trades at different TVs can limit the usefulness of CT data, leading to erroneous conclusions and undermining the empirical integrity of the CT feed.[62]
- Inclusion or exclusion of odd lots can change trading behaviour. A recent class action complaint in the US asserts that odd-lot investors persistently pay bid-offer spreads that are 25% to 300% wider than investors trading in round-lots of the same underlying bonds.[63]

**Observations About European Market Structure and User Feedback**

- Trade sizes in European bond markets do not formally recognise odd lots but institutional orders in corporate bonds are typically traded in minimum or round quantities (e.g. 100,000 nominal).
- Retail brokers say there are no prices at a retail size in bond markets.
- Different TVs have different practices in reporting orders versus trade data.

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| 11 | Aggregators and/or consolidators need to have strong reconciliation processes and capabilities to effectively monitor and cleanse the data for reporting. |
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**North American Field Research Findings**

- In the US and Canada, FINRA and IIROC aggregate both the post-trade data and the equivalent of transaction reporting data. This gives them an additional set of data to reconcile against.
- In bond markets, double-sided reporting is required if two dealer member firms are involved in the trade. This provides an extra set of data that can be used to help reconcile and clean data.

**Global Literature Research Findings**

- There was no literature discovered on this point.

**Observations About European Market Structure and User Feedback**

- In Europe, the transaction reporting data is sent to each domestic NCA in a format specified by each NCA. This format is not uniform across Europe, which means that it is not readily available or easily usable to a CTP provider.
- At present only single-sided reporting is mandated in Europe and participants are not in favour of double-sided reporting.

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| 12 | Consolidated data increases transparency and reduces costs. However, consideration must also be given to the effect of transparency on the ability to transact large orders. |
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**North American Field Research Findings**

- Most equity and bond market participants in the US and Canada advocate the benefits of a consolidated tape.
- However, in bond markets, institutional market makers and asset managers are concerned that the immediate transparency of large trades can damage their ability to source or provide liquidity, particularly since bank capital requirements have increased and the introduction of the Volcker Rule,[64] which prohibits banking entities from engaging in proprietary trading.
- Conversely, ETF market makers plus other market makers that provide liquidity in smaller sizes on CLOBs believe that the current transparency is not enough.
- Retail brokers also report too few price points for retail investors.

**Global Literature Research Findings**

- Lack of CT data in fragmented equity markets may result in higher trading costs, difficulties in using smart order routing for effective best execution, difficulties in measuring best execution, reduced transparency for buy-side traders and retail investors, and limitations on the longer-term adoption of electronic trading.[65]
- In the US, TRACE has had an impact on lowering transaction costs for investors, particularly retail investors.[66] However, both institutional buy-side and sell-side participants say that trading is more difficult under TRACE and this can decrease willingness to commit capital and increase the time and the cost to locate or sell bonds.[67]
- This transparency provided by TRACE has impacted investment firm profit margins and trader compensation leading some to shift of their focus to trading less liquid products.[68]

**Observations About European Market Structure and User Feedback**

- Most users are advocates of CT data but some express concerns that increased transparency, particularly in bond markets, may impact brokers' willingness to commit capital.
- Retail brokers also report that it is difficult to find prices in retail sizes in bonds, which make trading and valuations of portfolios difficult.
- Most users across asset classes say that costs are higher without CT data.

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## 7.3. CONCLUSIONS

North American market structure is much less complex than that of Europe. The starting point for successful data consolidation has been through the use of well-governed, self-regulated entities with exclusive aggregating and/or consolidating responsibilities. This allows them to mandate rules and standards for the market.

Pre- and post-trade data that is clearly defined in the law and legal recognition of these entities also gives them additional powers to enforce related laws on their members. Additionally, the US equity experience demonstrates that revenue allocation models, based on the value of each participant's contribution to the consolidated data, can significantly facilitate consolidation and the use of CT data. The Canadian equity experience shows that not resolving this issue results in less CT data usage.

The market structure continues to evolve and there are many legacy issues that need to be addressed; in particular, a lack of balanced governance and stakeholder representation at certain entities in equity markets that have exclusive responsibilities for consolidation and price setting. This is particularly important where some large TVs appear to have undue influence and possible conflicts of interest.

# 8 / THE OPTIMAL ARCHITECTURE FOR SUCCESSFUL DATA CONSOLIDATION IN EUROPE

*This Chapter consolidates the feedback from participant interviews, the evaluation of available literature and the field research into other market models and recommends optimal architecture for European data consolidation based on the requirements identified by users in Chapter 4.*

CHAPTER SUMMARY

**1.** The following are considered pre-requisites for successful CT data in Europe:

- A single, exclusive consolidated tape provider (ECTP) that is not subject to competition and is run as a utility should be created across both asset classes.
- All data aggregators of data should be obligatory members of this ECTP and should contribute towards its funding.
- The ECTP must be regulated and empowered by ESMA to enforce operating standards and rules via a harmonized set of rules, including penalties and other sanctions to maintain good data quality and behaviour.
- The ECTP should be recognised in the law and able to enforce market data law, as long as it has no conflicting interests.
- Balanced governance, with representation from different stakeholders, is required and no single stakeholder or stakeholder group should have undue influence over the ECTP.
- All pre-, post-trade and end-of-day data should be acquired and stored freely by the ECTP without contractual obligations. A revenue sharing mechanism to fairly share the revenue between contributors based on the value of each of their data sets to the consolidated data should be established.
- Sufficient pre-trade order and administrational event data must be provided to the tape and this must be defined in the law.
- The ECTP must have the appropriate tools to reconcile data. As such, reporting to the ECTP should be in real-time (no deferral management elsewhere) and double-sided trade reporting for non-matched trades should be introduced.

**2.** There are a further number of ancillary issues, which could also be addressed to enhance the use and viability of the data such as harmonising bond deferral regimes, increasing the population of bonds eligible for publication, separating RTS data formats for bonds and derivatives and introducing a vendor display rule.

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## 8.1. PRE-REQUISITES FOR CT DATA

There are a number of pre-requisites which are considered critical for the development of EU CT Data. These should be viewed as the optimal and holistic foundation in order to successfully deliver CT data.

Figure 31: Pre-Requisites for Consolidated Tape Data

| # | Pre-Requisites | Detail | Rationale |
|---|---|---|---|
| 1 | **An exclusive consolidated tape provider (ECTP) that is not subject to competition and is run as a utility should be created.**<br><br>**It should have no conflicting interests.** | A single entity should be put in place across equities and bonds. It should not be subject to competition.<br><br>In order to ensure the entity has no conflicting interests, it should most likely be run on a not-for-profit basis, but the final agreement on this would be established between stakeholders through the agreed corporate structure. | Technology alone cannot deliver CT data. To bridge the gap between the market requirements, current challenges and the technology available requires a single, organisational layer as the official manager of CT data governance and standards.<br><br>This ECTP should be the undisputed authority and trusted source of EU CT data. Competition does not achieve this.<br><br>Without the support and drive from this ECTP, the existing issues relating to collation, management and dissemination of data will only exacerbate as the industry's reliance on data increases. |
| 2 | **All data aggregators of MiFID II/MiFIR pre- and post-trade data should be obligatory members of this ECTP and contribute to its funding.** | The members of the ECTP must include all aggregators.<br><br>QIFs and SIs should also be able to elect to self-aggregate and report data directly. If they do so they should pass a conformance test. These firms should also become members.<br><br>All members should contribute to funding the entity. Membership categories with different rights and funding obligations for other data stakeholders could be introduced.<br><br>The members should work together to establish the rules and ensure that all members follow those rules. | The ECTP will only be able to fully hold its members (the firms that aggregate data) to account through the concept of membership and enforcement of rules.<br><br>Market participants should fund the ECTP as an incentive to improve the quality of the data they supply to the market. Aggregators are likely to pass on penalties to the underlying data generators so that market-wide behaviour changes. |
| 3 | **The ECTP must be regulated and suitably empowered by ESMA to enforce technical and operating standards via a harmonized set of rules, including penalties and other sanctions that have a sufficient impact on behaviour.** | This should include:<br><br>• Defining the standards, inputs, outputs, obligations, enforcement rules, responsibilities and technical requirements for the working of the CT.<br><br>• Determining the reasonable commercial price at which all data should be sold.<br><br>• Determining the appropriate allocation and contractual mechanism for revenue sharing with contributors.<br><br>• Defining, evolving and enforcing the rules, including controls and a penalty mechanism.<br><br>• Selecting the outsourced infrastructure provider/s for data consolidation and dissemination through a competitive tender process.<br><br>Translation to a common technical operating standard mandated by the ECTP must be required and should be the responsibility of the data generator or aggregator. | Without such powers, the ECTP cannot clean data or impose the standards that will improve data quality.<br><br>There must be appropriate sanctions for not following the rules. The ECTP must be able to establish and enforce a penalty regime that fully holds its members to account.<br><br>A common technical and operating standard must be followed in order to aid the compilation and cleaning of data. |

| # | Pre-Requisites | Detail | Rationale |
|---|---|---|---|
| 4 | **The ECTP should be recognised in the law.**<br><br>**The regulatory authorisation of firms that are data contributors should be linked to membership of the ECTP.** | If the ECTP is a recognised body it should be able to enforce not only its laws but also have the powers (under the oversight of ESMA) to enforce European laws related to market data and the collection of it so that it can resolve issues quickly.<br><br>A covenant should exist that states that if the entity becomes commercial or conflicted then it should lose its status.<br><br>Any member of the entity must show that it has the systems and procedures in place to follow the ECTP requirements upon authorisation and on an on-going basis. | If the regulatory authorisation of firms that are data aggregators is linked to membership of the ECTP, then the ultimate sanction for not complying with the rules can be to prevent them from doing their broader regulated business. This will be particularly important for resolving difficult issues where aggregators and other data generators are resistant to change.<br><br>The recognition of the ECTP in the law should allow for the fact that the role of the entity can evolve over time in which case its powers may need restraint in future. |
| 5 | **Balanced governance of the ECTP is required and no single stakeholder or stakeholder group should have undue influence.** | All types of data stakeholders should have input and be represented in the governance of the ECTP. This may include other stakeholders who are not data aggregators.<br><br>Stakeholder categories would need to be determined and the rights of any one stakeholder type should be capped.<br><br>A majority of independent directors will be required at Board level to ensure decisions are made.<br><br>Stakeholders would also be represented through advisory committees. | All stakeholders should be represented to agree on principles, resolve the key issues and, where necessary, to find a compromise to deliver the successful launch and on-going management of the consolidated tape.<br><br>However, to ensure resolution, a majority of independents at Board level will be needed to fairly evaluate issues and push through difficult decisions.<br><br>Stakeholders can also be represented at different specialist sub-committees. |
| 6 | **The ECTP must be able to acquire and store all pre-, post-trade and end-of-day data freely without contractual obligations.**<br><br>**A revenue sharing mechanism to fairly share the revenue between data aggregators based on the value of each of their contributions should be established.** | The data required is everything specified by the users in sections 4.2.1 and 4.2.2.<br><br>Data should be provided to the ECTP at the same speed as it is made available to other recipients.<br><br>See Appendix 17 for the full information required across asset classes.<br><br>The value of the various data sources should each be assessed by the quality of their contribution to the CT data. This does not mean data should be free but that the mechanism for determining its value is run by the ECTP.<br><br>It should be clear that the ECTP can store data for long-term historical use.<br><br>A revenue allocation model is required to fairly assess the data in recognition of the value it has to the formation of the price.<br><br>The revenue allocation mechanism used in the US equity markets (discussed in Appendix 9) is considered as a good foundation for liquid instruments. | Data aggregators should not be able to deliberately delay the data that they send to the ECTP in order to make their own proprietary feeds more attractive.<br><br>To operate on a sound financial footing the ECTP needs certainty about the cost of data and so the ability to determine the price at which it can be sold.<br><br>Ultimately it will be up to the stakeholder governance of the ECTP to determine the value of the overall data and how they sell that data in the market. |

| # | Pre-Requisites | Detail | Rationale |
|---|---|---|---|
| 7 | **Sufficient pre-trade order event, administrational event data and session statistics must be provided to the tape and this must be defined in the law.** | The data required is everything specified by the users in section 4.2.1.<br>An official volume-weighted BBO could be calculated as required.<br>Data will be stored and used for the CTP's and end-users' checks, reconciliations, reporting, modelling and other historical analysis as required. Data that takes out any non-public information would be available for end-users. | Without this pre- and post-trade information, a consolidated tape will not fully replace the information within the data feeds that users take today, and consolidation will be a waste of time.<br>If 5 levels of depth are not given, then latency may be more of an issue and the introduction of lot sizes may be needed. |
| 8 | **Reporting to the ECTP should be in real-time (no self-determined deferral management elsewhere) and double-sided reporting should be introduced for non-matched trades.** | APAs or individual firms should no longer be able to determine and apply deferrals.<br>Real-time reporting of bond data could allow ESMA to instigate a dynamic deferral regime for temporary spikes in bond liquidity.<br>Two-sided trade reporting should be mandatory for trades executed outside of a matching system/CLOB with trade identifiers attached. A trade identifier should be generated by either the buyer or the seller (to be agreed) and attached to both sides of the trade report. | This allows the ECTP to immediately identify erroneous data and reporting discrepancies as soon as possible and will also help identify any systemic withholding of data.<br>It is noted that two-sided trade reporting raised some concerns when tested with market participants in the workshop but without it, data reconciliation will be difficult. |

### 8.1.1. Alternative Models Evaluated

This study also considered several alternative organisational models to provide oversight, governance and management of a consolidated tape. These alternative possibilities along with some relevant comments are as follows:

1. **TVs could act as exclusive aggregators of all on and off-venue flow for their listed instruments and/or establish a CTP under their combined jurisdiction.**
    - This is not recommended, as it would reinforce the position of the incumbent exchanges at the expense of TV competition and innovation and they are already deemed to have conflicts of interest. Additionally, the exchanges are already both aggregators and vendors of data. To position them as the exclusive aggregators of data gives them even more power than they have today at the expense of other stakeholders who would not have a role in the governance.
2. **Expanding the role of APAs to allow membership and fining capabilities.**
    - This is not recommended, as APAs are commercial businesses with potential conflicts of interest, making it unlikely that they would be able to enforce the rules effectively or would want to fine clients. Additionally, it is not clear how competing APAs would be able to set a single market-wide set of rules and standards.
3. **Creating exclusive aggregators for each instrument in pre- and post-trade and allowing multiple CTPs.**
    - This is not recommended as there will be no single body to mandate market-wide standards. It is also not recommended as it does not bring all the stakeholders together at the highest level to resolve governance issues and the aggregators may only work in the interests of a subset of stakeholders.
4. **The roles of the standards body and technical consolidators could be divided so that there is a single body that mandates standards and enforces rules and a technical layer of consolidators that compete to disseminate the data.**

- Under this model, some improvements to data quality could be achieved, but it would still require the creation of a single, exclusive body to create the standards and rules.
- However, this will not resolve governance issues, mostly in relation to cost, and consolidation will, therefore, remain unviable.

5. **ESMA could be the entity that runs the ECTP with internal resources.**
   - This is not recommended as it does not have significant resources or data expertise.
   - There is a risk that if market stakeholders do not have some "skin in the game" over issues such as cost, consolidation will be a waste of time.

## 8.2. OTHER IMPORTANT ENHANCEMENTS TO IMPROVE DATA USABILITY AND QUALITY

Figure 32: Additional Enhancements to the Recommendations to Improve Data Usability and Quality.

| # | Enhancement | Detail | Rationale |
|---|---|---|---|
| 1. | **Bond deferral harmonisation.** | Deferral regime of government bonds needs to be harmonised. | Without harmonisation, comparing government bonds will be very difficult and government bond data will not be very useful. |
| 2. | **RTS definitions of fields and formats must be enriched and separated for each asset class.** | A separate RTS for the fields/reportable information for bonds and derivatives must be created.<br>A flag denoting the trading system, segment and session is also required.<br>A non-price forming and price-forming flag should be added.<br>(Noted that this means having a negotiated trade waiver for fixed income). | Bonds and derivative data requirements are all in one RTS, creating confusion (e.g. notional figures are meaningless in certain contexts).<br>Users need to know under which market trading session and segment protocol a trade occurred and translating from bespoke standards is difficult.<br>A price forming and non-price forming flag would be of immediate assistance in identifying addressable liquidity. |
| 3. | **Ambiguities should be removed as to what is on-venue and off-venue reporting.** | Firms that make quotes both on-venue and off-venue and then execute off-venue at a price inside the spread being quoted on-exchange should not be allowed to report the trade as on-exchange. | The data generated by the TVs that report these trades is confusing and it allows firms to avoid being classified as SIs. |
| 4. | **The population of the bonds eligible for inclusion in the consolidated data tape should be increased.** | The population of bonds that are available to be published needs to be broadened. | This makes the data more viable for the ECTP and more useful for the market. |
| 5. | **Introduce a vendor display rule and mandate the data to be used for free.** | Retail brokers should display CT data to end investors prior to and at the point of trading.<br>Ultimately a compilation of quotes may be helpful for display to retail investors, as many retail trades are executed off-venue. | This will educate investors about the underlying market structure and help them to challenge best execution.<br>Data should be free to prevent aggregators from creating substitute products. Otherwise, retail brokers may be incentivised to economise by finding cheaper but poorer quality data that could be supplied by the TVs. |

| # | Enhancement | Detail | Rationale |
|---|---|---|---|
| 6. | **An official definition of an EU instrument.** | This would help the ECTP to delineate EU versus non-EU activity to provide different data sets to customer segments. | Some participants may not need to see and process all market activity. |

## 8.3. OTHER ADVANTAGES OF A SINGLE ECTP ARCHITECTURE

An ECTP acting as the sole, independent, official source of data could deliver other advantages such as:

1. Improved market transparency management e.g. A **dynamic deferral regime** could be calculated for temporary liquidity spikes in bonds.
2. Undertaking regulatory calculations on behalf of ESMA.
3. Disseminating reference data for ESMA.

## 8.4. CONCLUSIONS

The optimal architecture to develop EU consolidated data at this point in European financial market evolution is one that rejects the possibility of competition between consolidators and moves to the adoption of an exclusive CTP that is not conflicted and has self-regulating capabilities.

The pre-requisites outlined in this chapter must be adopted holistically in order to successfully deliver the data requirements described in Chapter 4 and any compromises are likely to limit the successful development of CT data. The viability of the data could be further improved by additional enhancements that would certainly make the data more useful and a single official source of data may be used to harness other efficiencies for participants such as helping with regulatory calculations.

# 9 / OPERATIONAL AND TECHNICAL DESIGN: FEASIBILITY, COSTS AND FUNDING

*This Chapter assumes that the recommendations in Chapter 8 are adopted and describes the high-level organisational design of the ECTP and the technical design required to deliver the CT data. The designs and budgets are based on extensive discussions with vendors, technology providers and organisations with similar mandates and technical requirements.*

## CHAPTER SUMMARY

**1.** CT data for both equities and bonds can be delivered via the same high-level organisational and technical designs. This allows for economies of scale and the flexibility required to phase in different instruments and functionality over time.

**2. Organisational Design:**

- There would be a Board, and a permanent Executive and staff with advice given through stakeholder committees advising on product and technical requirements and rules.
- The key decisions and activities of the ECTP would be to define and implement:
  - The strategy and business plan and risk management policies and processes.
  - The standards, inputs, outputs, obligations, enforcement rules, responsibilities, and technical requirements for its members.
  - The cost at which to sell data and the revenue sharing mechanism.
  - The tender process for the outsourcing of the technology and the on-going relationship with the supplier/s.

**3. Technical Design:**

- The technology provided by a third-party supplier, which would allow for equity data to be delivered in tens of milliseconds, is expected to include:
  - "CT Engines" with core processing logic would be used to interact with other components and provide "plug and play" flexibility to allow for new functional elements to be added and allow for scalability.
  - Machine learning algorithms to identify data anomalies.
  - Operations in two data centres in Europe, which could be expanded as required. ECTP stakeholders would decide their locations.
  - The cloud for storage of historical data.

**4 Costs and Funding**

- The setup costs of the ECTP, including the technology for both asset classes, are expected to be €11 million. Start-up funding could be raised by levying a one-off joining fee from data aggregators with an average contribution of €25,000.
- The annual running costs of the entity for all asset classes in scope, including the running of the on-going technology, are estimated in the range of €6 million to €7 million. This could be obtained with a membership fee levied on data aggregators of **an average of €16,000** per entity per annum.
- Revenues from data sales would be allocated back to data contributors. Profits generated from other activities could be returned to members.

## 9.1. ORGANISATIONAL DESIGN

The key objectives of the ECTP entity would be to bring cultural change to the management of market data in Europe and fundamentally improve the governance, preparation, and distribution of the CT data.

The entity would be owned, run and funded by members and other stakeholders. The organisational detail and operating model of the ECTP would be determined through the governance structure and the scope of the work would include:

- Setting up the organisation together with its governance structure, relevant committees, terms of reference, etc.
- Hiring and establishing the Executive.
- Defining the CT data offering for pre- and post-trade products.
- Overseeing the procurement process to select optimal technology and other support provider(s) and subsequently negotiating their contract(s), finalising project plans, managing SLAs, etc.
- Determining fair and optimal pricing and reward structures in agreement with all stakeholders.
- Harmonizing data contracts and definitions with data contributors and for the redistribution of data.
- Undertaking the audits of data usage for itself and possibly offering a similar service for TVs and APAs that already use the services of other third parties to undertake audits on their behalf.
- Holding historic data that could be interrogated by the market in one place.
- Monitoring compliance, enforcing rules and levying penalties or fines as appropriate.

### 9.1.1. Governance

Under the oversight of ESMA, the ECTP will exercise effective operating authority over the entity through a balanced governance structure, whereby all key stakeholders have a say as to how the ECTP should be run.

A Board would govern the entity with a majority of independent directors. Material stakeholders would be represented in the governance of the entity even if they are not direct members (discussed below) of the entity. Voting rights of any one stakeholder type would be capped. The type and numbers of stakeholders to be represented and how directors are appointed would need to be addressed in the company's Articles of Association and any shareholder agreements.

ECTP members would be directly represented through the election of some of the directors. ESMA may wish to assert some authority and input into the management of the ECTP and it could approve the Chair, the Independent Directors and the CEO or even appoint them.

A committee structure, made up of industry representatives and under the Board's oversight, should ensure that there is subject matter expertise focussed on the key functions of the ECTP and that the input and feedback provided to the Board results from good cross-sector representation with no particular group having undue influence.

Figure 33: Proposed ECTP Organisational Structure and Responsibilities

| Functional Area | Activities |
|---|---|
| **Board** | Strategic direction, business planning, performance monitoring, priorities, policies, risk, regulation, oversight of Executive and Sub-committees, stakeholder engagement. |
| **Executive** | Day-to-day management & control, legal, finance and business management functions, contributor/user/provider contracts and management, PR, general compliance, human resources and staff welfare, secretariat, and support for Board & sub-committees. |
| **Product Advisory Committee** | Per Asset Class (or sub-asset class): product development priorities, product design, pricing, and revenue allocation recommendations.<br>The Product Advisory Committee could advise on cost and pricing of data or this could be dealt with by a separate committee or at the Board.<br>The ECTP must be in a position to determine the price at which it receives the data and the price at which it sells it. It will do this in consultation with the parties involved. An appropriate methodology for revenue sharing and cost allocation will be established and approved by the Board. |
| **Technical Advisory Committee** | Per Asset Class (or sub-asset class): Technical operating standards, architecture, record structures, technical development priorities, capacity/scaling/latency, selecting and monitoring an out-sourced provider for the technology, SLAs/KPIs and monitoring thereof. |
| **Compliance and Oversight** | Rules required to ensure data integrity: completeness, accuracy, timeliness & consistency; audit oversight; penalty regime; appeals & arbitration process. |

### 9.1.2. Staffing

The organisation would be run by a permanent staff of approximately 22 people (staff estimates and budgets are given in Appendix 14), which would cover:

- *The Executive*
- *Product Development*
- *Client and Member Services*
- *Operational Support/Helpdesk*
- *Technology liaison**
- *Compliance, Audit and Risk*
- *Financial Control & Admin*
- *HR*

**It is assumed that the technology would be outsourced so the cost of people to develop and run the technology is included in the cost of the technology.*

### 9.1.3. Membership of The Entity

Membership categories would need to be established and managed for the data aggregators. There is also an argument for having separate membership categories for other material stakeholders, such as data users and data vendors.

Each category could have different rights and obligations such as the right to nominate and elect representatives for its category onto the Board and sub-committees of the ECTP. Other data generators could have their memberships managed and handled through the APAs, e.g. the APAs could handle the membership costs or pass-through queries and fines.

### 9.1.4. Compliance and Oversight

At an operational level, it is important to ensure that the membership and constitution of the Compliance and Oversight Committee are robust with suitable access to legal resource and regulator(s) support where necessary. There should also be a clear and well-defined appeals process to support the integrity of this function.

To help ensure compliance with the rules and good behaviour, the ECTP could either levy fines or other penalties or, where relevant, hold back revenue share payments if the miscreant is a data aggregator. These policies would need to be submitted to ESMA for approval.

### 9.1.5. Procurement of IT Services

The ECTP is not expected to undertake any significant IT development in-house. There are many potential third-party providers for the required capture, processing, dissemination, and storage of data who are likely to be interested in tendering for the business. The procurement process would follow the usual rules for public procurement within the EU. The quality and completeness of the specified requirements and the efficacy of the procurement process will be critical to the success of the project and will be highly dependent on the quality of the work in defining the ETCP.

A single technology provider for the ECTP would, however, be preferable as it avoids any contention as to who is responsible for what but it may be decided that having specialist providers for different aspects may be desirable, such as equity versus non-equity or sub-asset classes.

Once the provider(s) is selected contract negotiations must be completed and service level agreements (SLAs) will be required. The information obtained during the procurement process will enable the project plan to be finalised and the budget to be updated. Developing and testing will be needed with stakeholders playing an active part in testing and rehearsals.

Monitoring the performance will be critical, both to ensure that the provider(s) is fulfilling its contract and SLAs and also as a basis for further developing further products and services going forward.

## 9.2. HIGH-LEVEL TECHNICAL ARCHITECTURE OVERVIEW

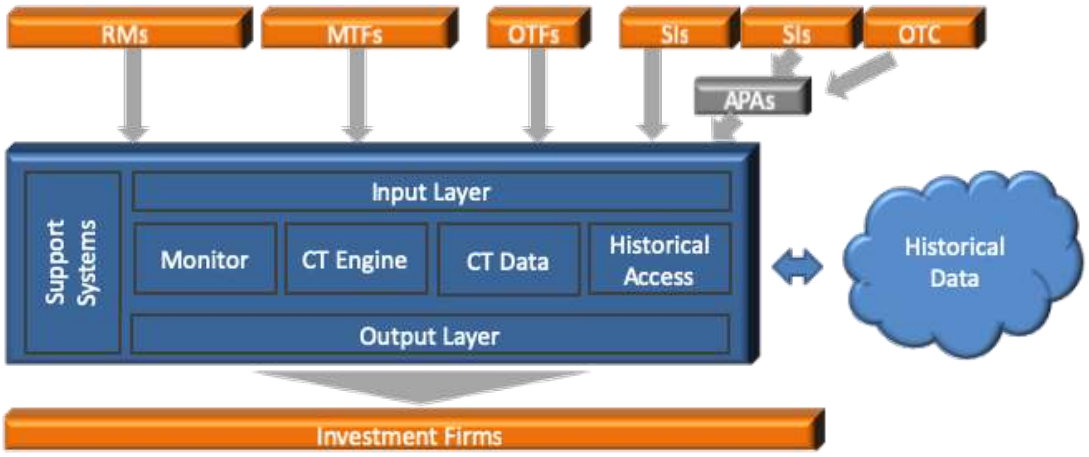
It is assumed that the technology required to support and manage the consolidated tape would be outsourced to a third-party provider. However, the following is an outline of the main technical components of the proposed tape, based on the research and interviews with data companies and market participants and the MSP team's own knowledge of building similar systems.

Although they capture different data points, the overall design of any pre- and post-trade consolidated tapes will be the same.

A key aspect of this design is the concept of "CT Engines". These are the core processing units, running the logic for taking the inputs, and assessing and creating the outputs. These engines will interact with the other components identified but would be designed to be interoperable ("plug and play") with other components, allowing multiple engines to be deployed to make the architecture highly scalable. This enables new functional behaviour to be added as required. It also allows for different parts of the tape to be delivered over time, e.g. equities post-trade, bonds post-trade, equities pre-trade, bonds post-trade.

The image below shows the overall technical architecture for a Consolidated Tape.

## Figure 34: Overall Technical Architecture for a Consolidated Tape




*Source: Market Structure Partners Research*

## Figure 15: Overall Technical Design Descriptions of a Consolidated Tape

| Key Components | Function |
|---|---|
| **Input Layer** | Connectivity into the CT supported by a FIX API to receive different types of messages:<br>*Pre-Trade* *Post-Trade* *Market Events* |
| **Monitor** | Machine learning engine to detect patterns that indicate erroneous reporting including the ability to match reports where both sides of the trade are reported. |
| **CT Engine** | Core processing logic that generates the pre- and post-trade tapes. This engine will consolidate and sequence the reports across the multiple data sources. Note that multiple engines can exist, processing data in parallel – e.g. separate engines for bonds and equities. This component would also ensure that only one side of the trade is reported. |
| **CT Reference Data** | Data needed to support the technology including data such as TV identifiers, firm identifiers and mappings, access permissions, asset class and instrument identifiers and other reference data.<br>Intra-day tape and events would also be stored in a fast-access storage medium within the core system. |
| **Historical Access** | This component controls the data that consumers can obtain from the historical data source. |
| **Output Layer** | Connectivity to CT data consumers. A standard API to provide access to different types of data.<br>*Pre-Trade* *Post-Trade* *Historical* *End-of-Day* *Venue Events*<br>The API would support specification of the type of data that a subscriber wishes to receive – e.g. equities or bonds for the pre- and post-trade CT, day, or time intervals for historical and end-of-day etc. |
| **Support Systems** | Ancillary systems that the CT organization will need to support it – e.g. HR systems, General Ledger, Audit etc. |
| **Historical data** | Use of a cloud-based service to store data for historical purposes. |

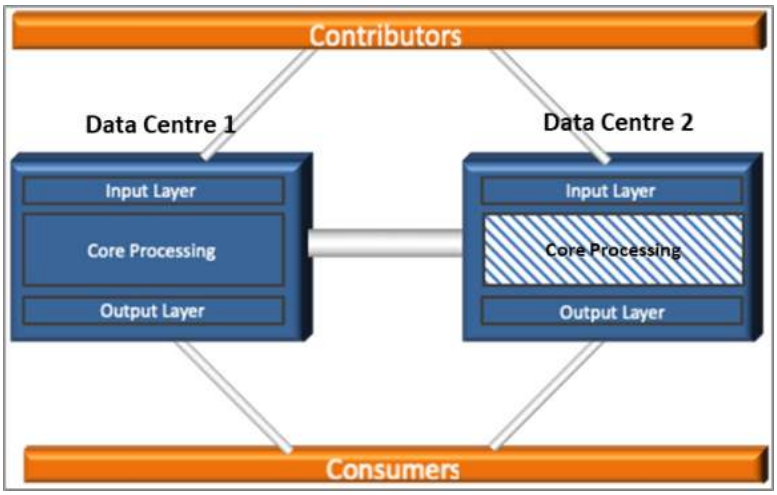
The output layer would take the form of a multicast distribution (see Chapter 3 for further explanation). As this is a non-guaranteed protocol, the CT would need to support a request/refresh snapshot to enable organisations to detect and "repair" data loss. This approach is consistent with the currently existing consolidated tape providers in the US.

The design and architecture would provide scalability and readily support additional capacity by increasing the number of CT engines as needed. This design can process data for both equities and bonds but can also be deployed for a single asset class at a time, adding more engines as needed.

The majority of the cost incurred for this architecture would be for the hardware to operate the system and for the storage of data. However, once a base infrastructure is in place, any additional costs become incremental (linear step function) in relation to the message throughput from the market.

Taking into consideration the use case requirements, which suggest that nano-second latency is not required, a single data centre would technically be sufficient. However, using two data centres is believed to be more prudent for resiliency.

Figure 36: High Availability Design Over Two Data Centres




*Source: MSP Research*

- *Each data centre (represented by the blue boxes) would hold the same data but each would be located in a different region within Europe. The two data centres would be linked with a high-speed connection to route traffic between the sites.*
- *Data generators and other contributors would connect to both data centres. However, they can contribute their data to either and should manage business continuity between the sites per their own recovery procedures.*
- *End-users would be recommended to connect to both data centres however this would not be mandatory. End-users can take messages and other data from one site or both. Taking from both sites would improve resiliency but would also require end-users to manage the same data from both sites.*
- *Regardless of the end-user's choice of data centre, the core processing for the CT would be carried out in one primary site with the secondary acting as a hot failover. This means that there is a seamless transition for the CT calculations from one site to the other.*

### 9.2.1. Cloud Storage

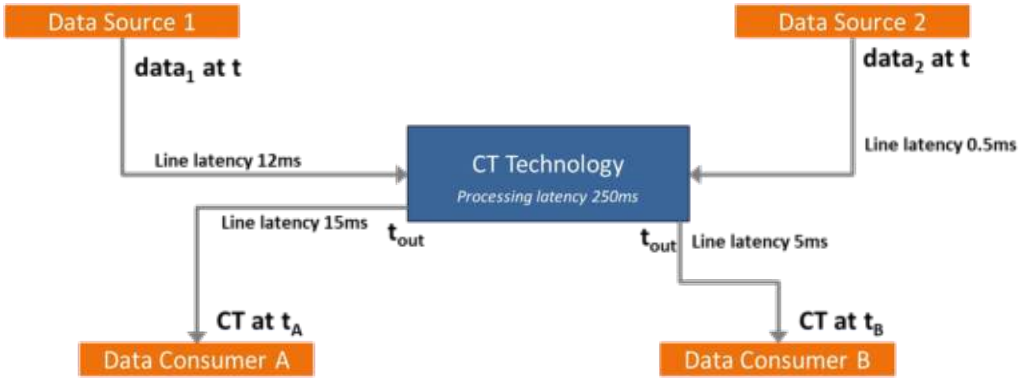
Pre- and post-trade historical data will be stored and archived in a cloud storage medium and available to users through an output layer via a standard API to download for their own use.

## 9.2.2. Data Centre Choices and Platform Latency

The platform latency will be subject to physical network limitations but the proposed technology, which is already available and widely used should allow the data to be processed in the order of tens of milliseconds.

To illustrate the practical implications of latency, the example below assumes that two venues, Data Source 1 and Data Source 2 generate data at time t such that $data_1$ and $data_2$ should appear in an aggregated form (or as a contiguous set of data).

Figure 37: Illustrative Latencies Example




| | $data_1$ | $data_2$ |
|---|---|---|
| ① Time CT receives data | t+12ms | t+0.5ms |
| ② Data available at the output | $t_{out}$ = t+12+250ms | $t_{out}$ = t+12+250ms |
| | Consumer A | Consumer B |
| ③ Data available at consumers at | $t_A = t_{out}$+15ms = t + 277ms | $t_B = t_{out}$+5ms = t+267ms |

*① The CTP would receive data from all data sources per their connectivity latencies. However, the CTP will need to allow time to "wait" for the sequencing of all data for a given time, t, to be received before processing data for the consolidated tape at that time*

*② In this example the tape will need to "wait" 12ms to before it can process like for like on both inbound streams - data will be available at an outbound time taking into account additional processing within the core technology – e.g. aggregation, stats etc. Time at the outbound layer is "normalized" by having to wait for all inbound messages to be at the same point in time i.e. at the time $t_{out}$.*

*③ Consumption of the data will again be dependent on communications latencies. In the example above, two end-users, one close to a distributor versus one further away would receive data 10ms apart. This is directly a consequence of the end-user's latency difference to distribution points.*

This example highlights the following key design features for a consolidated tape:

1. The ECTP will need to account for the different latencies on inbound messaging to correctly align and sequence the data for the consolidated tape.
2. The end-users will receive the outbound messages resultant from the consolidated tape at different times based on the network latency from the distribution centre to each respective end-user.
3. Due to the multicast nature of the outbound messaging, end-users may also experience further delays if they have lost or are missing data packets and need to invoke a refresh and restart to their data feeds.

There are multiple data centres available within Europe where the ECTP could be based. A decision on the best locations would be made under the governance of the ECTP taking account of the outcome for all stakeholders. Those further from the data centre may experience higher latency but if they have access to five levels of depth then this should not be an issue. Timestamping will, however, be critical to allow all participants to construct the same view of the consolidated tape across the market.

Further improvements to latency could be achieved by using additional data centres in but ultimately the overall time delay from an order book change or trade execution is subject to overall network latencies across Europe.

Any further improvements in latency must also consider whether the benefits outweigh the increased monetary and environmental costs. Whilst these environmental costs are difficult to quantify it should be noted that the greenhouse footprint would be linear with the number of data centres utilised whereas the improvements in latency may only be marginal and superfluous to the requirements of some end-users.

## 9.3. BUDGETS AND FUNDING

### 9.3.1. Assumptions

- The ECTP is likely to be a not-for-profit organisation. Any profits not required for future investment can be returned to members.
- The ECTP should effectively stand in the middle of the revenue being paid by the data users to the data contributors, potentially extracting a small fee for its services where appropriate. The ECTP should not be in the position of taking a commercial risk as regards the cost or price of the data.
- The ECTP would cover its initial set up cost and on-going operational funding from a number of sources such as:
    - Membership fees.
    - Administration fees for handling revenues from data users to data contributors.
    - Integrity audit fees, fines for non-compliance, etc.
    - Trade reporting fees for SIs wishing to report data directly to the ECTP.

If the above sources of funding were not sufficient then the ECTP could retain a percentage of data sales revenue to help cover its costs.

An alternative or complementary approach would be for the ECTP to levy a small charge for each transaction it has to process.

### 9.3.2. Source of Funding

Applying the membership concept that was outlined in the Governance section (9.1.3), the primary source of funding for the ECTP would be from membership fees of the data aggregators.

The initial set up costs would be funded by a one-off ‘entry fee’ to become a member and the on-going operational costs would be funded by annual membership fees.

To demonstrate how this revenue could be raised, consider that in Europe there are 482 potential providers of aggregated data across all asset classes. This includes all data aggregators and SIs that may elect to self-aggregate. The table below illustrates how relatively modest membership fees could be used to cover both the initial set and annual funding costs of the ECTP.

In this example, a one-off entry fee of approximately €25,000 per member would raise over €11 million to cover set up costs, whilst an annual membership fee of €16,000 per annum would cover annual operational costs. Note that these figures are averages only. The actual membership fees would be determined by the ECTP and could be based on the size and nature of each member and the benefit they are likely to derive

from the allocation of revenue from the sale of CT data. An alternative source of set up funding could be sought through a loan..

Once the ECTP is up and running then the membership fees should be reviewed on annual basis to ensure that they are fair to each member and sufficient to support the ECTP in the future expansion and development of the consolidated tape in Europe.

Figure 38: Potential ECTP Number of Members and Annual Fees

| INPUTS (Data contributors) | RM | MTF | OTF | APA | SIs, OTC* | Total |
|---|---|---|---|---|---|---|
| All Assets Classes | # | # | # | # | # | **#** |
| EU | 121 | 139 | 25 | 16 | 15 | **316** |
| UK | 15 | 81 | 49 | 6 | 15 | **166** |
| **Total** | **136** | **220** | **74** | **22** | **30** | **482** |
| | €k | €k | €k | €k | €k | **€k** |
| Average Annual Membership Fee €k | 16 | 16 | 16 | 16 | 16 | **16** |
| **Total Annual Membership Fees €k** | **2,176** | **3,520** | **1,184** | **352** | **480** | **7,712** |
| | €k | €k | €k | €k | €k | **€k** |
| **Average One Off Set up Fee €k** | **25** | **25** | **25** | **25** | **25** | **25** |
| **Total Set Up Fees €k** | **3,400** | **5,500** | **1,850** | **550** | **750** | **12,050** |

**Estimated direct contributors to ECTP*

## 9.3.3. Conclusions

CT data for both equities and bonds can be delivered via the same high-level organisational and technical designs. This allows economies of scale to be achieved and provides for the flexibility required for the phasing in of different instruments and functionality over time.

The proposed organisational and technical design to support the ECTP and deliver the CT data requirements is feasible and could be implemented.

An ECTP that would meet user requirements could be established for €11 million with on-going running costs of approximately €7.6 million, all of which could be funded by the industry for a relatively modest membership fee.

# 10 / CONSOLIDATED DATA IN THE CONTEXT OF THE EU 27 MARKETS (EX. UK)

This Chapter considers the requirements for CT data in the context of the EU 27 markets (i.e. post the departure of the United Kingdom ('UK') from the EU, where equivalence is not granted to the UK).

## CHAPTER SUMMARY

1 The impact of the UK's departure from the EU has been part of the backdrop to the analysis undertaken for this study but cannot yet be fully assessed as the terms of that departure have not been finalised. However, the findings from this study suggest that the **need for CT data within the EU 27 markets** remains compelling and will be **equally important** without the UK because:

- There is no discernible difference between the requirements and issues raised by participants within the EU 27 markets and outside of them. All participants in EU 27 markets, regardless of their location, still require quality CT data to manage their portfolios, risk and regulatory obligations and perform the other functions as identified in the use cases in this study.
- In a scenario where passporting rights or equivalence is not given to the UK, there will be a **proliferation of additional TV, SI, QIF and APA entities** set up within the EU, as UK based firms seek to continue doing business within the EU.
- The results will be twofold. Firstly, there will be a significant **increase in the number of entities** from which participants (or a CTP) will need to collect data. Secondly, there could also be an **increase in the number of overall trades** because QIFs and SIs are likely to undertake back-to-back trading between their EU and non-EU entities in order to manage client orders and risk.
- The overall effect is that it is likely to **introduce more complexities** and issues with data quality and is also **likely to further increase costs,** which participants already complain about.
- Specifically, for equities, MiFID II's Share Trading Obligation (STO), means that **equity liquidity pools are likely to be split** between the UK and the EU. This may generate **arbitrage opportunities** and **reduce trade sizes on lit markets** if data cannot be relied upon to give a complete picture of the market. This will contribute to more fragmentation and **larger volumes of trade reports** and put an even greater emphasis on the importance of **quality pre- and post-trade data**.
- If a third country creates **competing offshore pools** of liquidity in EU instruments for non-EU 27 investors, CT data will help the EU compete for capital and liquidity from those investors.

## 10.1. THE IMPACT OF THE UK'S DEPARTURE FROM THE EU ON CT DATA

The impact of the UK's departure from the EU has been part of the backdrop to the analysis undertaken for this study but cannot yet be fully assessed as the terms of that departure have not been finalised. It has not, therefore, been possible to fully examine the impact of the UK's withdrawal on these recommendations.

However, it is possible to outline the possible high-level scenarios under which the UK may leave and how the different outcomes attached to each of these scenarios will impact data stakeholders including TVs, APAs, investment firms, investors, regulators and other participants.
These high-level scenarios are as briefly described as follows:

1. The UK **retains its passporting privileges** similar to other EEA countries, which means that firms operating their business from the UK can continue to do so without the need to establish entities within the EU.
2. The UK **loses its passporting rights but is granted third country equivalence** which allows non-EU based firms to offer a limited number of services into the EU if their home country regulatory regime is accepted by the EU as being 'equivalent' to EU standards. This would mean that some investment firms and TVs may still be able to operate outside of the EU without the need to establish a presence in the EU.
3. The UK **loses passporting rights and is not granted equivalence** in which case UK based entities would need to establish a business presence within the EU.

This study incorporated feedback from EU 27 and UK investors who describe their desire for CT data as being "pan-European". This includes UK data and it can be reasonably assumed that in Scenarios 1 and 2, the EU and the UK would work together to progress the regulatory, operating and technical framework required to establish and develop a consolidated set of data across Europe. In this case, the analysis and recommendations in this study are applicable to the combined EU 27 markets and the UK.

However, in Scenario 3, the UK and EU may not co-operate to build combined CT data and the EU will consider whether it needs to develop CT data for the EU 27 markets and whether the analysis and recommendations in this study remain relevant.

## 10.2. CONSOLIDATED DATA REQUIREMENTS FOR EU 27 PARTICIPANTS AND INVESTORS

This study found no discernible difference between the use cases, requirements and issues raised in relation to data consolidation by investment firms and market participants that operate their European operations from the UK and investment firms that operate their European operations from within the EU 27 markets. After the UK's departure, the EU 27 markets will continue to compete to attract capital and investment from global investors and, as such, will benefit from setting high standards of market transparency and efficiency.

Most stakeholders, apart from possibly the incumbent trading venues, see CT data as an important tool for enhancing their business processes and fulfilling their use case requirements. Ease of access to good quality consolidated data with respect to both UK and EU 27 markets will remain a critical issue for all participants, both within and outside of the EU, post the departure of the UK.

## 10.3. THE IMPACT OF SCENARIO 3 ON EU 27 MARKETS AND DATA

UK-based market participants have been preparing for Scenario 3 and have either already established, or are preparing to establish, a presence for their businesses in the EU 27 markets. This presence typically takes the form of a separate EU domiciled entity within the firm's corporate structure. In the event that passporting or equivalence is not granted these entities will step up their activities and there will be a proliferation of QIFs, SIs, TVs and APAs within the EU from which participants will need to source data in order to manage portfolios, risk and best execution obligations. This burden will fall on all global participants who currently invest in EU 27 and 28 markets.

The results will be twofold. Firstly, there will be an increase in the number of sources from which to collect data and second, there may also be an increase in the number of overall trade reports This is because QIFs and SIs are likely to undertake simultaneous trading (known as back-to-back trading) between their EU and non-EU entities in order to manage client orders and risk.

### 10.3.1. Share Trading Obligation

Specifically, for equities, MiFIR's Share Trading Obligation (STO)[69] and more recent ESMA guidance mean that EU investment firms must ensure that the trades they undertake in shares that are admitted to trading on a regulated market, or traded on a trading venue in the EU, take place on a regulated market, MTF or systematic internaliser within the EU or a third-country trading venue that is considered to be equivalent to a regulated market by the European Commission.

As a result, equity liquidity pools are likely to be split between the UK and the EU and EU firms will only be able to trade EU shares on an EU venue regardless of where liquidity or best price may be achieved. Non-EU investors could trade in EU instruments in liquidity pools based outside of the EU[70]. This may generate arbitrage opportunities and reduce trade sizes on lit markets if data cannot be relied upon to give a complete picture of the market liquidity. It may also increase the number of trades being reported and data that needs to be managed.

Exchange-Traded Funds (ETFs) will also be impacted even though they are not subject to the trading obligation. Related participants including brokers, liquidity providers and fund managers that are subject to MiFID II will need to consider the STO when trading in the underlying securities that are subject to the STO. This will need careful data management.

Additionally, in the event that the UK, or any other non-EU jurisdiction, creates competing offshore pools of liquidity in EU instruments for non-EU 27 investors, CT data will be very important for the EU. Easy access to a complete and accurate picture of liquidity in the EU will help the EU compete for capital and liquidity from non-EU investors with large amounts of capital to invest that could be drawn to pools of liquidity elsewhere, particularly if there is a more complete and accurate picture of an alternative market. A failure to provide good data could, in turn, impact primary markets by encouraging EU domiciled companies to seek listings or capital raising outside of the EU 27 markets.

### 10.3.2. Two Consolidated Tapes?

It is likely that an ECTP in each jurisdiction would need to be created to solve the current data issues that exist both in the EU 27 markets and the UK but the creation of these entities and their recognition in the law may be treated differently. This would clearly increase the costs to the market and if the proposed funding model is adopted, these costs are likely to be borne by similar sets of stakeholders who are active in both markets.

Although this would be less efficient, if the costs described in this study were charged for both tapes, it would still outweigh the benefits for investors. The most important focus of data users would be to ensure that the technical and operating standards of both CT consolidators were as closely aligned as possible so that the inefficiencies could be reduced, particularly when cleaning and compiling the data. This may be achieved by the similar stakeholders being represented in the governance of both ECTPs.

Whichever jurisdiction commenced the development of CT data first could take the lead in establishing these standards.

## 10.4. CONCLUSIONS

The requirements and benefits identified for investors and regulators in this study continue to apply to the EU 27 markets regardless of the direction that the UK takes and there is still a very compelling case for CT data.

The most likely effect of the UK's departure from the EU is that more data will be generated from within the EU 27 markets than there is today and, in the absence of a consolidated tape, this will increase the complexities, issues with the quality of data and costs that participants already complain about. It may also be even more critical to develop EU 27 CT data if the UK leaves without equivalence in order to ensure that the capital of non-EU investors' capital is attracted to EU 27 markets and not to third countries.

Even in the less desirable scenario that two tapes must be developed, based on the findings in this study, the benefits of building two consolidated tapes would still far outweigh the costs of building them.

# 11 / LEGAL ANALYSIS

*This Chapter considers which aspects of a consolidated tape can be implemented within the current legislative framework versus which aspects would require further legislative amendments before they can be implemented. The full detail behind this legal analysis is set out in Appendix 19.*

## CHAPTER SUMMARY

1. **The EC has sufficient powers under current MiFID II legislation to direct ESMA to establish a consolidated post-trade tape by using its procurement process to:**
   - Establish an exclusive CTP (ECTP) to run a consolidated tape utility with self-regulating capabilities under ESMA's oversight.
   - Require that TVs and APAs, as key aggregators, become mandated members of this ECTP. Other key stakeholders could be non-mandated members.
   - Empower the ECTP to develop its rule book (including standards) and compliance framework (including sanctions and penalties).
   - Ensure that:
     - post-trade data for the consolidated tape would be provided free to the ECTP, which then determines the price for that data to be sold to end-users.
     - revenue from the consolidated post-trade tape would be shared via a revenue allocation model as agreed by the stakeholders.
     - post-trade data would be available to end-users in real-time and could also be accessed on a historical basis.
2. **Under MiFID II, many other market data issues could also be resolved as follows:**
   - With political goodwill, bond deferral rules could be harmonised.
   - ESMA could increase the population of bonds in scope for post-trade reporting.
   - RTSs could be amended to improve data quality and ease the ECTP's task of reconciling the data.
3. **The following cannot be achieved without new, or amendments to, legislation:**
   - A consolidated pre-trade tape is not possible because TVs are not currently mandated to submit pre-trade data to any CTP.
   - Recognition of the exclusivity of the ECTP in law thus empowering it to enforce European market data laws and align membership of the ECTP with authorisation of the data generators and aggregators.
   - Mandating other data generators such as SI's to be ECTP members.
   - Consistency in the data submitted by TVs and SIs, as they are not subject to the same pre- and post-trade transparency regimes.
   - Formal delineation between EU and non-EU instruments.
4. **To move forward the EC is faced with two possible alternatives. These are:**
   - **Option 1:** Use the powers already provided by MiFID II to implement an initial post-trade consolidated tape and introduce further legislation to support a pre-trade consolidated tape and the enhancements noted above, or,
   - **Option 2**: Defer any development on a consolidated tape until the full legislative framework is in place to support a complete pre- and post-trade consolidated tape.
5. **The pros and cons of each alternative are discussed in more detail within this chapter.**

## 11.1. ANALYSIS OF CURRENT POWERS VERSUS THE PROPOSED REQUIREMENTS

The following table outlines what is possible under the current law and where amendments would be required. The assessment of what can be achieved depends on a robust interpretation of the law and for the EC to provide clear specifications to ESMA as to what is expected of the ECTP and how it should be structured.

Figure 39: An Assessment of What Can Be Achieved Under Current Legislation.

**Key:** ● Yes ◐ Partial Achievement ○ No

| Requirements | Can it be Achieved Now? | What is Achievable under Current Legislation | Proposals for Future Legislation |
|---|---|---|---|
| **TO ESTABLISH AND EMPOWER A SINGLE, NOT-FOR-PROFIT SELF-REGULATED ENTITY WITH CENTRALISED OVERSIGHT FROM ESMA** | | | |
| 1. A single non-conflicted layer between the regulators and the technological solution. | ● | The EC has the power to request ESMA to set up an exclusive CTP, answerable to ESMA. The EC can set certain parameters that ESMA must consider and ESMA can use its current procurement process to establish an ECTP following the EC's desired specifications. ESMA and a number of stakeholders would need to work together to effectively create the entity that meets the stipulated requirements.<br><br>Through the procurement process, the ECTP can be empowered to determine its own suitable rules, standards, and behaviours for the CT data to succeed. However, it cannot enforce the related European laws or fully sanction members.<br><br>Balanced governance and lack of conflicts of interest is possible to achieve and should be stipulated as a requirement in the procurement process. It can also establish that a "commercial entity" means it can be a not-for-profit entity.<br><br>The organisation should be able to undertake audits of members and consumers.<br><br>An ECTP should be able to be directly authorised and regulated by ESMA (note that this is possible from Jan 2022[71]). | The ECTP needs to be recognised in the law and empowered to enforce not only its rules on its own members but also to enforce the European laws directly relating to the consolidated tape and reporting of data.<br><br>There should be a covenant to ensure that if the ECTP becomes conflicted that its powers under the law can be curbed or retracted.<br><br>When any firm that aggregates MiFID II data (either as a self-aggregator or a market aggregator) becomes authorised, it should be required to show that it has arrangements in place to provide data to the ECTP. These arrangements must be ongoing with the ultimate sanction being that an authorised firm could lose its authorisation if it is not willing to abide by ECTP rules. |
| 2. The ECTP must be suitably empowered by ESMA, to enforce operating standards and rules via a harmonized set of rules, including penalties and other sanctions that have a sufficient impact on behaviour. | ◐ | | |
| 3. The ECTP should be recognised in the law, as long as it has no conflicting interests. | ○ | | |
| 4. Balanced governance of the ECTP is required. | ◐ | | |

| Requirements | Can it be Achieved Now? | What is Achievable under Current Legislation | Proposals for Future Legislation |
|---|---|---|---|
| **MANDATED MEMBERSHIP FOR ALL DATA GENERATORS AND CONTRIBUTORS** | | | |
| 1. All data generators and aggregators of MiFID II/MiFIR pre- and post-trade data should be obligatory members of this ECTP and will contribute to funding. |  | The ESMA procurement process could ensure that there is a compulsory membership of the ECTP for data aggregators.<br><br>However, APAs and TVs are the only entities that could currently be mandated to become members of the ECTP. QIFs and SIs do not have the option to make data directly available to a CTP (but they could become voluntary members or it could be resolved it the ECTP became an APA, allowing them to report directly. | Allow all data generators/contributors of MiFID II pre- and post-trade data to report directly to the ECTP.<br><br>. |
| **EQUITY PRE-TRADE DATA CONSOLIDATION** | | | |
| 1. To collect pre-trade order data including 5 levels of depth, auction imbalance data and session statistics. |  | The European Commission will not be able to use its existing delegated powers to mandate a pre-trade consolidated tape or to mandate that firms or entities other than APAs and trading venues (TVs) submit data to it.<br><br>It may be possible to ask for voluntary sets of data from TVs but unlikely that all TVs would agree. | A core set of data and administrational event data that must be given up by exchanges has to be stipulated in the law and it must be clear that this data should be freely given up to the ECTP.<br><br>The concept of "Historical Data" needs to be introduced, defined and mandated as data that must be given to the ECTP for long-term storage and it must be clear that this should be freely given up to the ECTP.<br><br>Once this data is clearly defined in the law, the ECTP should be mandated to provide pre-trade equity order data in real-time and have historical data stored for analysis.<br><br>The ECTP must be able to establish:<br><br>• the reasonable commercial basis for which pre-trade data should be charged to consumers.<br><br>• the revenue allocation mechanism under which pre-trade data revenue would be shared with its members.<br><br>Although quote data is currently not a "must-have", flexibility should be allowed for quote data to be included for consolidation at some point and similar rules should apply. |
| 2. To publish the collected pre-trade data as soon as technically possible. |  | | |
| 3. To collect order event data to full depth for historical analysis and allow it to be available for analysis. |  | | |
| 4. Acquire the data freely in return for a revenue-sharing mechanism of all CT pre-trade data with contributors determined by the ECTP. |  | | |
| 5. Determine the reasonable commercial cost at which all the CT data should be sold. |  | | |

| Requirements | Can it be Achieved Now? | What is Achievable under Current Legislation | Proposals for Future Legislation |
|---|---|---|---|
| **POST-TRADE DATA CONSOLIDATION FOR EQUITIES AND BONDS** | | | |
| 1. To collect post-trade data. |  | ESMA can use its procurement rules to ensure that the ECTP can:<br>• publish real-time post-trade data submitted by contributors at a cost (a "reasonable commercial basis") until the point, 15 minutes after publication, at which it will be provided at no charge.<br>The EC can define the (parameters of) a "reasonable commercial basis" and the "reasonable cost" at which TVs and APAs shall make their data available to the CTP [NOTE: this does not permit the EC to set the cost at which other contributors of data may make their data available to the CTP].<br>It could either choose to do this by requiring the ECTP stakeholders to establish and recommend the reasonable cost for data (and the mechanism for establishing this cost) or it could interpret its obligations as the right to directly define the reasonable cost. | The concept of Historical Data needs to be introduced, defined, and mandated as data that must be given to the CTP for long-term storage and it must be clear that this should be freely given up to the CTP.<br>It needs to be clear that post-trade data is not always real-time and can include end of day/session data.<br>It should be clarified that the ECTP can establish:<br>• the revenue allocation mechanism under which post-trade data revenue for CT data would be shared with its members and that aggregators must comply with these rules. |
| 2. To publish the data as soon as technically possible. |  | | |
| 3. To collect and publish end-of-day data/session statistics. |  | | |
| 4. To collect and make available the data for historical analysis. |  | | |
| 5. Acquire the data (both real-time and historical) freely in return for a revenue-sharing mechanism of all CT post-trade data with contributors determined by the ECTP. |  | | |
| **OTHER PRE-REQUISITES** | | | |
| 1. Harmonising Bond Deferrals. |  | This is for the NCAs and politicians to resolve. | |
| 2. Separate RTS fields for each asset class (bond and derivatives) and enrichment of RTS data to include additional information about trading protocols and systems. |  | This can be done under the current law by amending or supplementing current Articles. | |
| 3. Reconciliation Capabilities. |  | Two-sided trade reporting for dealer-to-dealer trades can be introduced. | |

| Requirements | Can it be Achieved Now? | What is Achievable under Current Legislation | Proposals for Future Legislation |
|---|---|---|---|
| **ANCILLARY CHANGES TO MAKE DATA MORE VIABLE** | | | |
| 1. SIs are treated differently from trading venues. |  | SIs will have to adhere to the Tick Size Regime from 26 June 2020. | All trading venue rules should also apply to SIs.<br>Sufficient consideration should be given to the future need for SIs to publish quotes to the ECTP for consolidation. |
| 2. Increasing the population of bonds eligible for the tape. |  | ESMA can resolve this and it may be helped by greater transparency through the CT data. | |
| 3. Improving the definition of an EU instrument. |  | This is not possible without an official instrument list. | An official list of EU instruments needs to be created. |

### 11.1.1. Choices available

The creation of a regulated entity with a post-trade and historical data offering should, therefore, be possible under current legislation. However, it is not possible to create a pre-trade tape without changes to the legislation, as the data that must be given up is not specified in the law.

Therefore, the EC is faced with a choice. It may either:

- Commence the establishment of an ECTP pursuant to the existing delegated authority (which can be used as a proof-of-concept for an ECTP with wider responsibilities in the future) and follow through with amendments to the Level 1 text.
- Wait and seek political agreement to amend Level 1 text (or introduce a new “exchange act”).

The pros and cons of each choice are evaluated below.

Figure 40: Pros and Cons of Choices Available.

| Option 1: Use the current legislative powers to create an ECTP to establish a post-trade tape for both equities and bonds and then follow through with amendments to Level 1 text or new legislation. | |
|---|---|
| **Pros** | **Cons** |
| • A framework for an exclusive CTP entity is established that can be recognised in the law at a later stage.<br>• Through mandated membership and stakeholder governance, the industry has to work together to find solutions and this can help inform further changes at Level 1.<br>• Finding a solution is funded by the industry and means that it has "skin in the game" to resolve the problems.<br>• A significant part of the post-trade solution for non-venue generated data could be achieved.<br>• It can be implemented relatively quickly.<br>• There is currently significant impetus from market participants to work together (although not always with the same interests) to establish a consolidated tape.<br>• The end investor may accrue benefits earlier.<br>• Sufficient stakeholders appear ready to engage.<br>• Under the UK's departure from the EU, the need for CT data may be more urgent and the same stakeholders are still likely to be involved. | • ESMA's public procurement process needs to define the ECTP's role clearly and carefully to ensure that it follows the ECs parameters and the ECTP can achieve everything proposed.<br>• The ECTP will not have the power to enforce European laws with respect to data.<br>• The ECTP can only have APAs and TVs as members (two of the stakeholders most potentially disrupted by a CT) who may try to unduly assert themselves in the early governance and formation of the ECTP and CT data. (Other data contributors could become voluntary members)<br>• Any stakeholder with a vested interest not to have CT data could slow the process down or not co-operate.<br>• Equity participants would have to adapt to a hybrid state and may find it hard to consume and value post-trade CT data whilst pre-trade data is still being taken via direct feeds.<br>• It is possible that the proposed Level 1 legislative changes may not be achieved.<br>• Brexit may fragment the interests of different stakeholders |

| Option 2: Wait for wholesale legislative change. | |
|---|---|
| **Pros** | **Cons** |
| • The role of the ECTP can be more clearly defined in the law.<br>• The full consolidated pre- and post-trade tape can be designed with greater regulatory certainty.<br>• The full pre- and post-trade consolidated tape can be delivered together. | • The practical experience and knowledge gained from Option 1 are foregone.<br>• The industry may not work together to find solutions and continued lobbying for vested interests may not achieve a workable solution.<br>• Regulators will have to continue using sub-optimal data sets and dedicate resources to managing data or funding the development of a consolidated tape.<br>• Any benefits to end investors are deferred for a number of years whilst a small number of financial intermediaries continue to extract profit from information asymmetries. |

## 11.2. CONCLUSIONS

It is legally feasible under the current legislation to create an ECTP with a post-trade tape solution. There are pros and cons to moving forward now or waiting for more legislative change. To achieve a solution in the near term will require the EC to be robust in its interpretation of the law and for ESMA to carefully use its procurement process to work closely with stakeholders to bring the proposed ECTP to fruition.

# 12 / CONCLUSIONS & RECOMMENDATIONS

There is an urgent need for CT data to improve the transparency and efficiency of European equity and bond markets. Multiple use cases exist across the industry to show that it would bring considerable benefits to investors who could save billions of euros through the existence of such data. The establishment of CT data could also improve the functioning of European capital markets by increasing competition and supporting policy-making decisions.

The only firms who may be potentially disrupted by the development of CT data, are a small number of financial intermediaries which either have sufficient economic and technical power to process and gain advantage from current information asymmetries, or, which can disproportionately profit from the price of the data that they sell.

These findings remain applicable to the EU 27 markets after the UK's exit from the EU. CT data should become a fundamental cornerstone to achieving the Capital Market's Union's objectives, not only to serve the current needs of all investors and participants, but to preserve the competitiveness of the EU 27 financial markets in the event that pools of liquidity develop in third-country markets.

The technology required to build CT data is proven and widely available. The key issues to be overcome in creating such data are legal, structural, organisational and economic. It is impractical to expect multiple competing commercial consolidators of data to emerge when the underlying data that needs to be consolidated resides across many competing commercial entities, some with disproportionate economic leverage and conflicts of interest. Additionally, pre-trade CT data cannot be achieved under current legislation because it is not specified in the law.

The consolidation and aggregation experiences in North America, although not an exact model for Europe, show that, even in less fragmented markets, the optimum structure to commence creating CT data is via well-governed, self-regulated entities with exclusive aggregating and/or consolidating responsibilities. This allows them to mandate rules and standards for the market. Clearly defining pre- and post-trade data in the law combined with the legal recognition of these entities also gives them additional powers to enforce related laws on their members. The US equity experience also demonstrates that revenue allocation models, based on the value of each participant's contribution to the consolidated data, can significantly facilitate consolidation and the use of CT data.

Many similar characteristics are desirable in Europe but with adjustments that allow for the different market characteristics and to avoid some of the legacy issues that exist in both the US and Canada. In particular, an exclusive, non-conflicted consolidator across asset classes that has the role of enforcing standards, rules and related laws for market-wide CT data on all aggregators of data is more important for Europe at this point in its market evolution. A balanced governance structure and stakeholder representation are also critical, particularly to resolve the issue of cost and pricing of CT data. However, as in North America, such a consolidator should be self-regulating and recognised in the law. All of these recommendations are considered pre-requisites and should be viewed holistically if EU CT data is to be successfully delivered. Compromises are likely to result in less optimal CT data.

Economies of scale can also be achieved by using the same high-level technical and organisational framework to deliver both equity and bond data consolidation. The organisation and technology required to deliver a consolidated tape that meets the user requirements and resolves many of the issues identified in this study can be set up for a cost of less than €11 million with annual running costs of €7.6 million. The costs of setting up the CT data, should therefore not be an impediment as the benefits clearly outweigh the costs.

Whilst a consolidated pre-trade data tape cannot be implemented under current legislation, the establishment of an ECTP with a post-trade solution that meets most of the design requirements could be achieved. The EC could use its existing powers to set clear parameters for the creation of an ECTP and request ESMA to use its procurement process to follow those parameters to achieve the desired outcome. This would start to deliver benefits to investors and participants, many of whom believe that the development of CT data is long overdue and who appear ready to engage to help bring it to fruition. ESMA will need to carefully manage the procurement process, as well as to set milestones to measure progress and encourage the resolution of issues between stakeholders.

Further improvements to the post-trade consolidated tape, overall strengthening of the ECTP's role and the creation of a pre-trade consolidated tape for equities would need to be addressed in new legislation.

**Recommended Actions:**

- The EC should take a robust approach to the interpretation of its existing powers and pursue its power in MiFID II to request ESMA to launch a public procurement process that creates the specified conditions for the establishment of an exclusive CTP for post-trade data as soon as possible. This would be in anticipation that the CTP is a self-regulatory organisation, that it is exclusive and that a "commercial entity" means that it is not conflicted and can be a not-for-profit self-regulatory body with compulsory membership for data aggregators.

- ESMA and the NCAs should be encouraged to review government bond deferral rules and to reconsider and accelerate the phased approach on assessing liquidity in bonds.

- The EC should also seek to introduce further legislative changes to fully support an exclusive CTP for consolidation of both pre- and post-trade data and to enhance the viability of the data.

# BIBLIOGRAPHY TO THE MAIN REPORT

## ACADEMIC LITERATURE


Angel J (1998)

**Consolidation in the Global Equity Market: An Historical Perspective**

*Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.200.5944&rep=rep1&type=pdf*

Asquith, P., Covert, T., Pathak, P.A. (2019 revision of 2013 original)

**The Effects of Mandatory Transparency in Financial Market Design: Evidence from the Corporate Bond Market**

*National Bureau of Economic Research (NBER) Working Paper No. 19417*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2320623*

Balp G., Strampelli G. (2018)

**Preserving Capital Markets Efficiency in the High-Frequency Trading Era**

*Bocconi Legal Studies Research Paper No. 3097723; Journal of Law, Technology and Policy, Forthcoming*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3097723*

Bartlett R.P., McCrary J. (2017 revision of 2016)

**How Rigged Are Stock Markets? Evidence from Microsecond Timestamps**

*University of California, Berkeley Public Law Research Paper No. 2812123*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2812123*

Bessembinder H., Maxwell W., Venkataraman K. (2006)

**Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds**

*Journal of Financial Economics, Volume 82, Issue 2, November 2006, Pages 251-288*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=644624*

Biais B., Declerck F., Dow J., Portes R., von Thadden E-L (2006)

**European Corporate Bond Markets: Transparency, Liquidity, Efficiency**

*Centre for Economic Policy Research, City of London*
*Available at: http://faculty.london.edu/rportes/TT%20CorporateFULL2.pdf*

Boehmer E., Saar G., Yu L. (2004)

**Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE**

*Leonard N. Stern School of Business Dept. of Finance Working Paper No. 03-002*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=368102*

Boulatov A., Dierker M. (2007)

**Pricing Prices**

*European Finance Association 2007 Ljubljana Meetings Paper.*
*Available at: https://ssrn.com/abstract=967363*

Cespa G., Foucault T. (2013 revision of 2008)

**Insiders-Outsiders, Transparency and the Value of the Ticker**

*Working Papers 628, Queen Mary University of London, School of Economics and Finance*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1117581*

Cespa G., Foucault T. (2013)

**Sale of Price Information by Exchanges: Does it Promote Price Discovery?**

*Management Science, published 2014*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1875001*

Colby R.L.D., Sirri E.R. (2010)

**Consolidation and Competition in the US Equity Markets**

*Capital Markets Law Journal Vol 5, No 2, 2010*
*Available at: https://doi.org/10.1093/cmlj/kmq004*

Ding S., Hanna J., Hendershott T. (2014)

**How Slow is the NBBO? A Comparison with Direct Exchange Feeds**

*Eastern Finance Association – The Financial Review 49 Issue 2 (2014) 313-332*
*Available at: http://faculty.haas.berkeley.edu/hender/NBBO.pdf*

Easley D., O'Hara M., Yang L. (2016 revision of 2013)

**Differential Access to Price Information in Financial Markets**

*Journal of Financial and Quantitative Analysis (JFQA), 2016, 51(4), 1071–1110; Johnson School Research Paper Series No. 11-2011*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1787029*

Edwards, A. Harris L., Piwowar M.S. (2007),

**Corporate Bond Market Transaction Costs and Transparency Costs**

*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=982654*

Hamilton J. L. (1978)

**Marketplace Organization and Marketability: NASDAQ, the Stock Exchange, and the National Market System**

*The Journal of Finance Vol. 33, No. 2 (May 1978), pp. 487-503*
*Available at: https://www.jstor.org/stable/2326565*

Hasbrouck J. (2018)

**Price Discovery in High Resolution**

*Stern School of Business, New York University*
*Available at: http://people.stern.nyu.edu/jhasbrou/Research/HRVAR/HRVAR08.pdf*

Hasbrouck J, Saar G. (2013)

**Low-Latency Trading**

*Johnson School Research Paper Series No. 35-2010, AFA 2012 Chicago Meetings Paper*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1695460*

Holden C. W., Jacobsen S. E., Subrahmanyam A. (2017 revision of 2014)

**The Empirical Analysis of Liquidity**

*Foundations and Trends in Finance 8, No 4, 263-365, 2015, Kelley School of Business Research Paper No. 2014-09*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2402215*

Lee, R. (2002)

**The Future of Securities Exchanges**

*Brookings-Wharton Papers on Financial Services 2002, 1-33.*
*Available at:*
*http://www.oxfordfinancegroup.com/media/10341/lee%20future%20securities%20exchanges%202002.pdf*

Madhavan A., Porter D., Weaver D. (2005)

**Should Securities Markets Be Transparent?**

*Journal of Financial Markets 8 (2005) 266-288*
*Available at:*
*http://www.coba.unr.edu/faculty/liuc/files/RUC/topic_markettransparency/Madhavan_Porter_Weaver_2005.pdf*

Maxwell W. F., Bessembinder H. (2008)

**Transparency and the Corporate Bond Market**

*Journal of Economic Perspectives, 2008*
*Available at: https://ssrn.com/abstract=1082459*

O'Hara, M., Yao C., Ye, M. (2014)

**What's Not There: Odd Lots and Market Data**

*The Journal of Finance, Vol. 69, No. 5 (October 2014), pp. 2199-2236,*
*Available at: https://www.jstor.org/stable/43612955*

O'Hara, M., Ye, M. (2009)

**Is Market Fragmentation Harming Market Quality?**

*Journal of Financial Economics 100.3 (2011): 459-474.*
*Available at:*
*https://www.law.columbia.edu/sites/default/files/microsites/capitalmarkets/Market%20Fragmentation%20Paper.pdf*

Roseman B., Van Ness B. F., Van Ness R. A. (2018 revision of 2016)

**Odd-Lot Trading in U.S. Equities**

*Quarterly Review of Economics and Finance, Vol. 69, 2018*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2651975*

Seligman J. (2002)

**Rethinking Securities Markets: The SEC Advisory Committee on Market Information and the Future of the National Market System**

*The Business Lawyer, Vol. 57, No. 2 (February 2002), pp. 637-680 (44 pages)*
*Available at: https://www.jstor.org/stable/40688042*

Shkilko A. V. *, Van Ness B. F., and Van Ness R. A. (2008)

**Locked and Crossed Markets on NASDAQ and the NYSE**

*Journal of Financial Markets, Volume 11, Issue 3, August 2008, Pages 308-337*
*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=610584&download=yes*

Tivnan B.F., Dewhurst D.R., Van Oort C.M., Ring J.H. IV, Gray T.J., Tivnan B.F., et al. (2018)

**Fragmentation and inefficiencies in US equity markets: Evidence from the Dow 30**

*The Mitre Corporation (US not-for-profit)*
*Available at: https://arxiv.org/pdf/1902.04690.pdf*

Upson J., McInish T., Hardy Johnson IV, B. (2018)

**Orders versus Trades on the Consolidated Tape**

*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2625401*

Wah E. (2016)

**How Prevalent and Profitable are Latency Arbitrage Opportunities on U.S. Stock Exchanges?**

*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2729109*

## ACADEMIC LITERATURE - SPONSORED

Angel J. (2018)

**Retail investors get a sweet deal: The cost of a SIP of stock market data**

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*Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3268916*

Jones C.M. (2018)

**Understanding the Market for U.S. Equity Market Data**

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*Available at:*

*https://www0.gsb.columbia.edu/faculty/cjones/papers/2018.08.31%20US%20Equity%20Market%20Data%20Paper.pdf*

Macey J. R., O'Hara M. (1999)

**Regulating Exchanges and Alternative Trading Systems: A Law and Economics Perspective**

Financial support from Instinet (providers of a U.S. alternative trading system).

*Journal of Legal Studies, vol. XXVIII January 1999, University of Chicago*
*Available at: https://www.jstor.org/stable/10.1086/468045?seq=1*

# REGULATORY AND GOVERNMENT PAPERS


Alberta Securities Commission (1999)

**Discussion Paper: Consolidation Plan for a Consolidated Canadian Market**

*Available at: https://www.albertasecurities.com/-/media/ASC-Documents-part-1/Regulatory-Instruments/2018/10/Discussion-Paper.ashx*

Bank of Canada: Barker W., Pomeranets A. (2011)

**The Growth of High-Frequency Trading: Implications for Financial Stability**

*Bank of Canada, Financial System Review*
*Available at: https://www.bankofcanada.ca/wp-content/uploads/2011/12/fsr-0611-barker.pdf*

Bank of Canada: Garriott C., Pomeranets A., Slive J., Thorn T. (2013)

**Fragmentation in Canadian Equity Markets**

*Bank of Canada Review Autumn 2013, Financial Markets Department, Bank of Canada*
*Available at: https://www.bankofcanada.ca/wp-content/uploads/2013/11/boc-review-autumn13-garriott.pdf*

The Board of the International Organisation of Securities Commissions OICV-IOSCO (2013)

**Regulatory Issues Raised by Changes in Market Structure (Consultation Report)**

*CR03 March 2013*
*Available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD407.pdf*

The Board of The International Organization of Securities Commissions (2003)

**Objectives and Principles of Securities Regulation**

*Available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD154.pdf*

European Capital Markets Institute (ECMI): Karel L. (2007)

**ECMI Policy Brief: Financial Market Data and MiFID**

*Issue No 6, 30 March 2007*

*Available at: https://www.ceps.eu/ceps-publications/financial-market-data-and-mifid/*

European Securities and Markets Authority (ESMA) (2019)

**MiFID II/MiFIR Review Report No. 1 , On the development in prices for pre- and post-trade data and on the consolidated tape for equity instruments**

*ESMA70-156-1606, 5 December 2019*

*Available at: https://www.esma.europa.eu/sites/default/files/library/mifid_ii_mifir_review_report_no_1_on_prices_for_market_data_and_the_equity_ct.pdf*

Federal Reserve Board: Caglio C., Mayhew S. (2012)

**Equity Trading and the Allocation of Market Data Revenue**

*Available at: https://www.federalreserve.gov/pubs/feds/2012/201265/201265pap.pdf*

Financial Conduct Authority (UK): Aquilina M., Foley S., O'Neill P., Ruf T. (2016)

**Asymmetries in Dark Pool Reference Prices**

*Occasional Paper 21*
*Available at: https://www.fca.org.uk/publication/occasional-papers/occasional-paper-16.pdf*

Financial Conduct Authority (UK): Aquilina M. and Ysusi C. (2016)

**Are High-Frequency Traders Anticipating the Order Flow? Cross-Venue Evidence from the UK Market**

*Occasional Paper 16, Chief Economist's Department of the Financial Conduct Authority*
*Available at: https://www.fceligmana.org.uk/publication/occasional-papers/occasional-paper-16.pdf*

Ontario Securities Commission (2012)

**CSA Staff Consultation Paper 21-401: Real-Time Market Data Fees**

*Available at: https://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20121108_21-401_real-time-data-fees.htm*

U.S. Department of Treasury (2017)

**A Financial System That Creates Economic Opportunities – Capital Markets**

*Available at: https://www.treasury.gov/press-center/press-releases/Documents/A-Financial-System-Capital-Markets-FINAL-FINAL.pdf*

World Bank: Carson, J. (2011)

**Self-Regulation in Securities Markets**

*Policy Research Working Paper 5542, Financial and Private Sector Development, Global Capital Markets Department, Securities Market Group*
*Available at: https://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5542*

# INDUSTRY PARTICIPANT PAPERS

Aequitas Innovations Inc. (2015)

**Breaking the Virtual Canadian Market Data Monopoly**

*Available at: https://aequitasneo.com/documents/en/publications/market-data-position-paper.pdf*

Aite Group (2013)

**Market Fragmentation and Its Impact: A Historical Analysis of Market Structure Evolution in the United States, Europe, Australia, and Canada**

*Sponsored by BM&F Bovespa*
*Available at:*
*http://www.cvm.gov.br/export/sites/cvm/audiencias_publicas/ap_sdm/anexos/2013/sdm0513manifestacaoBMFBovespaAnexoII_09-08-2013.pdf*

Bank of Canada: Anderson L., Andrews E., Devani B, Mueller M., Walton A. (2018)

**Speed Segmentation on Exchanges: Competition for Slow Flow**

*Investment Industry Regulatory Organization of Canada and Financial Markets Department, Bank of Canada*

*Bank of Canada Staff Working Paper 2018-3*

*Available at: https://www.bankofcanada.ca/wp-content/uploads/2018/01/swp2018-3.pdf*

Copenhagen Economics (2018)

**Pricing of Market Data**

*Commissioned by the Danish and Swedish Security Dealers Associations*

*Available at: https://www.copenhageneconomics.com/publications/publication/pricing-of-market-data*

FIX Global (2019)

**Say Goodbye to the Order Protection Rule?**

*1st May 2019*

*Available at: https://www.fixglobal.com/home/say-goodbye-to-the-order-protection-rule/*

ICMA: Callaghan E. (2020)

**EU Consolidated Tape for Bond Markets. Final report for the European Commission**

*ICMA MiFID II Consolidated Tape Taskforce, International Capital Market Association. April 2020*

*Available at:*

*https://www.icmagroup.org/assets/documents/Regulatory/MiFID-Review/EU-Consolidated-Tape-for-Bond-Markets-Final-report-for-the-European-Commission-290420v2.pdf*

ICMA: Callaghan E. (2019)

**ICMA Quarterly Report Assessment of Market Practice and Regulatory Policy Secondary Markets; MiFID II/R: post-trade data**

*International Capital Market Association, 11 July 2019 Third Quarter. Issue 54. Pg 40 - 42*

*Available at:*

*https://www.icmagroup.org/assets/documents/Regulatory/Quarterly_Reports/ICMA-Quarterly-Report-Third-Quarter-2019-Final.pdf*

Oxera (2019)

**The Design of Equity Trading Markets in Europe – An Economic Analysis of Price Formation and Market Data Services**

*Sponsored by FESE*

*Available at:*
*https://fese.eu/app/uploads/2019/03/190321-The-design-of-equity-trading-markets-in-Europe-full-report.pdf*

Oxera (2014)

**Pricing of Market Data Services, An Economic Analysis**

*Available at: https://www.oxera.com/publications/pricing-of-market-data-services-an-economic-analysis/*

Securities Litigation & Consulting Group Inc. (SLCG) (2011)

**An Economic Study of Securities Market Data Pricing by Canadian Trading Venues**

*Commissioned by Investment Industry Association of Canada (IIAC)*
*Available at:*
*https://iiac.ca/wp-content/themes/IIAC/resources/1580/original/SLCG-Canadian-Market-DataJune%207.pdf*

Securities Litigation & Consulting Group Inc. (SLCG) (2008)

**An Economic Study of Securities Market Data Pricing by the Exchanges**

*Sponsored by the Securities Industry and Financial Markets Association (SIFMA)*
*Available at:*
*https://www.sifma.org/wp-content/uploads/2017/05/an-economic-study-of-securities-market-data-pricing-by-the-exchanges.pdf*

# REFERENCES


1 https://ec.europa.eu/info/business-economy-euro/growth-and-investment/capital-markets-union_en

2 Directive 2014/65/EU

3 Regulation (EU) No 600/2014

4 MiFID II Article (4)(1)(53) means a person authorised under the directive to provide the service of collecting trade reports for financial instruments listed in Articles 6, 7, 10.

5 MiFIR Recitals 117 and 118.

6 MiFIR II Recital 117

7 Regulation (EU) No 596/2014

8 Regulation (EU) 2019/876 and Regulation (EU) No 648/2012

9 Regulation (EU) No 648/2012. Commission Delegated Regulation (EU) 216/2251 is a Regulatory Technical Standard (RTS) that establishes prescriptive requirements regarding the Risk Mitigation techniques referred to in Article 11 of EMIR.

10 See Appendix 1: European Market Capitalisation; A.1. The Share of Value (Market Capitalization) of Equities in EU Countries".

11 MiFID II Article 4 (1). QIF in this document refers specifically to an EU MIFID II qualifying investment firm.

12 MiFID II Article 4 (1) (20)

13 Directive 2014/65/EU, Article 4(1)(63)

14 MiFID II/MiFIR Review Report No. 1 On the development in prices for pre- and post-trade data and on the consolidated tape for equity instruments, ESMA, Dec 2019.

15 A crossed market occurs when a market's bid price exceeds its ask price.

16 https://www.ctaplan.com/publicdocs/CTAPLAN_Population_Metrics_4Q2019.pdf

17 https://www.fca.org.uk/news/press-releases/state-street-uk-fined-%C2%A3229m-financial-conduct-authority-transitions-management

18 United States District Court, Southern District of New York. Case 1:20-cv-03154 Document 1 Filed 04/21/20 Page 1 of 81 ISABEL LITOVICH, on Behalf of Herself and All Others Similarly Situated,

19 https://citywire.co.uk/investment-trust-insider/news/revealed-woodford-investors-forecast-to-lose-33-in-wind-up/a1293136

20 Refinitiv, ETF.com, Cetfa.

21 RTS 13, MiFID II Articles 61(4), 64(6),(8), 65(6), (8), and 66(5).

22 https://www.esma.europa.eu/data-systematic-internaliser-calculations

23 According to Article 4(1)(20) of Directive 2014/65/EU (MiFID II) investment firms dealing on own account when executing client orders over the counter (OTC) on an organised, frequent, systematic and substantial basis are subject to the mandatory systematic internaliser (SI) regime.

24 ECMI Policy Brief (2007), "*Financial Market Data and MiFID*".

25 ICMA (2020), "*EU Consolidated Tape for Bond Markets. Final report for the European Commission*"

26 ESMA (2019), "*MiFID II/MiFIR Review Report No. 1 – On the development in prices for pre- and post-trade data and on the consolidated tape for equity instruments*"

27 IOSCO Board (2003), "*Objectives and Principles of Securities Regulation*", Section 7.2, p12.

28 World Bank: Carson, J. (2011), "*Self-Regulation in Securities Markets*"

29 Ibid.

30 Ibid.

31 Boulatov A., Dierker M. (2007), "*Pricing Prices*".

32 Colby R.L.D., Sirri E.R. (2010), "*Consolidation and competition in the US equity markets*"

33 *Ibid.*

34 *Ibid.*

35 Lee, R. (2002), "*The Future of Securities Exchanges*"

36 Colby R.L.D., Sirri E.R. (2010), "*Consolidation and competition in the US equity markets*"

37 ESMA (2019), "*MiFID II/MiFIR Review Report No. 1. On the development in prices for pre- and post-trade data and on the consolidated tape for equity instruments*"

38 Copenhagen Economics (2018), "*Pricing of Market Data*"

39 Angel J. (1998), "*Retail investors get a sweet deal: The cost of a SIP of stock market data*"; Boulatov A., Dierker M. (2007), "*Pricing Prices*"

40 Jones C.M. (2018), "*Understanding the Market for U.S. Equity Market Data*"

41 Oxera for FESE (2019), "*The Design Of Equity Trading Markets In Europe – An Economic Analysis Of Price Formation And Market Data Services*"

42 Bank of Canada: Garriott C., Pomeranets A., Slive J., Thorn T (2013), "*Fragmentation in Canadian Equity Markets*"

43 Aequitas Innovations Inc. (2015), "*Breaking the Virtual Canadian Market Data Monopoly*"

44 Ontario Securities Commission (2012), "*CSA Staff Consultation Paper 21-401: Real-Time Market Data Fees*"

45 Easley D., O'Hara M., Yang L. (2016 revision of 2013), "*Differential Access to Price Information in Financial Markets*"

46 Tivnan B.F., Dewhurst D.R., Van Oort C.M., Ring J.H. IV, Gray T.J., Tivnan B.F., et al. (2018), "*Fragmentation and inefficiencies in US equity markets: Evidence from the Dow 30*"

47 Lee, R. (2002), "*The Future of Securities Exchanges*"

48 FCA (UK): Aquilina M., Foley S., O'Neill P., Ruf T. (2016), "*Asymmetries in Dark Pool Reference Prices*"

49 Tivnan B.F., Dewhurst D.R., Van Oort C.M., Ring J.H. IV, Gray T.J., Tivnan B.F., et al. (2018), "*Fragmentation and inefficiencies in US equity markets: Evidence from the Dow 30*"

50 Holden C. W., Jacobsen S. E., Subrahmanyam A. (2017 revision of 2014), "*The Empirical Analysis of Liquidity*"

51 Hasbrouck J. (2018), "*Price Discovery in High Resolution*"

52 FCA (UK): Aquilina M., Foley S., O'Neill P., Ruf T. (2016), "*Asymmetries in Dark Pool Reference Prices*"

53 File No. 4-729: SIFMA Comment Letter on Improvements to the Market Data Structure, Sept 18, 2019

54 Notice of Proposed Order Directing the Exchanges and FINRA to Submit a New National Market System Plan Regarding Consolidated Equity Market Data (File No. 4-757), Feb 5 2020

55 A crossed market occurs when a market's bid price exceeds its ask price.

56 Federal Reserve Board: Caglio C., Mayhew S. (2012), "*Equity Trading and the Allocation of Market Data Revenue*"

57 FIX Global (2019), "*Say Goodbye to the Order Protection Rule?*"

58 https://www.nasdaq.com/articles/what-does-totalmarkets-do-market-structure-debate-2019-05-02

59 IOSCO Board (2013), "*Regulatory Issues Raised by Changes in Market Structure Consultation Report*"

60 SEC Release No. 34-87295 October 2019 (https://www.sec.gov/rules/sro/cboeedgx/2019/34-87295.pdf)

61 https://www.sec.gov/marketstructure/datavis/ma_stocks_oddlotvolume.html#.XqlapmRKhsM

62 Upson J., McInish T., Hardy Johnson IV, B. (2018), "*Orders verses Trades on the Consolidated Tape*"

63 Case 1:20-cv-03154. Document 1, Filed 04/21/20, Page 1 of 81, United States District Court, Southern District of New York

64 79 Fed. Reg. 5536, Pub. L. 111-203, July 21, 2010, section 619, codified at 12 U.S.C. § 1851

65 Aite Group for BM&F Bovespa (2013), "*Market Fragmentation and Its Impact: a Historical Analysis of Market Structure Evolution in the United States, Europe, Australia, and Canada*"

66 Bessembinder H., Maxwell W., Venkataraman K. (2006), "*Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds*"; Edwards, A. Harris L., Piwowar M.S. (2007), "*Corporate Bond Market Transaction Costs and Transparency Costs*"

67 IOSCO (2017), "*Examination of Liquidity in the Corporate Bond Market*"

68 Maxwell W.F., Bessembinder H. (2008), "*Transparency and the Corporate Bond Market*"

69 MiFIR Article 23(1)

70 https://www.fca.org.uk/news/statements/fca-update-share-trading-obligations

71 REGULATION (EU) 2019/2175 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2019 amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority), Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority), Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority), Regulation (EU) No 600/2014 on markets in financial instruments, Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds, and Regulation (EU) 2015/847 on information accompanying transfers of funds.

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FINAL REPORT

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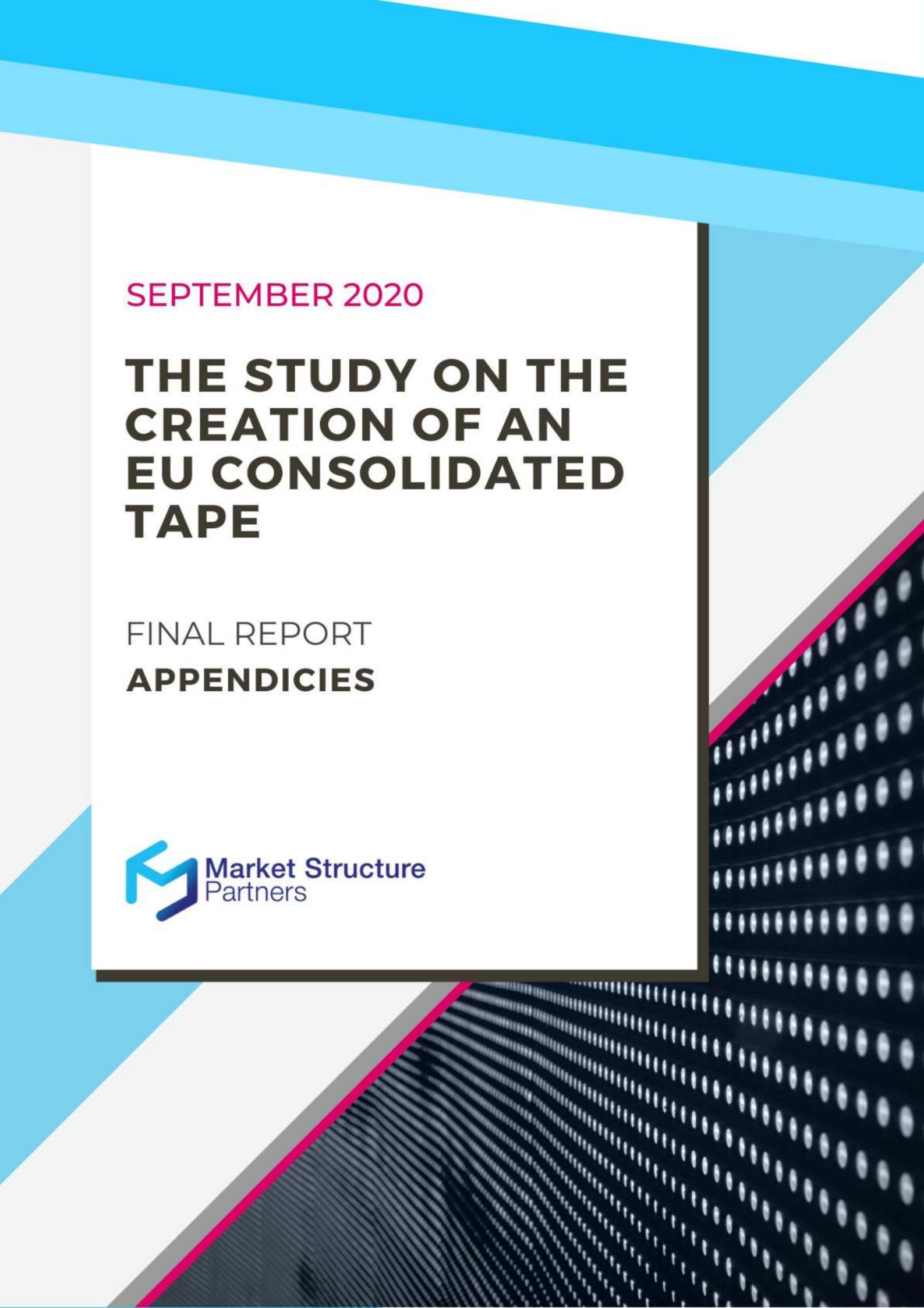

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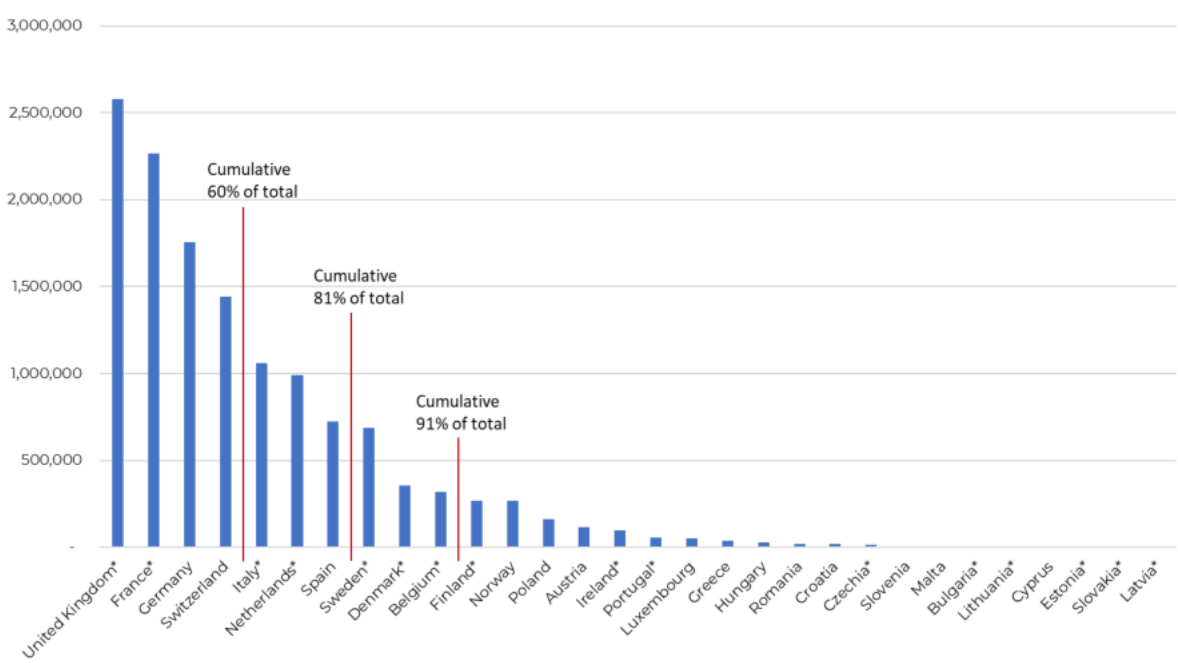
# A1 / EUROPEAN MARKET CAPITALISATION

## A1.1. THE SHARE OF VALUE (MARKET CAPITALISATION) OF EQUITIES IN EU COUNTRIES

Figure A: European Equity Market Capitalisation ($m average 09/2018 - 09/2019).




Source : World Federation of Exchanges
* denotes countries which are part of larger stock exchange groups (LSE, Euronext, Nasdaq OMX) and secondary data from CEIC was used to assign shares to the countries

# A2 / STUDY APPROACH AND METHODOLOGY

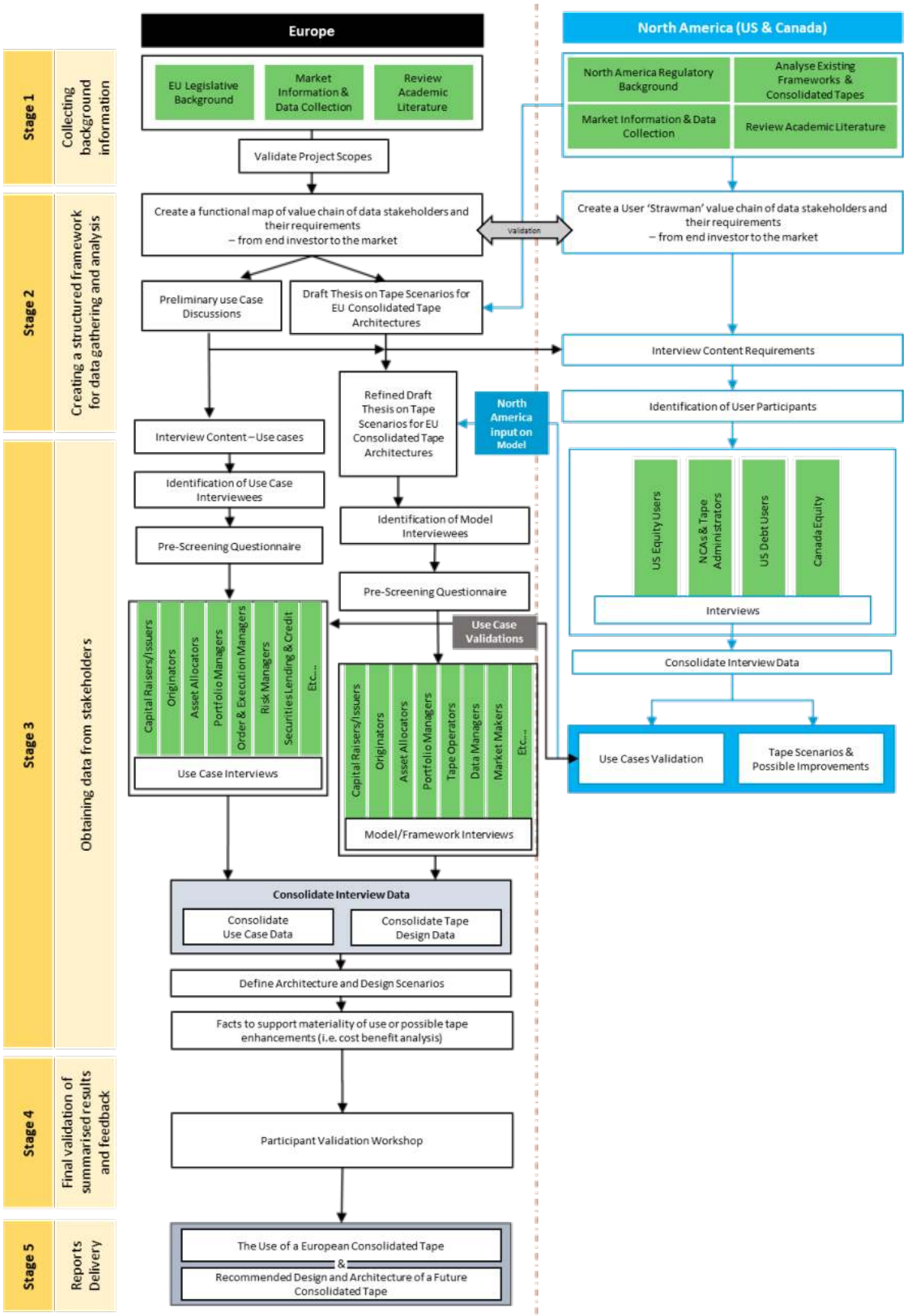
## A2.1. APPROACH

There were four high-level steps to the overall project approach.

1. **Collecting background information about Europe and North American market structure in relation to data aggregation:**
    - Desk research was undertaken to fully understand the current issues and to consider academic and industry research on consolidated data.
2. **Creating a structured framework for data gathering and analysis from a cross-section of data stakeholders:**
    - The stakeholder map discussed in Chapter 1 was created and used throughout the study as a guide to ensure adequate interview coverage of functional areas and types of users.
3. **Identifying, screening and obtaining data from stakeholders in Europe and North America:**
    - MSP ensured the interviews included a broad range of stakeholders and geographical coverage both within Europe for the European research and in North America for the North American research.
    - A screening questionnaire, explanation of the study objectives and the stakeholder map was sent to participants in advance of interviews for screening purposes and to prepare the interviewee in advance. One-on-one interviews were conducted, the majority were face to face and the remainder by telephone.
4. **Defining and validating recommendations:**
    - Recommendations were drawn from use case interviews and findings from desk and field research conclusions. MSP engaged with industry user groups and presented the use case findings and possible solutions for further validation at both the bond and the equity sessions at the Alpha Forum Conference for asset management traders in Europe in February 2020.
    - Prior to finalising recommendations, MSP held a validation workshop with 45 participants from a cross-section of stakeholders across the industry, some of whom had previously been interviewed.

These resulted in Stage 5, the output of the report. Figure B below illustrates the full process MSP undertook for this project.

Figure B: Schematic of the Approach.



# A3 / DATA STAKEHOLDER DESCRIPTIONS

| Stakeholder Type | Use Case Grouping | Estimated Number Entities (Europe inc. UK) where known | Stakeholder | Description of Stakeholder Function |
|---|---|---|---|---|
| **ISSUERS** | Issuers | 40 (est.) | Government Issuers | Governments issue sovereign guaranteed bonds with an explicit government guarantee or support from the sovereign, principal or state governments. |
| | | | Supranational Issuers | Multiple governments can combine to issue supranational bonds to promote economic development for the member countries. |
| | | | Agency Issuers | An agency bond is a bond issued by a government agency but not fully guaranteed in the same way as sovereign bonds |
| | | 9321 (WFE) | Corporate Issuers | Corporates can issue both debt and equity instruments to raise capital. |
| | | - | Originators / Advisors | Entities issuing debt and equity instruments engage 3rd parties to advise on and manage the process. This includes managing the placement |
| | | 69 (ETFGI) | Fund/ETF Issuers | The fund manager or financial company that creates and administers a fund or exchange-traded fund |
| **END INVESTORS** | End Investors | 15,500,000 | Retail Customers | These are individual investors who invest directly in the market or via a financial intermediary. |
| **FINANCIAL INTERMEDIARIES** | Buy-Side | 4,366 (ESMA) | Asset Managers & Portfolio Managers | Asset management manages an individual's or institution's assets to try to help them appreciate over time and to mitigate risk. Using an asset manager allows investors to pool their financial assets with others and spread it more widely than they would be able to do on their own, in a cost-efficient way. |
| | | | OEICs/SICAVs (inc. ManCos and Fund Administrators) | These are open-ended collective investment funds. They buy and sell the underlying assets to create units that are in turn acquired/redeemed by end investors. Their responsibilities include setting up the fund, ensuring that it is managed in line with its objectives, processing and valuing its assets and managing its unit holders (purchases, sales, dividends, etc). |
| | | - | Insurance Companies | Insurance companies pool client risks to make it more affordable for an insured person or entity to hedge themselves against risk. These companies collect significant financial assets which may or may not be called upon. This money is invested in stocks, bonds and other interest-bearing accounts so that it can appreciate and be used to pay claims and fund operating and administrational costs. |
| | | - | Pension Funds | These are responsible for arrangements for managing the fund's investments, including ensuring that its objectives are met. This includes strategic asset allocation and appointing and monitoring the performance of its fund managers |

| Stakeholder Type | Use Case Grouping | Estimated Number Entities (Europe inc. UK) where known | Stakeholder | Description of Stakeholder Function |
|---|---|---|---|---|
| | | - | Endowment Funds | Endowment funds result from a donation of financial assets to a non-profit organisation. The fund uses the resulting investment income for a specific purpose and is usually established in perpetuity. |
| | | - | Wealth Managers | Wealth managers a comprehensive set of services to their clients which includes investment management and financial planning, as well as accounting and tax services, retirement planning, estate planning and more. |
| | Sell-Side | 10,576 (ESMA) | Investment Banks (inc. SIs) | Investment banks undertake various services, usually for institutional clients with large and complex transactions. They provide financial advice, offer underwriting, provide research and act as the intermediary between issuers and investors in primary and secondary markets. They may also risk capital to facilitate client transactions and offer clearing and custodial services. |
| | | | Commercial / Retail Banks | Commercial banks offer services such as deposits, account services, loans and basic financial products to individuals and small businesses. They may offer trading services to their end customers. |
| | | | Development Banks | Development banks are national or regional financial institutions with the specific objective of providing medium to long-term capital for productive investment in their target region which is often accompanied by technical assistance. |
| | | | Institutional Agency Brokers | Agency brokers act in the best interest of their clients. Institutional agency brokers face large institutions that trade in significant-sized transactions. |
| | | | Inter-dealer Brokers | Inter-deal brokers tend to exist in markets where there is no formal exchange or trading venue. They act as an intermediary to facilitate trading between investment banks, broker-dealers and other large financial institutions. |
| | | | Retail Aggregating Brokers | Brokers that aggregate wholesale orders from retail agency brokers and then provide market-facing execution services, as well as other services such as custody. |
| | | | Retail Agency Brokers | Agency retail brokers act in the best interest of their clients. Retail agency brokers face individual clients that trade in small-sized transactions. |
| | | | Proprietary Traders (inc. SIs) | Firms that trade on their own account to make profits from price differences or movements. Systematic Internalisers (SIs) are proprietary trading firms that execute client orders away from trading venues on a frequent and systematic basis. |
| | Trading Venues | 136 (ESMA) | Regulated Markets (RM) | A multilateral system that is operated or managed by a market operator and that brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments within the system. |

| Stakeholder Type | Use Case Grouping | Estimated Number Entities (Europe inc. UK) where known | Stakeholder | Description of Stakeholder Function |
|---|---|---|---|---|
| | | 220 (ESMA) | Multilateral Trading Facilities (MTFs) | A multilateral system, operated by an investment firm or a market operator, which brings together multiple third-party buying and selling interests in financial instruments – in the system and in accordance with non-discretionary rules – in a way that results in a contract. |
| | | 74 (ESMA) | OTFs (Organised Trading Facility) | Any facility or system designed to bring together buying and selling interests or orders related to financial instruments. OTFs were introduced by the European Commission as part of MiFID II and are focused on non-equities such as derivatives and cash bond markets. |
| **CUSTODIANS/ THIRD PARTY RISK MANAGERS** | Post-Trade | 20 (est.) | Custodian Banks | A financial institution that holds customers' securities for safekeeping to minimize the risk of their theft or loss. A custodian holds securities and other assets in electronic or physical form. |
| | | 15 (ESMA) | CCPs (Central Counterparty) | A financial institution that takes on counterparty credit risk between parties to a transaction. |
| | | - | Clearers | Firms that carry out settlement activity outside central securities depositories (CSDs) on behalf of their clients. |
| | | 30 (ECSDA) | CSDs/ICSDs (Central Securities Depository / International Central Securities Depository) | A financial organisation that specialises in holding securities. A CSD organisation may be for a specific type of security, such as government bonds. These securities are either certificated or uncertificated in form so that ownership can be easily transferred electronically without the need for physical certificates. An international CSD settles trades in international securities such as Eurobonds in addition to some domestic securities. |
| **REGULATORS** | Regulators | 57 (FCA) | Regulators | The entities with statutory responsibility for maintaining confidence in the financial system, contributing to the protection and enhancement of stability of the financial system and securing the appropriate degree of protection for consumers. |
| **DATA ANALYTICS & BENCHMARK PROVIDERS** | Data Analytics & Benchmark Providers | - | Benchmark Providers | Specialist firms that provide benchmarks against which to measure investment performance. |
| | | - | Data Analytics Providers | Firms that enrich or add value to market data. |
| **OTHER** | Other | - | Research Providers | Firms that provide investment research. |
| | | - | Chartered Financial Planners | Accredited professionals providing retail investors with financial planning advice. |
| | | - | Independent Financial Advisors | Professionals offering independent financial advice to their clients and recommending suitable financial products from the whole of the market. |
| | | - | Software providers | Firms providing software solutions including Order Management Systems (OMS) Execution Management Systems (EMS) and risk tools. |

# A4 / NUMBER OF STAKEHOLDERS CALCULATION METHODOLOGY

<table>
<tr><th>Stakeholder Entity Type</th><th>Estimated Number Entities (Europe inc. UK) where known</th><th>Source</th><th>Description of Methodology</th></tr>
<tr><td colspan="4">Issuers</td></tr>
<tr><td>Government Issuers</td><td rowspan="3">40</td><td rowspan="3">Estimate</td><td rowspan="3">Governments + European agencies</td></tr>
<tr><td>Supranational Issuers</td></tr>
<tr><td>Agency Issuers</td></tr>
<tr><td>Corporate Issuers</td><td>9,321</td><td>World Federation of Exchanges (WFE)</td><td>Number of domestic listed companies on European exchanges. 1,521 foreign listed companies excluded to avoid the risk of double counting. Per the WFE definition, "A company with several classes of shares is counted just once. Only companies admitted to listing are included."</td></tr>
<tr><td>Issuers of Funds including ETFs</td><td>69</td><td>ETFGI</td><td>https://etfgi.com/news/press-releases/2019/11/etfgi-reports-assets-invested-etfs-and-etps-listed-europe-reached<br>ETF issuer numbers only – funds issuers included in 4,366 Buy-Side as part of 1,506 UCITS.</td></tr>
<tr><td colspan="4">End Investors</td></tr>
<tr><td>Direct Retail Customers</td><td>15,500,000</td><td>ECB + HMRC</td><td>
<table>
<tr><th>Population</th><th>Estimate</th><th>Source</th></tr>
<tr><td>Countries using the Euro plus Hungary and Poland<br>(Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia and Spain.)</td><td>144 million households, % households owning<br>• Bonds – 4.6%<br>• Shares – 8.8%<br>• Mutual funds – 9.4%<br>Assume all bondholders are also shareholders; 8.8% x 144 million = 12.7m<br>Assume one holder per household.</td><td>ECB paper 2016 –<br>https://www.ecb.europa.eu/pub/pdf/scpsps/ecbsp18.en.pdf?d2911394a25c444cd8d3db4b77e8891a<br>• Page 7 footnote 7: 144.4m households in Euro area countries plus Ireland, excluding Hungary and Poland.<br>• Page 27 2.3.2: Mutual funds, publicly traded shares and bonds.</td></tr>
<tr><td>UK</td><td>2.8 million people subscribed to an Adult Stocks & Shares ISA account in 2017/18</td><td>HMRC statistics 2019 -<br>https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/797786/Full_ISA_Statistics_Release_April_2019.pdf<br>• Page 21, table 9.4</td></tr>
<tr><td>Other (Bulgaria, Croatia, Czech Republic, Denmark, Romania, Sweden)</td><td>No estimate</td><td></td></tr>
<tr><td>Total</td><td>15.5 million</td><td></td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="4">Financial Intermediaries</th></tr>
<tr>
<td>Asset Managers & Portfolio Managers</td>
<td rowspan="5">4,366<br>(= 2860 AIFM + 1506 UCITS)</td>
<td rowspan="5">ESMA*</td>
<td rowspan="5">
The initial data source was the ESMA MiFID/UCITS/AIFMD Entities Register as at 15 Jan 2020 (https://registers.esma.europa.eu/publication/searchRegister?core=esma_registers_upreg). This includes both potential supplier and user entities.
<table>
<tr><td>Potential Supplier (Data Producer) Types</td><td>• Regulated Markets (RMs)<br>• Multilateral Trading Facilities (MTFs)<br>• Organised Trading Facilities (OTFs)<br>• Approved Publication Arrangements (APAs)<br>It also includes Approved Reporting Mechanisms (ARMs). These are outside the scope of this review.</td></tr>
<tr><td>Potential User (Data Consumer) Firm Types</td><td>• UCITS Management Company<br>• Alternative Investment FM (AIFM)<br>• Investment Firm (IF)<br>• Systematic Internaliser (SI)</td></tr>
</table>
It covers the following 31 countries:<br>
AUSTRIA, BELGIUM, BULGARIA, CROATIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ICELAND, IRELAND, ITALY, LATVIA, LIECHTENSTEIN, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, NORWAY, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM<br>
There is no unique entity identifier. Two possible approaches were identified for counting firms using the flags provided by the ESMA register.
<table>
<tr><th>Approach</th><th>Notes</th></tr>
<tr><td>Firm = Entity Name</td><td>Entity names are not unique and the value is not used consistently. For example, BlackRock Investment Management (UK) Limited, is also recorded as BlackRock Investment Management (UK) Ltd and BlackRock Investment Management (UK) Limited and with some branches adding branch information to the entity name.<br>There is a Head Office / Branch flag, but this is not sufficient to be able to use the entity name to provide a consistent value.<br>Grouping by entity name will understate the number of firms impacted. There are 13,570 different entity names with at least one AIFM/UCITS/IF/SI registration. Grouping by id expands this to 14,942 (an increase of 10%) to include the 962 ids where the same entity name has more than one type of registration and/or more than one instance of the same registration.</td></tr>
<tr><td>Firm = Unique ID</td><td>The field ‘ae_dbid’ gives a unique id. However, this is unique at the permissions level. For example, Tiedemann Independent A/S has AIFM, UCITS and Investment Firm registrations. These each have different id codes. Another example is Oberbank AG which has both Investment Firm and SI registrations.<br>Grouping by id will overstate the number of firms impacted. There are 13,570 different entity names with at least one AIFM/UCITS/IF/SI registration. Grouping by id expands this to 14,942 (an increase of 10%) to include the 962 ids where the same entity name has more than one type of registration and/or more than one instance of the same registration.</td></tr>
</table>
</td>
</tr>
<tr><td>OEICs/SICAVs (inc. ManCos and Fund Administrators)</td></tr>
<tr><td>Insurance Companies</td></tr>
<tr><td>Pension Funds</td></tr>
<tr><td>Endowment Funds</td></tr>
</table>

| | | |
|---|---|---|
| **Wealth Managers** | | |
| **Investment Banks (inc. SIs)** | 10,576<br>(= 10,356 IF + 220 SI) | ESMA* |
| **Commercial / Retail Banks** | | |
| **Development Banks** | | |
| **Institutional Agency Brokers** | | |
| **Inter-dealer Brokers** | | |

Based on this, the number of potential user (data consumer) firms is shown in the table below. We have included branches because we have assumed that they are all subsidiaries and therefore should be considered separately for the purposes of the consolidated tape. As noted above, branches may be included under the head office entity name or a separate entity name.

| Country | AIFM | UCITS | Investment firm | SI | Number of entities (Entity Name) | Number of registrations (dbid) |
|---|---|---|---|---|---|---|
| AUSTRIA | 23 | 16 | 607 | 8 | 629 | 654 |
| BELGIUM | 13 | 11 | 43 | 4 | 59 | 71 |
| BULGARIA | 11 | 31 | 56 | | 96 | 98 |
| CROATIA | 11 | 15 | 22 | | 42 | 48 |
| CYPRUS | 26 | 1 | 206 | 4 | 233 | 237 |
| CZECH REPUBLIC | 36 | 8 | 41 | 4 | 76 | 89 |
| DENMARK | 32 | 11 | 175 | 10 | 198 | 228 |
| ESTONIA | 3 | 7 | 13 | | 22 | 23 |
| FINLAND | 36 | 4 | 257 | 3 | 297 | 300 |
| FRANCE | 483 | 323 | 332 | 16 | 946 | 1,154 |
| GERMANY | 139 | 48 | 2,438 | 38 | 2,500 | 2,663 |
| GREECE | 17 | 14 | 53 | 2 | 83 | 86 |
| HUNGARY | 83 | 32 | 39 | 7 | 132 | 161 |
| ICELAND | | 10 | | | 10 | 10 |
| IRELAND | 117 | 115 | 169 | 9 | 329 | 410 |
| ITALY | 95 | 48 | 504 | 13 | 626 | 660 |
| LATVIA | 7 | 11 | 19 | 1 | 36 | 38 |
| LIECHTENSTEIN | 17 | 12 | 110 | 3 | 129 | 142 |
| LITHUANIA | 4 | 11 | 12 | | 27 | 27 |
| LUXEMBOURG | 302 | 267 | 151 | 2 | 528 | 722 |
| MALTA | 53 | 20 | 105 | | 162 | 178 |
| NETHERLANDS | 95 | 15 | 289 | 8 | 379 | 407 |
| NORWAY | 41 | 34 | 112 | 3 | 172 | 190 |
| POLAND | 60 | 61 | 56 | 7 | 130 | 184 |
| PORTUGAL | 18 | 19 | 66 | | 85 | 103 |
| ROMANIA | 16 | 18 | 45 | 1 | 72 | 80 |
| SLOVAKIA | 9 | 6 | 28 | | 38 | 43 |
| SLOVENIA | 1 | 5 | 11 | | 17 | 17 |
| SPAIN | 286 | 122 | 363 | 5 | 665 | 776 |
| SWEDEN | 97 | 46 | 147 | 4 | 259 | 294 |
| UNITED KINGDOM | 729 | 165 | 3,887 | 68 | 4,593 | 4,849 |
| **Grand Total** | **2,860** | **1,506** | **10,356** | **220** | **13,570** | **14,942** |

| Country | RM | MTF | OTF | APA | Number of entities (Entity Name) | Number of registrations (dbid) = MICs (ae_micLeiEsmaId) |
|---|---|---|---|---|---|---|
| AUSTRIA | 1 | 1 | | 1 | 1 | 3 |
| BELGIUM | 2 | 8 | | | 10 | 10 |
| BULGARIA | 3 | 3 | | 1 | 5 | 7 |
| CROATIA | 1 | 1 | | 1 | 1 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Retail Aggregating Brokers** | | | CYPRUS | 1 | 1 | | | 2 | 2 |
| | | | CZECH REPUBLIC | 2 | 3 | 1 | | 3 | 6 |
| | | | DENMARK | 3 | 4 | | | 7 | 7 |
| | | | ESTONIA | 1 | 1 | | | 2 | 2 |
| | | | FINLAND | 3 | 4 | | | 7 | 7 |
| | | | FRANCE | 3 | 9 | 10 | 1 | 20 | 23 |
| | | | GERMANY | 20 | 23 | 3 | 1 | 43 | 47 |
| | | | GREECE | 3 | 1 | | 1 | 2 | 5 |
| **Retail Agency Brokers** | | | HUNGARY | 2 | 3 | | 1 | 6 | 6 |
| | | | ICELAND | 3 | 3 | | | 1 | 6 |
| | | | IRELAND | 1 | 11 | 1 | | 13 | 13 |
| | | | ITALY | 6 | 13 | | | 19 | 19 |
| | | | LATVIA | 1 | 1 | | | 2 | 2 |
| | | | LIECHTENSTEIN | | | | | 0 | 0 |
| **Proprietary Traders (inc. SIs)** | | | LITHUANIA | 1 | | | | 1 | 1 |
| | | | LUXEMBOURG | 1 | 1 | | | 2 | 2 |
| | | | MALTA | 2 | 1 | | | 3 | 3 |
| | | | NETHERLANDS | 11 | 23 | 6 | 6 | 22 | 46 |
| | | | NORWAY | 5 | 2 | | 1 | 8 | 8 |
| | | | POLAND | 10 | 4 | | | 3 | 14 |
| | | | PORTUGAL | 3 | 2 | | | 5 | 5 |
| | | | ROMANIA | 1 | 1 | | | 1 | 2 |
| | | | SLOVAKIA | 1 | | | | 1 | 1 |
| | | | SLOVENIA | 1 | 1 | | | 2 | 2 |
| **Originators / Advisors** | | | SPAIN | 12 | 5 | 4 | 1 | 15 | 22 |
| | | | SWEDEN | 17 | 9 | | 1 | 26 | 27 |
| | | | UNITED KINGDOM | 15 | 81 | 49 | 6 | 151 | 151 |
| | | | **Grand Total** | 136 | 220 | 74 | 22 | 384 | 452 |

The following adjustments and assumptions were made to the downloaded data to identify the data producer and data consumer populations shown in the tables above. The proof in the table below is at the permission level, not the entity level.

| **Adjustment/ assumption** | **Description** | **No. records impacted** | **Balance** |
|---|---|---|---|
| Initial download | Total number of records (permission level, maybe >1 per firm) | - | 17786 |
| Remove inactive | Ae_status = inactive | - 2364 | 15422 |
| Remove ARM permissions | 28 firms have ARM permissions.<br>N.B. Of these, 7 only have ARM permissions (the others have IF/ SI/ RM/ APA permissions, so the firm remains in-scope for these other activities). | - 28 | 15394 |
| Data producer permission registrations – firms that only produce data | • Regulated Market (RM)<br>• Multilateral Trading Facility (MTF)<br>• Organised Trading Facility (OTF)<br>• Approved Publication Arrangement (APA) | - | 411 |

| | | |
|---|---|---|
| **Regulated Markets (RIE)** | 136 | ESMA* |
| **MTFs (Multilateral Trading Facility)** | 220 | |

| | | | |
|---|---|---|---|
| **OTFs (Organised Trading Facility)** | 74 | | Data producer permission registrations – firms that produce and use data: Producer registrations for firms with both IF permissions and RM/ MTF/ OTF/ APA permissions (this is only the RM/ MTF/ OTF/ APA count) – - – 41<br>**subtotal** – **452**<br>Data user permissions: • UCITS • IF – - – 14942<br>**total** – **15394** |
| **Custodians/Third-Party Risk Managers** | | | |
| **Custodian Banks** | 20 (est.) | 20 (est.) | 20 (est.) |
| **CCPs (Central Counterparty)** | 15 (ESMA) | 15 (ESMA) | 15 (ESMA) https://www.esma.europa.eu/sites/default/files/library/ccps_authorised_under_emir.pdf. LME excluded as not in scope for consolidated tape instruments. |
| **3rd Party Clearers (GCMs)** | - | n/a | n/a |
| **CSDs/ICSDs (Central Securities Depository / International Central Securities Depository)** | 30 | ECSDA | https://ecsda.eu/members-2/list-of-members<br>ECSDA full members |
| **Regulators** | | | |
| **Regulators** | 57 | ESMA + FCA | ESMA + 56 regulators as sourced from https://www.fca.org.uk/firms/passporting/regulators-eu-eea |
| **Data Analytics & Benchmark Providers** | | | |
| **Benchmark Providers** | - | n/a | n/a |
| **Data Analytics Providers** | - | n/a | n/a |
| **Other** | | | |
| **Research Providers** | - | n/a | n/a |
| **Chartered Financial Planners** | - | n/a | n/a |
| **Independent Financial Advisors** | - | n/a | n/a |
| **Software providers** | - | n/a | n/a |

* *ESMA's classification of stakeholders does not map one for one with the stakeholders identified for this study but the total number is believed to be a reasonable representation of all the entities. However, insurance companies, pension funds and endowment funds may or may not be operated by ESMA regulated entities, which may or may not be included in these numbers.*

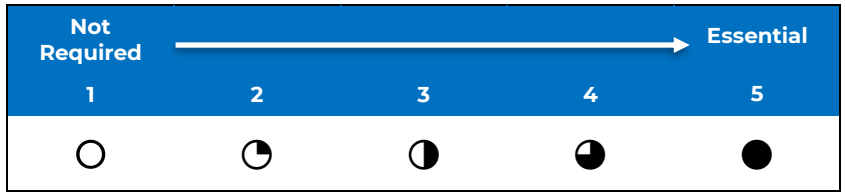
# A5 / MARKET, MODELS, SYSTEMS AND PROTOCOLS

| Tradeable Instrument | Venue Type | Market Model | Trading System/Protocol |
|---|---|---|---|
| **Equities, ETFs** | RM, MTF | On central limit order book (CLOB), on-venue | Continuous auction |
| | | | Periodic auction |
| | | Off central limit order book, on-venue or off-order book and off-venue | Open Outcry<br>RFQ (Request for Quote)<br>IOI (Indication of Interest) |
| | SI | | |
| | Investment Firms | OTC (Over-the-Counter) | Voice/OTC |
| **Corporate and Government Bonds** | RM, MTF, OTF | On-order book, On-venue | Continuous auction |
| | | | Periodic auction |
| | | Off-order book, on-venue or off-order book and off-venue | Open outcry<br>RFQ<br>Request to Stream<br>Click to Trade<br>Request for Market<br>Request for Spread |
| | SI | | |
| | Investment Firms | OTC | Voice/OTC |

# A6 / USE CASES

The following table describes the different functions and the underlying use cases for consolidated data within each function that data stakeholders described in their interviews. It also shows the different requirements for each use case and asset class. it is assumed that data analytics firms and vendors would use or distribute data to support these different functions for their customers.

**Key:**




| Level of Requirement Definitions: | |
|---|---|
| **EQ Orderbook RT** | Real-time pre-trade order book event data (including 5 levels of depth, auction imbalance data and session administration information). |
| **EQ Trades RT** | Real-time post-trade data – prices and volumes. To be delivered in milliseconds. |
| **EQ EOD** | End-of-Day prices and volumes or session statistics depending on the market model. |
| **EQ Ord & Trades, Hist** | Stored pre- and post-trade data with tick by tick data for analysis. |
| **Bonds Trades RT** | Real-time post-trade data – prices and volumes. To be delivered within 5 minutes. |
| **Bonds EOD** | End-of-day day prices and volumes or session statistics depending on the market model. |
| **Bonds Trades Hist** | Stored post-trade data available for analysis. |

## 1. Issuing

**Issuing refers to the creation and sale of financial instruments in exchange for cash or other acceptable payment (e.g. shares of another compan**y). Historical market data is critical for the analysis of liquidity and pricing and real-time data is important at the time of issue.

Issuance is usually associated with government debt, corporate debt and equity. It also includes the creation of financial instruments such as funds that give investors exposure to a broader set of instruments through managed funds or ready access to the market through products such as ETFs or liability-driven funds. Funds may offer specific types of market exposure (e.g. an investment firm issuing a "renewable energies" ETF through which owners of the ETF could invest in a diversified number of companies in that sector).

A key part of the issuing process is pricing the financial instrument to ensure it is attractive to both the issuers and the end investor and priced fairly for both parties. The pricing mechanism for new issues depends to a large extent on the type of instrument and the availability of historical data about comparable instruments and current market activity.

**Debt instruments:** The relatively illiquid nature of corporate bonds means that most issues are priced based on either a spread above a government bond or proxies from similar bonds in terms of the credit rating of the issuer (industry, seniority, coupon, etc). Availability of reliable and complete pricing data for bonds in general, not just for those of the issuer in question, is therefore very important. Some issuers may also be monitoring the activity of other asset classes e.g. credit default swaps.

**Equities:** The relatively liquid nature of equities means the pricing of new issues tends to be less reliant on proxies and therefore market data. However, there can be circumstances where issuers and their advisors need pricing data for certain indices or sectors to gauge the timing of an issue.

**Funds:** Fund creators need to understand the underlying market dynamics such as historical pricing and liquidity of instruments. They need data to ascertain the attractiveness of the product they are building and the potential lifespan of the fund. Most importantly they will need to consider the pricing and liquidity of the underlying instruments held

by the fund and ensure they match the liquidity being offered to the end investor. They will need to provide accurate information to either institutional or retail investors about these funds.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **1. a)**<br>**Pre-Issuance Analytics & Pricing** | • **Issuers**: Government, Supranational, Agency, Corporate, Issuers of Funds including ETFs<br>• **Sell-Side:** Originators / Advisors | **Pricing of New Debt and Equity issues**<br>• All issuers of Equity or Debt Capital need to ensure that new issues are correctly priced<br>• Pricing of Corporate Bonds depends heavily on reliable historical data. As these are relatively illiquid, issuers and their advisors will usually take the recent prices at which similar bonds (in terms of industry/sector, credit quality, maturity, coupon, liquidity, etc) have traded as a proxy<br>• The less liquid is the issue, the higher the dependency on historical data for pricing purposes<br>• Issuers may rely on cross-asset class analysis, (e.g. looking and debt prices when assessing an equity issue and vice-versa)<br>• Advisors to issuers will be modelling scenarios to help their clients determine the best timing and pricing of an issue.<br><br>**Issuance of ETFs and other Financial Instruments**<br>• ETF and other fund issuers will consider the longer-term life span of the product they are launching and how difficult it will be to trade and support it. Very importantly this involves assessing the liquidity of the underlying assets.<br>• Government issuers receive data from their primary dealers, but this is not available to others in the market and does not include other market maker activity that may provide more insights about market activity. | • Mispricing/mistiming of new issues, which may result in under subscription of the issue and adversely impact issuer's Cost of Capital Structure (Weighted Average Cost of Capital – WACC), or even force it to withdraw/delay the issue.<br>• Inability to raise capital due to poor availability of pricing data – may particularly impact less liquid instruments<br>• Shorter than expected lifespan for ETFs or other funds because they are harder to support in the market than anticipated, to the detriment of the investors in the ETF<br>• Failure by issuers to engage with all relevant sources/ providers of liquidity due to their insufficient knowledge about how and where instruments are traded<br>• Issuers are heavily dependent on advisers who in turn rely on market data for their decisions. Availability of the CT would at least remove uncertainty regarding the reliability of data sources used by advisers and help issuers to challenge the advice.<br>• New market makers cannot easily establish relationships with issuers as their activity may not be visible to them. | EQ Orderbook RT ○<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ◔<br>Bonds Trades RT ◑<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **1 b)**<br>**Improved visibility of Small and Mid-Cap Issuer Instruments** | • **Issuers**: Government, Supranational, Agency, Corporate, Issuers of Funds including ETFs<br>• **Sell-Side:** Originators / Advisors | • Smaller issuers may be using smaller listing platforms and not the main exchanges to list their securities. As a result, their data is not easily seen or discoverable.<br>• These smaller platforms disseminate data, but data vendors use their discretion as to whether they incorporate that data in onward packages to their customers. | • Smaller issuers find it very hard to get their data seen and investors may not be aware of the possibilities to invest.<br>• Platforms focusing on smaller issuers find it hard to successfully support their issuers if they cannot get their data seen. This means it is hard for platforms that specifically focus on smaller issuers to compete and larger exchanges have fewer incentives to innovate in the smaller issuer space. | EQ Orderbook RT ○<br>EQ Trades RT ●<br>EQ EOD ◔<br>EQ Ord & Trades, Hist ◑ |

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| | | • Data vendors will often exclude the data because they do not want the extra administrational overhead of managing who receives the data.<br>• Data vendors may compromise by aggregating the data after 15 minutes, but individual trades cannot be seen.<br>• A CT which takes data from all venues for "free" and then allocates revenue back to the venues based on the data utilised would overcome significant hurdles in getting data about smaller issuers to a broader set of investors across Europe. | • Data vendors make decisions that may not be in the best interest of smaller issuers.<br>• Investors are discouraged from trading as they cannot see their individual trades on 15-minute aggregated data. | Bonds Trades RT | ● |
| | | | | Bonds EOD | ◔ |
| | | | | Bonds Trades Hist | ◑ |
| **1. c)**<br>**Publication of Issuer Yield Curves** | **Issuers**: Government | • Some Treasuries formally publish their own yield curves periodically (e.g. monthly). In some instances, they derive the data from market data vendors and/or trading platforms during that period of observation.<br>• Data vendors also publish yield curves based on more frequent data sets.<br>• Given the importance of sovereign debt yield curves as a source for valuation of Fixed Income portfolios and cash flows in general, an increase in the accuracy of this data, however marginal, is likely to have direct and positive benefits for the market as a whole. | • Without a complete and clean dataset containing all trade events from which yields can be derived, accurate and/or reliable yield curves cannot be guaranteed. | EQ Orderbook RT | ○ |
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| | | | | EQ EOD | ○ |
| | | | | EQ Ord & Trades, Hist | ○ |
| | | | | Bonds Trades RT | ○ |
| | | | | Bonds EOD | ● |
| | | | | Bonds Trades Hist | ○ |
| **1. d)**<br>**Decisions and Disclosures at Issuance and On-going** | • **Issuers:** Issuers of Funds including ETFs<br>• **Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | **The risk profile of any product needs to be assessed using market data and then communicated to investors. The benchmarks used, the valuation processes and the trading costs also need to be explained.**<br>• Under PRIIPS regulation, issuers of financial products directed to retail customers must provide an accurate assessment of risks and costs under the form of KIDs (Key Information Documents) for end investors to compare the features of the products.<br>• Asset managers create bespoke product information for products created for their larger institutional clients | • Incomplete and/or inaccurate historical trade records are likely to result in a biased measure of liquidity, which may, in turn, result in an inaccurate risk assessment being disclosed to the end investor<br>• This can affect both retail and institutional investors and the viability of a fund.<br>• Inaccurate liquidity information may put investors at risk. | EQ Orderbook RT | ○ |
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| | | | | EQ EOD | ● |
| | | | | EQ Ord & Trades, Hist | ○ |
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| **1. e)**<br>**Cash and Capital Structure Management** | • **Issuers:** Corporate<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | **Companies look for investment opportunities that will provide an expected return above their Weighted Average Cost of Capital (WACC)**<br><br>Firms with excess cash that cannot find these opportunities within their company have options for deploying this capital, e.g.<br>• Acquisitions<br>• Dividends<br>• Return of Capital<br>• Share buybacks<br>Companies that detect investment opportunities that will provide expected returns above their WACC may decide to raise more equity/debt capital. The cost of raising this new capital will be determined by the prices of their current outstanding Shares and Bonds, or the prices of any companies that can be taken as proxies if the company has no publicly traded securities | • When considering decisions that may have an impact on their Capital Structure, corporations need to assess the wider, longer-term implications that market structure may have on their choices, e.g.<br>o The overall liquidity of their shares/bonds<br>o Trading Venues where they trade most<br>o Predominant investor profile<br>• Large industrial corporations with Treasury functions and most Financial Services firms are familiar with the structure of capital markets and the implications for their capital structure decisions.<br>• Smaller companies with listed shares and bonds are much less familiar with capital markets structure and may underestimate the implications. For example, some CFOs at small firms, although fully aware of the prices of their shares and bonds, are unaware that large portions of trading in their companies' shares are taking place outside of their national exchanges.<br>• The availability of a reliable and consolidated market data feed, even if on a delayed or historical basis, would contribute to wider knowledge and familiarisation with Market Structure. | EQ Orderbook RT ○<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◑<br>Bonds EOD ○<br>Bonds Trades Hist ● |

## 2. Asset Allocation

**Asset Allocation is typically the first decision in the Investment Management Process.** Historical pricing data and good benchmark data is very important as an input.

Asset Allocations are made based on the expected return on an asset class or on long-term goals, such as meeting a specific liability in 20 years' time. Asset Allocation is a "Macro" process and is mostly concerned with Systematic Risk/Return, or Beta.

The inputs to the process are sets of long-term expectations regarding the risk and return of each asset class. This process involves identifying the macroeconomic factors that will affect the returns of each asset class (e.g. interest rates, GDP growth etc) and estimating the sensitivities of asset prices to each of those factors. This analysis will also consider the liquidity of the asset class. Generally, investors in less liquid assets will expect to receive a premium to compensate them for the potential additional cost and the risks of holding these assets.

In order to set those expectations, Asset Allocators rely heavily on historical pricing data with low-frequency data points. They have little or no need for real-time market data.

The output of the Asset Allocation process is an Asset Allocation Model or "Asset Mix", that specifies the asset classes that the funds will be invested in and the % weight that will be allocated to each of them (e.g. 30% Small Cap Equities, 40% Large Cap Equities, 30% Government Bonds)

Once an Asset Allocation Model has been defined, Portfolio Managers will be selected to build and manage optimal portfolios for each of the subsets of asset classes in an Asset Mix. Good benchmark data, which relies on accurate underlying data, is required to select the Portfolio Manager.

Even end investors may undertake a basic form of asset allocation decisions but are still reliant on good data.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **2. a)**<br>**Asset Allocation** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Other**: Chartered Financial Planners, Independent Financial Advisors | Generation of "Asset Mix"<br>• The asset allocation process relies on the correct assessment of risk/return profiles for each of the asset classes being considered.<br>• A part of this risk/return assessment involves statistical analysis of historical time series to model the degree to which asset class prices are correlated with other variables including interest rates, liquidity, GDP, unemployment and other asset classes. The accuracy of these statistical analyses depends on the quality and reliability of the underlying data. | • Incomplete or inaccurate data can lead to inaccurate risk/return profiles and by extension to sub-optimal Asset Allocation that will not be aligned with the risk/return objectives.<br>• For example, an incomplete and/or inaccurate historical data set may lead to an over/underestimation of liquidity. This is likely to cause an under/overestimation of the overall Asset Class risk and lead to an over/under allocation of funds to the asset class (compared to the "optimal" allocation based on accurate data)<br>• The less liquid the instrument, the more critical this becomes, especially for Bonds where it is difficult to obtain reliable pricing data that can be used as Benchmark. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **2. b)** | • **End Investors**: Direct Retail Customers | • Asset Allocators may decide to transfer the management of an entire portfolio or subsets of asset portfolios (or in times of stress may be forced | • The reliability with which implied trading costs can be modelled, and therefore minimised, will | EQ Orderbook RT ◔<br>EQ Trades RT ◑ |

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| **Asset movements/ Transition Management** | • **Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Other**: Chartered Financial Planners, Independent Financial Advisors | to do so e.g. when a government has to buy distressed assets).<br>• This will usually require the receiving manager to rebalance the portfolio to meet its Target Allocation Model. This is an expensive process since any rotation of assets incurs explicit costs (commissions, fees, etc) and implicit costs (spread, slippage etc).<br>• Explicit costs can be easily estimated and modelled. Implicit costs, which are the larger of the two costs, are harder to estimate, and therefore more likely to adversely affect the overall return of the portfolio being transferred.<br>• Valuations of funds will also be important. As many reference data points as possible are needed to ascertain the value of all the assets in the fund. | depend on the availability of complete and accurate historical data series.<br>• Without consolidated data, any modelling being done is with a subset of data - a decision to move a portfolio could be at the expense of the end investor.<br>• Lack of consolidated data means that specialist firms may be required to help with valuations of certain assets. | EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ◑<br>Bonds EOD ●<br>Bonds Trades Hist ○ |

## 3. Portfolio / Investment Management

**Portfolio Management is the management of a subset of the decisions (e.g. stock selection) within the Asset Allocation Mix.**

Following the asset allocator's "Macro" process, Portfolio Management is "Micro" process. It relies on the Portfolio Manager's expertise in a specific asset class or investment "style". Historical pricing data and good benchmark data is required to support this process.

Active and semi-active strategies rely on the Portfolio Manager's expertise in Micro research to identify individual assets that are mispriced and are expected to produce excess returns. Passive strategies simply look to replicate the performance of a benchmark as closely as possible.

Portfolio Management is an on-going, self-feeding process that consists of three main processes: Portfolio Construction, Monitoring, Rebalancing.

Portfolio Managers' price data requirements vary according to their strategy, but generally speaking, they are much less sensitive to latency and granularity of data feeds and more reliant on longer-term data. However, there are some funds, usually quantitative that are more short-term in nature.

Retail investors may also construct, monitor and rebalance their own portfolios using much less sophisticated techniques but are still reliant on good data.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **3. a) Portfolio Construction** | • **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers<br>• **End Investors**: Direct Retail Customers | • Portfolio managers invest their share of allocated funds according to a mandate that includes objectives (expected return, time horizon, etc) and constraints (risk, liquidity, etc)<br>• Active and semi-active managers rely on their expertise to generate excess returns. This involves micro-research at the individual instrument level<br>• Passive managers are concerned with replicating as closely as possible the return of a specific benchmark (an index, basket of stocks, etc) and minimising tracking error. | • Poor data quality may result in inaccurate risk metrics (liquidity, volatility, etc) and by extension inaccurate risk/return profiles for components of portfolios. This is likely to result in sub-optimal portfolio allocations.<br>• Active managers may not have the best data to generate accurate Risk/Return profiles for each of the instruments that they are assessing for inclusion in a portfolio. This may result in less efficient portfolios. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ● |

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| | | | • Without consolidated data, it is harder for passive managers to develop the most accurate "heat maps" for potential sources of liquidity. This has a direct and impact on their ability to reduce frictional costs | Bonds Trades Hist ● |
| **3. b)**<br>**On-Going Monitoring** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | This covers:<br>• Monitoring the overall fund value at the portfolio and individual levels to ensure alignment with the mandate<br>• Handling cash inflows/outflows due to redemptions, new entrants etc<br><br>These can result in new orders being submitted to the fund's internal trading desk or an agency desk (as the case may be)<br><br>Pricing data is obtained from a hierarchy of sources. For liquid instruments traded on-exchange, the previous day's closing price is sufficient. However, for instruments that trade less often, there are other sources of data that need to be considered beyond the last traded price. These extend to an estimated "fair value" formally determined by a Fair Value Committee.<br><br>When markets are stressed real-time data becomes more important. | • A CT would reduce the number of instances where pricing data must be obtained from "lower" (i.e. less reliable) levels of the pricing hierarchy and help real-time risk management.<br>• All the different entities that have to monitor the funds frequently have different valuation information that requires additional resources to resolve - a consolidated tape would be one official tape of record for the valuations. | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **3. c)**<br>**Portfolio Rebalancing** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Portfolio Managers must ensure that exposures to systematic risk factors are kept within the limits established by the Asset Manager / Client.<br><br>This is done via periodic "rebalancing" of positions, with any positions exceeding (or falling short) of targets being reduced (or increased)<br><br>Portfolio Rebalancing is necessary to ensure alignment with client mandate but is a drag for portfolio performance as it incurs costs:<br>• Tax Liabilities<br>• Explicit (commissions, fees, etc) costs<br>• Implicit costs (spread, slippage etc)<br><br>Explicit costs can be easily estimated and modelled, but implicit costs, which are larger, are harder to estimate, and therefore more likely to adversely affect the overall return of the portfolio being transferred.<br><br>It is important to note that rebalancing typically requires a higher than average amount of trading for a fund and is, therefore, best timed to take place when overall market liquidity is increased. | • Implicit costs are bigger and harder to estimate, and without good data require more resources to model.<br>• The reliability with which implied trading costs can be modelled, and therefore minimised, depends on the availability of complete and accurate historical data sets from which those costs can be modelled. Poor data means increased costs are borne by the fund and the end investors.<br>• Due to the adverse impact of rebalancing in portfolio performance, there may be instances where portfolios are rebalanced less often or where liquidity timing proves to be incorrect. | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◑<br>Bonds EOD ●<br>Bonds Trades Hist ● |

## 4. Pre-Trade Analytics

**Once the investment decisions are made, an execution strategy for the investments must be determined. Every stakeholder involved in executing a trade undertakes some sort of pre-trade analytics to determine their execution strategy. This runs throughout the investment chain of activities.** All of these stakeholders require good data and the more asymmetries that exist in the data the harder the analysis becomes.

**The Rationale for an Execution Strategy**

- Most institutional investors have large orders that cannot be executed immediately as there may not be enough supply and demand in the market. They, therefore, need to calculate how best to manage an order to achieve the best outcome. This is important to minimise trading costs and prevent "leakage' to the wider market about the size of the order and their intentions. A poor strategy means the market may move against them to the cost of the end investor.

**Pre-Trade Analytics/Execution Strategies across the Value Chain:**

- In the first instance, portfolio managers execute their investment decisions by sending their orders to specialised trading desks which may be internal (part of the firm) or external desks (3rd party desks) acting on their behalf.
- **In liquid instruments** with high levels of electronic trading, these (parent) orders are then passed to multiple sell-side/agency desks to trade on behalf of the buy-side client. Each sell-side desk may only see a subset (child) order of the original order and not be aware of the full trading strategy or size of the trade. This is to minimise information leakage across the market. The sell-side desk will then undertake its own pre-trade analysis based on the child order it has received and will break down that order into a further set of child orders for execution in a variety of different venues as it sees fit. The majority of this is executed electronically and anonymously on trading venues. If a buy-side client requires an immediate execution in a large order, it may seek to undertake a block trade with a sell-side participant that is willing to risk its capital (principal trade).
- **In less liquid equity instruments and bonds,** the concept of agency trading is less prevalent. Orders are likely to be much larger and the sell-side will more regularly act as principal and take on risk on behalf of the investor. The buy-side evaluates the quotes being made by the sell-side, but these are unlikely to be the price at which sell-side would commit capital to a large order. The buy-side cannot approach too many sell-side risk-takers without creating information leakage and risking prices moving against their order so the counterparties are much more concentrated.
- Any firm risking its capital will also be undertaking pre-trade analytics to decide the price at which is it willing to take the risk.

**Pre-trade analytics for any of these trades are mostly concerned with three variables:**

- Liquidity profile of instrument (main sources of liquidity, average trading volume and size), volatility, special market circumstances, etc
- Time to execution
- Minimising Information leakage (slippage) at the expense of the end investor.

**Pre-trade analysis relies heavily on historical as well as real-time market data including current bid/ask spreads, depth of book in liquid instruments, volatility etc.** Data accuracy is very important, and issues are often detected during in-flight execution management. For example:

- Missing trade data may lead to lower perceived liquidity, resulting in smaller suggested order sizes. When those orders are sent to market, the observed fill rates will be higher than initially anticipated, leading to a wrong perception of "sudden increase" in liquidity.
- Two participants (e.g. buy-side and sell-side trading desks) running pre-trade analytics based on different data sets.

**Retail investors must also decide how to execute an order** once a decision to invest/divest has been taken and can, therefore, benefit from pre-trade analysis. However, their trades may be relatively small and there may be enough supply and demand for immediate execution. The extent to which pre-trade analysis benefits retail investors depends on the size of their order, the liquidity of the instrument and their access to trading venues or pricing visibility. If an investor only has access to one trading venue the potential benefits of pre-trade analysis may be significantly reduced.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **4. a)**<br>**Pre-Trade Analytics for Investors** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Data is required to find the optimum balance between:<br>• The size of the order to execute: larger orders have a higher adverse price impact.<br>• The time horizon within which the purchase/sale must be completed<br>• The risk profile of the instrument, including liquidity<br><br>All things being equal, the more liquid the instrument, the smaller the adverse impact of order size and time to execution; i.e. the easier it is to trade the whole order at a price that is closely related to the currently available market price.<br><br>This is true regardless of the method by which the order is executed (i.e. electronic/phone/block trade). | The degree to which the execution strategy is successful depends on the accuracy of the assessment of an instrument's risk profile, including liquidity profile. Currently, no one has the same information.<br>• Information asymmetries are rife across the industry and lead to many issues daily.<br>• An under/overestimation of liquidity/volume will result in wrongly sized orders and increased cost of trading due to higher implicit costs (spread, slippage, etc)<br>• Lack of understanding about true volumes in equities may be diverting more trading away from lit equity environments<br>• For instruments that are less liquid, or traded bilaterally such as bonds, a CT would potentially increase the number of data points from which much more accurate pre-trade analytics could be derived for all instruments<br>• Investors are not able to challenge in real-time the execution strategy decisions made on their behalf in each part of the value chain. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **4. b)**<br>**Pre-Trade Analytics for Smart Order Routers/Venue Selection** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Banks and brokers acting on behalf of clients have pre-selected venues to which their Smart Order Routers (SORs) send orders<br><br>These banks and brokers will be continually evaluating the performance of these venues to establish whether any changes should be made to the venues that their smart order routers can access. They could wait to get this data from RTS27 publication but some firms with sophisticated modelling will be doing this more frequently. This requires good historical data.<br><br>Buy-side firms are also increasingly evaluating the performance of brokers to determine which ones to route their orders to and need good data to interpret results. | • Even where banks rely on their own data feeds, lack of transparency for their clients around the performance of different venues may mean that brokers fail to adapt their smart order routers when appropriate<br>• Competing venues with good liquidity may not receive the orders and the client may miss the good quality prices and volume over a prolonged period.<br>• More innovative liquidity providers may not be rewarded.<br>• Buy-side firms may not see the best performers to route their orders to.<br>• End investors are currently focused only on commissions as they currently do not see a difference in the liquidity/price that might be offered to them if data was consolidated. | EQ Orderbook RT ◕<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |

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| **4. c)**<br>**Price Formation and Transparency at the same price for everyone (Buy and Sell-side trading desks- Agency and Risk)** | • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• **End Investors**: Direct Retail Customers | The amount of technological, human and capital resources required to have a complete and accurate view of the market is out of reach of the average investor.<br><br>A consolidated tape would help level the playing field for all investors. | • Most firms cannot afford to aggregate and clean data and must rely on best efforts.<br>• Information asymmetries generate potential profits for one set of participants who have superior data processing skills and an informational edge over the rest.<br>• This results in higher overall execution costs and the flight of liquidity to less transparent models of trading<br>• Incorrect execution strategies have a compounding effect on all of the market and the data signals being disseminated. Others who pick up signals in the market may increase aggressive trading as this information asymmetry is picked up by better-informed market participants who will in turn trade on it.<br>• Whilst the creation of a CT would not eliminate all informational asymmetry, it would eliminate one of the root causes by providing all market participants with a universally accepted source of data that could at least address seemingly simple issues such as:<br>  ○ "True" liquidity of instruments/asset classes<br>  ○ Actual prices of instruments, especially less liquid ones<br>  ○ Potential sources of liquidity | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ◑<br>Bonds Trades Hist ● |
| **4. d)**<br>**Block-size liquidity provision (Sell-side Trading Desk)** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Banks, broker-dealers and other liquidity providers with block trading desks buy or sell large positions in Equities, Bonds & other instruments from clients who are looking for immediate execution or where another source of liquidity is not available.<br><br>These trades are done at a discount or a premium to current market prices and the risk-taker assumes the risk related to unwinding the positions off their balance sheets.<br>The assessment of an instrument's risk profile, with special attention to liquidity, will determine the trading strategy and have will have a direct impact on the degree to which the block trade will make money for the firm.<br>To be rewarded for risking its capital, the trading desk must devise the optimal unwinding strategy to flatten the position at a higher (lower) weighted average cost than it was bought (sold). | • The lack of a CT containing the full and correct universe of all relevant price points decreases the accuracy of the metrics based on which the position will be unwound. The impacts of this are:<br>• A block may be wrongly priced to the detriment of the end investor.<br>• A block trade may not be required but the lack of good information increases uncertainty and encourages investors to trade in blocks to increase the certainty of execution. This causes less liquidity on lit trading venues<br>• Poor data impacts the willingness of liquidity providers to commit capital and the prices offered due to higher uncertainty about unwinding positions<br>• Competing market makers find it harder to enter the market because there is no data available with which to price risk | EQ Orderbook RT ◕<br>EQ Trades RT ●<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |

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| | | | • Concentration risks exist where a few market makers have most of the market knowledge and it reduces the likelihood of instruments being traded in a more transparent environment<br>• Wrongly sized orders sent to the market for unwinding may result in increased execution costs for the risk-taker and they may be less willing to commit risk again. | |
| **4. e)**<br>**Trading Strategy Research (Venue and SI Liquidity Provision)** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Liquidity providers continuously assess the success of their trading strategies and assess the feasibility of new ones as market dynamics constantly evolve.<br>Historical market data is used:<br>• To assess the potential addition of new profitable trading strategies and to improve existing ones.<br>• To calculate metrics (e.g. average roundtrip latencies, average resting times for visible and dark orders) and probabilities related to specific events such as the probability of hidden liquidity being in a venue, the probability of successfully executing against displayed quotes, etc.<br>Each combination of event/trading venue is ranked based on the probability of success, and those statistics are used as inputs for trading strategies, SOR (smart order routing) algorithms, etc.<br>In addition to new/improved metrics and trading strategies, this process may also result in the addition of a new Trading Venue or alternative source of liquidity. This may be for a strategy specific to this venue or as part of one involving multiple venues.<br>Proprietary and agency trading firms will rely on their own datasets to perform research on trading venues. However, they will not have historical datasets for all trading venues and liquidity sources, particularly ones they are not currently connected to and, in the first instance may use consolidated data where available.<br>Similar to liquidity providers, agency trading desks perform research in order to identify potential improvements for their execution algorithms as well as potential sources of liquidity with specific profiles.<br>Firms would merge data from the consolidated feed with their current feeds to derive more precise metrics (e.g. market-wide liquidity of individual instruments/asset classes). | • Lack of consolidated data prevents firms from making at least preliminary assessments on key metrics for a much wider range of trading venues in a highly efficient way (as all data would be normalised)<br>• Innovative venues and liquidity providers may not be rewarded.<br>• Imprecise risk metrics reduce liquidity provision efficiencies across Trading Venues. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **4. f)**<br>**Sales/Trade Idea generation** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer | Salespeople monitor information about their clients and a CT would give a more comprehensive view of the market and possible ideas for clients. | • In equities, most research salespeople see the main exchange data as a proxy. There is unlikely to be a big difference between the proxy price and the broader market price but inclusion of all | EQ Orderbook RT ●<br>EQ Trades RT ● |

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| | Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | The feasibility of some trading ideas generated by research/salespeople relies on correct pricing/ liquidity data. This may be a manual or automated process. For example, some trading ideas require the monitoring of virtual portfolios over long time periods in order to assess their feasibility and will be taking market data to assess this. | markets to gain a better understanding of the broader depth of the market could make the difference between some ideas being taken or not.<br>• In bonds, where there is less data available, the impact of a CT in terms of some ideas being followed is thought to be even bigger. | EQ EOD | ● |
| | | | | EQ Ord & Trades, Hist | ● |
| | | | | Bonds Trades RT | ● |
| | | | | Bonds EOD | ● |
| | | | | Bonds Trades Hist | ● |

## 5. In-Flight Execution Management

**In-flight execution management starts when the execution strategy is defined and the trade begins. This is the point at which each order is sending signals to the market and it is therefore critical to also get real-time signals back from the market to inform, manage and adjust the execution strategy.** As described in 4, it will continue across each part of the value chain involved in the execution (with parent and child orders) until the entire trade is completed.

In-flight execution management relies heavily on real-time market data including orderbook (for liquid instruments) and trade events for all instruments and applies to Buy-Side, Sell-Side/Agency, Liquidity Providers and Retail Investors. All of these stakeholders require good data as they conduct their trades and communicate with each other. The more asymmetries that exist in the data the harder the in-flight management of the trade becomes.

Large trades or those in illiquid instruments require more time which could take hours or even days unless immediately taken on risk. Retail investors may execute trades more quickly as their trades are smaller. Stakeholders will be feeding in both post-trade events and any current order events during the course of execution to monitor the process. There will be more data points to continuously feed in for liquid instruments and less for illiquid instruments. Traders will be looking for:

- Ex-post deviations that are occurring outside acceptable boundaries
- Changes in market dynamics (such as an increase in volatility or decrease in liquidity) that could lead to a future deviation from the expected result (ex-ante) or a need to change strategy.
- Opportunities (e.g. if the market is rallying unexpectedly, it might warrant an upward revision of sell prices, and vice-versa if it is falling)

Execution monitoring is done at the parent and child order levels by each participant. Responses to issues identified include increasing/decreasing the order sizes of child orders, adjusting their limit prices, moving them from lit to dark order books.

N.B. Deviations detected during by in-flight execution management can be “false deviations” caused by incorrect pre-trade analytics derived from incorrect historical datasets (see pre-trade analysis).

Participants monitoring electronic trading, including venues, have front-line support desks to pick up on any immediate issues during the trading process.

| Use Case ID | Stakeholders | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement | |
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| **5. a)**<br>**Investor's In-Flight Execution** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, | The main objective is to detect any adverse deviations from the expected outcome. The underlying reasons need to be understood to decide whether any corrective measures are required. | **The absence of a consolidated tape may lead to the following issues for buy-side traders**<br>• Miscommunication arising from the mismatch between buy and sell-side perception of current | EQ Orderbook RT | ● |
| | | | | EQ Trades RT | ● |

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| **Management (Buy-side Trading Desk)** | OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | "Deviations" and "corrective" measures must be interpreted both from precautionary and opportunistic perspectives. Adverse deviations might lead to a more risk-averse update of execution parameters, favourable deviations might lead to a relaxation of parameters to try to take advantage of the favourable deviation. | market dynamics due to the use of different data feeds<br>• Difficulty in challenging agency brokers' trades on a real-time basis due to lack of complete real-time market data<br>• Difficulty for buy-side traders to detect venues with better liquidity profiles and to direct their executing brokers to take or provide liquidity to those venues<br>• Missed opportunities to see liquidity spikes<br>• The wrong signals are transmitted to the market and other market participants react on those signals thus compounding the problem. | EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **5. b)**<br>**Sell-Side In-Flight Execution Management (Sell-side Agency and Proprietary Trading Desks) and unwinding of block trades (Principal)** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | The main objective is to detect any adverse deviations from the expected outcome. The underlying reasons need to be understood in order to decide whether any corrective measures are required.<br>"Deviations" and "corrective" measures must be interpreted both from precautionary and opportunistic perspectives. Adverse deviations might lead to a more risk-averse update of execution parameters, favourable deviations might lead to a relaxation of parameters in order to try to take advantage of the favourable deviation<br>Agency Trading Desks are primarily judged by their TCA metrics. For Equities and other liquid instruments, where large amounts of market data need to be processed at high speeds, some Agency and Proprietary trading desks rely on highly automated mechanisms for in-flight execution management. They may consume low-latency consolidated feeds that include a larger range of trading venues and counterparties than those of the average buy-side firm, arising in more information asymmetries. If a CT were available and their clients were referencing the CT, then they would also need to reference it.<br>Those same feeds are less reliable for pricing of less liquid Asset Classes (including bonds), for the following reasons:<br>• The nature of the products means that they have long holding periods and thus only trade sporadically<br>• As a result of the above, there are few price points to use as references<br>• The types of firms that hold these instruments are very diverse and therefore trading has remained | The absence of a CT means Buy-side and Sell-side do not have the same full and accurate view of the true liquidity profile of illiquid instruments.<br>• Participants cannot easily monitor the execution together without the same data.<br>• Less data makes it harder to find potential sources of liquidity<br>• Pricing of orders is less reliable because there are fewer price points and less accurate risk profiling for the instrument<br>• Competing venues with better liquidity may be losing out.<br>• The wrong signals are transmitted to the market and other market participants react on those signals thus compounding the problem. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |

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| | | highly decentralised with most negotiations being bilateral<br>• Trade data in those instruments is reportedly inaccurate and hard to consolidate<br><br>Hence, for less liquid asset classes In-flight execution management is subject to less automation and more human supervision but may also be a slower or more immediate process.<br><br>All the above also applies to scenarios involving the unwinding of block trades that the sell-side desk might trade at risk, i.e., high automation in liquid instruments and much less so in illiquid ones. | | |
| **5. c)**<br>**Utility data for monitoring and risk checks** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers | SIs need to check that their quotes reflect prevailing market conditions. A tape with a broader set of data would improve their ability to check this.<br><br>Firms sending algorithmic orders to their agents or directly to the market are undertaking risk checks to ensure that the order is not significantly out of line with the current market prices.<br><br>These firms need to perform basic risk checks. These need reliable reference prices that do not need to be updated at low latency.<br><br>Most firms are using the primary market as reference for Equities, which is a proxy for all liquid stocks<br><br>Less liquid instruments need broader reference data to manage risk. This applies to both bonds and less liquid equities. | • It is hard for firms to assess if their SI quotes truly reflect all prevailing market conditions<br>• There is no reliable utility data that offers complete pricing reference data.<br>• Some of the reference prices used for risk checks may not be as accurate as needed for the risk checks to be effective. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ○ |
| **5. d)**<br>**Harmonised Taxonomies** | • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | An orderly market requires the timely and efficient dissemination of not only pricing data (orderbook / trade events) but also other information that is needed for the correct interpretation of the pricing data that is being disseminated. Each venue and each bank has its own taxonomies.<br><br>Dissemination of admin/session events (e.g. declaration of a fast market, trading halt, triggering of circuit-breaker) has been highlighted as a source of disorderly conditions. Currently, only the consumers of direct market data from the venue announcing a relevant event are informed in a timely manner via the corresponding Market Data API.<br><br>In addition, all trading venues have different codes and descriptions for the disclosure of those admin | • It is harder to manage algorithms and detect errors without the adoption of an industry-wide taxonomy for the dissemination of such event information: Trading halts<br>  ○ Triggering of circuit breakers/price bands<br>  ○ Short Selling restrictions<br>  ○ Other regulatory data<br>• Market participants currently receive information about admin events in equities at different times or not at all. A consolidated tape would disseminate information all at the same time.<br>• In bond markets, participants struggle to deal with each bank's individual taxonomy which makes aggregating data harder. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ○<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ○<br>Bonds Trades Hist ○ |

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| | | events. This has been identified as another source of inefficiency due to the confusion it creates. | | |
| **6. e) Front Line Support & Help Desk for electronic trading** | • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs), Originators / Advisors<br>• **Trading Venues:** Regulated Markets (RIE), MTFs, OTFs | Market Support & Help Desk teams are usually first responders to inquiries relating to technical or business-related issues.<br>Data is used to assess the overall market status as a first step, to understand whether the issue is market-wide as opposed to specific to the firm. Once this is assessed they will progress the enquiry as appropriate. | Assessment of overall Market Status may be less reliable or slower in the absence of a CT:<br>• In the absence of a third-party feed that can be used as a benchmark, it is more difficult to detect whether the perceived issue is technical (for example, slow feed) as opposed to attributable to overall market status<br>• Progressing the inquiry may require access to historical datasets that enable the construction/replay of a timeline of events for the market as a whole. In the absence of a CT, it is unlikely that the firm's own feed will include such breadth of data sources<br>• Absence of a full dataset may lead to confusion regarding the event being questioned. For example, a client may be questioning a trade-through event based on trades he saw from a small venue. If the Agency Broker does not include this venue in its feed, it will be unable to assess the client's claims. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ◑<br>Bonds Trades Hist ● |

## 6. Post-Trade Analytics

**Post-trade analytics is required for several different functions. Firstly post-trade information is constantly feeding back into pre-trade analysis and in-flight monitoring as described in 4 and 5. It is also needed for Transaction Cost Analytics (TCA) and best execution to meet regulatory requirements and explain to clients how the firm has performed on their behalf over a longer period.**

**Feeding of Daily Outcomes**

Firms need to combine market data with their own pre-trade analytics to evaluate their individual outcomes from on-going trading activity (average resting times of orders per order type, frequency of racing conditions per trading venue, etc). This provides data needed to feed into and fine-tune pre-trade analytics engines on a constant basis.

**Transaction Cost Analysis (TCA)**

Transaction Cost Analysis is the framework within which institutional investors assess best execution for their clients, and by extension the performance of their execution brokers. The cost of executing a trade has a major impact on overall performance, as execution costs can be thought of as negative performance. Transaction costs are made up of explicit (e.g. commission) and implicit (e.g. bid-ask spreads, market impact, missed trade opportunity costs and delay cost) costs. Although much harder to measure, implicit costs are just as important and a key indicator of "skill" in execution management.

Transactions are a key point of focus across the investment management chain:

- Asset Managers are concerned with their decremental effect on fund valuations and their performance
- Agency Brokers are ultimately judged by their TCA metrics and they increasingly undertake their own TCA both as an additional service to their clients as well as a KPI to be able to demonstrate superior skills.

TCA is an ex-post activity and relies on historical data (both orderbook and trade events) and real-time data.

**Best Execution**

In the context of *post-trade analysis*, Best Execution can be thought of as a simpler version of TCA that aims to get the best outcome for end investors, given the conditions at the time the order was placed and framework within which the broker must operate, as described in its Best Execution Policy. Under MiFID2:

- All execution venues must publish quarterly reports on the execution quality achieved.
- Investment firms (including retail brokers) must, on an annual base disclose the top 5 execution venues per class of financial instrument, justify the basis on which they selected those 5 venues, and review their Best Execution policy including an assessment on whether the list of Trading Venues must be updated based on the execution quality reports provided by trading venues and the investment firm's own execution statistics.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **6. a)**<br>**Transaction Cost Analysis (TCA)** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs), Originators / Advisors | Data is a very important input into both Transaction Cost Analysis and best execution, and by extension how the performance of execution brokers is measured.<br>• It assesses the difference between the price of the asset at the time the decision to buy or sell was made (or the order received by the agency broker) and the final execution price obtained by the broker.<br>• This difference will be attributable to explicit and implicit costs<br>• It requires pre- and post-trade historical data to measure the different types of implicit costs: bid-ask spreads, market impact, missed trade opportunity costs and delay costs)<br>• It requires a limited number of price inputs, such as:<br>  ○ Benchmark Price (Price at time of decision to trade)<br>  ○ Execution price(s)<br>  ○ Closing Price on cancellation day (if relevant)<br>  ○ Previous Day's Closing Price | • Where the instrument is liquid, consolidated feeds from most brokers and vendors can be used with reasonable assurance of their accuracy as proxies. However, the lack of ability to challenge brokers means that SOR's may not be tuned as efficiently as possible and some venues with improved depth of liquidity may not be fairly rewarded.<br>• As liquidity of the instrument decreases the reliability of inputs obtained from incomplete datasets decreases.<br>Key issues:<br>• It is currently possible to manipulate the outcome of TCA by "picking" certain prices or venues over others without challenge<br>• Even though a CTP does not guarantee the availability of the most recent pricing data, the availability of an unbiased source may facilitate the adoption of a compromise or better challenge. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **6. b)**<br>**Post-Trade Analytics, Liquidity Providers** | • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | **Banks, broker-dealers, SIs and proprietary traders who take their own positions will be evaluating their positions and on-going ability to unwind those positions after committing capital.**<br>• The post-trade data being received will have an immediate impact on the pre-trade decisions about the next price made in the market.<br>• For block trades, the post-trade data will also be used to monitor how successful trading risk with | • Pricing of risk may be less accurate and influence willingness to commit capital in future.<br>• Capital may be not be allocated to less liquid instruments if the available information is not sufficient.<br>• It may impact individual client relationships as firms measure their ability to be profitable on each client trade. | EQ Orderbook RT ◕<br>EQ Trades RT ●<br>EQ EOD ●<br>EQ Ord & Trades, Hist ● |

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| | | each individual client is and used for further negotiations with clients to discuss whether the risk-taker has made a profit or loss on certain trades<br>• Most liquidity providers will rely on their own data analysis but cannot clean poorly labelled data 100%. They will be beneficiaries of cleaner data that should come about as a consequence of a consolidated tape. | | Bonds Trades RT ● |
| | | | | Bonds EOD ● |
| | | | | Bonds Trades Hist ● |
| **6. c) Provision of Best Execution (Retail Clients)** | • **Issuers**: Corporates<br>• **End Investors**: Direct Retail<br>• **Sell-Side**: Retail Brokers, Retail Agency Brokers | • Retail brokers have a Best Execution policy, which is the framework within which they must operate with regards to achieving the best possible outcome for their clients.<br>• In defining their Best Execution policy, retail brokers must assess all relevant factors, including availability of liquidity, costs (execution, settlement, custody, market data etc.) and other relevant factors.<br>• In the event of a CTP being available, it is reasonable to assume that it would become a widely accepted source of data that most relevant outlets would be referring to, thus triggering an interest in alternative sources of liquidity and service provision by retail investors. | • Retail clients as a whole are largely unaware of the fact that they can execute orders in multiple venues, which has generated a circular dynamic that is hard to break:<br>• Retail brokers do not include other venues in their best execution policies because they are not requested by their clients,<br>• Retail investors do not demand access to a wider number of venues because they are unaware of this possibility<br>• Retail broker service models are almost entirely based on commission costs rather than service models | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ◑<br>Bonds Trades RT ●<br>Bonds EOD ◑<br>Bonds Trades Hist ◑ |

## 7. Middle and Back Office Processing and Administration

**Once trades are executed, the buyer's and seller's interests are matched, and a number of other processes commence that cover:**

- Settlement and reconciliation
- Safekeeping and custody
- Valuation, including NAV valuations by fund administrators
- Client administration, including fees and penalties

Positions need to be valued regardless of whether held by a firm on its own account or on behalf of a client and regardless of whether held deliberately or has arisen as a result of a settlement or processing failure or delay.

Incorrect prices can result in valuation and charging errors. Different price sources result in reconciliation differences (operational inefficiency).

Inaccurate or incomplete liquidity information can result in incorrect prices (the price used is not the price at which the asset can be liquidated) and restrictions on securities lending (especially relevant for ETFs).

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **7. a)** | | | • NAV calculations could be incorrect. | EQ Orderbook RT ○ |

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| **Valuations and Fair Price Adjustments** | • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• **Custodians / Risk Managers**: Custodian Banks, CCPs, 3rd Party Clearers, CSDs/ICSDs | The price used for valuations needs to accurately reflect the acquisition cost/realisation value for those assets.<br><br>It can be difficult to know that the data is accurate for larger sizes and less liquid assets<br><br>Independent review of valuation processes by 2nd and 3rd line controls is dependent on accurate price data. In practice, different providers often use the same source making it difficult to know that what is being used to validate is independent | • Client statements/reporting could be incorrect. Investors may be relying on incorrect valuations of their investments<br>• If there are significant redemptions in a fund, the last investors out may be severely disadvantaged if liquidity changes dramatically.<br>• Internal positions could be valued incorrectly (both positions held deliberately and arising from settlement or processing failures or delays). This can lead to significant errors, especially on illiquid assets and these may not be identified until the assets are offered for sale. | EQ Trades RT ◔<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◑<br>Bonds EOD ○<br>Bonds Trades Hist ● |
| **7. b)**<br>**Reconciliations** | • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Sell-Side**: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• **Custodians / Risk Managers**: Custodian Banks, CCPs, 3rd Party Clearers, CSDs/ICSDs | P**rices can be a variable in reconciliations due to firms using different data (e.g. transaction feeds received from exchanges or prime brokers, valuations, fees based on valuations).**<br>The use of a standard price (tape of record) would simplify reconciliation processing resulting in lower costs, improved controls (reduced risk) and fewer resources being consumed. | • If tolerances are used to avoid investigation of differences due to pricing, other issues may be missed<br>• If tolerances are not used, differences may be investigated unnecessarily and identification of more significant or systemic issues may be delayed or missed<br>• The need to independently source prices, identify and then investigate differences creates unnecessary cost and inefficiencies | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ○<br>Bonds Trades Hist ○ |
| **7. c)**<br>**CSDR Penalties Calculation** | • **Sell-Sid**e: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, | **CSDR Penalties Regime regulation assumes that all CSDs will use the same price to value fails in order to calculate penalties and buy-in cash compensation.**<br>In practice CSDs source prices independently. There is no single official price for each ISIN, and the current guidance is not prescriptive enough to ensure that all | • Penalties may be passed between CSDs that are using different prices resulting in P&L gains/losses for the CSD or the need for CSDs to apply different prices to the same ISIN depending on where the penalty originated<br>• External parties (CCPs, Custodians, direct CSD/ICSD participants as well as their clients) | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ● |

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| | Proprietary Traders (inc. SIs)<br>• **Custodians / Risk Managers:** Custodian Banks, CCPs, 3rd Party Clearers, CSDs/ICSDs | venues will use the same price, especially where ISINs are traded OTC.<br>The CSDR Penalties price is also used to calculate cash compensation where buy-ins fail | that want to validate CSDR Penalties using independent price sources will struggle to define a rule for which price to use<br>• A standard price from a single source would simplify both the calculation and verification processes | EQ Ord & Trades, Hist ○<br>Bonds Trades RT ○<br>Bonds EOD ○<br>Bonds Trades Hist ○ |
| **7. d)**<br>**Initial Consistency checks/Product Improvements** | • **Sell-Sid**e: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | The Middle Office function is often the first opportunity to check data quality and consistency and take corrective action e.g.<br>• Trade reporting checking to ensure timely post-trade reporting<br>• Peer data/checking of data fields being used<br>• ISIN inconsistencies<br>It is also where potential product improvements can be identified. Firms may be looking for insight into where the rest of the market is trading and a gap analysis of product capabilities. Firms also look at how they are performing against SLAs, particularly if they are performing functions such as trade reporting on behalf of clients. | • There is not sufficient data to help pick up errors immediately<br>• Post-trade reporting errors or other data inconsistencies may not be identified at early stages or at all<br>• It is hard to improve the client product offering with the current data set | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ○<br>Bonds Trades Hist ● |

## 8. Funding and Collateral Management (including non-cash collateral)

**When executions are completed, firms perform funding and collateral management activity to ensure they meet their intraday and end of day credit and margin obligations, as well as meeting collateral requirements imposed by their counterparties and CCP**s. This requires data inputs to make the correct calculations.

Examples include:

- Exchange and broker obligations to facilitate settlement.
- Initial and variation margin to/from CCPs (cleared) and clients (cash and non-cash collateral)
- Legally agreed to custody limits
- Credit/debit balances at custodians
- Collateral payments to/from counterparties for OTC positions under ISDA arrangements (uncleared)
- Securities Lending

Treasury and cash management is a function that almost every type of financial firm and retail participant has to manage on a regular basis.

Asset prices are needed to value non-cash collateral and exposures. Different price sources result in reconciliation differences (operational inefficiency) and can cause credit limit breaches.

Inaccurate or incomplete liquidity information can result in restrictions on securities lending. This is especially relevant for ETFs.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **8. a) Initial and Variation Margin calculations** | **Issuers:** ETF Issuers<br>**Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>**Custodians / Risk Managers:** CCPs, 3rd Party Clearers | Instrument price and liquidity is a key input into CCPs' calculations of initial and variation margins.<br>• A full set of post-trade data for all instruments cleared would provide better data and probably improve the valuations for less liquid assets. It would also help the assessment of other instruments that could potentially also be cleared.<br>• Receiving this in real-time would help during times of market stress | • Fewer instruments being centrally cleared: more ETFs (and potentially other less liquid instruments) could be centrally cleared as total liquidity became more visible through a CT and then become subject to the share trading obligation<br>• Clearing costs too high: the amount of IM/VM could be reduced for instruments where full liquidity is not currently visible<br>• Market stress management could be improved by more complete data, including depth<br>• Would create more transparency between CCP models if all using the same CT data set to determine liquidity risk. | EQ Orderbook RT ○<br>EQ Trades RT ◔<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◑<br>Bonds EOD ○<br>Bonds Trades Hist ● |
| **8. b) Securities Lending and Collateral Management** | **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>**Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>**Custodians / Risk Managers:** CCPs, 3rd Party Clearers | Securities lending and the ability to deploy assets as collateral (Financing markets) are essential for capital markets to operate effectively.<br><br>A Market Maker's (MM's) costs & ability to make efficient prices is directly affected by financing markets:<br>• The level of acceptance and therefore the ability to deploy an asset as collateral has a direct impact on the MM's cost of funding i.e. the cost for a MM to hold a position while waiting for a buyer<br>• The existence of a stable, competitive borrow market:<br>  • Improves settlement rates, reducing potential Broker frictional costs (especially important with the introduction of the CSDR Penalties regime in 2021 which introduces new penalties + mandatory buy-ins)<br>  • Allows MMs to sell short, in lieu of finding a seller they can purchase securities from or in the case of ETFs also potentially creating additional ETF Units<br>An active lending market also increases the potential lending returns for Beneficial Holders (e.g. pension funds, Insurance Companies). This is a low-risk, collateralised activity that generates incremental returns for underlying holders/clients. | Securities lending may not work effectively, and the impact may be:<br>• Reduced liquidity<br>• Wider bid and offer spreads<br>• Increased volatility<br>• Higher dealing costs and reduced ability to deal in smaller sizes<br>• Reduced ability to support derivative markets, resulting in reduced ability to hedge, meaning still less liquidity, wider spreads, increased volatility and higher dealing costs | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ○<br>Bonds Trades Hist ● |

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| | | The market structure that supports securities lending and the use of assets as collateral relies on accurate and timely price and liquidity information for the security.<br>• Securities lending agents typically set lending limits based on daily trading volumes (a percentage of daily trading volume that they will lend to any single borrower)<br>• Lenders/collateral receivers (often utilising tri-party agents) typically set concentration limits for collateral received as a percentage of trading volumes. If the data sets available are incomplete, only a fraction of the potential capacity could be utilised. | | |
| **8. c)**<br>**Less Liquid Instruments e.g. ETFs for lending and use as collateral** | **Issuers:** ETF Issuers<br>**Sell-Side:** Investment Banks (inc. SIs) | ETFs are used as an example here, but it is similar for other less liquid instruments where good data is not available.<br><br>EMEA ETF liquidity is distributed across multiple trading venues without a primary listing venue that can provide a proxy for the total market. For example, one ETF (with a single ISIN) may be trading on multiple venues (say LSE, Borsa Italiana, Deutsche Börse, Euronext, OTC) with a different SEDOL for each. The total daily volume might be 100,000. However, if a lender is only receiving LSE data, where the volume is 10,000 shares, they could restrict lending (as this is all the liquidity they see), due to a concern a borrower could not buy back and return securities if they were recalled. This means that the current Equities infrastructure does not work effectively for ETFs to be used and considered as collateral.<br><br>ETF liquidity should be improved with a more efficient borrow market, increased availability will reduce MM's cost of trading, directly resulting in reduced bid/offer spreads for end clients. For example, in certain circumstances, it is more efficient to borrow securities in lieu of buying back off someone else or creating additional units at a later date.<br><br>Collateral receivers/Tri-party agents' inability to effectively access complete ETF trading volumes restricts the use of ETFs as collateral for similar reasons. The amount of an asset that can be used as collateral is determined in part by the daily trading volume. If the collateral receiver is only seeing a subset of the volume (e.g. 10% in the example above) then this will significantly restrict the amount that can be deployed, thereby potentially increasing funding costs for the asset class.<br><br>The limits on the use of ETFs as collateral described above assume that the ETF has been approved. Risk approval is needed before an ETF (or any other | ETF funding rates are artificially high.<br>• This is in part due to the lack of a complete view of liquidity (Market Maker funding costs for long positions are dependent on their ability to deploy the assets as collateral)<br>• The higher funding rates for ETFs has a negative impact on liquidity<br>• ETFs have not met the share trading obligation | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ○<br>Bonds Trades Hist ● |

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| | | instrument) can be accepted as collateral. The Risk function will have the same challenges as the rest of the business in obtaining full/accurate trading volume data, thereby reducing the potential acceptance of specific ETFs in the first instance. For example, minimum liquidity levels may be a prerequisite and only met if full access to data is available.<br><br>Bloomberg does provide a partial solution to this problem by consolidating some of the venue data to provide a view by ISIN. However, this is not complete and depends on the agent having the necessary licenses and using this data within their operational processes. The scale of the challenge faced by Bloomberg in creating its solution suggests that it is not feasible for any individual lender or agent to create a proprietary solution. | | |
| **8. d)**<br>**Standardised Collateral Agreements** | **Issuers:** ETF Issuers<br>**Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>**Custodians / Risk Managers:** CCPs, 3rd Party Clearers<br>**Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Collateral agreements can be bespoke between different bank clients. If a market-wide list of securities and prices were available, it would help facilitate differences in eligibility criteria and liquidity ratings and move. This would also help standardise agreements between counterparties.<br><br>Non-cash collateral is becoming more important might be taken more widely if the liquidity risks and pricing were improved – this would be particularly helpful in the bond market. | • Funding and securities lending are not working as easily as it could be with better data.<br>• Non-cash collateral is not being taken as the risks and pricing are not well understood.<br>• Bespoke contracts create a lot of inefficiencies in the industry.<br>• Unnecessary haircuts may be taken on certain instruments. | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ○ |
| **8. e) Credit / Counterparty Risk, OTC Derivatives** | **Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds,<br>**Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, | Market participants entering into uncleared OTC derivative contracts covered by EMIR have to calculate Initial and Variation Margin. Industry practice was previously to not post Initial Margin upon execution of the contract, but now it must be posted -i.e. cannot be offset.<br>• Reg IM Commission Delegated Regulation (EU) 216/2251 is an RTS that establishes prescriptive requirements regarding the Risk Mitigation techniques referred to in Art 11 EMIR.<br>• Key amongst those requirements is the obligation imposed on BOTH counterparties entering into | Lack of a CT results in the following:<br>• The outcome of the calculations is only as accurate as the underlying sensitivities, which in turn are derived from market data<br>• The regulation establishes that both parties to the trade must validate the outcome of each other's calculation. The probability of mismatches will, therefore, increase if both parties have used different datasets to derive their sensitivities | EQ Orderbook RT ◔<br>EQ Trades RT ◔<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◔ |

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| | uncleared OTC Derivatives contracts to calculate and exchange IM upon execution of trades.<br>• Calculation of IM can be based on 2 methodologies:<br>1. Standard Methodology Approach (AKA "grid") based on a table model whereby margin is calculated per contract type as a fixed % of notional<br>2. IM Model Approach: a much more complex model that allows for the recognition of risk offsetting effects (within limits) and is much less onerous on capital, but much more complex.<br>• The industry approach has been to adopt the IM Model Approach (more specifically ISDA SIMM).<br><br>One of the key aspects of the IM Model approach is that it relies on Market Data to calculate all required correlations sensitivities (delta, gamma, vega, et.) etc. More specifically:<br>• Sensitivities must be based on continuous historical data series with a minimum duration of 3 years and a maximum duration of 5 year<br>• At least 25 % of that market data shall be representative of a period of significant financial stress<br>• Counterparties must establish procedures regarding the quality of the data used in the model, the selection of appropriate providers and the cleaning and interpolation of data.<br>There are other stringent obligations related to back-testing, monitoring, etc that also establish strict quantitative and qualitative requirements related to the underlying market data. | • All data requirements relate to historical data, which would be much harder to source and consume without consolidation. | Bonds EOD ●<br>Bonds Trades Hist ● |

## 9. Market Surveillance

**Market surveillance is required to monitor trading activity to prevent and detect manipulative or illegal trading practices by participants, and to complement real-time pre-trade checks.**

Market surveillance requirements apply to Buy and Sell-side investment firms (including venues) and regulators are also undertaking surveillance across all the markets. Participants have to monitor potential orders that could be manipulative as well as executed orders. Suspicious Transaction and Order Reports must be submitted to NCAs if a participant detects that such behaviour has taken place.

Some participants who do not directly face trading venues or which do not have electronic/algorithmic flow may be more focussed on insider trading and the misuse of material, non-public information. This could be handled manually but requires historical data.

Other firms and venues with more electronic order flow must implement a set of much more data-intense processes related to the order flow that they handle, whether on own account or on behalf of clients (i.e. agency) in order to detect potential manipulation of the market as well as looking for insider trading. This includes monitoring trading activity via algorithmic-driven models that monitor all orders (regardless of whether or not executions resulted) and trades for specific patterns. This activity relies heavily on both real-time and historical data with a low level of granularity of both potential orders and executed trades.

All approaches rely heavily on first line of defence/policy procedures such as the implementation of Chinese walls, restricted lists, strict pre-approvals and monitoring of trading activity, etc.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **9. a) Detection of Insider Trading** | • **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers<br>• **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• **Trading Venues:** Regulated Markets (RIE), MTFs, OTFs | • All participants are looking to prevent insider trading, which could take place across multiple markets to avoid detection.<br>• Buy-side firms are focused on what they sent to their brokers. Brokers are focused on the orders they receive from different clients and forward to different venues. Venues tend to look at their own data but not at data across the entire market. | Insider trading may occur without detection. Surveillance departments are taking a subset of data either from their own proprietary feeds or from data vendors, but they do not have a complete set of data.<br>• Creating historical look back data is an issue.<br>• A lack of aggregated, standardized, timestamp tolerant data makes it hard to expose insider trading identified in the Market Abuse Regulation (MAR)<br>• Consolidated timestamps may be critical in insider trading cases because they are related to when a participant may have had inside information.<br>• There is no single point to identify anomalies in the market (e.g. price spikes) and these activities are often carried out across multiple markets and jurisdictions to avoid detection. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ◑<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ◑ |
| **9. b) Detection of Market Abuse/ Manipulation** | • **Sell-**Side**:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)<br>• Trading **Venues:** Regulated Markets (RIE), MTFs, OTFs | • All participants are also looking to prevent market manipulation or abuse, particularly in electronic markets where certain trading strategies may mislead the market. This mostly falls on electronic brokers and venues to monitor.<br>• Brokers may have multiple feeds from across the market, but trading venues are the first line of defence for detecting market abuse/manipulation. The scope of their efforts is often limited solely to the activity taking place on their venue and not on a cross-market basis.<br>• Given that such illegal activities usually involve multiple venues and brokers to cover up the activity, they must be capable of monitoring across multiple venues and Markets. Data must be easily replayed in machine-readable formats. | In the absence of a single, widely available "source of the truth", any attempts to manipulate the market are more likely to succeed because the perception of activity by different observers may be biased in different ways, depending on the data sources that they use.<br>• Currently, the market surveillance departments take a subset of data, either from their own proprietary feeds or from data vendors, but they do not have a complete set of data.<br>• A lack of aggregated, standardised, timestamped data makes it hard to expose the manipulations identified in MAR. This is because there is no single point to identify anomalies in the market (i.e. price spikes) and these activities are often carried out across multiple markets and jurisdictions to avoid detection.<br>• The market can easily be manipulated or destabilized and it may not be detected or could take years to resolve (e.g. US flash crash).<br>• It is impossible to build up a picture of completely fungible instruments that are related to stocks e.g. ETFs or convertible bonds. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◔<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ◑<br>Bonds Trades Hist ● |

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| | | | • Availability of reliable historical data for lookback purposes is expensive or not consistently available and requires significant resource to rebuild cross-market activities<br>• Firms may not be able to fulfil their duties under MAR.<br>• Confidence in the ability to detect such behaviour is currently low. | |
| **9. c) Detection of Insider Trading and Market Manipulation (NCAs & Regulatory Bodies)** | **NCAs** | • NCAs and Supranational Regulatory Bodies have an overarching responsibility to ensure Market Fairness and Orderliness, which extends to the prevention/detection of manipulative/abusive behaviour by any type of market participant.<br>• NCAs may be able to rely more heavily on domestic Transaction and Position Limit reporting data for insider trading. However, this may not be sufficient to detect issues and for other types of abusive behaviour (spoofing, layering, quote stuffing etc) availability of historical pre- and post-trade data on a pan-European basis is critical.<br>• NCAs may have good quality historical market data (orderbook & trade events) from their home trading venues and investment firms, but poor-quality data (or no data at all) from trading venues and investment firms in other jurisdictions. In these circumstances, they usually resort to manually request the required market data to the NCA of the other member state, a process usually done via email and other sub-optimal processes that usually take days to conclude. There are often limits imposed on how much information they can ask for.<br>NCA's need to be able to easily replay market activity in machine-readable formats. | • The inefficiency of the process and the operational burden placed on the NCA that has to supply the data means that more often than not data sets received are smaller than required and only a subset of all requests are progressed.<br>• Information may not be available in the same format and may take considerable resources to piece it together.<br>• NCAs will often have to make compromises in terms of the cases they choose to progress due to the above implications.<br>• Confidence in the ability to detect such behaviour is currently low. | EQ Orderbook RT ●<br>EQ Trades RT ●<br>EQ EOD ◔<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ● |

## 10. Risk Management

**All stakeholders are constantly evaluating risks related to their business and endeavouring to take steps to minimise them.** Good market data is an extremely critical input.

Financial firms are generally exposed to the following four risks, each of which relies on different sets of data.

- **Liquidity Risk** looks at asset liquidity and operational funding liquidity risk. Both Buy-side and Sell-side firms review how quickly assets can be converted to cash as well as reviewing their daily cash flow. Market data, particularly volume related data, is very important to assess asset liquidity and it is usually a real-time intra-day activity.

- **Market Risk** is the risk of adverse movements due to fluctuations in interest rates, foreign exchange rates or in the prices of financial instruments e.g. equities, commodities, FX and Bonds. Where a portfolio of assets is marked-to-market, any components of the portfolio that are publicly traded must be valued based on their "market" (i.e. publicly disseminated) prices. Banks have a particular focus on market risk. New banking capital requirements known as the Fundamental Review of The Trading Book (FRTB) has two prescribed

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| | approaches for banks to calculate the market risk. These two approaches are known as the Internal Models Approach (IMA) and Standardised Approach (SA). |
| • **Operational Risk** includes the appropriateness and control of the firm-wide processes. It is indirectly influenced by market data as such data may be used to pick up discrepancies or identify errors in operational risk processes. | • **Credit Risk** is the risk incurred through exposure to counterparties and by extending credit to customers and suppliers which is constantly occurring in financial markets. |
| Market data is very important for liquidity risk and market risk but also for any modelling that is undertaken in the organisation associated with all types of risks. Given that outputs of quantitative/statistical models are directly influenced by the data inputs, their accuracy and by extension the risk of losses directly related to poor modelling will be highly influenced by the market data inputs that were fed to the model. | |

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
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| **10. a)**<br>**Liquidity Risk Management (Portfolio Managers)** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Institutional investment managers have a fund liquidity risk function that acts as a second line challenge to a portfolio manager's decisions around portfolio construction, especially with regard to risk and liquidity in the context of the fund's investment objectives.<br>It ensures that positions do not exceed certain thresholds, which, if exceeded, increase the risk that a position may not be exited within a calculated period of time without incurring a significant loss<br><br>At the outset of the investment decision, there may be a review of activity over a two to three-month period and an assessment based on liquidity risk which is based on that historic data.<br><br>However, as the trade commences there may also be a requirement for intra-day data to be able to manage major liquidity changes immediately | • Portfolio managers may over or under-invest in an instrument and inaccurately construct a fund based on the assessment of liquidity risk - this is then wrongly communicated in client communications<br>• A rush to redeem cash by investors means last man standing gets a poor deal (see Woodford scandal in the UK)<br>• The opportunity cost to issuers as one instrument may be wrongly favoured over another | EQ Orderbook RT ◑<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◑<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **10. b)**<br>**Fund Manager Risk Oversight** | **Buy-Side**: Pension Funds, OEICs/SICAVs (inc. ManCos and Fund Administrators) | Firms (ACDs, pension fund trustees, SICAV ManCos) in an oversight role provide a challenge to institutional fund managers and one part of this is to independently review portfolio construction.<br>• The firms are notionally independent of fund management companies but are in fact often heavily reliant on those same fund management companies to provide them with data (because they cannot easily access it elsewhere) so that they can play their oversight role.<br>• This potential conflict could be removed, and better challenge created if those same firms had good access to better data. | • Lack of proper oversight and ability to challenge delegated firms.<br>• Everyone relying on the same (poor) sets of data | EQ Orderbook RT ◔<br>EQ Trades RT ◔<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◔<br>Bonds EOD ●<br>Bonds Trades Hist ◑ |

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| **10. c)**<br>**Liquidity Risk Management (Sell-Side)** | • **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Risk managers look at trading positions on the trading book.<br>• There may be individual departmental risk management activities, but these will roll up to a centralised function which will be assessing the overall position of the firm<br>• A financial institution's trading book comprises assets intended for active trading. These can include equities, debt, commodities, foreign exchange, derivatives and other financial contracts.<br>• The portfolio of financial instruments in the trading book may be resold to benefit from short-term price fluctuations, used for hedging or traded to fulfil the firm's or clients' needs.<br>• The fluctuations in the trading book must be recorded daily and recognised in the profit and loss (P&L).<br>• In the case of banks, positions in the banking book are presumed to be held until maturity and valued differently<br>• The allocation of assets into the trading book has a significant impact on a firm's regulatory risk capital requirements. | • In marking to market, a" haircut" or adjustment to valuation must be made based on the liquidity (or rather "illiquidity") profile of the position.<br>• Hence, accurate assessment of liquidity will have a direct impact on Profit and Loss and overall capital requirements<br>• Accurate assessment of liquidity risk requires the availability of complete and accurate historical datasets in order to construct accurate liquidity profiles for instruments and asset classes | EQ Orderbook RT ○<br>EQ Trades RT ●<br>EQ EOD ◔<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ●<br>Bonds EOD ◑<br>Bonds Trades Hist ● |
| **10. d) Market Risk Management (General)** | • **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | Banks undertake stress testing for each desk to show that the business could be sustained in prolonged periods of stress.<br>• They are modelling multiple scenarios under stress, across all asset classes and across all the markets they trade in. They currently have EOD data on a T+1 basis. They need to see the highs and lows intra-day in a post-trade environment.<br>• Firms report that they would ultimately like this data on a real-time basis.<br>• Historical data is currently very difficult to access.<br>• Linking data currently requires manual intervention and introduces risk. | Errors arising from:<br>• Manual processing errors during data linkage process<br>• Lack of access to data available in real-time<br>• Lack of access to historic data | EQ Orderbook RT ○<br>EQ Trades RT ◑<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ◑<br>Bonds EOD ●<br>Bonds Trades Hist ○ |
| **10. e)**<br>**Market Risk - Fundamental Review of the Trading Book (FRTB) using the** | **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) | There are significant advantages for firms in using internal models to calculate their capital requirements because it may free up more capital. These models are heavily reliant on good data. Calculating risk factors for the Internal Model Approach for FRTB<br>• Banks using the IM approach to calculate market risk capital need 'real' data to calculate risk factors in FRTB's Expected Shortfall measure. The evidencing of market liquidity is based on these risk factors meeting minimum standards with respect to actual transactions and committed quote volume. The | • Banks may choose not to trade and hold certain products to avoid higher capital charges.<br>• The on-going monitoring of FRTB compliance is harder without consolidated data. There must be 24 observable prices per year or banks must revert to a standardised model.<br>• Banks may have to use standard models and may have less capital available as a result. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ◑<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ◔ |

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| | | pooling of observable transaction would reduce implementation challenges of FRTB, reduce potential capital charges and enhance the ability to perform analysis.<br>Regulators have emphasized that they would prefer banks to utilize the IM model.<br><br>The issue here is incomplete data. Under FRTB for a risk factor to be classified as modellable, there must be continuously available "real" prices for a sufficient set of representative transactions.<br>• Real data is defined as:<br>1. A price on which the institution has conducted a transaction<br>2. A verifiable price for an actual transaction between arms-length parties or,<br>3. A comingled quote<br>• There must be 24 price observations per year over the period used to calculate the expected shortfall model and a maximum period of one between consecutive price observations. FRTB allows banks to supplement their own transaction and quote data with 'real' data obtained from a third party.<br>• Risk factors that do not meet these criteria are referred to as 'non-modellable risk factors' (NMRF). They are capitalized through the calculation of a stress capital add-on measure through a stress scenario called 'Stressed Expected Shortfall". Increases market risk capital charge. | | Bonds EOD ●<br>Bonds Trades Hist ○ |
| **10. f)**<br>**Credit / Counterparty Risk,** | **Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds,<br>**Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, | Credit risk managers are concerned about exposure to individual counterparties. They may implement policies to limit exposure, for example, to counterparties below a certain credit rating or ensure that exposure is not concentrated at certain counterparties. They constantly monitor the firm's exposure.<br>• They will also be challenging the models used to calculate collateral and margin requirements (as covered in Section 8). Ideally, they would use an independent data set to challenge these models. | • The outcome of the counterparty risk calculations is only as accurate as the underlying sensitivities, which in turn are derived from market data.<br>• The probability of mismatches will increase if both external or internal parties have used different datasets to derive their sensitivities.<br>• All data requirements relate to historical data, which would be much harder to source and consume without consolidation. | EQ Orderbook RT ◔<br>EQ Trades RT ◔<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ◔<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **10. g)**<br>**Operational Risk -** | **All market participants** | Market Participants rely heavily on electronic/algorithmic systems to perform a number of key front, middle and back-office functions. Those systems rely on market data inputs to perform their | • A CT would reduce operational risk across firms by making an additional source of market data available for use in non-latency sensitive | EQ Orderbook RT ●<br>EQ Trades RT ● |

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|---|---|---|---|---|
| **Back-up Source of Market Data** | | tasks, as a consequence of which ensuring backup sources of market data is key to reduce operational risk.<br>Although a CT would not be a candidate to replace low latency feeds, it would nevertheless be appropriate for ensuring continuity in middle and back-office processes, and for most front-office functions that rely on display data. | processes, or even in latency-sensitive processes in extreme situations | EQ EOD ●<br>EQ Ord & Trades, Hist ◑<br>Bonds Trades RT ●<br>Bonds EOD ●<br>Bonds Trades Hist ◑ |

## 11. Performance Measurement, Evaluation & Attribution

**Performance Measurement, Evaluation and Attribution (PMA)** is used in all by all stakeholders in the asset management process and ultimately feeds back to Asset Allocation. It requires good data inputs to answer questions such as:

- What has been the total return?
- Where is it coming from?
- Is it attributable to Asset Class allocation or Portfolio Manager Selection?
- Which Portfolio Managers have over/underperformed?
- Is Portfolio Manager performance attributable to skill or luck?
- What level of risk has been taken to achieve this investment return?

**Index Provision**. Performance measurement and attribution is always with respect to a benchmark/index:

- Indexes are benchmarks against which to measure investment performance.
- They can be created in-house or obtained from specialised providers, some of which are owned by exchange groups.
- Components of an Index are chosen based on the type of performance that they will be benchmarking.
- They can represent a particular market, a proportion of a market, or an investment style
- Index providers require the overall data input of movements in all the instruments they are measuring or else the index is not an accurate benchmark.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement |
|---|---|---|---|---|
| **11. a) Calculation of the rate of return** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Performance measurement is only accurate as the inputs used for its calculation. Calculated rates of return will be more or less reliable based on the quality of its inputs.<br><br>Risk is usually measured as the volatility of investment returns versus benchmark returns. | • Rates of return for accounts invested in liquid and transparently priced securities may be unreliable performance indicators<br>• Rates of return for accounts invested in illiquid or less transparently priced assets are likely to be particularly suspect and/or unreliable<br>• If investment returns or benchmark returns are not calculated correctly, the risk will not be calculated correctly. | EQ Orderbook RT ◔<br>EQ Trades RT ◔<br>EQ EOD ●<br>EQ Ord & Trades, Hist ◔<br>Bonds Trades RT ◔<br>Bonds EOD ●<br>Bonds Trades Hist ◔ |
| **11. b) Index/benchmark creation and pricing** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, | Performance is a relative measure; in that it is calculated relative to a benchmark. The benchmark can be a widely distributed index (e.g. FTSE100), a custom-made basket of instruments, a target (e.g. | Reduces the accuracy with which benchmarks are priced, and by extension, the accuracy of the Macro and Micro attribution Analysis. | EQ Orderbook RT ○<br>EQ Trades RT ○ |

| | | | | |
|---|---|---|---|---|
| | OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers<br>• **Data Analytics & Benchmark Providers: Benchmark Providers**<br>• Asset Managers<br>• Portfolio Managers | Inflation + 2%), or even the reported performance of other managers.<br><br>For example, a Small Cap Portfolio Manager that has achieved a 10% return may have underperformed by 3% if the benchmark for the portfolio (say a Small Cap Index) obtained a return of 13% over the same period. The accuracy with which benchmarks/indexes are constructed and priced is of utmost importance since any inaccuracy in the pricing of the index will result in inaccurate performance measurement.<br><br>This is usually not an issue for widely disseminated or liquid indexes (e.g. CAC40, DAX, etc), it is a very real problem for custom-made benchmarks and even for some commercial indexes that include illiquid asset classes. | • This is especially critical where the benchmark/Index includes illiquid asset classes/instruments, in which case it is crucial that the data sets from which pricing data is obtained is accurate and complete, otherwise the benchmark/index might be priced based on stale data, which might lead to any of the macro/micro attribution metrics being over or under-stated. | EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **11. c)**<br>**Macro Performance Attribution** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | This is conducted at the fund sponsor level; for example, how well are the pension trustees doing at allocating funds to various managers?<br><br>It identifies how much of the total return is attributable to<br>• Asset Allocation decision<br>• Choice of "right" Portfolio / Asset Manager<br>• The manager's style as opposed to his "active" decisions<br><br>There are three main inputs to Macro Attribution:<br>• Allocations to Asset Classes and Weights<br>• Benchmark Returns (for Asset Classes, Market Indices, Investment. Styles)<br>• Fund Returns | • The accuracy of with which Benchmarks and Funds are priced is of utmost importance since any inaccuracy in the pricing will unavoidably result in an inaccurate measurement of performance at the corresponding level.<br>• The accuracy of financial instrument pricing is highly correlated with its liquidity hence. Accurate pricing of illiquid instruments/Asset Classes is dependent on the amount and accuracy of available data.<br>• Lack of a CT reduces the accuracy with which benchmarks, asset class, Instrument, and by extension, portfolio returns are calculated | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ◔<br>Bonds Trades RT ○<br>Bonds EOD ○<br>Bonds Trades Hist ○ |
| **11. d)**<br>**Micro Performance Attribution – Equities** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Micro Performance Attribution is performed at the Portfolio/Investment management level and identifies how much of the Investment Manager's return is attributable to each of the following decisions:<br>• Decision to invest (or not) in specific sectors<br>• Decision to invest in specific securities (i.e. superior ability to pick stocks)<br>• Decision to be over/underweight in specific sectors and securities<br>• Timing of trades (residual)<br><br>It is performed at the Investment / Portfolio Manager level.<br><br>The inputs for Micro Attribution are: | • The accuracy with which benchmarks are priced is of utmost importance since any inaccuracy in the pricing will unavoidably result in an inaccurate measurement of performance at the corresponding level.<br>• The accuracy of financial instrument pricing is highly correlated with its liquidity hence. Accurate pricing of illiquid instruments/Asset Classes is dependent on the amount and accuracy of available data.<br>• Lack of a CT reduces the accuracy with which benchmarks, asset class, Instrument, and by extension, portfolio returns are calculated | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ○<br>Bonds EOD ○ |

| | | | | | |
|---|---|---|---|---|---|
| | | • Allocations to Sectors and Weights<br>• Individual Instrument Returns<br>• Benchmark Returns<br>The accuracy with which benchmarks are priced is of utmost importance since any inaccuracy in the pricing will unavoidably result in an inaccurate measurement of performance at the corresponding level.<br><br>The accuracy of financial instrument pricing is highly correlated with its liquidity hence. Accurate pricing of illiquid instruments/Asset Classes is dependent on the amount and accuracy of available data. | | Bonds Trades Hist | ○ |
| **11. e)**<br>**Micro Performance Attribution - Fixed Income** | • **End Investors**: Direct Retail Customers<br>• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers | Fixed Income Micro Performance Attribution is performed at the Portfolio Manager level, and its main objective is to assess whether a Fixed Income investment manager is doing a good job, and identifies how much of the Investment Manager's return is attributable to each of the following decisions:<br>• How well does the manager predict changes in the yield curve?<br>• Is the manager skilled at identifying outperforming sectors or rating tiers (quality)?<br>• Is the manager skilled at picking winning bonds?<br>• Can the manager add alpha through trading activity (residual)?<br><br>Inputs for FI Micro Attribution are:<br>• Yield Curves<br>• Allocations to Sectors and weights<br>• Individual Instrument Returns<br>• Benchmark Returns | • The accuracy with which benchmarks are priced is of utmost importance since any inaccuracy in the pricing will unavoidably result in an inaccurate measurement of performance at the corresponding level.<br>• The accuracy of financial instrument pricing is highly correlated with its liquidity hence. Accurate pricing of illiquid instruments/asset classes is dependent on the amount and accuracy of available data.<br>• Lack of a CT reduces the accuracy with which benchmarks, asset class, Instrument, and by extension, portfolio returns are calculated | EQ Orderbook RT | ○ |
| | | | | EQ Trades RT | ○ |
| | | | | EQ EOD | ○ |
| | | | | EQ Ord & Trades, Hist | ○ |
| | | | | Bonds Trades RT | ○ |
| | | | | Bonds EOD | ● |
| | | | | Bonds Trades Hist | ● |

## 12. Regulatory Oversight/Policy

Regulatory oversight refers to the ongoing process whereby NCAs and supranational regulatory entities (such as ESMA) perform their supervisory duties and identify forthcoming regulatory requirements based on stakeholder feedback and empirical data from the market. This includes:

**Monitoring Systematic Risk:**

- Trade, Transaction and Position Limit reporting requirements
- Clearing and trading obligations
- Margining requirements for OTC Derivatives (Reg IM)
- Stricter capital requirements (FRTB)

**Market Transparency**:

- Market Abuse & Surveillance
- Pre- & Post-trade transparency obligations for Trading Venues and Investment Firms

**Market Orderliness:**

- Enforcement of liquidity provision schemes for HFT/algorithmic trading firms
- Identification of algorithmic orders

These are all dependent on accurate and complete market data. In addition, firms would also benefit from the use of a standard data source: this would simplify the processes needed to demonstrate compliance

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement | |
|---|---|---|---|---|---|
| **12. a) Update of regulatory metrics/thresholds** | **NCAs** | Regulators need to make calculations to define and maintain regulatory thresholds and obligations. Examples that ESMA undertake include:<br>• RTS1: Determination of the trading venue that is the most relevant market in terms of liquidity.<br>• RTS2: Classes of Bonds not having a liquid market, pre-trade and post-trade SSTI and LIS thresholds.<br>RTS1:<br>• Average Daily Trading Volume for the purposes of:<br>  • Identifying the size of orders that are Large in Scale.<br>  • Applying deferred publication thresholds and delays for shares and depositary receipts based on transaction sizes.<br>• Average value of transactions for the purpose of determining the Standard Market Size.<br>• Deferred publication thresholds and delays for shares and depositary receipts.<br>RTS2:<br>• Classes of Bonds (except ETC, ETNs) not having a liquid Market requires following metrics:<br>  • Average Daily Notional Amount.<br>  • Average Daily Number of Trades.<br>  • % of days traded over the period considered.<br>• Bonds (except ETCs, ETNs), SFPs pre-trade and post-trade SSTI and LIS thresholds, Size Specific to the Financial Instrument.<br>  • Normal Market Size.<br>  • Large in Scale compared with Normal Market Size.<br>  • Trade size below which lies the % of transactions corresponding to the trade percentile for each bond type, to determine pre-trade SSTI, pre-trade LIS, post-trade SSTI, post-trade LIS.<br>  • Threshold values below which SSTI will not be applied when the number of transactions is < 1000. | • Incorrect calculations of metrics/thresholds by ESMA (in these examples) to ensure that they are aligned with current market dynamics based on a consolidated set of data feeds.<br>• Regulators have to overcome data quality and integrity issues. This makes it harder to ensure the full accuracy of the updated threshold values.<br>• No guarantee of the accuracy of the underlying data from which the thresholds are re-calculated and by extension the possibility of thresholds being biased.<br>• Inefficient use of resources at regulators.<br>• Increased requirement for regulators to have data manipulation skills. | EQ Orderbook RT | ○ |
| | | | | EQ Trades RT | ○ |
| | | | | EQ EOD | ○ |
| | | | | EQ Ord & Trades, Hist | ● |
| | | | | Bonds Trades RT | ○ |
| | | | | Bonds EOD | ● |
| | | | | Bonds Trades Hist | ● |
| **12. b) Ongoing monitoring of** | **NCAs** | A number of Regulatory provisions require the on-going monitoring of certain metrics in order to check whether certain conditions are met. | • Like other stakeholders, regulators have to overcome data quality and integrity issues to try to consolidate data. This makes it harder to | EQ Orderbook RT | ○ |
| | | | | EQ Trades RT | ○ |

| | | | | |
|---|---|---|---|---|
| **regulatory requirements** | | For example, the double-volume cap mechanism by which trading of shares in Dark Pools is capped at 4% at individual venue level and 8% globally implies the ongoing monitoring of traded volumes both inside and outside of trading venues. | ensure the completeness and accuracy of the values being monitored.<br>• The volume cap may be triggered incorrectly depending in the completeness and accuracy of the feeds being consolidated.<br>• Accuracy of data is not currently guaranteed the accuracy of the underlying data from which the thresholds re re-calculated and by extension would reduce the possibility of any of those thresholds being biased. | EQ EOD ○<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **12. c)**<br>**Cross-market scenarios involving NCAs** | **NCAs** | Supervisory activities can involve cross-border scenarios that require the sharing of data between NCAs.<br>NCAs tend to have access to data (orderbook & trade events) from their home market trading venues and investment firms, but poor-quality data (or no data at all) from trading venues and investment in other member states. In these circumstances, they usually request the required market data from the NCA of the other member state. This process is usually done via email and usually takes days to conclude.<br>A CT, and more specifically, historical orderbook and trade events would eliminate this burden and have a direct and significant positive impact on the NCAs' capabilities relating to on-going supervisory activities. | • The inefficiency of the process and the operational burden placed on the NCA that has to supply the data means that data sets received are often smaller than would be ideal and that only a subset of all requests is progressed.<br>• It also means that in order to avoid putting that burden on the other NCA, the requesting NCAs will often have to make compromises in terms of the cases they choose to progress due to the above implications. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ○<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |
| **12. d)**<br>**Forthcoming regulatory proposals** | **NCAs** | National and Supranational regulatory bodies, as part of their oversight functions, need to identify any gaps between the expected and actual outcomes of implemented policies and implement any required changes in order to close or narrow those gaps.<br>Quite often, the implementation of regulation results in unintended consequences that defeat the aim of the regulation.<br>For example, stricter pre-trade transparency requirements in MIFID2/R have resulted in a substantial increase of trading models potentially aimed at circumventing pre-trade transparency (e.g. the increase in ad-hoc/random auctions in parallel with continuous trading sessions) | • The lack of a reliable, complete and normalised source of market data that contains all the required attributes for effective oversight of market activity makes it much more difficult to get a clear picture of the" what", "where", " how" and "why" of the observed activity, and therefore substantiate any proposals. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |

| | | | | |
|---|---|---|---|---|
| **12. e) Harmonised implementation of regulatory requirements** | **NCAs** | There are a number of regulatory requirements related to the notification of events where the current implementation is inefficient and often results in disorderly trading conditions.<br><br>An example of this is the handling of regulatory trading halts.<br><br>The regulatory requirement related to dissemination of trading halts states that:<br><br>"It is important to ensure a proportionate application of the notification requirement. After being notified of a temporary halt in trading, the competent authority is obliged to assess whether that notification is to be disseminated to the rest of the market and to coordinate, where necessary, a market-wide response..."<br><br>A CT that is widely disseminated to the market would enable the instantaneous and widespread distribution of any events that require efficient, immediate market-wide dissemination and ensure that this information is available to all market participants at the same time (including other Trading Venues, SIs, etc) | • The increasingly fragmented market means that a declaration of a trading halt by a venue has repercussions across all other Trading Venues (widening of spreads, loss of liquidity, etc).<br>• However, widespread dissemination of this information is inefficient (usually by phone or email) which results in market participants not knowing about the event at the same time and creating the possibility of disorderly market conditions. | EQ Orderbook RT ○<br>EQ Trades RT ●<br>EQ EOD ○<br>EQ Ord & Trades, Hist ○<br>Bonds Trades RT ●<br>Bonds EOD ○<br>Bonds Trades Hist ○ |
| **12. f) Regulatory oversight** | **NCAs** | The current regulatory requirements require a number of periodic disclosures by investment firms, trading venues and other stakeholders.<br><br>By way of example, RTS 27 & 28 requires the disclosure of certain execution statistics<br><br>Although the onus is on those firms to disclose this information, regulators may from time to time want to audit the accuracy of those disclosures. | The lack of a reliable, complete and normalised source of market data means that any challenge by regulators, or any other stakeholder willing to challenge the accuracy of the disclosed data, is much more difficult, and by extension, more time consuming and expensive to resolve. | EQ Orderbook RT ○<br>EQ Trades RT ○<br>EQ EOD ●<br>EQ Ord & Trades, Hist ●<br>Bonds Trades RT ○<br>Bonds EOD ●<br>Bonds Trades Hist ● |

## 13. Audit

All firms are subject to external audit review. The availability and use of a standard source of prices simplifies the external review process for auditors of financial markets firms.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement | |
|---|---|---|---|---|---|
| **13. a) Audit Oversight** | **Auditors** | The availability and use of a standard source of prices would simplify the audit process and reduce time and effort for all involved.<br><br>Independent review of valuation processes by 3rd line controls is dependent on accurate price data. | The lack of a reliable, complete and normalised source of market data means that independent challenge by auditors:<br>• May not be genuinely independent, if the data is from the same original source as the company being audited uses (which may be the only way to get some data but is not the "official" data)<br>• Is more time consuming and expensive than it would be if the same, standard source were used | EQ Orderbook RT | ○ |
| | | | | EQ Trades RT | ○ |
| | | | | EQ EOD | ○ |
| | | | | EQ Ord & Trades, Hist | ● |
| | | | | Bonds Trades RT | ○ |
| | | | | Bonds EOD | ○ |
| | | | | Bonds Trades Hist | ● |

## 14. Improving Environmental Practices

All firms are increasingly reviewing their impact on the environment. In financial markets, data processing is one area of focus.

| Use Case ID | Stakeholder Data Users | Use Case | Impact of Lack of Consolidated Tape | Level of Requirement | |
|---|---|---|---|---|---|
| **13. a) Helping to Achieve Environmental Action Policies** | **All** | • Financial market data processing requires significant data centre usage across Europe.<br>• Data centres use electricity, generate carbon emissions and constantly have to update their hardware which means that they annually purge metric tons of hardware.<br>• All firms are now seeking ways to reduce their impact on the environment. | • Multi-layered and multi-lateral data processing arrangements exist to clean, process and store disparate data sets, using far more data centre capacity than is necessary and contributing to carbon emissions and hardware waste. | EQ Orderbook RT | ● |
| | | | | EQ Trades RT | ● |
| | | | | EQ EOD | ● |
| | | | | EQ Ord & Trades, Hist | ● |
| | | | | Bonds Trades RT | ● |
| | | | | Bonds EOD | ● |
| | | | | Bonds Trades Hist | ● |

# A7 / SROS: THE FOUNDATIONS OF DATA GOVERNANCE

## AN INTRODUCTION TO SELF-REGULATORY ORGANISATIONS

In North American markets Self-Regulated Organisations (SROs) have a significant role in aggregating and consolidating data.

The genesis of self-regulated entities in financial markets was as member-owned, mutual organisations, such as stock exchanges or dealer associations, which needed a mechanism of direction and control of their members.

In the US, they originally regulated themselves, without any need for further oversight. However, as North American markets evolved and financial regulation developed, the role of self-regulated entities was formalised into the law and they became SROs.

SROs have increasingly come under the oversight of public regulators and thus to avoid increased regulation they have an incentive to be effective when enforcing their own member rules. Nevertheless, whether through past failings, market events or potential conflicts, the weight of regulation and regulatory oversight has increased over time. In this respect, they now partner and comply with public regulators to enforce not only their own member rules but also to ensure compliance with regulations that have subsequently been more widely introduced. Additionally, they have a long history of acting as data aggregators and disseminators, and so the evolution of SROs and the automation of systems and data dissemination are inextricably interlinked.

In the US and Canada, the SRO and regulator relationships have endured and developed over time as the industry and government agendas changed. Indeed, at various points in time, the symbiosis between these agendas has become a driving force for change but there are also conflicts to be resolved.

Europe also has self-regulated entities, but they are not formalised in MiFID II, nor do they have the power to act like SROs and enforce national or pan-European laws.

## A7.1 SROS AND THEIR ROLE IN THE EVOLUTION OF US MARKETS[1]

In the US, market-led, regulated entities in the form of exchanges were being run by their members without regulatory oversight until the 1930s when reform was needed to address market failures at the time of the Great Depression. Amongst other legislation passed in the wake of this economic catastrophe, the Securities Exchanges Act of 1934 enforced self-regulated entities, which included all of the regional exchanges in the US, to be registered with the SEC as "national securities exchanges", and, under the SEC's oversight, enforced compliance from their trading members with their own rules as well as the federal securities laws.

Initially, OTC dealers were not covered by the Act and were left relatively unregulated. These had their own separate member association, the Investment Bankers' Association of America (IBAA). This changed four years later in 1938 (amidst a further recession) when an extension to the Securities and Exchange Act (1934), The Maloney Act, was approved to permit SROs of OTC firms to directly govern and punish their members, though subject to government supervision. The Maloney Act provided for the evolution of the IBAA into the National Association of Securities Dealers (NASD) and quickly gained a large number of members.

1 SEC Historical Organisation: The Institution of Experience: Self-Regulatory Organizations in the Securities Industry, 1792-2010. http://www.sechistorical.org/museum/galleries/sro/sro06g.php

### A7.1.1. SRO and Regulator Co-Operation is Established

From 1938, the NASD and the SEC co-operated to slowly build up a body of administrative law. The NASD also evolved a set of disciplinary processes and procedures for its members. The Maloney Act (1938) gave the NASD the right to access member books and records and required it to investigate misconduct and impose discipline through sanctions, including censures, fines, suspensions and expulsions.

Initially, the NASD had operated on a shoestring budget with volunteers, but later membership fees were raised and the budget expanded. By 1973 the NASD had 400 staff members. Using new technology, it also started to disseminate over-the-counter (OTC - i.e. off-venue) market prices to the public but from the 1960s onwards there had been complaints that this information to the wider public was neither consistent nor accurate.

The SEC wanted the public to see the actual best bid and offer quote information, as well as the final prices of a trade. A new computerized network was conceived to provide prices in real-time and perhaps even automatically match customer orders. As the NASD oversaw this market, it seemed natural that they should run the proposed computer system and so, in 1971, the NASD Automated Quotation System (NASDAQ) was born.

### A7.1.2. SEC Oversight of SROs Grows, as Conflicts of Interest Show

Around the same time, NYSE was engaging in anti-competitive behaviour by banning the listing of its stocks on regional exchanges and so further reforms led to the Securities Act's Amendments of 1975. These amendments expanded the SEC's role in overseeing SROs' powers of enforcement and discipline, and authorized the SEC to initiate, as well as approve, SRO rulemakings. The amendments also required SROs to include outside representatives on their boards of directors, thus extending the federal government's reach into the structure of SRO governance.

The 1975 amendments impacted both exchange-led and dealer-led SROs. The NASD's status as the sole SRO for securities dealers was enshrined by barring the creation of the regional associations that had once been anticipated by the Maloney Act. The amendments also took into account advancements in technology and empowered the SEC to effect the unification of an increasingly fragmented securities market into a "national market system", which led to the consolidation of quotes from all the dealers. **The governance of the consolidated tape was given to the SROs under the SEC's supervision.**

The creation of NASD's automated quote system, NASDAQ, gave the NASD an unusual dual SRO status, as both a member regulator and a market regulator. NASDAQ's success led to concerns about conflicts of interest and in the 1990s, an SEC and Department of Justice review led to a recommendation to separate the electronic system from the NASD's regulatory functions. The NASD undertook to separate its market activities from its self-regulatory function as well as to provide for greater non-industry representation on its board and policy committees. In 1996, the NASD reorganized as a parent holding company, with NASD Regulation, Inc. (NASDR) and The Nasdaq Stock Market, Inc. (Nasdaq) as subsidiaries.

### A7.1.3. Supervisory Roles Clash with SROs' Growth as Exchanges

A year later in 1997, the SEC implemented new order handling rules that impacted the entire industry and introduced the possibilities for more competitive matching of buy and sell orders electronically through central limit order books (CLOB), which meant a new type of pre-trade data was becoming available for consolidation. Nasdaq's quoting system was under threat and it also seemed that for Nasdaq to compete and change as a market, it would need to move away from the influence of its members and find the flexibility and capital to grow. The NASD announced that it would spin Nasdaq off as a private company and the NASD would focus solely on the business of self-regulation. This left the NASD to rethink its purpose as the largest SRO in the industry.

NYSE was also undergoing a period of change and thinking about global expansion and these forces ultimately led to the privatisation and floatation of the exchange. As such, NYSE also split its regulatory functions from its market. From 2000 onwards, exchanges in the US started to list as public companies and gradually transferred responsibility for member firm regulation, sales practice enforcement and market surveillance for OTC dealer flow to the NASD. However, there was little thought given to redefining the role of the SROs and the exclusive responsibilities that they had for aggregating data and playing a role in the

governance of the consolidated tape which they retained. The impact of the new for-profit models on the previous mutual governance structure of the tape and the impact that it might have on the new competing venues was overlooked.

### A7.1.4. The Era of FINRA

In 2007, the SEC approved the consolidation of NASD and NYSE's regulatory subsidiaries to create the Financial Industry Regulatory Authority (FINRA), to operate under SEC supervision[2] FINRA is authorized by Congress to protect America's investors by making sure the broker-dealer industry operates fairly and honestly. It is a not-for-profit entity and remains an SRO.

It now plays a key role in the governance, aggregation and dissemination of data in both debt and equity markets. It also undertakes cross-market surveillance in equities and bonds. In equities, in coordination with the exchanges, it now covers 99.5 percent of US stock market trading volume and about 65 percent of US options trading activity.

Any firm or individual that conducts securities transactions and business with the investing public in the US must be registered with FINRA. Firms must apply and meet certain criteria in order to become a FINRA registered broker-dealer.

FINRA now processes and monitors an average of 37 billion stock and options quotes, trades, orders and related market events every single day. That is nearly 68 million events every minute and 1.1 million events every second of the trading day, occurring across many different trading venues. It uses machine learning and pattern detection to find anomalies.

## A7.2. MEMBER REGULATED ENTITIES IN EUROPE[3]

Historically, Europe has had many member-owned stock exchanges, originally organised on a national basis but their role has not been formalised in law. The idea of dealer-led, member-regulated entities has not prevailed as the dealer culture has not been part of the evolution of many European markets, nor had there been any mandate to consolidate dealer quotes or central limit order book business (CLOB) across Europe. Each market evolved differently depending on their investment culture.

### A7.2.1. Member-Owned, Domestic Exchanges Had No Need for SROs: Lessons from the LSE

In the UK, the London Stock Exchange (LSE) was a market that was completely intermediated by dealers using a quote-based electronic system in the 1980s and then to a CLOB in the late 1990s. As a quote-driven market, the LSE already played the key role in incorporating quotes and negotiated trades into its rules, ensuring the data it gathered and disseminated before a CLOB became the accepted way of trading and reporting trade data for equities. This requirement was mandated to all its members, which alongside a similar requirement for reporting post-trade data, allowed the LSE to collate an entire set of pre- and post-trade consolidated data for the market.

When CLOB trading was introduced, the LSE disseminated its order event information from the CLOB as well as the post-trade data which included the off-order book trades that members were still obliged to report to it. The market had no need for another regulated entity to manage dealers because, as the LSE was the dominant market, all dealers were subject to the LSE rules. Members who wished to do business within the UK wanted to comply with the rules and the exchange had enough authority to enforce proper trade reporting standards on its members.

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2 https://www.sec.gov/news/press/2007/2007-151.htm
3 Based on MSP's knowledge and practical experience of European market structure.

### A7.2.2. Disregarding the Dealer's role

Other European markets did not have the same history of member-owned dealer-markets where technology allowed quotes to be centralised but negotiations could take place outside of the system, (albeit under the rules of the exchange, which included ensuring these trades were reported to the exchange).

In some markets, exchanges were much more nascent organisations, many of which had only recently been spun off from government ownership in the 1990s and many immediately adopted the recent trading system advances to implement central limit order book technology without establishing quote driven markets, rules and data gathering methods for negotiated trades. In France, for example, dealer markets were discouraged so the issue of data aggregation outside of the market was not considered. In Germany, dealer markets existed outside of the exchanges to intermediate large trades, but the flows were never reported to the market.

During this time, European exchanges also became private, for-profit companies but the role of exchanges in managing, consolidating and governing data for the stakeholder community was not addressed.

### A7.2.3. MiFID I, Market Fragmentation and Unregulated Data Governance

When MiFID I came into effect in 2007 it created pan-European competition in both trading and trade reporting. Exchanges still had authority over members for CLOB trading, but dealers now had a choice about where to report their OTC trades. This introduction of competition in post-trade reporting meant that the LSE lost its leverage to enforce data standards on post-trade reporting activity that was reported elsewhere.

The new data aggregators were commercial, mainly unregulated entities with no formal membership concept or any sort of cooperative public and private partnership role with the regulator. These market data aggregators had no ability to impose penalties or enforce standards for poor data quality.

The natural self-interest of these for-profit firms resulted in a focus on commercial products that they sold to the same customers that were reporting data to them. If customers did not like dealing with them, then they had other aggregators that they could choose to report to and thus meet their regulatory obligations. In short, the aggregators had little or no leverage over their customers to enforce reporting requirements or standards. Post-MiFID II these data aggregators have morphed into Approved Publication Arrangements (APAs), which are now formally regulated but the same issues persist with a lack of membership and rules for members to follow, alongside a commercial disinterest in enforcing rules in the first place.

## A7.3. LITERATURE FINDINGS ON SELF-REGULATION

IOSCO[4] and the World Bank[5] have previously undertaken studies to review the effectiveness of self-regulation. They have found that there is no clear international definition of self-regulation but that it typically involves a unique combination of private interests with government oversight. IOSCO has also concluded that SROs can be a valuable component to the regulator in achieving the objectives of securities regulation and that the efficacy of self-regulation can be a valuable complement to regulators in achieving their objectives.

Self-regulation in Europe (except in the UK) has never been extensive because of its civil law system and cultural approach to government supervision of financial business.

4 IOSCO Board (May 2000), *"Model For Effective Regulation"*, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD110.pdf

5 World Bank: Carson J. (2011), *"Self Regulation in Securities Markets", see Main Study Bibliography*

# A8 / US EQUITY DATA CONSOLIDATION FRAMEWORK

## A8.1. LEGISLATION

### A8.1.1. Foundational Legislation

The legislation that underpins the lead up to the consolidation of data in the US is The Securities Exchanges Act of 1934. This gave the SEC oversight of exchanges that had previously been self-regulated organisations (SROs) outside of the SEC's authority. From this point on, the law enforced the exchanges to comply with their own rules as well as the federal securities laws. Four years later, an amendment was made to also bring dealer-based SROs under the same SEC legislation so that they also had to comply with the laws as well as their own rules.

### A8.1.2. The Mandate for a Consolidated Tape

In the 1960/70s there was growing concern in Congress and the SEC about the lack of efficiencies and competition in the markets, particularly regarding whether investors were getting the best price to transact at. The US equity market had become quite fragmented due to the proliferation of regional exchanges, with the same stock sometimes trading at different prices across various trading venues.

Through an amendment to the Securities Exchange Act (Section 11A) in 1975, Congress directed the SEC to facilitate the establishment of a "national market system" (NMS) to link together the multiple individual markets that trade securities. At this point, there was no electronic matching of trades. Floor trading took place at NYSE and NASDAQ was an OTC quoting system run by dealers rather than an exchange in its own right. Congress' intention was for the SEC to push the underlying SROs to take advantage of opportunities created by new data processing and communications technologies to preserve the strength of the securities markets. Among its objectives was the protection of investors and the maintenance of fair and orderly markets by ensuring the availability of core data at reasonable fees[6] with respect to quotations and transactions.[7]

### A8.1.3. Regulation National Market System (Reg NMS)

Section 11A of the Securities Exchange Act authorizes the SEC, by rule or order, to authorize or require the SROs to act jointly on matters for which they share authority under the Act in planning, developing, operating or regulating a facility of the NMS.[8] In 2005 the SEC issued its release adopting Regulation National Market System (Reg NMS). This rule was intended to ensure that investors received the best price for order execution by encouraging competition in the marketplace as a whole, and amongst individual markets, for orders to promote efficient, fair price formation across securities markets.

Key rules included in Reg NMS are Rules 600, 601 and 603. These rules amended existing rules and NMS plans governing the dissemination of market data, therefore controlling how exchanges charge for access to data on quotations and orders.[9] Rule 603 of Regulation NMS requires SROs and now FINRA (formed from NASD and NYSE Member Regulation), to provide certain quotation and transaction data for each NMS stock to securities information processors (SIPs) who are responsible for the "dissemination of consolidated information" of "core data" (see detail below) including a national best bid and national best offer, on

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6 See infra note 27 and accompanying text (defining "core data").
7 See 15 U.S.C. 78k-1(a)(1)(C).
8 15 U.S.C. 78k-1(a)(3)(B).
9 SIFMA Insights (July 2018), *"US Equity Market Structure Primer"*, available at https://www.sifma.org/resources/research/equity-market-structure-primer/

quotations for and transactions in NMS stocks.[10] It also requires regulatory data (see detail below) that informs the market about the status of the market.

### CORE DATA

Core data for each NMS security consists of three components:

1) last sale reports, which include the price at which the latest sale of the security occurred, the size of the sale and the exchange where the execution took place;
2) the current highest bid and lowest offer for the security, along with the number of shares available at those prices, at each exchange; and
3) the "national best bid and offer," or NBBO, which is the highest bid and lowest offer currently available on a US exchange and the exchange(s) where those prices are available.

All other data distributed by exchanges is considered "non-core data." Exchanges are not currently required to make non-core data available to central data processors for consolidation pursuant to joint industry plans and are permitted to sell directly to participants for a fee.

### REGULATORY DATA

The SIP is also relied upon to collect, calculate and disseminate certain regulatory data. This includes information required by the NMS Plan to address Extraordinary Market Volatility ("LULD Plan"), information related to regulatory halts and market wide circuit breakers and short sale restrictions. The LULD plan is designed to prevent trades in NMS stocks from occurring outside specified price bands, which are set at percentage levels above and below a specified reference for an NMS stock.

## A8.1.4. Regulatory Obligations That Drive Use of The Tape

Use of the tape is driven by two rules:

### *The Vendor Display Rule*

- Rule 603 (c) of NMS known as the "Vendor Display Rule" requires broker-dealers to display to customers any information regarding quotations for, or transactions in, an NMS stock at the time an order is routed or at the time a trading decision is made. More specifically, it requires a consolidated display that includes (1) the prices, sizes and market centre identifications of the national best bid or offer and (2) the most recent last sale information.[11]
- Recently, FINRA released a guidance notice emphasizing their position stating that: "relying solely on a market data product that is limited to a particular market or markets to provide quotation information to customers will not suffice for a firm in meeting its obligations under the Vendor Display Rule."[12]

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10 Core data is defined in the regulation.

11 "Consolidated display" is defined to mean "(i) The prices, sizes and market identifications of the national best bid and national best offer for a security; and (ii) Consolidated last sale information for a security." 17 CFR 242.600(b) (13). "Consolidated last sale information" means the price, volume and market identification of the most recent transaction report for a security that is disseminated pursuant to an effective national market system plan. *See* 17 CFR 242.600(b)(14).

12 SEC Regulatory Notice 15-52

### *Order Protection Rule*

- Broker-dealers are required to respect the 'Order Protection Rule' (OPR)[13] (in the same way as Canada). The OPR applies to on/off-exchange stocks and is designed to prevent trade-throughs or trades executed at prices other than the best-quoted price for that security.[14] Under this rule, when investors place an order, it must be matched at the best publicly available and automatically accessible price. This means that market participants must monitor all prices on all available venues regardless of the liquidity available on the marketplace. The 'Access Rule' (Rule 610) was introduced at the same time as the OPR and addresses the responsibilities of trading centres to provide fair and non-discriminatory order execution access to their quotations. The rule established a limit on access fees to harmonize the pricing of quotations across different trading centres.[15]

## A8.1.5. Best Execution

- It is a longstanding principle that a US broker-dealer has a legal duty to seek to exercise reasonable care to execute a customer's order in a way to obtain the most advantageous terms for a customer.
- FINRA has a rule (5310) which requires that in any transaction for, or with, a customer, or a customer of another broker-dealer, a member and persons associated with a member, shall use reasonable diligence to ascertain the best market price for the subject's security, and buy or sell in such market so that the resultant price to the customer is as favourable as possible under prevailing market conditions.
- Rule 605 under Regulation NMS specifically mentions execution price and speed as determinative inputs for best execution, however, FINRA has made clear that factors such as the character of the market for the security (e.g. price, volatility, relative liquidity and pressure on available communications), the size of the transaction, the number of markets checked, accessibility of the quotation and the terms and conditions of the order which result in the transaction should also be considered.
- Since the OPR puts emphasis on price and time to prevent trade-throughs (where the best price is bypassed), these factors are often over-emphasized in best execution analysis and in effect, the exchanges have taken on the burden of ensuring best execution. There has been debate in the US and Canada on whether the OPR inhibits certain trading behaviour that may have otherwise achieved best execution and if the OPR should be replaced with stronger, more clearly defined best-execution obligations. SEC personnel have conveyed in recent speeches that further analysis is needed to determine the right balance between OPR and best execution obligations.[16]
- There is also industry debate questioning if the SIP is robust enough to prove best execution.[17] Asset managers and broker-dealers interviewed explain that the SIP is too slow and because of the lag, they will rarely use the SIP feed for their trading algorithms. Others cited that the content of SIP data is too narrow compared to proprietary feeds. Key analytical factors such as imbalances and odd lots are seen as important differences between SIP and proprietary feeds, but this data is not included in the SIP.

## A8.1.6. Additional Transparency Rules

Additionally, the US has addressed market fragmentation with the SEC's 2001 implementation of new rules to increase the public visibility of execution quality.[18] SEC Rule 605[19] requires US market centres to publish monthly reports that include uniform statistical measures of execution quality. To facilitate comparisons

13 Rule 611 under the Securities Exchange Act of 1934 ("Exchange Act").
14 SEC Rule 611 (17 CFR § 242.611)
15 17 CFR PARTS 200, 201, 230, 240, 242, 249, and 270
16 SIFMA, Market Structure Debrief, 2019
17 SIFMA, Market Structure Debrief, 2019
18 In 2001, the SEC issued rule 11Ac1-5 and 11Ac1-6
19 SEC IIAc 1-5, Also known as rule 605

across trading venues (known as market centres), the Rule adopts basic measures of execution quality, such as effective spread, rate of price improvement, fill rates and speed of execution, and sets forth specific instructions on how the measures are to be calculated. Furthermore, the SEC requires broker-dealers to disclose order routing information, including any data on payment for order flow on a quarterly basis. (Rule 606).[20]

The intent behind these rules is to give all public investors tools to make more informed decisions. In November 2018, the SEC amended Rule 606 requiring broker-dealers to provide enhanced disclosure requirements regarding the handling of their client orders. The amendments seek to address the perceived conflict between broker-dealers' venue selection and the best interests of the client in any given order.[21] The amendments to Rule 606 introduce the concept of 'held orders' and 'not held orders.' Not held orders are NMS stocks that are executed immediately. Typically, not held orders are customer orders in NMS stock that provide a broker-dealer with price and time discretion in the handling of such orders. Broker-dealers, upon request of a customer, must provide an order handling report of the customer's NMS stocks submitted on a 'not held' basis for a period of six months subject to two *de minimis* exceptions.[22] Disclosure requirements for 'held orders' have been enhanced and include more detailed information on limit orders and payment for order flow.[23]

## A8.2. FEATURES OF US MARKET STRUCTURE AND CONSOLIDATED TAPE FRAMEWORK

### A8.2.1. Oversight and Tape Structure

The purpose of the SIP is to aggregate the best bid and offer quotes and trades for all US exchanges and to create a universal public feed. It is also relied upon for certain regulatory information such as trading halts and short sale restrictions.

As a result of the legislative changes in 1975, the market has been organised into a number of plans and tapes that organise, aggregate, publish and govern the collection and dissemination of data.

The Consolidated Tape Association (CTA) sits underneath the SEC and oversees the dissemination of real-time trade and quote information. The CTA runs Plans that govern the collection, processing and dissemination of trade and quote data. Two Plans exist for listed securities data, the Consolidated Tape System (CTS) Plan and the Consolidated Quote System (CQS) Plan. There is also a third Plan for Unlisted Trading Privileges (UTP).

### A8.2.2. Operational Framework

From an operating perspective, three separate networks or tapes currently collect, consolidate and disseminate SIP Data: Tape A, Tape B and Tape C. Tape A is comprised of NYSE listed securities. Tape B is primarily all corporate stocks and ETFs listed outside of NYSE and Nasdaq. Tape C consists of Nasdaq-listed stocks. The aggregation of the data on behalf of the plans is managed by two exchanges/SROs; NYSE (which is now owned by Intercontinental Exchange, ICE) which operates Tape A and Tape B and Nasdaq which operates Tape C.

20 SEC, IIAc1-6, Also know as Rule 606
21 https://www.sec.gov/tm/faq-rule-606-regulation-nms
22 SEC 606(b)(3), The Rule came into Effect – September 2019
23 SEC 606(a)

Figure C: Operational Tape in the US.

| # | Plan | Listed Securities | Operated by | Data collected and Disseminated | Tape (Network) |
|---|---|---|---|---|---|
| 1 | **Consolidated Tape Association Plan (CTA Plan)** | NYSE | NYSE/ICE | Last sale information | A & B |
| 2 | **Consolidated Quotation Plan (CQS Plan)** | Exchanges other than NYSE or NASDAQ, e.g. CBOE, BATS, ACRA | NYSE/ICE | Quotation (pre-trade) Information | A & B |
| 3 | **Unlisted Trading Privileges (UTP Plan)** | NASDAQ | NASDAQ | Last sale and quotation | C |

## A8.2.3. Reporting and Dissemination

FINRA requires member firms to report one side of over-the-counter (OTC) transactions in NMS securities to a trade reporting facility (TRF) for FINRA regulatory compliance and data dissemination.[24] Specifically, members must submit trade reports as soon as practicable, but no later than 10 seconds, following the trade execution during market hours.[25] Participants have the option to report to a number of TRFs. FINRA operates three TRFs on behalf of NYSE and NASDAQ, which provide the technology and business services to support trade reporting whilst FINRA provides regulatory and surveillance services.

FINRA also operates its own TRF known as an Alternative Display Facility[26] (ADF) that provides members with a place to display quotations and also to report trades, thus effectively providing some competition by offering its own in trade reporting.

FINRA processes and monitors an average of 37 billion stock and options quotes, trades, orders and related market events every single day. That is nearly 68 million events every minute and 1.1 million events every second of the trading day, occurring across many different trading venues.[27]

24 FINRA Rule 6380; 1) In transactions between two members, the executing party shall report the transaction. (2) In transactions between a member and a non-member or customer, the member shall report the transaction.
25 FINRA Rule 6380
26 The ADF provides members with a facility for the display of quotations, the reporting of trades, and the comparison of trades. There are currently no active quoting ADF participants.
27 Speech by Robert W. Cook, President and CEO, FINRA, Equity Market Surveillance Today and the Path Ahead, 20 September, 2017

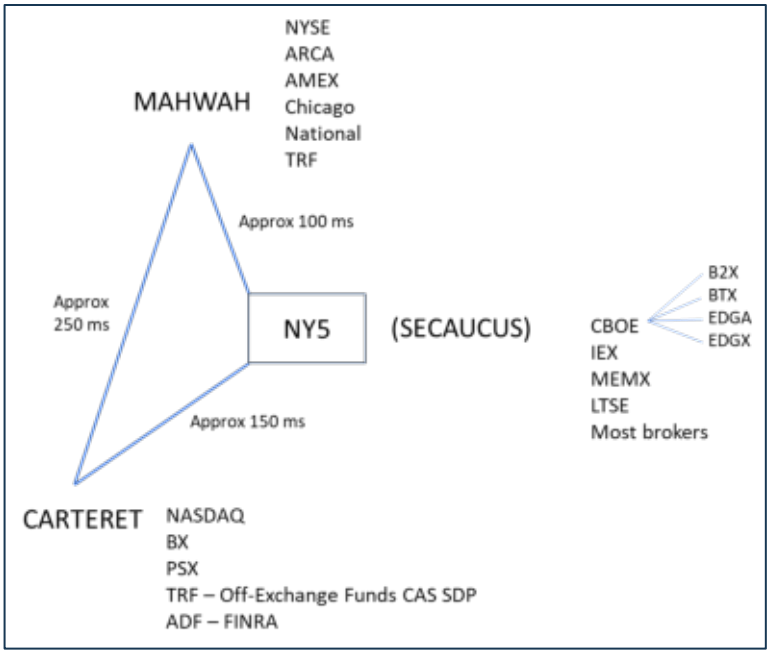
Figure D: Oversight and Tape Plan Structure.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Securities Exchange Commission (SEC)** *Oversight Body of Self-Regulatory Organizations & Equity Data Plans* | | | | | | |
| | **Consolidated Tape Association (CTA)** **Plan 1:** Consolidated Tape System (CTS) Plan **Plan 2:** Consolidated Quote System (CQS) Plan **Plan 3:** Unlisted Trading Privileges (UTP) Plan | | | | | | |
| | **Off-Exchange Data Aggregation** | | | | **On-Exchange Aggregation** | | |
| | **FINRA** | | | | Plan 1 | Plan 2 | Plan 3 |
| **FINRA works in partnership with each TRF.** TRFs operate technology and provides reporting services. FINRA provides market and securities regulation services. | FINRA own TRF (known as ADF ) | FINRA operated on behalf of NASDAQ | FINRA – operated on behalf of NASDAQ | FINRA operated on behalf of NYSE | SRO: ICE/NYSE | | SRO: NASDAQ |
| | | | | | Post-trade (CTS) *Tape A & B* | Pre-Trade (CQS) *Tape A & B* | Pre-post-trade data (UQDF & UTDF) *Tape C* |
| **Data Centre Location** | Carteret | Carteret | Chicago | Mahwah | Mahwah | | Carteret or Chicago |

*Source: MSP Research*

## A8.2.4. Latency and Data Centres

Figure E: Schematic to Illustrate Data Centres and Latency.




*Source: MSP Research*

There are three main data centres for US equity markets. NYSE operates Tape A and Tape B SIPs out of its Mahwah data centre in New Jersey, while the Tape C SIP is operated and run out of Nasdaq's Carteret, NJ, data centre. A third data centre is known as NY5 in Secaucus. The existence of the three data centres causes some latency issues as data must travel backwards and forwards between data centres. US SIPs have had reasonable success in recent years reducing latency caused by data aggregation from multiple sources, however, geographic latency remains.

The three data centres for the tapes are within a 38-mile radius of each other with most dealers sitting at NY5 as shown in Figure E above. The issue with the current SIPs is that extra data hops are needed between data centres before the trade information is aggregated and disseminated, which many believe make the SIP unsuitable for latency-sensitive traders. A few alternative models have been presented by the industry in recent years including moving to a single SIP, opening up to competing SIPs and a proposal by NYSE for a distributed SIP.

## A8.3. GOVERNANCE STRUCTURE

Each SIP has an operating committee made up of plan participants and advisory committee members. Plan participants include the exchanges and FINRA and are entitled to one vote or 'medallion'. In 2005, when the SEC adopted Regulation NMS, it amended the Equity Data Plan to establish non-voting advisory committees to allow interested parties to express their views on Equity Data Plan business before any decisions are made. The advisory committees are made up of representatives of different types of market participants: broker-dealer, retail, institutional, investor and vendor representatives. Each SRO has the right to select another advisory committee member. Although advisors attend quarterly meetings and their viewpoint is welcome prior to Plan decisions, advisors do not have a vote and, according to interviewees, up until relatively recently, they were asked to sign a non-disclosure agreement so that they could not share information with the wider market.

Plan participants have significant sway in Equity Data Plan Actions including decisions that affect:

1. the capacity of the Equity Data Plans to submit data,
2. investment in infrastructure that can impact performance and latency,
3. the fees charged for SIP data, and
4. the selection of advisory committee members.

Therefore, decisions are controlled exclusively by SROs that are conflicted between business interests and regulatory obligations.

Recent consolidation in the industry has changed the allocation and voting power among the SROs and the operators of the Equity Data Plans. A small number of the exchanges represented on the operating committee now control blocks that can sway a decision. Currently, 14 of the total 17 bodies that have a vote on the Operating Committee are controlled by three exchange groups:

1. CBOE Holdings, Inc. has five votes (BYX, BZX, Cboe, EDGA and EDGX).
2. Intercontinental Exchange Group, Inc. (ICE) has five votes (NYSE, NYSE American, NYSE Arca, NYSE Chicago, and NYSE National).
3. Nasdaq, Inc. has four votes (BX, ISE, Nasdaq, and PHLX).[28]

This makes it extremely difficult to change anything. The SEC's Proposed Order, in January 2020,[29] recommends one vote per exchange group and a second vote if the exchange group has more then 15% of consolidated equity market share.[30]

28 www.ctaplan.com
29 https://www.sec.gov/news/press-release/2020-5
30 For purposes of this Order, the Commission considers "consolidated equity market share" to mean the average daily dollar equity trading volume of an exchange group or unaffiliated SRO as a percentage of the average daily dollar equity trading volume of all of the SROs, as reported by the Equity Data Plans.

## A8.4. COST STRUCTURE OF SIP

Figure F: Market Data Fees for CTA and UTP Networks (monthly).[31]

| Timing | Entitlement | Tape A | Tape B | Tape C |
|---|---|---|---|---|
| Real-time | Per professional subscriber | $45[32] | $23 | $24 |
| Real-time | Per non-professional subscriber | $1 | $1 | $1 |
| Real-time | Per-query | 0.0075/query | 0.0075/query | 0.0075/query |
| Real-time | Co-location, Direct Access | $3,000 | $2,000 | $2,500/firm |
| Real-time | Feed, Internet, Indirect Access | $2,000 | $1,000 | $500/firm |
| Real-time | Non-display | $4,000 | $2,000 | $3,500 |
| Historical | Delayed – 15mins | Free | Free | Free |
| Historical | End-of-day | Free | Free | Free |

*Source: CTA and UTP Plans*

## A8.5. ADMINISTRATION COSTS

The SIP still imposes contractual obligations and audits that have to be managed and negotiated. Market participants managing both the SIP and non-SIP data must have the resources to manage this.

These frictions have led to some SIP controllers (i.e. the exchanges) to undercut the SIP. For example, Nasdaq has created 'Nasdaq Basic' which provides the best bid and offer and last sale information using only their own prices as well as trades reported to FINRA/Nasdaq TRF. The product sells at a lower rate than the SIP and differentiates itself by offering commercial vs private use contract terms rather than professional versus non-professional, and it allows users to buy all-you-can-eat price packages. This is popular with retail brokers who can use this data in display screens for customers that are not trading but that may be reviewing or valuing their positions. However, when the customer switches to trading mode, SIP data is introduced, as per the vendor display rule, at which point the SIP has to be paid for.

## A8.6. ENFORCEMENT

Each of the SROs enforces fines for not following the rules. For example, NYSE applies a Late Reporting Fee if a user fails to provide the required data usage report to the network administrator or if it is incomplete or inaccurate ($2,500 – Tapes A and B). Fees apply if incomplete consolidated volumes are displayed to the end-user without a qualifying statement that reads: "real-time quote and/or trade prices are not sourced from all markets" ($3,000 per network).[33]

31 CTA, Schedule of Market Data charges, 1 January, 2015; updated in 2018. Available on CTA Plan website. UTP Plan Administration Data Policies, October 2018,
32 Tiered for single users based on # of users.
33 CTA, Schedule of Market Data Charges.

## A8.7. EVOLUTION OF THE TAPE

Market structure in the US has changed substantially since 2005 which has compelled the SEC to review certain elements of the consolidated tape framework. Technological advances and order routing and trading strategies have greatly increased the speed and automation of markets making trading more dependent on market data. Trading has moved from being concentrated on a small number of exchanges to a decentralized electronic framework.

Exchanges have converted from not-for-profit entities mutually owned by their members to demutualized entities that are owned by shareholders driven by commercial interests.

These concerns have recently led the SEC to address some of these concerns in two new proposals. In January 2020, the SEC released a Proposed Order regarding the current governance and operations of the Equity Data Plans. The Proposed Order recommends that the exchanges and FINRA work together to come up with a single tape plan and governing body: the "New Consolidated Plan". The proposal aims to re-structure the governance framework by reducing the influence of exchange groups by capping their voting rights and by giving non-exchange entities one-third of the vote.

On February 14, 2020, the SEC proposed two further amendments to Regulation NMS.[34] It suggested amending the method by which 'consolidated market data' for NMS stocks is collected, calculated and disseminated by introducing a decentralized consolidation model. This would have **competing consolidators replace the exclusive securities information processors**.[35] The model would in effect replace the 'exclusive SIP' model with a competing 'decentralized model'. It would require each self-regulatory organization, like FINRA and the exchanges, to make available its NMS data in the same manner and using the same methods needed to generate NMS market data to two new categories of entities: (1) competing consolidators responsible for collecting, consolidating and disseminating consolidated market data to the public; and (2) self-aggregators, brokers or dealers that elect to collect and consolidate market data solely for internal use.

As part of the proposal, the SEC has suggested expanding the content of the NMS information by adding 5 levels of depth of book data, lot sizes and information about opening and closing auctions. It will also introduce several new defined terms including "consolidated market data," "core data,", " regulatory data," "administrative data," and "exchange-specific program data."

Currently, the SIPs provide a limited range of auction information following limit up and limit down (LULD) pauses, which are intended to prevent trades in NMS securities from occurring outside of specified price bands without allowing for a circuit breaker. This would be expanded under the new rules to include any information specified by SRO rules or effective NMS Plans that is generated by an SRO leading up to and during an auction, (including opening, reopening and closing auctions), and disseminated during the time periods and at the time intervals provided in such rules and Plans.[36]

## A8.8. INPUT FROM INTERVIEWS WITH MARKET PARTICIPANTS

In terms of overall use cases, all US interview participants are taking the SIP; some for primary reasons and some for secondary reasons.

Even participants that take proprietary feeds will take SIP regulatory data into their systems to monitor limit up and limit down information and be informed of trading halts and short sales. Even though the exchanges publish trading halts, ultimately it is what the SIP publishes that matters. Some interviewees said that they use SIP data for certain order types. For example, SIP volume may be used to calculate the VWAP for certain types of orders or to calculate the mid-point for a dark order.

34 The SEC is proposing amending 17 CFR 242, Rules 600 and 603 and adopt new rule 614
35 SEC Proposed Rule, 17 CFR Part 240, 242, and 249, RIN 3235-AM61
36 SEC Proposed Rule, 17 CFR Parts 240, 242 and 249, RIN 3235-AM61

## A8.8.1. Summary of Issues with the Current SIP

The issues raised during the interviews can be rolled up into four themes: content, infrastructure, cost and governance. Though SIP providers are attempting to reduce the latency gap between the SIPs and proprietary feeds and the SEC has made an initial proposal for governance changes, there remain some fundamental content gaps and market structure issues.

### *Content*

It is widely believed that the SIP does not provide a clear picture of liquidity and trading interests, as it is missing key analytic factors such as auction imbalance and odd lot information. Currently, odd lot information (trades under 100 shares) is not part of the SIP core data set required to be published to the market and therefore heavily traded stock like Amazon, Google and Microsoft are not part of NBBO. This is because they are so highly-priced that a retail investor may only be able to afford a small number of shares, less than 100, which is not reflected in the NBBO. While this may have been practical in the past, higher-priced stocks are actively traded today, and they typically trade in odd lots. To put this into context, odd lot trading in US stocks increased from 5.7% of volume and 21% of trades in 2013 to almost 11% of volume and 38% of trades in 2018.[37] As of July 15, 2019, there are 21 securities priced above $400, and five above $1,000, that have three-month average trading volumes above 50,000 shares per day.[38]

The industry has also proposed its own changes including recommendations to re-define the round lot size for high priced securities and adjusting the definition of core data to include odd lot information. Nasdaq put forth a proposal for comment at the end of 2019 suggesting that SIPs disseminate certain consolidated odd lot quotation data as ancillary information to the SIP core data feeds. The information would be available, but it would not be protected quote data and part of the NBBO. Feedback on the proposal is mixed with divergent views between retail and institutional investors.

Participants say that auction imbalance information should be added to the definition of core data to alleviate the discrepancy in content between the SIP and proprietary feeds and to make it useful for order placement.[39]

Another key difference between proprietary feeds and the SIP is the depth of book information. There are varying views, particularly questioning which type of investor would benefit from an increase in the depth of book. Many focused on the cost of adding depth of book information and struggled with the trade-off between the cost versus benefit of its addition. Others assert that for it to be valuable to proprietary and high-frequency traders, speed is also needed which increases the cost and complexity of implementation. However, there are supporters of adding five levels of depth information to the SIP. Retail brokers thought that a higher depth of book would neutralise the speed issue by giving investors a better view of the direction of the market without having to worry about a flickering screen at the top of the book due to fast-changing prices. SIFMA members have been vocal in their support of adding five levels of depth as it would increase the use of the SIP by institutions for routing purposes and improve the availability of data to prove best execution.[40]

### *Infrastructure*

Through the discussions, it was clear that proprietary feeds fulfil a distinct purpose and that the SIP will not replace proprietary feeds for certain types of trading. However, there is a view that if the SIP feed were faster and more robust in terms of content, it would be 'close enough'. A few interviewees believe that speed is becoming less relevant for certain types of investors and, in response to this changing behaviour, broker-dealers are adjusting their service model and routing methodology to meet demand from clients who rely on speed and those that do not.

Participants report that SIPs providers have made efforts to reduce latency by improving aggregation time, leaving geographic latency as the largest inhibitor. The SEC's recent proposal puts forward-moving to a single SIP operator, and they leave the door open for an exchange to run it. The Securities Industry and Financial Markets Association (SIFMA) has also recommended alternative models such as a single SIP model that is operated and administrated by a processor that is not an exchange or market participant, and

37 Deutsche Bank (2019), "There is more to Odd lots than High Priced Stocks", 25 June 2019
38 SIFMA "Comment Letter on Improvements to Market Data Structure", File No-4-729, 18 Sept 2019
39 *Ibid.* At minimum, auction imbalance information shall include matched quantity, imbalance size, near price, far price, paired shares and imbalance shares.
40 *Ibid.*

a model where competing consolidators can co-exist and compete.[41] NYSE has proposed a distributed SIP concept which would reduce latency by reducing the number of 'hops' to one. In this model, (1) existing SIP providers would establish instances of their system in multiple data centres, preliminarily in each of Mahwah, Carteret, Secaucus and Chicago; (2) participants would publish their quote and trade data to each SIP instance; and (3) recipients could consume consolidated data for Tapes A, B and C securities from one or more of the SIP locations.[42]

### *SIP Governance*

It was nearly impossible to have a conversation about the SIP without discussing cost; the current governance framework of the SIP was deemed to be at the root of the problem because costs and plan changes are controlled by an operating committee that is made up of only exchange participants creating an inherent conflict. We heard repeatedly that the voting structure of the operating committee should have representation from a diverse range of participants with equal voting rights and that the number of votes from each exchange group should be reduced to one. The current model gives *one vote per exchange* which means certain exchange groups have multiple votes and can sway a decision.

Market participants are particularly aggrieved that the exchanges can sell products that undercut the SIP and that there is no real user vote on the governance committees. The fact that the three exchange groups now control so much of the vote is also significant.

### *Cost of Market Data*

#### Direct Costs

As in most markets, market data fees are a prominent issue in the US (including new fees, excessive fees, duplicate fees etc).

However, from a retail perspective, there are several reasonably priced options to access data. Professional users can access real-time data at an aggregate cost of $92 per month or by query, and historical data is free of charge after 15 minutes.

#### Indirect Costs

Market participants report that managing data contracts and dealing with inconsistent definitions and application of terminology such as 'professional versus non-professional' or 'displayed versus non-displayed' across venues pushes up the administrative cost of managing market data and adds a number of steps to the onboarding process.

One retail broker described the process of on-boarding clients as taking months because the definition of 'professional versus non-professional' becomes critical in the interpretation of the contract. Someone who works in financial markets, whatever their role, may be deemed to be a professional trader even if they only trade once a year. Therefore, typically, after the subscriber declares their status as professional or non-professional, the venue will validate their status using a third party and doing further internal checks such as checking social media. Sometimes they will even have to ask a client to change a social media page so that they are not caught by the definition.

These participants confirm that they are taking the alternative feeds such as Nasdaq Basic and that they use this data in display screens for customers that are not trading but may be reviewing or valuing positions and when the customer switches to trading mode SIP data is introduced as per the vendor display rule (and then the SIP has to be paid for).

The administrative burden for firms handling audits are generally expansive, and the process is long, difficult and often duplicative. One of the main issues cited was that the exchanges often use independent third-party firms who are paid by contingency where the amount they get paid is related to the amount of issues uncovered that might result in more income for the exchanges, so they are quite aggressive and unyielding.

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41 SIFMA "Comment Letter on Improvements to Market Data Structure", File No-4-729, 18 Sept 2019

42 NYSE Comment letter, 24 October 2018, Comments for Consideration for Panel 4 of the SEC's Roundtable on Market Data and Market Access (File No. 4-279)

### Issues that Interviewees Did Not Recognise

Data is generally believed to be clean and timely. Many market participants said they could not imagine not having one clear ADV volume for the market.

## A8.9. INDUSTRY PAPERS THAT VALIDATE PARTICIPANT INTERVIEWS

Figure G: Industry Papers on Data Consolidation.

| # | Issue | Reference |
|---|---|---|
| 1. | Latency (geographical) is an issue – reducing the latency associated with how data is aggregated, normalized and re-distributed. | SIFMA, Market Structure Debrief, 2019 |
| 2. | The SIPs do not provide depth of book. If depth of book is shown, then it may change the need for the OPR. | SIFMA, Market Structure Debrief, 2019 |
| 3. | The SIPs are missing key analytic factors such as imbalances and odd lots (higher-priced securities trade in odd lots; high priced securities tend to trade in odd lots. In 1990, 80% of S&P 500 stocks were priced over $50, but no stocks were priced over $200. Today, 27% of stocks are over $50 and 65 auction stocks are over $200). | SIFMA, Market Structure Debrief, 2019 |
| 4. | There is a single point of failure (no alternative if one exchange goes down during the day); the SIP will go down. | SIFMA, Market Structure Debrief, 2019 |
| 5. | SIP costs are increasing; exchanges are offering cheaper alternatives (e.g. Nasdaq Basic). | SIFMA, Real Clear Markets, The Cost of Investing is Going Down, So Why are market data fees rising? 31 January 2019 |
| 6.. | Conflict of interest; the SIPs are operated by the exchanges that sell their own, faster data. | SIFMA, Real Clear Markets, The Cost of Investing is Going Down, So Why are market data fees rising? 31 January 2019 |
| 7. | The SIPs do not provide adequate speed. | https://www.sifma.org/resources/general/sec-roundtable-on-market-data-and-market-access/ |

# A9 / US EQUITY MARKET DATA REVENUE ALLOCATION MODEL

## A9.1. BACKGROUND

The concept of sharing revenue from a consolidated tape exists in US equity markets where exchanges are mandated to send certain data to a tape in return for a share of the revenue generated by that tape. Over time the revenue allocation model has been adjusted in order to encourage certain types of liquidity or to discourage certain behaviours. Consideration, therefore, needs to be given as to which types of data should be rewarded when sharing revenue from a tape.

The starting point of what might be applicable in Europe could, therefore, be to look at the "Revenue Allocation Scheme" for the consolidated tape in the US and see what lessons can be drawn from it. Note that **there is no revenue sharing agreement in North American bond markets** where CLOB markets do not exist and participants pay to report trades without taking a share in any revenue. The concept of a revenue-sharing model for bond markets and whether any data should be paid for merits further debate. This model is primarily focused on equities.

## A9.2. THE MARKET DATA REVENUE ALLOCATION METHOD FOR THE US SIP

The market data income from the US Consolidated Tape is allocated amongst CTA and UTP plan participants based on a two-step process:

a) Determine revenue attributable to each eligible security; termed "Security Income Allocation" (SIA)

b) Determine participant's share of revenue in an eligible security based on "Trading Share" and "Quoting Share". Quoting share actually refers to the firm orders being shown in the order book.

### A9.2.1. Step 1: Security Income Allocation (SIA)

Security income allocation (i.e. revenue in $ value to be split amongst all venues) is determined by dividing the square root (SQRT) of each securities dollar value traded by the sum of the SQRTs of all securities' dollar traded values.

The reason for determining the SIA based on the SQRT of traded value is to prevent excessive concentration of revenues in the most liquid securities.

However, in order to prevent allocating too much income to very illiquid securities, the SIA is capped at $4 per trade report, with any income above $4 per transaction being distributed to other symbols that did not exceed the $4 cap.

### A9.2.2. Step 2: Allocation Participant's Share of Revenue

For each security, 50% of its SIA is allocated to participants based on their trading share (see definition below), and 50% based on their quoting share.

## *Step 2.1: Allocation of Trading Share*

A participant's trading share is calculated as the arithmetic average of its percentage share of overall dollar value traded and its percentage share of qualified trade reports (QTR).

Where:

$$\%\ of\ Dollar\ Value\ Traded = \frac{Participant's\ Total\ Dollar\ Value\ Reported}{Total\ Value}$$

*QTR is calculated such that each trade report of $5000 or more gets 1 full credit, and each trade report of $5000 or less gets a proportional amount of 1 full credit (i.e. two trade reports for $5000 and $7000 respectively would get a credit of 1 each, whereas a trade report for $3000 would get a credit of $3000/$5000 = 0.6).*

*Hence, a participating venue that traded 2% of all reported $ value, and that had a 5.7% share of all QTRs, would receive: (2.0% + 5.7%) / 2 = 3.85% of the stock's total trading share.*

## *Step 2.2: Allocation of Quoting Share*

The quoting share is allocated to participating venues based on the following principles:

- A participating venue's quoting share is calculated as the venue's fraction of total quote credits for that security.
- Quoting credits are calculated based on the duration and dollar size of the best prices for each participating venue, independently for the best bids and best offers (i.e. price x size x time).
- If multiple participants share the best price, then each participant will receive quote credit for its quotes size.
- Quoting credits are only awarded to a participant only if its best bid (or offer) persists as its best bid (or offer) for a minimum period of time (currently 1 second).
- Multiple concatenated updates in price and/or size may satisfy this condition as long as the updated bids or offers remain that participant's best bid or offer for longer than the minimum credit interval (i.e. 1 second).
- The calculation logic contains anti-gaming logic: discarding all sub-second spread narrowing quotes might unduly reward less aggressive quoting or allow market participants to disrupt longer-duration quotes to prevent revenue credits. (To address this situation, each participating venue's lowest bid (highest ask) with the lowest size within each 1/10th of a one-second period is calculated and taken as a reference price (look ahead value).
- For each participating venue, an adjusted price for each second interval is calculated. The adjusted price will be the most aggressively priced of the minimum ahead values for the current time period and the nine previous periods.
- The Revenue Best Bid and Offer (RBBO) will then be derived as the best-adjusted price amongst all markets (calculated separately for bid and offer).
- After the RBBO prices are calculated, the 'Adjusted Sizes' are calculated for each 1-second interval as the lowest of the minimum and median sizes during that one-second interval.
- The quoting credit is then calculated for all venues that are at the RBBO.

## A9.3. KEY TAKEAWAYS

The US revenue share model establishes a sound foundational framework for the allocation of revenue amongst participating venues that could also help mitigate some of the challenges that participants in the EU market appear to be facing: a flight of liquidity away from multilateral trading models, an increased use of trading models that rely on pre-trade transparency waivers, an increased difficulty to interact with meaningful liquidity and hyperactive behaviour in CLOBs.

The calculation of the SIA based on SQRT of traded volume effectively transfers a portion of revenue potential from the more liquid shares to the less liquid ones, thus resulting in an allocation of market data revenue across a much wider number of stocks.

This appears to be a sensible approach especially in an environment where the adverse effects of fragmentation are accentuated in different parts of the liquidity spectrum.

The requirement of a minimum resting time in order to accrue quoting revenue may also encourage the re-assessment of fee structures in a way that is more closely aligned to the allocation logic.

The approach of not penalising venues for "joining" a quote, is especially positive in encouraging the accumulation of liquidity at competitive price level whilst not adding yet another incentive for the race to the lowest latency.

### A9.3.1. Pros and Cons of Rewarding Pre- and Post-Trade Data Versus Post-Trade Data Only

Any reward mechanism for CT data would need to decide whether to reward post-trade data alone or whether to reward pre- and post-trade data contributions to the tape. The pros and cons are examined below.

| | Rewarding Post-Trade Volume only | Rewarding Traded Volume & Pre-Trade Information |
|---|---|---|
| **Pros** | 1) Simple implementation.<br>2) Could reward the reporting of larger trade sizes. | 1) Rewards contribution to price formation.<br>2) Incentive to move bond trading to CLOBs in order to participate in quoting revenue allocation.<br>3) Potential to address some of the undesired side-effects of fragmentation, by incentivising:<br>a. Price formation through addressable liquidity.<br>b. Quoting practices that generate deeper and/or more stable liquidity.<br>4) Potential to re-align pricing policies for two clearly different subset of users:<br>a. Exchanges retain control over all aspects of pricing for HFT/Latency sensitive client base.<br>b. CTP can develop pricing policy that better fits needs of non-latency sensitive user base. |

| | Rewarding Post-Trade Volume only | Rewarding Traded Volume & Pre-Trade Information |
|---|---|---|
| **Cons** | 1) Can (and should) be implemented alongside traded volume allocation.<br>2) Does not address current structural problems:<br>a. Flight of liquidity to un-displayed or unilateral trading models (SIs).<br>b. "Hyperactive" behaviour of CLOB.<br>c. Unmanageable amounts of Mkt data.<br>3) May discourage price formation via addressable liquidity (i.e. visible order books).<br>4) Potential to exacerbate current issues by rewarding the provision of liquidity through that do not contribute to price formation (SIs, midpoint dark pools, etc). | 1) More complex implementation. |

# A10 /CANADIAN EQUITY DATA CONSOLIDATION FRAMEWORK

## A10.1. LEGISLATIVE AND REGULATORY FRAMEWORK

Canadian securities regulation is managed through laws and agencies established by Canada's 13 provincial and territorial governments. The 10 provinces and 3 territories in Canada are responsible for securities regulation which includes securities trading and the oversight of marketplaces and information processors.[43] For example, in Ontario, the Ontario Securities Commission (OSC) administers the Securities Act (Ontario) and its general regulation, as well as the Commodity and Futures Act and its general regulation.[44] Although the securities regulatory regimes are generally similar within Canada, **there is currently no national securities law or national securities regulator**.[45]

To achieve a more harmonized approach, the provinces work under an umbrella organization; the Canadian Securities Administrators (CSA). The primary objective of the CSA is to improve, coordinate and harmonize regulation of the Canadian capital markets.[46] The CSA works under a 'passport system' through which a market participant has access to markets in all passport jurisdictions by dealing only with its principal regulator and complying with one set of harmonized laws. As a result of harmonized efforts by the CSA, securities markets are governed by a large number of mostly aligned national or multilateral instruments (i.e. regulations), called "National Instruments" (NI). Differences in securities regulation are clearly articulated in the text of each NI. Variances in law within a National Instrument is likely due to differences in the provincial legislation frameworks and are clearly articulated in the text of the National Instrument.

As part of the Recognition Orders[47] with the Canadian Securities Administrators (CSA), the Investment Industry Regulatory Organization of Canada (IIROC) monitors trading of equity securities on and across all stock exchanges and Alternative Trading Systems (ATSs) to ensure compliance with the Universal Market Integrity Rules (UMIR) that cover trading activity in Canada. All securities dealers are registered by provincial and territorial regulators and are registered members of IIROC.

In its monitoring role, IIROC receives both on and off-exchange data and performs real-time cross-market surveillance. When multiple markets emerged through market fragmentation in 2005, IIROC made the decision to mandate the feed in the FIX format so that they could control the data coming in. The data taken in is used for surveillance and is not published to any other parties, although IIROC produces some aggregated market statistics. The data includes only 'listed' flow which means IIROC only has insight into child orders placed on a marketplace, not the parent order (the original order from which child orders are generated). In April 2019, IIROC approved amendments to UMIR and the Dealer Member Rules to include client identifiers and/or certain designation on 1) each order for a listed security that is sent to a marketplace (an exchange or ATS) and 2) each reportable trade in a debt security.[48] If a marketplace introduces a new attribute, the CSA will approve the change and IIROC will work to standardize the attribute so that it can be used across multiple marketplaces.

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43 As defined in NI 21-101; "information processor" means any person or company that receives and provides information under this Instrument and has filed Form 21-101F5 and, in Québec, that is a recognized information processor.
Marketplace as per NI 21-101 as: in every other jurisdiction but Ontario is defined as 1) an exchange ii) a quotation and reporting system and iii) a person or company not included in i)/ii i.e. ATS.

44 https://www.osc.gov.on.ca/en/SecuritiesLaw_legislation_index.htm

45 The Cooperative Capital Markets Regulatory System is an attempt to move towards a national securities regulatory framework,
There is effort on Canada to create a national regulator: The Cooperative Capital Markets Regulatory System (CCMR). Participating provinces include British Columbia, New Brunswick, Ontario, Saskatchewan, Yukon and Nova Scotia,

46 CSA Website: https://www.securities-administrators.ca/aboutcsa.aspx?id=45

47 Mean as per the Securities Acts of the provinces, (ex: clause 21.1 of Ontario Securities Act); IIROC has been recognized via an order by the Commission as a self-regulatory organization.

48 IIROC Notice 19-0071 Notice of Approval UMIR & DMR, April 8, 2019. IIROC Notice 19-0179, Notice of Approval, DMR Amendments, October 17, 2019

Companies in Canada are bound by timely disclosure rules which require timely and fair dissemination of their business and financial information to the public. IIROC monitors all disclosure material and makes any determination of trading halts or suspensions. TSX listed companies are required to submit their material news releases to IIROC for review prior to being disseminated over the news wires, however, issuers are encouraged to submit all news release announcements. IIROC notifies marketplaces of trading halts and the public of trading halts/suspensions on the IIROC website.[49]

Each Canadian equity marketplace administers, monitors compliance with, and enforces all other marketplace requirements, unless IIROC has been retained to administer specific marketplace requirements.[50]

## A10.2. THE MANDATE FOR THE CONSOLIDATED TAPE

The CSA is responsible for the appointment of an "information processor" (IP) following a due diligence process. An 'information processor' is defined as a person or company that receives and provides information and its role is to disseminate trade data according to Rule NI 21-101.[51] The Rule states that an information processor must produce a consolidated feed in real-time showing pre- and post-trade information.[52] In June 2018, the CSA stated that the TMX Information Processor (TMX IP) will continue to act as an IP for exchange-traded securities other than options[53] under NI 21-101 until June 30, 2022.[54] **TMX IP has been operating as the sole IP for equities** since it was designated by the CSA in June 2009.

Figure H: Key Equity Market Regulation.

| # | Legislation | High-Level Scope |
|---|---|---|
| 1. | NI 21-101 – Marketplace Operations, originally enacted in April 2001, several amendments and consolidations since coming into law | Includes:<br>• Marketplace requirements; (in terms of operations but also transparency requirements).<br>• ATS requirements where different<br>• Information Processor requirements |
| 2. | NI 23-101 - Trading Rules, originally enacted in April 2001, several amendments and consolidations since coming into law | Rules for Trading (Trading rules, monitoring enforcement requirements for a Recognized Exchange, ATSs and Inter-Dealer Brokers |
| 3. | Universal Market Integrity Rules (UMIR), latest annotated version, November 7, 2018 and includes consolidation to April 11, 2016 | UMIR means those rules adopted by the Investment Industry Regulatory Organization of Canada (IIROC) and designated by the IIROC as the Universal Market Integrity Rules as amended, supplemented and in effect from time to time. |

49 https://www.iiroc.ca/news/Pages/Halts-Resumptions.aspx
50 For example: CSE, Nasdaq and TMX retain IIROC to administer timely disclosure
51 Definitions section N1-21-101
52 NI 21-101; Clause 7.5, 7.1 and 7.2
53 In Québec, options are derivatives under the Derivatives Act (Québec) and are excluded from the definition of "exchange-traded securities".
54 CSA Staff Notice: 21-324 Information Processor for Exchange-Traded Securities other than Options

## A10.2.1. Regulatory Obligations That Drive Use of The Tape

### *Marketplace Regulation*

In July 2000, the CSA introduced a proposal framework allowing competition between types of trading venues and introduced the concept of a marketplace, an entity that can either be an exchange or ATS.[55] To address the potential trading fragmentation within the new expanded framework, the new rule required all marketplaces to share order and trade information with a centralized data consolidator who would then share that information to the public at large. Even though this rule was enacted in 2001, Canada's principal equity exchange did not see meaningful competition from other marketplaces until 2007. At this point in time, the CSA conducted a procurement process for an information processor (data consolidator) for the entire market and the Toronto Stock Exchange (TSX) was subsequently selected as the IP (TSX is a subsidiary of TMX Group and operates TMX IP).

In support of the transparency requirements, the IP must collect, consolidate and disseminate marketplace data in at least one source of data to investors and market participants.[56] Trade data must be distributed accurately and be timely and reliable.

It is important to note that although each marketplace must provide accurate and timely pre- and post-trade information for exchange-traded securities to the information processor and is bound by an agreement to provide it information, **unlike in the US, there are no standards or requirements on its use for trading or compliance**.[57]

According to MSP's interviews and knowledge of the local market, it is widely believed that due to the time between when the law changed and when the TMX IP was first introduced, most market participants had already developed a consolidated data solution or had outsourced to third-party vendors to consolidate trade information, thus hampering the official tape's wide-spread use.

### *Order Protection Rule*

National Instrument 23-101 also introduced the Order Protection Rule (OPR).[58] The OPR is intended to protect the discovery process and ensures that an investor, particularly the retail investor, receives the best price and is not traded through. A trade-through means that the execution of the order is 1) in the case of a purchase order, higher than any protected offer or 2) in the case of a sale, lower than a protected bid. A bid or offer is protected if it is displayed on a marketplace that provides automated trading functionality and it meets or exceeds the marketplace threshold set by the CSA.[59] A bid or offer for a security listed and traded on a recognized exchange is also protected. The OPR is an obligation that extends to the market as a whole and requires market participants[60] to immediately enter client orders for the purchase of 50 standard trading units[61] or less to a marketplace.[62] This means that market participants must monitor all prices on all available venues regardless of the liquidity available on the marketplace.

Similar to the rules governing trading in the US brokers, marketplaces in Canada are required to respect the OPR which mandates that orders must be routed to the marketplace with the best-priced orders available on "protected"[63] lit markets. As a result, the challenge for market participants is that, although connectivity to all marketplaces is not required, it becomes difficult to see how a given broker can meet the stated obligation without visibility to all marketplaces.

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55 NI 23-101
56 N1 21-101, Clause 14
57 NI 21-101, Clause 7.1(1), 7.3(1)
58 Part 6 National Instrument 23-101, UMIR 5.2, the "best price" rule which preceded OPR, was repealed as a result.
59 The threshold is currently set at 2.5%.
60 As per N1 21-101 a market participant means a member of an exchange, a user of a quotation and trade reporting system, or a subscriber to an ATS.
61 This is a broad lot. Standard broad lot is 100 shares.
62 UMIR (6.3), Block orders above $100,00 are exempted.
63 UMIR defines a "protected marketplace" as a marketplace that: disseminates order data in real-time and electronically through an information processor or one or more information vendors in accordance with the Marketplace Operation Instrument.

## OPR Review

Concern over costs and inefficiencies resulted in the CSA conducting a review of the OPR to determine what changes could be made to reduce the extent to which it acts as a support for smaller marketplaces that would not otherwise exist if their data did not have to be taken and paid for, and to mitigate the related costs.[64]

The CSA recognized that any changes must be balanced against both the original objectives and intentions of the OPR and considerations related to the effect on competition and innovation. The review resulted in the introduction of a market share threshold that is intended to provide flexibility to marketplace participants in determining if and when to access trading on certain marketplaces.[65] The revision amended the definition of a protected bid and protected offer to include a requirement that the marketplace must exceed a threshold, currently at 2.5%, to be protected.[66] In addition, securities listed on a recognized exchange will be protected and must be taken into consideration by all marketplace participants even if they do not meet the threshold.

The CSA believed that by implementing a market threshold it would reduce the scope of the application of the rule, enabling broker-dealers to better manage the implicit and explicit costs associated with accessing marketplaces.[67] However, many have argued that the introduction of market thresholds may result in reducing choice, increasing market complexity and negatively impacting innovation.

## CSA Fee Review

To address concerns over rising market data fees, the CSA put in a protocol to review fees in 2011 and in 2016 they introduced a methodology to assess fee structures each year while conducting their annual assessment of each marketplace.[68] It intends to control market data fees by establishing a fee range for top-of-book (Level 1) and depth-of-book (Level 2) market data for securities listed on the TSX and TSXV2 for each marketplace **based on their contribution to price discovery and trading activity**.[69] The methodology has three stages.

1. The collection of pre-and post-trade data from IIROC.[70]
2. The marketplaces are ranked based on two reference domestic benchmarks; one for Level 1 data and a separate benchmark for Level 2 data.[71]
3. The output provides a fee range that the marketplace can charge in the subsequent year.

There is a lot of industry debate on the fairness and transparency of this process as in some cases the inputs are opaque as they are based on estimates. Many believe that the process incentivises the gaming of market data costs by using payment for order flow schemes to attract data that will enable marketplaces to increase or keep prices high. It also introduces unnecessary complexity as market participants are obliged to change fees after each regulatory assessment and this proposed methodology may cause them to be in breach of contract terms and budgets that are already in place. Canada's industry group, IIAC, has been focused on controlling market data costs for many years. Along with greater oversight, the group has asked for greater transparency of the fee methodology however, the CSA does not share the data across the market.

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64 As part of the review process, the OSC interviewed 35 market participants across Canada. A summary of the review can be found in Annex A, Background and Description of Proposed Amendments to N1 23-10, May 15, 2014.
65 CSA Staff Notice 23-316
66 Protected order means an offer or bid of an exchange traded security that is displayed on a marketplace (i.e. above threshold) or a security listed on a recognized exchange. Dark orders are not traded on protected markets.
67 Proposed Amendments to NI 23-101, Trading Rules, 15 May 2014
68 The Data Fees Methodology was initially proposed in the CSA Staff Notice and Request for Comment Proposed Amendments to National Instrument 23-101 Trading Rules published on May 15, 2014. It was subsequently adjusted, based on the public comments and staff's experience in applying it
69 CSA Notice 21-319, December 8, 2016
70 All marketplaces are included. Pre-trade quotes during regular trading hours are included but odd lot quotes or quotes with no market on a given trading day are not included in the metrics
71 CSA Staff Notice, 21-319 – The domestic benchmark was created because there was no suitable global benchmark at the time the methodology was put in place.

### *Best Execution in Canada*

In Canada, IIROC recently published proposed amendments to best execution requirements (the most advantageous execution terms reasonably available under the circumstances) to clarify regulatory expectations. The proposed rule requires dealer members to have tighter controls for best execution policies and procedures, staff training and governance arrangements. The rule will improve market transparency by introducing new requirements for dealer members to disclose information concerning order handling practices and market data feed information. The rule consolidates the existing Universal Market Integrity Rules' (UMIR) best execution requirements, Dealer Member Rule requirements for fair pricing and over-the-counter (OTC) securities into a single Dealer Member Rule.

A dealer or advisor must take reasonable steps to achieve best execution when acting for a client. This obligation applies to all securities.[72] When trading in securities that trade on multiple marketplaces, the dealer must consider information from all applicable marketplaces, not just those in which it is a participant. When making the decision to access or not access orders on a particular marketplace, the dealer must consider how this might impact their ability to achieve best execution. Although real-time access is required to all marketplaces, a dealer's policies and procedures must describe the rationale and evaluation process.[73]

Furthermore, the instrument requires that a dealer or advisor make reasonable efforts to use facilities providing information regarding orders and trades. These reasonable efforts refer to the use of the information displayed by the information processor or if there is no IP, an information vendor.[74]

## A10.3. FEATURES OF CANADA'S EQUITY MARKET STRUCTURE AND CONSOLIDATED TAPE FRAMEWORK

### A10.3.1. Oversight and Tape Structure

The TMX IP acts as the sole consolidator of market data for exchange-traded instruments in equities. It was designated by the CSA in 2009 and its term was recently extended to June 2022. Although the legislation does allow for more than one IP, there is little incentive for competition due to the cost/benefit of operating it and there is no public benefit justification for operating more than one.

The IP is highly regulated, required to connect to each marketplace in Canada and must provide timely, accurate, reliable and fair collection, processing, distribution and publication of information for orders, and trades in, securities.[75] The IP must not unreasonably restrict fair access to the market. Practically this means that the TMX IP has built-in connectivity to each marketplace and since the TMX uses a third-party data provider to consolidate and normalize the data, it is delivered in a standard format. Although burdensome in terms of cost for the operator, it is one of the main benefits to any users of the IP as they save on connectivity, data normalisation and development costs. However, the underlying data costs remain the same.

In addition to the technical obligations, Rule NI 21-101 places certain obligations on the IP including filing its audited financial statements and annual budget to the CSA.[76] For securities, an information processor must file, within 30 days after the end of each calendar year, the process to communicate the designated securities to the marketplaces, inter-dealer bond brokers and dealers providing the information required by the National Instrument, including where the list of designated securities can be found.[77]

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72 NI 23-101, 4.1(2), 4.1(3)
73 N1 23-101, 4.1(5), 4.1(6)
74 N1 21-101, 4.3
75 NI 21-101, (14.4.2), F5 Process –outlines requirements for IP in the rule. For example: n IP is subject to filing and record keeping requirements. Systems must have adequate internal controls and have a reasonable business continuity plan that is annually reviewed by a third party.
76 NI 21-101; 14.4.6; 14.4.6.1; 14.4.7; 14.4.7.1
77 NI 21-101, 14.4.9

## A10.3.2. Operational Framework

### *The TMX IP*

The IP does provide a standard contract between the IP and the user, however, in order to take the consolidated data a consumer must still enter into a bilateral agreement with each marketplace for access to their data. This results in it being cumbersome and costly for participants to administer and permission data. The IP simply acts as a pass-through mechanism but does not aggregate or reduce the cost of data. Administration is further complicated by variances in definitions of 'professional and non-professional' users among marketplaces that have to be dealt with under the contracts of each exchange, and then also in the subsequent audits where each marketplace may be imposing different assessment methods about the usage of the data.

TMX IP offers six types of consolidated feeds as outlined in Figure I below.[78] The Consolidated Data Feed (CDF) is the most popular feed because it runs on a common protocol and users save money on connectivity and programming costs. Also, unlike the other five feeds that are co-mingled data of a subset of fields, the CDF provides Level 2 data as a straight copy of the marketplaces' proprietary feeds.

Figure I: Available TMX Tapes.

| Feed Name | Marketplaces Included | Dark Markets Included* | Unprotected Markets Included | Description |
|---|---|---|---|---|
| **Consolidated Data Feed (CDF)/Book Building Guide** | ALL, essentially a custom feed | If selected by user (post-trade only) | If selected by user | Individual Marketplace data, Level 2, Tag-based (TMX IP) Protocol. |
| **Canadian Best Bid and Offer for Protected Markets Only (CBBOP)** | TSX Alpha, TSX, TSXV, NASDAQ CX2, NASDAQ CXC, OMEGA, CSE, | N | N (only own listings) | Consolidated Level 1 Best Bid and Best Offer data, Flat file format RTMD Protocol Real-time. |
| **Canadian Best Bid and Offer (CBBO)** | TSX Alpha, TSX, TSXV, NASDAQ CX2, NASDAQ CXC, OMEGA, CSE, LYNX, NEO Exchange | N | Y | Consolidated Level 1 Best Bid and Best Offer data, Flat file format RTMD Protocol. |
| **Consolidated Last Sale (CLS)** | ALL | Y | Y | Consolidated Last Sale data, Tag-based (TMX IP) Protocol. |
| **Consolidated Depth of Book for Protect Markets Only (CDBP)** | TSX Alpha, TSX, TSXV, NASDAQ CX2, NASDAQ CXC, OMEGA, CSE | N | N (only own listings) | Consolidated Level 2, Depth of Book data, Tag-based (TMX IP) Protocol. |
| **Consolidated Depth of Book (CDB)** | TSX Alpha, TSX, TSXV, NASDAQ CX2, NASDAQ CXC, OMEGA, CSE, LYNX, NEO Exchange | N | Y | Consolidated Level 2, Depth of Book data, Tag-based (TMX IP) Protocol. |

**Dark markets are not included in CBBO, CBBOP, CDB and CDBP*

*Source: TMX*

78 TMX: Factsheet Equity Information Processor

## A10.4. GOVERNANCE STRUCTURE

There are no specific IP governance guidelines in the Rule, but the IP Governance Committee meets four times a year, which includes members of each marketplace and is led by an independent chair. It is considered 'light in touch' and mainly serves the purpose of overseeing the IP's product and performance, as any cost decisions are managed separately between the IP and the CSA. Members of the IP Governance Committee may provide input on operational issues and have voting rights.

As discovered in our interviews, a source of contention for the industry is that the IP is not set up in a ring-fenced organization and that the same support team supports the IP and TMX's proprietary products creating conflict during outages. TMX's view is that due to economics and the low margins of the business, they need to keep the support team small and that members of the team must sign an annual attestation that they will ensure the protection of confidential information.

## A10.5. COST STRUCTURE

The law requires timely, reliable and accurate publication of information but it does not mandate or provide any guidance on fees charged to the users of the data, other than that the IP must disclose all fees that they charge for consolidated data on its website.[79] User fees for the IP are set through negotiation between the IP and the CSA. We heard the view on a few occasions during interviews, that the fees are set to deliberately undercut market data vendors such as Bloomberg and Reuters.

As stated, the TMX IP operates a pass-through model when it comes to market data fees, meaning that in addition to the TMX IP distribution fee, the market data fees (for Level 1 and Level 2, as applicable) and the costs of data policies (including access fees of the contributing marketplaces) are passed through to the client. Practically, this means that if a firm wanted the TMX CBBOP feed, they would pay each marketplace any charges for that data, plus an access fee, plus the TMX distribution charge. Individual subscribers will either contract directly with the marketplace or buy a composite feed through a market data vendor.

Figure J: TMX IP Distribution Fees.

| Feed | TMX IP Distribution Charge Per User |
|---|---|
| Consolidated Data Feed (CDF) | $200 [80] |
| Canadian Best Bid and Offer for Protected Markets Only (CBBOP) | $500 |
| Canadian Best Bid and Offer (CBBO) | $500 |
| Consolidated Last Sale (CLS) | $500 |
| Consolidated Depth of Book for Protect Markets Only (CDBP) | $750 |
| Consolidated Depth of Book (CDB) | $750 |

*Source: TMX*

For some users, particularly in the retail wealth sector, this is a costly proposition and many of them resort to using Level 1 TMX data (which is the dominant marketplace) as a proxy for the market. Online and self-directed retail investors therefore do not know what other orders are out there. As a result, dealers are reluctant to place orders anywhere other than the visible market available to them and their client. It also means that they are taking that feed as a proxy for NBBO, but it may not be the NBBO. This issue is accentuated when the main listing exchange goes down. Trading stops and there is a transparency deficit even though other marketplaces are continuing to provide available markets.

79 UsNI 21-101; Clause 14
80 Maximum $1000 monthly per source

Delayed data is not a cost-effective alternative. Unlike in the US where data delayed by 15min is mandated to be made freely available, delayed data is not mandated to be free in Canada.

### A10.5.1. Cost of Market Data

Like the work that SIFMA is doing in the US, the Investment Industry Association of Canada (IIAC) is working closely with its members and other global industry associations to control market data pricing and influence greater regulatory oversight. It is widely believed that the exchanges and ATSs in Canada are abusing their power and that cost of market data is too high, particularly for investment advisers (IAs). In a December 2018 letter to the CSA, IIAC requested that that consideration be given to the market power of the exchanges and ATSs, and their effective monopoly over their own market data, as well as certain access fees imposed by marketplaces.[81] Since consolidated information is too expensive, most IAs will only get information from the TMX proprietary feed as a proxy for the market. This will often create an issue if the trade is executed on an alternative venue and the end investor queries a price.

## A10.6. INPUT FROM INTERVIEWS WITH MARKET PARTICIPANTS

The above information was collated through desk research and 14 interviews with market participants including marketplaces, regulatory bodies and a limited number of buy and sell side organisations. Additional key takeaways are summarised below:

### A10.6.1. Content

- Market participants believe that Canada's market structure has developed in a way that has resulted in the perception that there is a "shadow' market operating outside of the main exchange. Since the pass-through model of Canada's consolidated tape is too expensive for investment advisors and direct investors, most use the TMX's own marketplace feed as a proxy for the market as opposed to using the comprehensive set of data. Trades are often routed to a retail trading desk that may execute at a better price on another marketplace to satisfy best execution obligations creating ambiguity to the end investor. Since the end investor cannot see all the available prices, this can lead to a sub-optimal investment or non-investment decision.
- This is seen as a particularly pervasive issue in Canada's ETF market. ETFs do not have a "home market" in the same way as listed equities. As of November 2019, market share is primarily divided between three exchanges with TMX having 37%, Nasdaq 39% and NEO 20% of volume.[82] Without consolidated information, it would be easy for an investor to conclude there is no liquidity in an ETF. In recent years, the issue has amplified as TMX's market share is eroding as new players are becoming more relevant, but the investing public cannot necessarily see the data that demonstrates this change. As recently as 2001, TMX was the only senior marketplace but recent market share figures show that its market share has dwindled to approximately 56%.[83]

### A10.6.2. Infrastructure

- A benefit of the current IP is that consumers can save on connectivity and development costs by using the TMX IP. It was conveyed that it largely comes down to a business decision and once it is made, the consumer will use the IP for multiple uses, not just trading.

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81 Comment Letter dated 10 December 2018, Prior to this an independent study was undertaken by the Securities Litigation & Consulting Group (SLCG) by IIAC and submitted to the OSC in January 2011
82 NEO Exchange Overview, December 2019; ETF volume by venue ownership
83 Fidessa's Fragulator

### A10.6.3. Cost

- Issues around data costs remain at the forefront of complaints. Dealers say that as a community they are paying too much for market data and there is not enough emphasis on the cost of regulation. Market data and technology costs have spiralled in recent years while margins have compressed and revenue has stagnated. IIAC, Canada's industry advocacy group, is working with its members and other industry associations to highlight the problem and control market data pricing.
- The cost to administer the IP is complex. Although there is a standard contract between the consumer and the TMX, consumers must also negotiate a bilateral contract with each marketplace. Market data costs can fluctuate from one year to the next following the annual CSA fee review which can lead to re-contracting and eroding trust. Administration is further complicated by different definitions of user categories across marketplaces.
- The definition of professional versus non-professional use is already different between each marketplace which introduces further complications for the contractual arrangements and audits. Some marketplaces are now introducing new types of users adding further complexity to administer and permission data.

### A10.6.4. Trading Use

- **Dealers stated that the IP is not really used for trading purposes**. The underlying reasons for that are multiple and stem from market structure, timing and technical issues:
    - Most importantly, the use of the IP feed was not mandated.
    - Though competition was anticipated when the law changed in 2000 it did not truly enter the Canadian equity markets until years later. The CSA was slow to choose an IP consolidator and by the time they did most dealers had already done the work to put proprietary feeds in place, and it was not commercially or technically prudent to switch. There was also little incentive to switch due to the pass-through cost model which meant that the IP did little to change the costs involved. Dealers had already opted to either build their own proprietary feeds or use one of the market data vendors. Bloomberg and Reuters[84] are primarily used in Canada as well as feeds developed by order management systems such as IRESS and Fidessa.
    - Finally, although latency is seen to have significantly improved over the years, there were also many technical teething issues with the IP feed in the early days and latency-sensitive dealers still believe that IP data is too slow. Asset managers will rely on their dealers for execution and source their market data from vendors such as Bloomberg and Refinitiv.
- Common use cases cited for the IP were for its use as a back-up, a price reference for retail wealth and direct investing and for trading by foreign dealers that need a Canadian trading benchmark.

84 System initially Thomson 1, now Elikron. Reuters was rebranded Refinitiv.

# A11 / US BOND MARKETS DATA CONSOLIDATION FRAMEWORK

## A11.1. LEGISLATIVE & REGULATORY FRAMEWORK

There is no bond trading on registered exchanges in the US; all trading is over-the-counter (OTC). As a result, historically there was little to no transparency in the bond market. From the early 1990s, the US bond market had a program known as the "Fixed Income Pricing System" (FIPS) but the SEC wanted to bring greater transparency to the market and created new rules at the turn of the century which the NASD (now FINRA) adopted.

As the ultimate regulatory body of the securities industry, the SEC has oversight of the Financial Industry Regulatory Authority (FINRA), the private, non-governmental organisation that acts as a self-regulatory organisation (SRO) that regulates OTC trading in equities, corporate bonds, securities futures and options.

All firms dealing in securities that are not regulated by another SRO (including equity exchanges), such as by the Municipal Securities Rulemaking Board (MSRB), are required to be member firms of FINRA.

FINRA is the modern evolution of the original SROs in US markets, the National Association of Securities Dealers (NASD) and the member regulation and enforcement operations of NYSE. The NASD was founded in 1939 and was registered with the SEC in response to the 1938 Maloney Act amendments to the Securities Exchange Act of 1934, which allowed it to supervise the conduct of its members subject to the oversight of the SEC. In July 2007, the SEC approved the formation of the new SRO, FINRA.

The SEC was able to leverage FINRA's SRO structure to mandate transparency requirements on market participants through the enforcement of FINRA's rules on its vast membership. FINRA created the Trade Reporting and Compliance Engine (TRACE) that manages reporting of over-the-counter (OTC) transactions for eligible **fixed-income securities**. Brokers, who are FINRA members and deal with specific fixed-income securities, are required to report their transactions by the Securities and Exchange Commission (SEC) rules. Some of this data is then disseminated publicly.

## A11.2. FEATURES OF US BOND TAPE (TRACE)

FINRA launched the Trade Reporting and Compliance Engine (TRACE) on July 1, 2002, with TRACE Rules requiring virtually all transaction information in TRACE-eligible securities[85] to be reported to FINRA. To promote transparency without negatively impacting liquidity, FINRA adopted a measured approach and phased in the reporting time and public dissemination requirements over several years to ensure there was minimal impact on reporting firms. This also allowed FINRA to study the impact of transparency on market liquidity.

At launch, approximately 520 securities were publicly disseminated via TRACE. This included primarily investment-grade debt securities having an initial issue of $1 billion or greater, but it also included 50 non-investment-grade (high-yield) securities that had previously been disseminated under NASD's FIPS2 system.

Public transparency increased materially in phase two of the implementation of TRACE and by April 2004, approximately 4,650 bonds in a wide range of investment-grade securities were publicly available.

By February 7, 2005, approximately 99 percent of all public transactions and 95 percent of par value in the TRACE-eligible securities market were disseminated immediately upon receipt by the TRACE System.

85 "TRACE-Eligible Security" means a debt security that is US dollar-denominated and is: (1) issued by a US or foreign private issuer, and, if a "restricted security" as defined in Securities Act Rule 144(a)(3), sold pursuant to Securities Act Rule 144A; (2) issued or guaranteed by an Agency as defined in paragraph (k) or a Government-Sponsored Enterprise as defined in paragraph (n); or (3) a U.S. Treasury Security as defined in paragraph (p). "TRACE-Eligible Security" does not include a debt security that is issued by a foreign sovereign or a Money Market Instrument as defined in paragraph (o).

However, transactions over $1 million in certain infrequently traded non-investment-grade securities were subject to dissemination delays, as were certain transactions immediately following the offering of TRACE-eligible securities rated BBB or below.

FINRA gradually reduced the required reporting time frame from 75 mins at the launch of TRACE, to 15 minutes in July 2005.

Reporting of US Agency debentures (a type of unsecured bond) as well as primary market trades transactions in TRACE-eligible securities, began in March 2010 and by 2011, securitized transactions in asset-backed and mortgage-backed securities were required to be reported. As of June 30, 2014, TRACE began disseminating transactions executed pursuant to SEC Rule 144A.[86]

In October 2016, the SEC approved proposed rules requiring FINRA members to report certain transactions[87] in Treasury securities. The requirement applies to all treasuries except savings bonds. In July 2019, FINRA published a proposal to expand TRACE reporting requirements to collect information on trades in foreign sovereign debt securities that are US dollar-denominated. If adopted, trades in US dollar-denominated foreign sovereign debt securities would be subject to same-day reporting and would not be disseminated publicly.

On September 23, 2019, the US Treasury announced plans to disseminate aggregated US Treasury bond data being collected through the TRACE system.[88] This decision followed a study to determine potential impacts and the details are still being worked out, but the overall recommendation is for FINRA to provide Treasury transaction data weekly in an aggregated format.

### A11.2.1. TRACE Reporting (Regulatory Reporting)

TRACE is the automated system developed by FINRA that, among other things, accommodates the reporting and dissemination of transaction reports where applicable in TRACE-eligible securities. Trace operates between 8 AM EST to 6:29:59pm on each business day, unless otherwise notified by FINRA.

A FINRA member must report a transaction as soon as practicable but no later than within 15 minutes from the time of execution.[89] Trades executed prior to 8 AM EST must be reported on the same day but no later than 15 minutes after TRACE opens. Trades executed less than 15 minutes before TRACE closes (6:30 PM EST) must be reported no later than 15 minutes after the TRACE system opens on T+1 and if reported on T+1 must be designated “as/of” and include the date and time of the transaction.

Trades are reported via FIX, CTCI (Computer to Computer Interface) or TRAQS (Web interface).

Figure K: Single-Sided Versus Double-Sided Reporting Compared.

| | US - TRACE | Europe – MiFID II | Canada - IIROC |
|---|---|---|---|
| **Single- or double-sided reporting** | Single-sided reporting<br>(Double-sided if two FINRA firms involved). | Single-sided reporting | Single-sided reporting<br>(Double-sided if two IIROC dealer member firms involved) |

*Source: IIROC, FINRA and MiFID II*

86 FINRA: https://www.finra.org/sites/default/files/2014-TRACE-Fact-Book.pdfA TRACE reporting timeline can be found in the appendix
87 Excludes auctions, repo and non-marketable securities (savings bonds)
88 https://home.treasury.gov/news/press-releases/sm782
89 “Time of Execution” is the time when the Parties to a Transaction agree to all the terms of the transaction that are sufficient to calculate the dollar price of the trade.

## *Dissemination-Capped Trades*

As part of the initial TRACE implementation in July 2002, FINRA established dissemination protocols that included certain caps to reduce the potential market impact of block trade transparency. FINRA also recently announced additional caps as part of the dissemination of transaction information on agency pass-through mortgage-backed securities traded known as TBA transactions.

### Figure L: Dissemination Caps.

| Type of Security | Cap | Dissemination |
|---|---|---|
| TRACE-eligible securities and agency debt | $5MM | >$5MM ="$5MM+." |
| Non-investment-grade TRACE-eligible securities | $1MM | >$1MM="$1MM+." |
| TBA eligible 'for good delivery' | $25MM | >$25MM="$25MM+." |
| TBA transactions "not for good delivery," Agency Pass-Through MBS traded in Specified Pools, SBA-backed ABS traded in TBA and Specified Pool transaction | $10MM | >$10MM=$10MM+." |

*Source: FINRA*

In 2017, the SEC tasked the Fixed Income Market Structure Advisory Committee (FIMSAC) "to provide the Commission with diverse perspectives on the structure and operations of the US fixed income markets, as well as advice and recommendations on matters related to fixed income market structure."

Part of this review included an examination of the impacts of transparency on the corporate and municipal bond markets. FISMAC developed the concept for a pilot to analyse the current dissemination protocols for block trades in corporate bonds and whether there should be an alternative approach; for example, 48-hour deferred trade reporting rather than the immediate reporting with masked volumes which is currently in place.

The alternative approach would raise the dissemination caps (for investment-grade corporate bonds from "5MM+" to "10MM+", for non-investment grade corporate bonds from "1MM+"to "5MM+"and modify the dissemination time frames by 48 hours after execution time (or later depending on the time of receipt of the trade report i.e., trades reported after hours will be disseminated more than 48 hours after execution time) for trades above the caps.

Figure M: Reporting and Dissemination Timetable.[90]

| Reportable Securities | Reporting Time | Dissemination |
|---|---|---|
| High-yield and unrated debt of U.S. companies and foreign private companies, including PC | 15 mins | Real-time |
| Medium-term notes | 15 mins | Real-time |
| Convertible debt and other equity-linked corporate debt not listed on national securities exc | 15 mins | Real-time |
| Capital trust securities | 15 mins | Real-time |
| Equipment trust securities | 15 mins | Real-time |
| Floating Rate Notes | 15 mins | Real-time |
| Global bonds issued by U.S. companies and foreign private companies | 15 mins | Real-time |
| Risk-linked debt securities (e.g. "catastrophe bonds") | 15 mins | Real-time |
| Effective March 1, 2010, U.S. Dollar denominated debt securities issued by an Agency or issued or guaranteed by a Government Sponsored Enterprise (i.e. FNMA, FHLMC) | 15 mins | Real-time |
| Asset Backed Securities | 15 mins | Real-time |
| Asset Backed Securities that are not Disseminated (ABSX) | 15 mins | Real-time |
| Mortgage Backed Securities (MBS) | 15 mins | Real-time |
| Special Pools | 60 mins | Based on pool characteristics |
| CDO's and CMBS | Same day | Not disseminated |
| Collateralized Mortgage Obligations (CMO), REMIC, RMBS | Same day | Trades under $1mil - real-time, over $1mil weekly or monthly reporting |
| To Be Announced (TBAs) | 15 mins | Real-time |
| Treasury | Same day | Not disseminated |

*Source: FINRA*

## *Information Reported*[91]

Each TRACE trade report (to FINRA) shall include the following:

1. **CUSIP number** or if a CUSIP number is not available at the Time of Execution, a similar numeric identifier (e.g., a mortgage pool number) or a FINRA symbol.
2. **Size (volume)** of the transaction:
   - For a transaction in a Securitized Product traded TBA ("TBA transaction"), report the original face value of such security.
   - For a transaction, other than a TBA transaction, in a Securitized Product that is subject to amortization, report the original face value of such security and, if a member uses a Factor to execute the transaction that is not the most current Factor publicly available at the Time of Execution, report the Factor used.
   - For a transaction in a Securitized Product that does not amortize, report the total par value, principal value or original face value of such security.
   - For a transaction, other than a TBA transaction, in a Securitized Product that is executed in an agency capacity and subject to a commission charge, report the original face value of such security and the Factor used to execute the transaction.
3. **Price** of the transaction (or the elements necessary to calculate price, which are contract amount and accrued interest) or, for When-Issued Transactions in US Treasury Securities executed before the Auction for the security, the yield as required by paragraph (d)(1) of this Rule;

90 FINRA: https://www.finra.org/filing-reporting/trade-reporting-and-compliance-engine-trace/trace-reporting-timeframes
91 ibid.

- For When-Issued Transactions in US Treasury Securities executed before the Auction for the security and conducted on a principal basis, report the yield, which must include the mark-up or mark-down, of the security in lieu of price.

4. A symbol indicating whether the transaction is a **buy or a sell**.
5. Date of Trade Execution ("as/of" trades only).
6. **Contra-party's identifier** (MPID, customer, or a non-member affiliate, as applicable).
7. Capacity — **Principal or Agent** (with riskless principal reported as principal).
8. Time of Execution.
9. Reporting side executing broker as "**give-up**" (if any).
10. Contra side **Introducing Broker** in case of "give-up" trade.
11. The **commission** (total dollar amount), if applicable.
12. Date of settlement.

### *Access and Pricing Model*

Data is distributed through a broadcast feed from FINRA to authorized resellers. The broadcast feed is in XML format.

### *Data Fees*[92]

#### Authorized Re-sellers

1. $60/month per display application per data set of real-time TRACE transaction data.
2. Or a flat fee of $7,500/month per data set of real-time TRACE transaction data, entitling professionals to make unlimited internal use of such data set(s) through any number of display applications.
3. Vendor real-time data feed: $1,500 per month for continuous receipt of TRACE transaction data
4. Can be discounted to $400 /month for qualifying tax-exempt firms.
5. Vendor daily snap-shot feed: $250 per month for end of day receipt of data.

#### Historical Data

1. One-time set-up fee of $2,000, may be discounted to $1,000 for tax-exempt firms.
2. $2,000/calendar year per data set for receipt of historic TRACE data, except for qualifying tax-exempt organizations. The data is enabled for internal use and internal and/or external display application. Bulk re-distribution of data is not permitted.
3. Re-distribution fee: Charge of $1/CUSIP per calendar year within each data set per recipient of the data with a maximum fee of $1,000 per calendar year per recipient.

#### End-Users

1. Fee imposed by authorized re-distributor.
2. Real-Time data fee pass-through payment to FINRA of $60 per user/month for real-time TRACE access or a flat fee of $7,500 for a firm-wide license.
3. Non-real-time data charge: None.

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92 FINRA: https://www.finra.org/filing-reporting/trace/pricing https://www.finra.org/rules-guidance/rulebooks/finra-rules/7730

### Academic Access

1. $500 set-up fee.
2. $500/calendar year for receipt of academic corporate bond TRACE data. Redistribution of data is not permitted.

### Additional Reports

**TRACE Security Activity Report:**

1. $750 per month, $250 per month for qualifying institutions.

**End-of-Day TRACE Transaction File:**

1. $750 per month for each data set.
2. $250 per month for qualifying institutions.
3. Free for real-time data feed subscribers.

## A11.2.2. TRACE Governance

As discussed in section A11.1.1., dealers trading in OTC equities, corporate bonds, securities futures and options, are required to be members of FINRA, as overseen by the SEC.[93] In its role, FINRA creates and enforces rules and manages the TRACE reporting tool.

FINRA has 14 advisory committees that provide feedback on rule proposals, regulatory initiatives and industry issues. More than 160 industry members and 35 non-industry members serve on these committees. A fixed income committee is in place and its role is to advise and make recommendations to FINRA about regulatory initiatives, rules and policies and public policy issues involving debt securities, including municipal securities and municipal advisory activity.[94]

Additionally, the SEC is informed by the Fixed Income Structure Advisory Committee (FIMSEC) whose mandate is to provide the SEC with diverse perspectives on the structure and operations of the US fixed income markets, as well as advice and recommendations on matters related to fixed income market structure.[95] Recently, a subcommittee was formed to explore the impact of the increased use of electronic trading platforms on the liquidity, efficiency and resiliency of the corporate and municipal bond markets. As a result of such consideration, the Subcommittee has reached a recommendation to improve the price transparency requirement for certain types of fixed income transactions reported to TRACE.

## A11.2.3. Data Enrichment

- Participants would like to add a voice/electronic trade flag. Currently, some venues are registered under Regulation ATS, however, others are not. The current ATS flag is not comprehensive
- A principal versus agency (or “Riskless Principal”) flag would help issuers and some market participants understand the true liquidity in the market and also the names of the principals so that the increasing or decreasing relevance of principals can be understood.
- ERISA flag (US specific issue) to denote what is an ERISA eligible security for ERISA pension funds.
- Principal Trading Firms (PTFs) are not required to report to TRACE for Treasuries or credit because they are not under FINRA’s jurisdiction. If these firms trade via a platform/venue which is registered as a broker/dealer with FINRA, then the venue reports those trades. A flag to identify a trade by one these firms is required.

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93 Firms dealing in securities that are not regulated by another SRO (including equity exchanges), such as by the Municipal Securities Rulemaking Board (MSRB), are also required to be member firms of FINRA.
94 FINRA website: https://www.finra.org/about/governance/advisory-committees
95 FIMSEC Charter

- Identification of type of spread trades - Portfolio trade flag e.g. Butterfly or Treasury Spread would be useful to understand if it is one leg of a trade.
- The volume traded in off-the-run securities is a helpful catalyst for greater trading in a less liquid portion of the market (already disseminated).
- Trades are seen to be reported on time, but timestamps could be enhanced. Several people did note that investment-grade bond trades are frequently reported at 3PM after being spotted to the US Treasury, long after the trade was "executed" and creating the appearance of significant volume at 3PM erroneously.

## A11.2.4. Preliminary Recommendations by FIMSEC to Enhance Trace Reporting

The Subcommittee considered two types of trades for which the TRACE reported price may not be reflective of the current market price: completed spread trades awaiting a Treasury spot and portfolio trades.

### *Completed Spreads Awaiting a Treasury Spot*

Most investment-grade credit is traded on a spread basis to a US Treasury (UST) benchmark. These trades are then converted to a dollar price by "spotting" the benchmark Treasury security. The spotting process can either occur at the time of the spread trade or it can be done a delayed basis (often at a set time in the afternoon, such as 3PM).

When a trade is spotted on a delayed basis, FINRA Rule 6710(d) provides that the time of execution shall be the time when the parties have agreed all of the terms of the transaction that are sufficient to calculate the dollar price of the trade (i.e., the time of the delayed Treasury spot). Completed spread trades awaiting a Treasury spot are therefore reported to TRACE following the completion of the spotting process, even if the parties agreed to the spread much earlier in the day.

To address this mismatch, the committee is recommending:

1) that FINRA should require reporting parties to include a flag or modifier for delayed spot trades, which will alert market participants that the spread-based economics of the trade had been agreed earlier in the day.
2) the reporting party on a delayed spot trade shall be required to report the time at which the spread was agreed earlier in the day. Even though the trade will still be reported to TRACE following the completion of the spotting process, the inclusion of the time at which the spread was agreed will allow market participants to estimate the agreed spread to Treasury.

### *Portfolio Trades*

The Subcommittee also recommends that portfolio trades be identified and recommend:

1) that reporting firms use a TRACE modifier to identify whether a particular trade was executed as part of a portfolio trade; and
2) for purposes of this recommendation, "portfolio trade" shall mean a trade:

   i. that is executed between only two parties.

   ii. involving a basket of securities of at least 30 unique issuers.

   iii. for a single agreed price for the entire basket; and

   iv. that was executed on an all-or-none or most-or-none basis.

# A12 / CANADIAN BONDS DATA CONSOLIDATION FRAMEWORK

## A12.1. CANADIAN BOND MARKET STRUCTURE

The fixed income market in Canada is a quote-driven market where trades take place OTC, typically on a bilateral basis. Like other jurisdictions, investors transact with dealers mainly through a request for quote (RFQ) model. Non-electronic execution accounts for approximately 70% of the traded volume. In addition, Canadian bond markets are highly concentrated with the top 10 broker-dealers conducting an estimated 93% of total trading activity.[96]

### A12.1.1. Legislative & Regulatory Framework

Although bond transparency requirements were introduced in the legislative framework for Marketplace Operations (NI 21-101) when it was adopted in 2001, there were no means to provide price transparency in debt markets until IIROC adopted Rule 2800C in October 2014 and an information processor[97] was appointed by the CSA and operational. Furthermore, there was no way for the regulators to monitor bond trading activity. Prior to the implementation for Rule 2800C, the most standardized reporting of debt market activity in Canada was a weekly statistic reports provided by Government Securities Distributors (GSD) to the Bank of Canada. A 'Government Securities Distributor' is defined as an entity that has been given notice of its status by the Bank of Canada and has assess to bid at Government of Canada auctions. GSDs would submit weekly reports via a simple portal called the Market Trade Reporting System (MTRS). The information was used by the Bank of Canada for various purposes related to its management of government securities auctions, including the calculation of bidding limits for GSDs and for analysis of trends and developments in the debt and money markets.

Prior to the implementation of the debt rule, CanPX acted as an information processor for Canada's corporate debt market. CanPX is a joint venture between Canada's leading investment banks and broker-dealers. In 2014, CanDeal,[98] another industry utility, began displaying CanPX trade price information on its website. IIROC's information processor replaced CanPX and CanDeal currently provides a number of commercial pre-and post-trade services to the Canadian marketplace for bond and derivative data.

The new rule was meant to significantly enhance bond surveillance and improve the efficiency of MTRS Debt collection; prior to its enactment, oversight was limited to onsite reviews by IIROC surveillance team and often combined with the equity review. Rule 2800C introduced the requirement for every dealer member to report debt securities, including repo transactions to IIROC within specified frames depending on the time of execution.[99]

When first introduced, the rule primarily covered secondary market trading and excluded reporting requirements of primary or new issues, exchange-listed debt and transactions where the Bank of Canada is the counterparty. Recognizing the limited availability of affordable post-trade information about trades in government securities that can be accessed by retail and small institutional customers, the CSA proposed mandatory reporting of government debt securities (NI 21-323). The legislation also extends corporate debt transparency by amending the obligation to 'a person or company.' Previously the obligation fell on marketplaces, IDBBs and Dealers to report.[100] The new rule also reduced the reporting time frame for corporate debt securities from T+2 to T+1pm (ET).

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96 IIROC: Devani B., Zhang I. (August 2017), *"Corporate Bond Markets: Liquidity Determination and Overview"*, available at https://www.iiroc.ca/Documents/2017/80b6432d-30d9-4e69-bd27-889212873 9b6_en.pdf

97 As defined in NI 21-101; "information processor" means any person or company that receives and provides information under this Instrument and has filed Form 21-101F5 and, in Québec, that is a recognized information processor.

98 CanDeal is owned by the six major banks in Canada and the TMX Group

99 Rule 2800C

100 CSA Staff Notice: 21-323 - Proposal for Mandatory Post-Trade Transparency of Trades in Government Debt Securities, Expanded Transparency of Trades in Corporate Debt Securities; Amendment to Clause 8.1; NI 21-101; Effective Date: 31 December 2019

IIROC was designated by the CSA to be the information processor for corporate debt in July 2016 and has been providing transparency to the public regarding all trades in corporate debt securities[101]. The CSA extended IIROC's role as IP to include the government debt and as part of its role as IP, IIROC must make available comprehensive, accurate trade information to the public and not unnecessarily restrict access to the information.[102] Post-trade information is available on a delayed basis with caps on reported volume; pre-trade information is neither collected nor disseminated. The cap on the displayed volume (otherwise known as a volume cap) is a threshold trade volume above which the volume field in the report is masked. Specifically, volume caps are the maximum volume that would be displayed for a trade. IIROC developed the volume cap framework alongside a working group committee. The resulting methodology places different types of government debt (e.g. federal, provincials, municipals etc.), depending on their liquidity profile, into three volume cap groups: $2 million, $5 million and $10 million. For example, a trade of 3 million in a municipal debt (which is considered a less liquid instrument and therefore has a 2 million volume cap), would appear as a trade of $2million+.

Figure N: Reporting Requirements for Government and Corporate Bonds.

| Description | Government Securities | Corporate |
|---|---|---|
| **Pre-trade reporting requirement** | No | (Yes) (only indicative) |
| **Post-trade reporting requirement** | Yes | Yes |
| **Who must report** | Any person or company - extends reporting requirement to Dealers, IDBBs, marketplaces and Banks | Any person or company -extends reporting requirement to Dealers, IDBBs, marketplaces and Banks |
| **Real-time post-trade information** | No | No |
| **Reporting Time Frame** | T+1 5pm (ET) | T+5pm (ET)[103] |
| **Subject to volume caps** | Yes | No |
| **Publicly disseminated** | Yes | Yes |
| **Trading Halts** | No | No |

*Source: MSP Research and IIROC*

101 Designated by Ontario Securities Commission, in Saskatchewan, by the Financial and Consumer Affairs Authority of Saskatchewan and in Québec, it is recognized by the Autorité des marchés financiers.
102 N1 21-323, Proposal for Mandatory Post-trade Transparency of Trades of Government Debt, Section VI Information Processor.
103 The reporting time was shortened in from T+2 in recent amendment.

Figure O: Summary of Applicable Legislation.

| # | Legislation | High-Level Scope |
|---|---|---|
| **1.** | NI 21-101 – Market Place Operations, *originally enacted in April 2001, several amendments and consolidations since coming into law.* | Includes:<br>1) Marketplace requirements (in terms of operations but also transparency requirements).<br>2) ATS requirements where different.<br>3) Information Processor requirements. |
| **2.** | Rule 2800C – Transaction Reporting for Debt Securities, October 2014. | Includes:<br>1) Requires debt transaction reporting to IIROC. |
| **3.** | NI 21-323 – Proposal for Mandatory Post-trade transparency of Trades of Government Debt. | Includes:<br>1) Introduces the reporting requirement of government debt.<br>2) Reduces the reporting time from for corporate debt securities from T+2 (ET) to T+1 5pm (ET). |

*Source: Legislation (as referred to above)*

## A12.1.2. Features of the Consolidated Tape for Bonds

There are a few key differences between the consolidated tape framework for equity and bonds. Unlike equities, there is **only one post-trade data feed for corporate bonds**,[104] run by IIROC, and it is **available free of charge**. The public can access a public website and search online data relating to corporate debt securities two days after a trade occurs (T+2).[105] Users can look up summary and transaction-level data by issuer name or by CUSIP/ISIN number.

In equities, post-trade data must be submitted in real-time and the onus for sending post-trade data is on marketplaces. However, for bonds, dealers are also required to submit trade information at the end of the day.

IIROC operates on a cost recovery basis so although access to data is free of charge, the cost to operate the IP is ultimately paid by dealer member firms. IIROC developed a fee model where the operating cost is shared among the dealers based on the contributing dealer member's proportion of publicly reported debt transactions.[106] The debt operating expense for the year ending March 31, 2019 was $458,000, down from $570,000 the year before. The cost to build the IP was approximately $2.5million and is amortized at $461,000 per year over 5 years.[107] Overall market debt regulation operating expenses accounted for approximately $2.5 million of the 2019 budget.

## A12.1.3. Governance Structure

IIROC is a self-regulatory organization (SRO) overseen by a Board of Directors. IIROC's Board of Directors is comprised of 15 directors including the President and CEO. There are five directors representing dealer members, two directors representing marketplaces, seven independent directors and IIROC's CEO and President. IIROC also has an advisory committee whose role is to review and make recommendations on proposed initiatives. Any operating or business issue in relation to the IP would be discussed and agreed

104 The TMX IP has 6 feed options.
105 IIROC Notice 17-0071
106 IIROC Notice 17-0071
107 IIROC Financial Statements (March 31, 2019), Statement of Operations,

upon in these forums. In contrast to the TMX IP for Canadian equities, there is greater representation from a variety of industry participants.

### A12.1.4. Interview Summary

In discussion with the regulators, the bond market consolidated tape is mainly used by the retail sector to look up their trades or by compliance teams to access fair pricing. In IIROC's view, since the CSA's debt reporting approach has been quite measured for bonds, market demand has evolved slowly and to date, they have not had any requests for a consumable feed. Any change to a consumable, closer to real-time feed, like the US' TRACE feed would require IIROC to rebuild its technology.

# A13 / SUMMARY OF COMPARISONS OF NORTH AMERICAN EQUITY DATA FRAMEWORKS

## A13.1. KEY TAKEAWAYS ABOUT TAPE STRUCTURE & GOVERNANCE FROM US & CANADIAN EQUITY MARKETS

MSP undertook extensive field research in the US and Canadian markets, including interviews with market participants, regulators, venues and tape operators. The table below summarises MSP's key takeaways about the positive and negative design features of data consolidation models that was fed into the European tape structure design and architecture proposal. Some context to the feedback is also provided.

Figure P: Conclusions on the Positive and Negative Elements of the Consolidated Data Framework in the US and Canada.

(Rated by MSP on A 'Red, Amber, Green' Scale: Green signals the most positive takeaways for adoption in Europe and red the least positive)

**Key**:

● Optimum Approach ◐ Neutral ○ Approach to be avoided

| Framework Feature | Canada | Rating | United States | Rating |
|---|---|---|---|---|
| **An SRO undertakes aggregation and consolidation of the data.** | • Yes, but in equities the data the cost of the data is not consolidated into one price for consumption. | ◐ | • Yes, in both equities and debt. | ● |
| **SRO undertakes cross-market surveillance** | • Yes.<br>• Via IIROC (an SRO). | ● | • Yes, in both equities and debt.<br>• Via FINRA (an SRO). | ● |
| **The existence of a consolidated tape is mandated by the law** | • Yes. | ● | • Yes. | ● |
| **Consolidated Tape is mandated for regulatory purposes** | • No.<br>• Not required to be used for regulatory or compliance purposes | ● | • Yes, for best execution in equities. | ○ |
| **Consolidated Tape is used for regulatory events and calculations (administrational event data)** | • No. | ◐ | • Yes, required for compliance.<br>• Used for limit up/down information, halts and short sale restrictions. | ● |
| **Equity core data is defined in the legislation** | • Not explicitly; they are not in legislation but some guidance in companion policy. | ◐ | • Yes. | ● |
| **Regulatory oversight/enforcement of behaviours and governance of the consolidated tape provider** | • No regulatory authority (enforcement) over the Information Processor (IP).<br>• New designation order gives CSA licencing power to regulate organization, fees. | ◐ | • Yes; SEC.<br>• Enforcement rights. | ● |

| Framework Feature | Canada | Rating | United States | Rating |
|---|---|---|---|---|
| **Governance structure of the consolidated tape** | • Informal structure – only there to provide feedback.<br>• Meets 4 times a year.<br>• No voting rights.<br>• No say on fees. |  | • SIP operating committee has representation from exchanges + SEC – some exchanges have multiple votes.<br>• Separate advisory board of other market stakeholders (recent) but no voting rights.<br>• Exchange groups dominate the governance and have undue influence. |  |
| **Vendor display rule** | • No |  | • Yes (but the data is sold at a price determined by the SIP and it is noted that exchanges undercut the SIP to provide non-trading data at a cheaper price). |  |
| **Funding of the consolidated tape** | • Funding of the equity model undertaken by the provider. This is an exchange that may have an incentive not to see full consolidation and is therefore willing to bear the cost. Cross-subsidization may occur and no ring-fencing between the exchange entity and the IP exists.<br>• Equity fee pass-through model does not allow for sharing of information. |  | • Data is freely given by each TV in return for a revenue share based on a calculation on each market contribution which covers the cost of the SIP. |  |
| **Price of tape to users controlled by regulator (in equities)** | • Collaborative approach between Consolidated Tape Provider (IP) and regulator.<br>• Pass through model of all underlying fees.<br>• Regulator now reviewing pricing schedules of exchanges. |  | • Plans control the fees; SEC has oversight and is starting to scrutinise data fee schedules.<br>• Would be better if governance were fixed. |  |
| **Overall Equity Tape Structure Offerings** | • One IP with a choice of 6 different feeds available.<br>• Consolidated Data Feed (CDF) is most popular but essentially pass-through model; not co-mingled data; each instance or connection costs $200 but is capped at $1000.<br>• Users save on connectivity, set up/admin costs. |  | • Content of the feed is based on where the securities are listed.<br>• Three Tape Plans.<br>• Unlimited Trading Plan (Nasdaq, Tape C): UTP Quotation Data Feed (UQDF) for quotes and UTP Trade Data Feed (UTDF) for trades.<br>• Two plans are under the CTA: Consolidated Tape System (CTS) Plan and Consolidated Quote System (CQS) Plan.<br>• Only Level 1 depth and odd lots excluded. |  |
| **Standardization of end-user definitions for data consumption** | • No. Each marketplace has its own definitions for pro/non-pro; display, non-display and creates confusion |  | • No. Tape A&B have standardized terms. Tape C is different. |  |

Figure Q: Challenges identified by Participants from Market Participant Interviews in US and Canada.

| Area of Challenge | Canada | US |
|---|---|---|
| **Governance** | • Data stakeholders feel they have no representation or say over data governance. | • Data stakeholders feel they have no representation or say over the governance of venue data and the SIP.<br>• Stakeholders are particularly aggrieved that the venues sell their own data as a proxy for the whole market to undercut the SIP where it is not required for trading. |
| **Administration for users of the tapes is very onerous** | • There are issues with inconsistent definitions of end-user types, e.g. professional vs. non-professional classifications, which makes it difficult and expensive to validate status of users, particularly for retail brokers.<br>• A standard contract exists with the IP, but users must enter a bilateral arrangement with each marketplace.<br>• The cost of administering and permissioning the data is a significant administrative undertaking. | • There are issues with inconsistent definitions of end-user types e.g. professional vs. non-professional classifications which is difficult and expensive to validate status of users, particularly for retail brokers.<br>• Some tapes also have different tiers for different types of subscribers or separate data streams adding burden to the reporting process<br>• Firms must report the number of users to exchange each month. it is complex and if the data is not reported on time, the SIP can levy a late charge. For example: For Tape A & Tape B, the late fee is $2,500.<br>• To alleviate the administrative headache NASDAQ offers a basic price feed that differentiates users as private or commercial. Participants feel the exchanges are conflicted. |
| **Contracts Process** | • A standard contract exists with the IP, but users must enter into bilateral arrangements with each marketplace. | • Tape A & B differ from Tape C. There can be modifications 'approved by the regulator', which mean extra diligence and archiving of changes to ensure compliance.<br>• All contracts come with policies and procedures that are not approved by the regulator. |
| **Audit** | • The IP has no regulatory power to audit the marketplace in terms of timeliness and accuracy of data submissions.<br>• Contracts for the underlying data are with each venue and they can impose an audit on users. | • Long and often duplicated processes.<br>• Exchanges often use third parties that are paid by contingency.<br>• Although the same firm that audits on behalf of the SIP is not the same as the firm that audits the exchange, the timing of the audit may overlap.<br>• Some firms are working hard to limit audit rights of exchanges/SIPs. |
| **Market Data Costs** | • Issues around data costs remain at the forefront of complaints.<br>• Costs for proprietary and retail feeds are high.<br>• CSA assess market data fees charged by marketplaces every year. Current formula structure motivates marketplaces to drive for market share to get paid (venues pay for internal crosses; | • Issues around data costs remain at the forefront of complaints.<br>• There are a number of reasonably priced options to access data. Professional users can access real-time data at an aggregate cost of $60 per month or by query and historical data is free of charge after 15 minutes. |

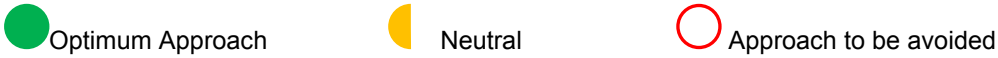
| Area of Challenge | Canada | US |
|---|---|---|
| | ownership structure of some venues creates unlevel playing field). | |
| **Depth of data** | • Less of an issue because the market participants have to pay for the underlying fees. | • Retail brokers and some other markets are particularly keen to get more depth of book in the SIP (3-5 levels) as this would help offset latency issues and give a broader sense of market direction. |
| **Historical Data** | • Exchanges often charge a fee for official close which is different than last trade.<br>• Several fees for storing, redistributing, streaming. | • Exchanges often charge a fee for official close which is different than last trade.<br>• Several fees for storing, redistributing, streaming. |
| **Transparency and resiliency** | • Most dealers with retail customers elect to have the primary market only (as a proxy for the overall market). Disadvantages smaller marketplaces.<br>• Also causes a resilience issue if main listing venue goes down. | • Market transparency is good. Vendor Display Rule requires a consolidated display of trade information at the time of execution. e.g. price, size, last sale information.<br>• Single point of failure; there is no alternative. If one exchange goes down during the day, the SIP goes down too. |
| **Latency** | • Not suitable for latency-sensitive users.<br>• Issue with arbitrage.<br>• IP would not provide latency figures. | • Issue with arbitrage.<br>• Nasdaq: medium 20 microseconds.<br>• NYSE: medium 350 microsecond. |
| **Trading Obligation (OPR)** | • Based on depth of book.<br>• Depth of book adds expense to complying. | • Only top of book information. |
| **Content** | • TMX's Consolidated Data Feed (CDF) is deemed to have robust content, however the data replicates a proprietary feed making it cumbersome to manage and anti-competitive.<br>• But smaller dealers often only take data from primary exchange as proxy. | • Auction and imbalance information.<br>• Lot sizes are an issue, e.g. if Amazon trades at $1400 and the protected quote is $150,000 or 100 shares, if odd lots are shown it would confuse protected quote.<br>• No depth of book.<br>• Tick size harmonization.<br>• Flag MPID (Marketplace identifier) not on the trade. |

## A13.2. KEY TAKEAWAYS ABOUT TAPE STRUCTURE & GOVERNANCE FROM US & CANADIAN BOND MARKETS

Bond transparency is relatively new compared to equity markets and the market has benefited from lessons learned from the equity markets. Bond data is collected, aggregated and disseminated by self-regulatory organizations therefore the oversight, governance model and reporting framework is less complicated. The output from desk research and interviews with market participants is summarized below.

Figure R: MSP's key takeaways of the Advantage and Disadvantages of the Bond Markets Rated on a 'Red, Amber, Green' Scale.

**Key**:




| Tape Feature | Canada | Rating | US | Rating |
|---|---|---|---|---|
| **SRO undertakes aggregation and dissemination of the data** | • Yes (IIROC).<br>• Delayed. |  | • Yes (FINRA).<br>• Most bond types disseminated in real-time. |  |
| **SRO undertakes cross-market surveillance** | • Yes. |  | • Yes. |  |
| **The existence of a consolidated tape is mandated by the law** | • Yes. |  | • Yes. |  |
| **Governance structure of consolidated tape** | • Mutualised governance. |  | • Mutualised governance.<br>• Robust structure - 14 advisory committee and informed by FIMSEC (SEC advisory group) |  |
| **Cost of the data** | • Free. |  | • Reasonable fees imposed.<br>• $60 per month for display. |  |
| **Single or double-sided reporting** | • Single-sided reporting (Double-sided if two IIROC dealer member firms involved). |  | • Single-sided reporting (Double-sided if two FINRA firms involved). |  |
| **Reporting subject to volume caps** | • Corporates – no.<br>• Government securities – yes. |  | • Yes.<br>• Provides consistency but some think that trades are disseminated too quickly creating information leakage. |  |

## Figure S: Input from Interviews with US Market Participants.

As the Canadian post-trade tape is relatively new and only used by a sub-group of users, a comparison of the two markets is less meaningful. This table summarizes feedback from US participants and presents areas for improvement.

| Attribute | Positive Feedback | Areas for Improvement |
|---|---|---|
| **Data Quality** | • Data is thought to be clean, consistent and reported in a timely manner.<br>• Data is powerful, provides direction and is largely accurate. | • Timestamp could more accurate and reflect time of execution; late reporting may distort where the market is, at present time. |
| **Reporting Time** | • Good for small trades, some think that for smaller trades the reporting time could be reduced.<br>• Rules are sensible, straightforward and clear.<br>• TRACE strikes a good balance between timely reported information (maximum delay is 15 minutes) and ensuring liquidity providers are not exposed. | • Volcker Rule has forced dealers to unwind positions fast; short reporting timeframes for blocks puts a strain on how banks manage balance sheets and offset risk.<br>• Real-time TRACE reporting has contributed to a decline in block size liquidity.<br>• Reporting time is too short to manage blocks – some think the reporting time should increase to 48 hours for blocks.<br>• ETF and electronic market makers do not think it is fast enough. |
| **Impact of Transparency** | • Reduced transactions costs.<br>• Increase in market quality. | • Although TRACE has reduced the cost of trading, it has led to a greater amount of time to trade risk.<br>• TRACE has also incentivized people to be more technical rather than value-driven - so market participants try to arbitrage the dealers.<br>• TRACE has also helped electronic market makers get into the business even though they are less regulated. |
| **Pre-trade Analysis** | • For illiquid bonds, it allows traders to interpolate data points and make more informed trading decisions, e.g. price curves and relative value ETFs.<br>• For illiquid bonds, it informs traders ahead of entering an order; less likely to get picked off.<br>• Aids in the understanding of liquidity risk of ETFs. | • None given. |
| **Execution** | • Important input into both sell-side pricing algorithm and automated execution processes.<br>• Enables the buy-side to push back on dealers if mark-up is too high. | • None given. |
| **Post-trade analysis** | • More accurate assessment of execution quality.<br>• More accurate end of day pricing to calculate NAV and ETFs.<br>• Controllers use it for month-end price validation.<br>• Has helped to promote effective liquidity risk management for compliance to SEC Liquidity Rule.[108] | • None given. |

108 SEC, 17 CFR Parts 210, 270, 274

# A14 / ECTP STAFFING ASSUMPTIONS

**ECTP Staff Calculations**

| | Notes | Post Trade FTE | Pre Trade FTE | Total | Avg cost per person €k | Post Trade €k per annum | Full Service €k per annum |
|---|---|---|---|---|---|---|---|
| **CEO** | | 1 | 0 | 1 | 200 | 200 | 200 |
| **Product development** | | 2 | 2 | 4 | 80 | 160 | 320 |
| **Client services** | 1 | 2 | 2 | 4 | 60 | 120 | 240 |
| **Operational support / helpdesk** | | 2 | 1 | 3 | 60 | 120 | 180 |
| **Technology liaison** | 2 | 2 | 1 | 3 | 65 | 130 | 195 |
| **Compliance, Audit & Risk** | 3 | 2 | 1 | 3 | 70 | 140 | 210 |
| **Financial control & admin** | | 3 | 1 | 4 | 50 | 150 | 200 |
| **HR** | 4 | 0.3 | 0 | 0.3 | 75 | 25 | 25 |
| | | | | | | 1,045 | 1,570 |
| Employer's on-costs (pension, etc.) | | | | | 30% | 313 | 471 |
| **Total** | | **14.3** | **8.0** | **22.3** | | **1,358** | **2,041** |

**Notes**

1. Managing service changes, on-boarding, etc.
2. Main ECTP technology services to be outsourced
3. Data quality compliance, usage audits, risk management
4. HR function to be outsourced or part-time

*Source: MSP research into organisations with similar mandates to aggregate/consolidate data*

# A15 / ACADEMIC LITERATURE REVIEW - EQUITIES

## A15.1. SUMMARY OF ACADEMIC RESEARCH – EQUITIES

There is a body of both pure academic and sponsored academic literature, mostly based on US equity market experience, that points to the critical role of data and technology in the development of markets, latency, pricing and cost, as well as to the importance of the calibrations of a tape's characteristics and constituents. It should be noted that some academic papers have been funded by exchanges.

There is also a selection of recent European industry association and regulatory papers. They are mostly focused on the cost of market data, data quality issues and the possibility of creating a consolidated tape.

### A15.1.1. The Impact of Competition on Data

Consolidation of data is much debated in markets where competition has occurred such as North America and Europe. IOSCO noted in 2013 [109] that transparency levels differ across markets and that the consolidation of data had become important to offset the fragmentation of markets. It pointed out that market structure is not internationally uniform but called for regulatory frameworks in each jurisdiction to evolve alongside trading spaces to reduce search costs for market participants and their customers.

Nonetheless, moving the market to a data consolidation model that works for each market has proved difficult. In Canada, proposals for a consolidated tape have been mooted from as far back as 1999[110] but have yet to come to fruition. New exchanges persistently call[111] for an end to one exchange's monopoly on data consolidation and pricing which they say leads to negative perceptions about liquidity and transparency, reduced visibility and liquidity and lower investor confidence.

The consequences of not addressing data consolidation in fragmented markets are broad. In Europe these are believed to include: higher trading costs; difficulties in using smart order routing for best execution effectively; difficulties in measuring best execution; decreased transparency for buy-side traders; and the limitations of longer-term adoption of electronic trading.[112]

### A15.1.2. The Use of Data and Technology in Creating Market Dominance

History shows that data and technology have been used by exchanges to create dominant positions which may require regulatory intervention to further transform markets. For example, NYSE's original dominance in industrial stocks came from the use of the then-new technology of the stock ticker to disseminate NYSE price information and attract order flow. Once it achieved dominance, the NYSE competed with a fortress approach; refusing to cooperate with other exchanges and using its natural liquidity advantages to dominate the market. It was only when regulators intervened that regional exchanges and third market dealers could build sustainable positions. New regulations promoted competition between exchanges, allowed the internalization of order flow and forced the NYSE to share price information via the consolidated tape and the Intermarket Trading System (ITS) which along with the Consolidated Quotation System, gave the regional markets access to the NYSE's quotes and the ability route orders to any of the US stock exchanges in search of the best price.[113]

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109 IOSCO Board (2013), "Regulatory Issues Raised by *Changes in Market Structure Consultation Report*", see Main Study Bibliography

110 Alberta Securities Commission (1999), "*Discussion Paper: Consolidation Plan for a Consolidated Canadian Market*", see Main Study Bibliography

111 Aequitas Innovations Inc. (2015), *"Breaking the Virtual Canadian Market Data Monopoly"*, see Main Study Bibliography

112 Aite Group for BM&F Bovespa (2013), "*Market Fragmentation and Its Impact: A Historical Analysis of Market Structure Evolution in the United States, Europe, Australia and Canada*", see Main Study Bibliography

113 James J. Angel, 'Consolidation in the Global Equity Market, An Historical Perspective' (1998)

Exchanges that have dominance ultimately may not be making the best strategic decisions for themselves or the market. An attitude of "If it ain't broke, don't fix it" leads to a lack of adaptability[114] to changing market conditions where alternative methods or more innovative liquidity provision might be embraced.

### A15.1.3. The Link Between Pricing of Market Data and Liquidity

Exchanges are increasingly reliant on data for profit maximisation, but this directly conflicts with their role in discerning the optimum liquidity and price formation model for the overall market. Many academics believe that this can have negative consequences on price discovery and capital allocation decisions. Through their fee system, exchanges are also controlling the proportion of investors who have access to privileged information and are also incentivised to determine that one liquidity provision model is better than another if it pays more in data fees.

The rationale for this is that exchanges are direct beneficiaries from pricing information being made available because it impacts their liquidity. Where there are only a small number of informed market makers then access to real-time prices is valuable, but it comes at the expense of lower market liquidity; selling data is not so compelling even though it might help inform a wider set of trading counterparties.

When multiple informed agents compete in financial markets, it is more beneficial for them to acquire real-time pricing information and exchanges have an incentive to sell data in order to increase liquidity on their markets. However, as some firms start to see the value of faster data which can be profitable when used as a complement to their own internal data sets, it has resulted in a tiered system where some market participants receive market signals at different times.

The fastest participants receive it in nano-seconds, general professionals receive it in milliseconds and non-professional investors receive it after 15 minutes. Exchanges charge for these different signals accordingly and by providing informed traders with more information, it can intensify the degree of competition among them. This moves in a continuous circle as it increases the informed traders' willingness to pay for the high precision signal and incentivises the exchanges to continue to maximise profit but ultimately this cycle has a negative impact on overall market liquidity.[115] Exchanges have been seen to benefit from the willingness of some participants to pay for these trading rights for over two decades.[116]

Some academics, therefore, argue that exchanges should not be allowed to sell market data, and it should be made freely available to the public. They point out that the lack of any consolidated tape in Europe also means that traders are unable to get information from anywhere but the primary exchange data products which is a worse situation than the US.[117] Others conclude that there is ground for regulating the sale of price information by exchanges, and that price discovery may be more efficient with free price information.[118]

### A15.1.4. Latency

The two or three-tier system of speed gives rise to a discussion about latency which is exacerbated in markets with multiple data centres.

In the US, the official consolidated tape BBO (NBBO) is slower than that which can be calculated in-house by taking in faster direct feeds from each exchange. Execution delays may result in the best prices, as shown on the public NBBO, being unavailable when the order reaches the market for fulfilment.

According to some studies, latency issues in the US market appear unavoidable. Conclusions have been reached that information cannot be propagated instantaneously across a fragmented market with spatially separated matching engines and so this means the best bids and offers (BBO) reported on different

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114 Ibid.
115 Boulatov A. Dierker M. (2007), *"Pricing Prices"*, see Main Study Bibliography
116 Seligman J. (2002), *"Rethinking Securities Markets: The SEC Advisory Committee on Market Information and the Future of the National Market System"*, see Main Study Bibliography
117 Easley D., O'Hara M., Yang L. (2016 revision of 2013) *"Differential Access to Price Information in Financial Markets"*, see Main Study Bibliography
118 Cespa G., Foucault T. (2014), *"Sale of Price Information by Exchanges: Does it Promote Price Discovery?"*, see Main Study Bibliography

information feeds are likely to vary.[119] For this reason, some research proposes that the concept of the consolidated BBO will break down[120] and **introducing post-trade transparency in an opaque market may have more benefits than introducing pre-trade transparency into in an already relatively transparent market**.

Other research states that the US consolidated tape processor, the SIP, has not benefitted from the same level of technological investment as the direct data feeds[121], with less superior fibreoptic cables for transmission, less streamlined setup and additional processing requirements, thus causing additional latency although it is acknowledged that further improvements have been made since the original data was collected. Nonetheless, most of the market uses the SIP; even sophisticated users will take the SIP as back up tool for use in some activities or combine the SIP with a direct feed to construct their own BBOs.[122]

Some academics argue that for that reason equal access to information should not be compromised and the ability to sell data to different segments inherently creates information asymmetry.[123]

Academics are, however, are divided on whether direct feed arbitrage is a meaningful source of profits for the firms that can leverage it, such as algorithmic traders. Some believe that the changing landscape for high-frequency traders may have reduced their ability to benefit from exploiting other participants' use of SIP consolidated tape with arbitrage strategies.[124] Others say that high-frequency traders (HFT) have a strong ability to benefit from it and this especially true of larger stocks and at certain exchanges.[125]

Latency arbitrage is a debate in other markets too. The Bank of Canada raised concerns about it in the Canadian market in 2013.[126] A later study[127] undertaken by the UK regulator highlights that, in contrast to the US, UK trading venues enjoy close physical proximity to data centres around London, which they believe reduces the speed advantage. The lack of a US-style order protection rule also prevents less predictable routing strategies and trading behaviour and where speed is exploited, it is not only by HFTs but also by investment banks and broker algorithms.

Timestamping precision is therefore important in creating an accurate picture of the market at any point. If a tape is used for trading then the wider the time gap between consolidated and direct feeds, the bigger the issue. One study finds that only at one-second resolution does the US consolidated tape align with the direct feeds that have much lower latency resolution.[128]

A study[129] of European markets, undertaken by the UK regulator pre-MiFID II, also points out that timestamping needed careful consideration in MiFID II. It recommended that MiFID II should have microsecond granularity and maximum timestamp divergence of 100 microseconds for venues with less than a one millisecond gateway to gateway latency. It also commented on the clock synchronisation and timestamping issues that affect the precision of trade reporting.

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119 Tivnan B.F., Dewhurst D.R., Van Oort C.M., Ring J.H. IV, Gray T.J., Tivnan B.F., et al. (2018), "*Fragmentation and inefficiencies in US equity markets: Evidence from the Dow 30*", see Main Study Bibliography

120 Holden C.W., Jacobsen S. E., Subrahmanyam A. (2017 revision of 2014), "*The Empirical Analysis of Liquidity*"; Easley D., O'Hara M., Yang L. (2016 revision of 2013) "*Differential Access to Price Information in Financial Markets*", see Main Study Bibliography

121 Tivnan B.F., Dewhurst D.R., Van Oort C.M., Ring J.H. IV, Gray T.J., Tivnan B.F., et al. (2018), "*Fragmentation and inefficiencies in US equity markets: Evidence from the Dow 30,* see Main Study Bibliography

122 Ibid.

123 Balp G., Strampelli G. (2018), "*Preserving Capital Markets Efficiency in the High-Frequency Trading Era*", see Main Study Bibliography

124 Bartlett R.P., McCrary J., (2017 revision of 2016), "*How Rigged Are Stock Markets? Evidence from Microsecond Timestamps*", see Main Study Bibliography

125 Wah E. (2016), "*How Prevalent and Profitable are Latency Arbitrage Opportunities on U.S. Stock Exchanges?*", see Main Study Bibliography

126 Bank of Canada: Garriott C., Pomeranets A., Slive J., Thorn T. (Autumn 2013), "*Fragmentation in Canadian Equity Markets*", see Main Study Bibliography

127 FCA (UK): Aquilina M. and Ysusi C. (2016), "*Are High-Frequency Traders Anticipating the Order Flow? Cross-Venue Evidence from the UK Market*", see Main Study Bibliography

128 Hasbrouck J. (2018), "*Price Discovery in High Resolution*", see Main Study Bibliography

129 FCA UK: Aquilina M., Foley S., O'Neill P. and Ruf T. (2016), "*Asymmetries in Dark Pool Reference Prices*", see Main Study Bibliography

## A15.1.5. Tape Design and Data Constituents

The constituents of a consolidated tape and the definition of what is required to be submitted to it need careful consideration or it can lead to market inefficiencies. It should be adaptable as the market changes as it has been demonstrated that that investors change their strategies according to market design, which in turn is characterized both by frequent regulatory interventions and by competitive pressures.[130] Markets need to be enabled to respond to changes in their environments.

In its 2002 review of the US market structure, the SEC identified the consolidated quotation system, as opposed to the consolidated last sale reporting tape, as being the most important component of the consolidated reporting system.[131] Further studies agree that greater pre-trade transparency is a win-win situation and it was found to have improved the informational efficiency of prices and increased displayed liquidity. The subsequent decline in the trading activity of the NYSE specialists suggests that they lost their informational advantage when pre-trade transparency was improved, and participants adopted new actively managed strategies in response to the data.[132]

Equally, a detailed grasp of the underlying data details and market variations is important when designing a tape. Discrepancies in the reporting of orders versus trades have been found to limit the usefulness of the US consolidated tape, leading to erroneous conclusions and undermining the empirical integrity of the CT feed.[133] The NYSE is the only exchange that reports trades based on the size of the marketable order but all other US exchanges report trades based on the size of the resting order in the central limit order book. There are therefore statistically and economically significant biases created in microstructure measures when trade prints are used rather than marketable orders. The study states that the findings are applicable to any market, foreign or domestic, that reports trades based on the size of the resting order in the CLOB and therefore asserts that the issue of bias exists in other, non-US markets including London.

A proper understanding of market dynamics is also very important to regulatory policy about data consolidation. For example, in the US there is considerable debate about dark and lit markets. Academics have found that the US markets have not been harmed by fragmentation because of good data consolidation, but they point out that in Europe's newly fragmented markets the lack of consolidation is inhibiting good execution because participants cannot see a single virtual market.[134]

More granular issues also need consideration. The concept of odd lots (trades for less than 100 stocks) exists in the US and these trades were historically excluded from the US consolidated tape. This is because trades of this size were originally thought to be only generated by retail investors and have little contribution to price formation. However, more recently algorithmic traders are also trading in very small sizes and, in some stock, 60% of the price discovery was occurring in trades that are odd lots. This has led to inaccuracies and order imbalance measures.[135] When odd-lots have subsequently been included in the tape in academic analysis, conclusions have been drawn that when they are not included they help algorithmic traders to use them as an exploratory tool, to learn about current market conditions and predict returns. Odd-lot imbalances appear to predict returns up to two days in advance.[136]

## A15.1.6. Revenue Allocation

The US consolidated tapes share revenue for quotes and trade event information according to a formula. It has been widely acknowledged and confirmed that allocation formulas influence how trades are executed and reported and that data revenues will continue to play a significant role in shaping the industry.

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130 Boehmer E., Saar G., Yu L. (2004), "Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE", see Main Study Bibliography

131 Seligman J. (2002), "*Rethinking Securities Markets: The SEC Advisory Committee on Market Information and the Future of the National Market System*", see Main Study Bibliography

132 Boehmer E., Saar G., Yu L. (2004), "*Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE*", see Main Study Bibliography

133 Upson J., McInish T., Hardy Johnson IV, B. (2018), "*Orders verses Trades on the Consolidated Tape*", see Main Study Bibliography

134 O'Hara, M. and Ye. M. (2009), "*Is Market Fragmentation Harming Market Quality?*" (2009), see Main Study Bibliography

135 Maureen O'Hara, Chen Yao And Mao Ye, '*What's Not There: Odd Lots and Market Data*', The Journal of Finance, Vol. 69, No. 5 (October 2014), pp. 2199-2236

136 Roseman B., Van Ness B. F., Van Ness R. A. (2018 revision of 2016), "*Odd-Lot Trading in U.S. Equities*", see Main Study Bibliography

Findings show that prior to 2007, exchanges were allocated revenue in proportion to the number of trades executed on their venues and so incentivisation programs for members were geared to larger numbers of small trades which was skewed to the largest securities by capitalisation. The allocation rule changed to a weighted rule in 2007 with an additional incentive for exchanges to provide liquidity at the national best bid and offer (NBBO). The result was fewer smaller trades and that revenue became more evenly spread across all securities so that trading in smaller capitalised securities was encouraged.[137]

### A15.1.6. Cost

The cost of data has been a significant focus in global markets in recent years. Many market participants complain about market data costs and their complaints have been supported by regulatory research.

The Bank of Canada found that the fragmentation of Canadian markets had lowered trading fees and increased innovation but at the same time increased data and connectivity costs for dealers. The existence of the order protection rule makes dealers feel that they must monitor prices on all trading venues regardless of the size of the venue to ensure compliance.[138] The Ontario Securities Commission opined that whilst the Canadian market can probably not attain the same level of prices as the consolidated fees in the US due to the differences in regulatory environments, industry structure and scale, consolidated data fees in Canada were still significantly higher when scaled for trading volume.[139]

Competing Canadian exchanges also claim that there is a monopoly in place via the TMX information processor which supplies the consolidated tape. TMX Group (the parent of the TMX IP and the leading exchange, TMX) is accused of creating anti-competitive agreements, charging excessive fees for market data and claiming to own investment dealers' private market data, despite no longer providing the sole exchange post-fragmentation.[140] As a result of this, investors only get a partial view of the market as they take subsets of data in a bid to cut market data costs.

In Europe, industry participants have sponsored papers which find that the pricing of market data is not reasonable[141] and suggest that it should be a marginal cost activity. Recent findings by ESMA[142] also report that there is no CT data because of the complexities of contracts and the cost being too high.

However, those that currently profit from the sale of data argue that the cost of data is not high and that the costs for data cannot be easily separated from other business costs.

In the US, a study[143] (sponsored by NASDAQ), says that the joint nature of the production of information along with trading, surveillance and listing services makes it difficult to allocate the fixed costs to customer classes but it finds that the costs of providing data fall mainly on the professional investors who value it the most. Professional traders pick up over 80% of the cost of the SIP data because the SIPs intentionally provide real-time data at very low cost to non-professional investors and delayed data to the public for free. Using inflation adjustments, it finds that the costs to non-professional investors have fallen. Meanwhile, the investment in the technology required to match buyers and sellers has increased although this has not been quantified in the paper. This cost needs to be recovered but the joint nature of the production of information along with trading, surveillance and listing services makes it difficult to allocate the fixed costs and scrutiny of financial statements does not provide an easy way to interpret it. Overall latency has fallen as a result.

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137 Federal Reserve Board: Caglio C., Mayhew S., (2012), "*Equity Trading and the Allocation of Market Data Revenue*", see Main Study Bibliography

138 Garriott C., Pomeranets A., Slive J., Thorn T. (2013), "*Fragmentation in Canadian Equity Markets*", see Main Study Bibliography

139 Ontario Securities Commission (2012), "*CSA Staff Consultation Paper 21-401: Real-Time Market Data Fees*", see Main Study Bibliography

140 Aequitas Innovations Inc. (2015), "*Breaking the Virtual Canadian Market Data Monopoly*", see Main Study Bibliography

141 By Copenhagen Economics, Commissioned by the Danish and Swedish Security Dealers Associations.

142 ESMA (2019), "*MiFID II/MiFIR Review Report No. 1 , On the development in prices for pre- and post-trade data and on the consolidated tape for equity instruments*", see Main Study Bibliography.

143 Angel J. J. (2018), "*Retail investors get a sweet deal: The cost of a SIP of stock market data*"; Boulatov A., Dierker M. (2007), "*Pricing Prices*", see Main Study Bibliography

A further study[144] (sponsored by NYSE) says tape data revenues are modest ($387 million in 2017) and that they are lower than they once were. It states that data fees are smaller compared to other costs that market participants bear and also when compared to third-party vendor feed revenues and broker-dealer commission revenues. It also states that the market is competitive as exchanges cannot increase prices for the risk of alienating order flow and that new entrants to the market often share their data for free.

European exchanges have also expressed similar views through industry-sponsored papers. A recent study[145] found that market data prices are reasonable, that market forces can be relied on to ensure that pricing remains fair and venues are not exploiting their monopoly positions, and that pre- and post-trade market data cannot be viewed as a by-product of trading and execution.

The findings of three recent European studies are highlighted below.

| **Pricing of Market Data**<br>By Copenhagen Economics, Commissioned by the Danish and Swedish Security Dealers Associations[146] | |
|---|---|
| **Paper Remit** | Analyse the efficiency of the market for market data and give recommendations on how to improve it. |
| **Paper Conclusions** | 1. Market data pricing is not reasonable and trading venues have a monopoly on the market data generated on their trading platforms. The high cost of data is damaging to market participants and issuers.<br>2. This position should not be exploited as both MiFID I and MiFID II/MiFIR state that market data fees should be set with a "*reasonable relationship to the cost of producing and disseminating that data*".<br>3. However, this has not been implemented in practice and issues include a lack of standardisation across pricing tariffs, contracts, data definitions and audit processes. Practices from other industries with monopoly sectors should be observed.<br>4. Market data should be considered a marginal cost activity. Trading venues should include their costs relating to trading and execution activities in their charges for these services. The overall cost of data distribution technology has also been falling.<br>5. A tape could emerge if the above was taken into account but otherwise, a public organised consolidated tape could provide a second-best solution, particularly if the pre-trade data includes the full order book. |

144 Jones. C.M. (sponsored by NYSE) (2018), "*Understanding the Market for U.S. Equity Market Data*", see Main Study Bibliography

145 Oxera for FESE: (2019), "The Design of Equity Trading Markets in Europe – An Economic Analysis of Price Formation and Market Data Services", see Main Study Bibliography.

146 Copenhagen Economics (2018), "*Pricing of Market Data*", see Main Study Bibliography.

| **The Design of Equity Trading Markets in Europe – An Economic Analysis of Price Formation and Market Data Services**<br>By Oxera, Prepared for Federation of European Securities Exchanges (FESE)[147] | |
|---|---|
| **Paper Remit** | To undertake an economic analysis of the design of the market for equity trading in Europe. The report did not consider a consolidated tape. |
| **Paper Conclusions** | 1. Market data prices are reasonable. Aggregate market data revenues have increased by approximately 1% p.a. for the period 2012 to 2018 and revenues as a percentage of exchange income have moved from 30% in 2015 to 31% in 2018.<br>2. Market forces can be relied on to ensure that pricing remains fair and venues are not exploiting their monopoly positions.<br>3. It is not the venues' responsibility to ensure that investors (retail and professional) have sufficient or equal access to information. Data costs do not restrict investor access to data and the costs are very small compared to other costs incurred by professional intermediaries.<br>4. In equities, the model works to provide all necessary liquidity information and ensure that this is accurately reflected in asset prices and risk models. It also works for derivative pricing, including ETFs.<br>5. It is incorrect to view pre- and post-trade market data as a by-product of trading and execution. It is a joint product and therefore shares both costs and revenues. This matters when defining access to market data on a 'reasonable commercial basis'. Making changes to the model may threaten the quality of price formation. |

| **MiFID II/MiFIR Review Report No. 1 – On the Development in Prices for Pre- and Post-trade Data and on the Consolidated Tape Equity Instruments[148]**<br>By ESMA (European Securities and Markets Authority) | |
|---|---|
| **Paper Remit** | The remit for this report was an assessment of the MiFID II/MiFIR provisions for market data, aiming at improving the quality and availability of market data and reducing costs for market participants when purchasing data, as well as the provisions for the equity CT. |
| **Paper Conclusions** | 1. Trading venues and market data users agree that the demand for market data and its value is increasing but disagree on whether the price is reasonable.<br>2. Market data agreements and policies are neither readily accessible nor consistent, do not use common definitions and are extremely complex. Users can need multiple licences for different usages of the same data.<br>3. The objective of making data available free of charge after 15 minutes has not been met, especially for professional investors in a machine-readable format.<br>4. The majority view was that a CT only needed to be real-time but not low latency (nano-seconds).<br>5. There is no CT because of the complexities of contracts and the cost is too high. The 15-minute delay further limits revenue opportunities and data quality is poor.<br>6. The benefits of a CT include:<br>o Improved data quality and a more level playing field.<br>o Improved liquidity, market resilience and price formation.<br>o Confidence that there is a neutral and reliable source of current market prices.<br>o Increase market competition and limit the power of trading venues and data providers.<br>o Help European markets to develop further and contribute to the CMU.<br>7. Trading venues and data vendors disagreed with the benefits of a CT but did support the set-up of a "tape of record" (TOR).<br>8. If the issues identified can be addressed, there should be a CT for equities, but its complexity should not be under-estimated, and this could take more than 5 years. |

147 Oxera for FESE (2019), *"The Design of Equity Trading Markets in Europe – An Economic Analysis of Price Formation and Market Data Services"*, see Main Study Bibliography.

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# A16 / ACADEMIC LITERATURE REVIEW – BONDS

## A16.1. SUMMARY OF ACADEMIC RESEARCH – BONDS

This section explores publicly available academic research and industry literature on the experiences of TRACE reporting in the US.

Bonds are an important source of finance for economic growth. A deep and liquid market for long-term debt provides diversification and an alternative source of funding beyond bank financing and equity offerings. Liquidity[149] in bonds is essential as it underpins the smooth functioning of the financial market and allows market participants to manage market shocks and interest rate events without destabilizing the market. There are many definitions of liquidity and there are many factors that impact liquidity but in summation, it is often described by practitioners as the 'ease of transacting.' The factors that tend to be associated with liquid markets include low transaction costs, immediacy in execution and the ability to execute large transactions with limited price impact.

Before the introduction of TRACE reporting in 2002 in the US, corporate bonds were mainly traded in an opaque environment via telephone. TRACE was introduced to improve their post-trade transparency by making bond dealers report all trades of publicly issued bonds to the National Association of Security Dealers (NASD), before it became FINRA, which in turn made transaction data available to the public. FINRA took a measured approach to TRACE reporting and implemented the requirement in three phases, giving FINRA time to study the impact of transparency on the liquidity in the US corporate bond market.

Since the introduction of TRACE in the US, there have been numerous empirical studies to assess the impact on market transparency on US corporate bonds.

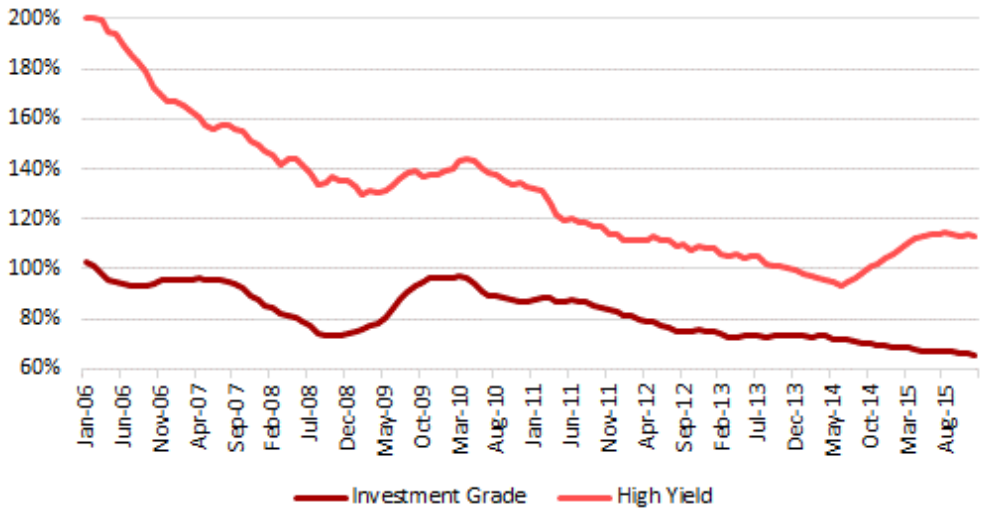
### A16.1.1. Impact on Trading Costs

Many of these studies focus on the impact of TRACE on trading costs. Academics have struggled to get pre-TRACE data and therefore have mainly relied on comparing data sets during the phasing in of TRACE. However, one study[150] obtained data from the National Association of Insurance Commissioners' database of insurance company bond trades to estimate trade execution costs during periods six months before and six months after TRACE's introduction on July 1, 2002. Their study covered publicly disseminated bonds during the second half of 2002 and showed an average one-way trading cost in the amount of 0.05 to 0.08 percent, which is approximately half of their estimates of pre- TRACE trading costs.[151] In a cross-sectional analysis of data drawn from 2003, Edwards, Harris and Piwowar (2007), reported that one-way trading costs dropped from 0.6 to 0.03 percent for those bonds whose trades are disseminated to the public, after controlling for other factors affecting costs.[152]

TRACE allows customers to assess the competitiveness of their own trading price and it informs asset managers of where the market is before they call their broker. Academic research supports that following the introduction of TRACE, dealers were less likely to extract disproportionate profits Academic research also illustrates that the introduction of TRACE reduced dealers' information advantage relative to customers, and reduced cross-sectional variation in the degree to which customers are well-informed regarding bond values.[153]

149 Liquidity is a measure of the ability to buy or sell a product in a desired quantity and at a desired price and time without materially impacting the product's price.
150 Bessembinder H., Maxwell W., Venkataraman K. (2006), *"Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds"*, see Main Study Bibliography
151 Bessembinder H. and Maxwell W. (2008), *"Transparency and Corporate Bond Market"*
152 *Ibid.*
153 *Ibid.*

Figure T: Investment Grade & High Yield 12-Month Rolling Turnover Ratios.




*Source: Tabb Group, Bond Liquidity Metrics, Reading Between the Lines*

It is generally viewed that greater transparency has led to lower trading costs, particularly for retail traders, however, it has had a number of impacts on investment firms. Like with any shift towards automation, there has been a reduction in trading personnel dedicated to bond trading and a decrease in profits and compensation. Bessembinder, Maxwell and Venkataraman (2006) and Edwards, Harris and Piwowar (2007) each calculate based on their respective empirical estimates that TRACE reduced the costs to investors of trade execution, or equivalently, corporate bond dealers' market-making revenue, by approximately $1 billion per year.[154] The decline in trading revenue from the sale of corporate bonds has enticed bond trading firms to turn to less liquid products such as syndicated loans and credit default swap to find value.

## A16.1.2. Impact on Liquidity

A study by Goldstein et al [155] assessed the impact of TRACE specific to the liquidity of BBB corporate bonds. The authors found that transparency had either a positive or neutral impact on market liquidity and spreads and led to lower transaction costs.

The International Organization of Securities Commissions (IOSCO) took a close look at secondary market liquidity[156] and their assessment showed a substantial decrease in bid-ask spreads since the financial crisis.[157] The trend is the same for both investment-grade and high-yield bonds.

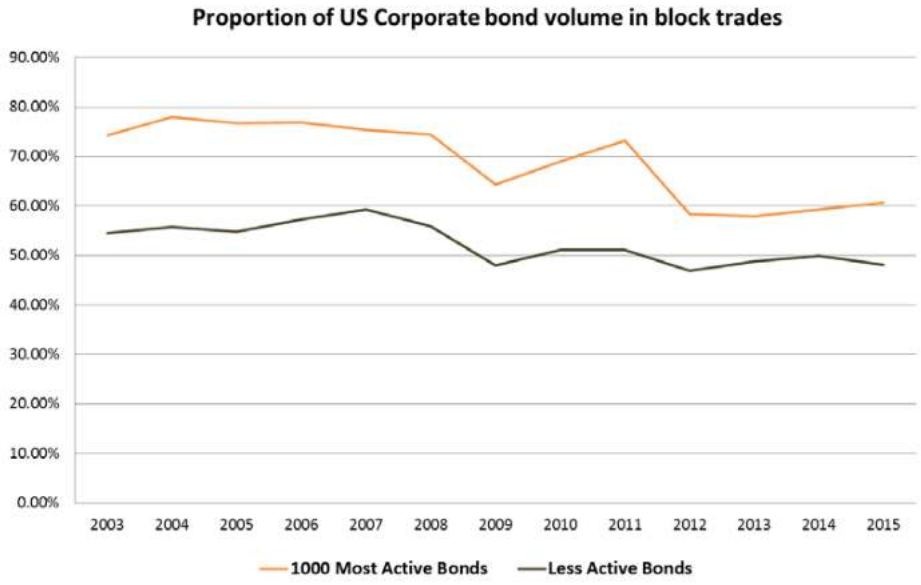
Many market participants profess that trading has become more difficult for sell-side firms, leading to a reluctance to operate as a principal and commit capital.[158] This shift has a negative effect on the overall market as it can increase the time and the cost to locate bonds. The longer a buyer/seller must wait to complete a transaction, the higher the risk that prices may move against them.

Another shortcoming of the US price transparency regime is that the near real-time dissemination does not allow dealers enough time to offset their risk on sizeable bond transactions. Even with the total volume masked, it can be relatively easy for certain market participants to identify when a block trade has taken

154 Maxwell W.F., Bessembinder H. (2008), "Transparency and the Corporate Bond Market", see Main Study Bibliography.
155 Goldstein, M. A. and Hotchkiss, E. S. and Sirri, E. R. (March 2007), *"Transparency and Liquidity: A Controlled Experiment on Corporate Bonds"*, Review of Financial Studies, Vol. 20, No. 2, pp. 235-273.
156 IOSCO Board (February 2017), *"Examination of Liquidity of the Secondary Corporate Bond Market"*, https://www.iosco.org/library/pubdocs/pdf/IOSCOPD558.pdf.
157 The bid-ask spread is the difference between the price at which dealers are willing to buy (bid) and the price at which dealers are willing to sell (ask).
158 Purchasing and holding bonds on books to sell to customers.

place when coupled with other market factors. Both FINRA and the UK FCA have examined the percentage of trades that are large (or block trades) compared with the total bond trading volume.[159] Both studies showed a soft decline in recent years which could potentially indicate that it has been more difficult.[160] A study by FINRA's Chief Economist, Bruce Mizrach, showed slightly different results; that the average trade size in the most active issues is down more than a third since 2006. The decline in the average trade size in the less active segment has been less severe, and the trend toward increasing trade size since 2009 appears to be continuing. But this measure is still down over $150,000 since 2007.[161]

Figure U: Proportion of US Corporate Bond Volume in Block Trades (Trade Size of $5 Million and Above).




*Source: GFMA*

As a result of the price impact of large transactions, dealers may be forced to break up big transactions into multiple smaller transactions. Declines in larger transactions (block trades) in US corporate bonds from pre-2008's financial crisis levels indicate a shift in trading patterns, with liquidity now associated with smaller trade sizes.[162]

One of the limitations of the empirical studies is that they do not factor in behaviours. Many asset owners have unrelated objectives and constraints that drive their behaviour in disparate ways, suggesting that market participants are unlikely to react to changes in market conditions in the same way.[163] Post-trade data does not reflect behavioural decisions; for example, a trader's decision to reduce trade size or not execute an order. Regulations, such as the Volcker Rule, also factor into liquidity conditions. A study by the Office of Financial Research (OFR) tried to isolate the impact of the Volcker Rule on US corporate bond trading. Their findings show a significant adverse effect on liquidity for covered firms' corporate bond trading with higher

159 The FCA used a large trade size threshold of £100m and FINRA used a block trade threshold of $5m (in accordance with TRACE).

160 IOSCO Board (2017), "*Examination of Liquidity in the Corporate Bond Market,* https://www.iosco.org/library/pubdocs/pdf/IOSCOPD558.pdf"

161 FINRA Office of the Chief Economist Research Note, Bruce Mizrach B. (2015), "*Analysis of Corporate Bond Liquidity*", https://www.finra.org/sites/default/files/OCE_researchnote_liquidity_2015_12.pdf

162 Oliver Wyman (August 9, 2016), "*Interaction, Coherence, and Overall Calibration of Post-trade Basel Reforms*", https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2016/aug/post-crisis-basel-reforms.pdf

163 An analysis of this can be found in Blackrock (October 2016), "*Addressing market liquidity – A broader perspective on today's bond markets.*"

costs by 20-45 basis points for customers even for roundtrip trades of shorter duration.[164] They conclude that the Volcker Rule appears to have increased the cost of the liquidity provided by covered firms and has not decreased the liquidity risk exposure of covered firms. Furthermore, other measures have an impact on liquidity conditions such as changing market models, the increased electronification of the market and global monetary conditions which need to be considered when assessing the impact of TRACE on market transparency.

Below we summarise a key study from the ICMA.

**EU Consolidated Tape for Bond Markets Interim Study for the European Commission**

By ICMA (International Capital Markets Association)

ICMA strongly supports a European Consolidated Bond Tape and with the help of a taskforce of members has produced both final and interim reports for the European Commission.[165]

Many ICMA member firms say they struggle to have a full picture of European market liquidity, size and coverage due to aggregation, market structure and data quality challenges. A number of aggregation issues were cited including the inconsistencies in data formats between APAs, lack of standardization of how to access the APA websites, data errors and data licensing costs. The usability of the information for price discovery is also very low due to differing formats and levels of completeness and quality control measures between aggregators and data service providers. Both buy and sell-side firms struggle to understand the overall market volume but have no means to validate this precisely because the cost to do this is prohibitive.

The benefits of a tape would include levelling the playing field in terms of access to information and reducing information asymmetries, helping with best execution and transaction cost analysis assessments. It would also improve the accuracy of fund valuations and the pricing of derivative products because the underlying instruments would better reflect current market conditions. It would also facilitate automation including the pricing and execution of orders and enable a stronger Capital Markets Union.

The report outlines ICMA's recommendations in detail but broadly ICMA proposes the following:[166]

- ESMA to have supervisory authority and powers over the consolidated tape provider (CTP) and the responsibility for awarding the CTP contract.
- A single consolidated tape provider, which is a third-party with data management experience:
    - The CTP will manage the day to day operations and will have a robust governance structure and supporting policies and procedures.
    - Raw data to be made available to all market participants via a low-cost utility model.
- Mandatory contribution of trade information by trading venues and APAs.
- Consumption of the consolidated post-trade data should not be made mandatory.
- The scope of the EU bond CT should aim to cover a minimum of 80%, or better, of all volumes of bond transactions, across all trading venues and APAs (may require phasing in).
- A harmonized post-trade deferral regime.
- Timing of reporting should be in line with the existing MiFID II/R post-trade transparency regime.
- Several data quality enhancements to improve the ease of reporting.

164 The Office of Financial Research: Allahrakha M., Cetina J., Munyan B., and Watugala S. (June 2016), *"The Effects of the Volcker Rule on Corporate Bond Trading: Evidence from the Underwriting Exemption", available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3068476. The study uses the underwriting exemption to isolate the Volcker Rule's effects separate from other post-crisis changes in bank regulation and broader trends in market liquidity.

165 Consolidated Tape Taskforce & Working Group have representatives from the buyside, sell side, trading venues and data vendor communities. It is a 35 member taskforce and is also part of a wider Consolidated tape working group made up of 65 member firms

166 Reference to the report for detailed recommendations: EU Consolidated Tape for Bond Markets 'Interim' study for the European Commission, ICMA MiFID II Data Workstream - Consolidated Tape Taskforce & Working Group February 2020

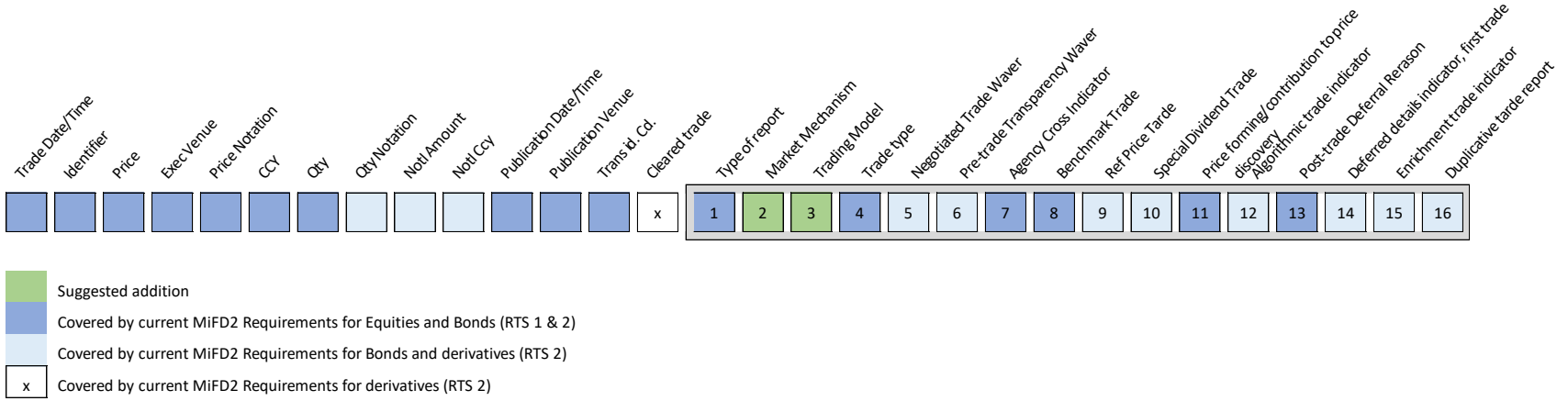
# A17 / RECOMMENDED CT DATA OFFERING

Figure V: Summary of The Proposed Tape Offerings in Each Asset Class.

| | | Equities | Bonds | Derivatives | Notes |
|---|---|---|---|---|---|
| **Order book Events** | Depth Updates (side, level, side, size) | x | | | Indicates an update for a given price level and side (increase qty, decrease qty, insert price level and qty, remove price level). Only relevant for Market by Level. |
| | Indicative Auction Price | x | | | Indicates the price at which an auction would uncross based on the current state of the order book. |
| | *Indicative auction volume* | x | | | Indicated the total volume (in relevant units) that would be traded at the indicative auction price. |
| | Auction Imbalance size and Side | x | | | Indicates the total value of unmet liquidity (if any) during the auction call period. |
| **Trade Events** | Trade report (new, cxl, amend) | x | x | x | Indicated a new trade report message (with all required details). Note that a "new" message may be related to cancellation or amendment. |
| **Statistics (Liquid instruments on an order book)** | Pv Day Closing Price (per venue) | x | | | The closing price of the instrument on the trading session immediately preceding the trading session of record. This is venue specific. |
| | Opening Price (per venue) | x | | | The opening price for the instrument on the trading session of record, per participating venue. |
| | Closing Price (per venue) | x | | | The closing price for the instrument on the trading session of record, per participating venue. |
| | Session Hi (per venue) * | x | | | The highest price at which the instrument has traded on the trading session of record, per participating venue. |
| | Session Low (per venue) * | x | | | The lowest price at which the instrument has traded on the trading session of record, per participating venue. |
| | Cumulative Volume* | x | | | The cumulative traded volume of the instrument on the trading session of record, per trading venue. |
| | Cumulative Value* | x | | | The cumulative traded value of the instrument on the trading session of record, per trading venue. |
| | EOD Statistics Summary (per venue) | x | | | A snapshot with the values of each of the statistics (Hi, Lo, Cumulative Volume and Value etc), per participating venue, as of the closing of the session of record. |
| | Consolidated Pv Day Closing Price | Optional | x | x | The consolidated closing price of the instrument on the trading session immediately preceding the trading session of record. |
| | Consolidated Opening Price | Optional | x | x | The consolidated opening price for the instrument on the trading session of record; this is a derived price based on an industry-agreed calculation method. |
| | Consolidated Closing Price | x | x | x | The consolidated closing Price for the instrument on the trading session of record; this is a derived price based on an industry-agreed calculation method. |
| | Consolidated Session Hi* | x | x | x | The consolidated high price at which the instrument has traded on the trading session of record. |
| | Consolidated Session Low* | x | x | x | The consolidated low price at which the instrument has traded on the trading session of record. |
| | Consolidated Cumulative Volume* | x | x | x | The consolidated cumulative traded volume of the instrument on the trading session of record. |
| | Consolidated Cumulative Value* | x | x | x | The consolidated cumulative traded value of the instrument on the trading session of record. |
| | Consolidated EOD Statistics Summary (per venue) | x | x | x | A snapshot with the values of each of the statistics (Hi, Lo, Cumulative Volume and Value etc), per participating venue, as of the closing of the session of record. |
| **Session Admin** | Order book Status Updates | x | x | | Indicates that there has been a change in the status of the Order book, as well as any further details required related to the change in status. The value disseminated is the NEW status (e.g. "Reg. trading halt"). |
| | "Other" | x | x | | Other admin messages, free text. |

* Not all trade reports will contribute to the update of these metrics

# A18 /PROPOSED ENRICHMENT OF RTS FLAGS




1 New, Cancellation, Amendment
2 Visible OrderBook, Dark OrderBook, Off-book, Periodic Auction, RFQ […]
3 Opening Auction, Closing Aution, Continuous Trading […]
4 Dark trade, Price Improved, Package trade, others, etc […]
5 NT in Liquid Instrument, NT in Illiquid Intrument […]
6 Pre-trade Transparency Waver for Illiq Instrument on SI […]
7 Agency Cross Tarde Y/N
8 Benchmark Ttrade Y/N
9 Ref Price Tarde Y/N
10 Special Div Trade Y/N
11 Price Forming tarde Y/N
12 Algorithmic trade Y/N
13 No deferral, LIS, Illiquid, Illiquid and LIS […]
14 Limited Details Trade, Daily Aggr. Tarde, Volume Omission Trade, […]
15 Full details of Limited Details Tarde, Full details of Daily Aggregated Trade […]
16 Duplicative trade report Y/N

# A19 / LEGAL ANALYSIS

## A19.1. LEGAL BACKGROUND

It is our understanding that the European Commission (EC) will not be able to use its existing delegated powers to mandate a pre-trade consolidated tape (CT) or to mandate that firms or entities other than APAs and trading venues (TVs) submit data to it.

- Article 65 of MiFID II which refers to a CTP making available information in accordance with **Articles 6, 10, 20 and 21** of MiFIR (our emphasis).
- Articles 6, 10, 20 and 21 refer only to post-trade data.
- Although TVs must make pre-trade data available for free 15 minutes after publication (Article 13 of MiFIR) and the Recitals to MiFID II envisage CTP(s) "to consolidate data from all **APAs and trading venues**" (our emphasis).

Article 4(1) MiFID II defines a "CTP" as a person authorised under this Directive to provide the service of collecting **trade reports** for financial instruments listed in Articles 6, 7, 10, **12 and 13**, 20 and 21 of [MiFID]…" (our emphasis).

- Articles 12 and 13 of MiFIR do refer to "pre-trade data", but this conflicts with the term "trade reports" (which are not "transaction reports" and are post-trade).

On our reading of MIFID II:

- although a CTP can offer the service of collecting pre-trade data from APAs, TVs and others, there is no provision which mandates TVs, APAs and others to provide it.
- there is neither an obligation on TVs to provide pre-trade data to a CTP nor an obligation for a CTP to publish it – see also Article 90 MiFID II which refers only to trade data.

Therefore, the EC is faced with a choice. It may either:

1. seek political agreement to amend the Level 1 text (or introduce a new "exchange act"); or
2. establish a CTP pursuant to the existing delegated authority (which can be used as a proof-of-concept for a wider CTP in the future).

We have analysed the process and challenges/opportunities under point 2 above on the basis that if an amendment to Level 1 (or a new Level 1) is sought, the EC may seek whatever it likes and there are no limits to what it may do. Our legal recommendations are provided on this basis.

## A19.2. EXERCISE OF CURRENT POWERS

We take the approach that the EC should judge and then argue that, unless Level 1 or Level 2 is explicit about on what the EC (or ESMA) cannot mandate, then it can so mandate. Our recommendations are predicated on the EC exercising this judgement, as well as on the EC taking robust positions with other EU institutions as to why it may delegate or mandate certain acts or omissions. Similarly, we take the approach that the words in Article 90 ("provide", "ensure", "specify") can be interpreted by the EC as giving the EC powers or obligations to determine how to so "ensure", "specify" or "provide".

In support of these arguments, we recommend that the EC emphasises the long-term cultural and data-quality benefits and simplicity of (a) a single self-regulatory body which oversees the acts and omissions of its members in exchange for providing them with certain membership benefits and (b) the mandatory membership of the body by contributors.

We recommend that the EC interprets and pursues its power in:

- Article 90(2) MiFID II to request ESMA to launch a public procurement process for an exclusive CTP (**ECTP**), on the anticipation that the CTP is a self-regulatory organisation.
- Article 90(3) MiFID II to amend Articles 59 to 65; and

- Article 90(3)(b) MiFID II is exercised – in other words, there is to be one, exclusive CTP and that a "commercial entity" means that it could be a not-for-profit self-regulatory body and should have a compulsory membership for contributors,
- Article 90(3) - on the basis that where sub-sections of Article 90(3) use the words listed below, the EC/ESMA interprets them as set out:
    - Article 90(3)(d), that to "**ensure**" the aims of said Article are achieved, the EC shall provide that the ECTP (or its immediate supervisory body):
        - shall be permitted to publish the real-time post-trade data submitted by contributors (pursuant to RTS 1 (as drafted currently)) at a cost (a "reasonable commercial basis") until the point, 15 minutes after publication, at which it will be provided at no charge; **and**
        - shall have the power, through its own membership rules to issue fines and undertake audits of providers' data and of members usage; **and**
        - shall have the power to store data for free or as soon as it is published and to allow third parties access to that data for historical analysis; **and**
        - may be supervised by (or be) a separate self-regulatory organisation; **and**
        - shall have no conflicts of interest (which the EC is free to interpret as narrowly or broadly as it considers necessary)
- further
    - in 90(3)(e), that to "**ensure**" the aims of said Article are achieved, the EC can define the (parameters of) a "reasonable commercial basis"
        - in 90(3)(f), that to "ensure" the aims of said Article are achieved, the EC can define the "reasonable cost" at which TVs and APAs shall make their post trade and historical data available to the CTP[NOTE: this does not permit the EC to set the cost at which other contributors of data may make their data available to the CTP]; the EC could choose in the alternative to decide that it would fulfil its powers and obligations under said Article by establishing rules that provided that *if* the costs were "reasonable", a TV or APA which failed to make its trade data available to the ECTP, then the failure would have negative commercial or financial consequences for the TV or APA in question
- amend Article 65(2)(g) to provide that SIs have a direct obligation to report to the CT on the basis that without such obligation, said Article 65(2)(g) will only capture trades undertaken between investment firms
- amend or supplement Article 65(2) to provide:
    - that there will be a flag for "price-forming" or "non-price forming" trades (which terms would be defined) – noted that this would introduce a negotiated price waiver in bonds,
    - that there will be a trade report identifier number attached to non-matched trades, **and**
    - that counterparties of unmatched trades will report both sides of the trade and which counterparty should provide the trade identifier reference, **and**
    - there should be a separate RTS for the fields/reportable information for each asset class and trading system/model identifiers should be attached.

## A19.3. CTP STRUCTURE

We discuss elsewhere the proposed structure of the CT and CTP. The challenges from a legal perspective will be:

- that Level 1 anticipates that CTP(s) will be authorised, regulated and supervised by their home NCAs but it is noted that from 1 January 2022 ESMA will be centrally authorised to manage and oversee CTPs centrally.[167]
- The EC's legal team being comfortable that the proposals remain within the EC's and ESMA's delegated remits is of paramount importance. We believe that the above and our recommendations in the report should provide a good starting point.

## A19.4. CONSIDERATIONS FOR FUTURE LEGISLATIVE CHANGE

- Full recognition of the ECTP in the law.
- SIs and QIFs must be mandated to be able to provide pre- and post-trade data directly to the ECTP according to the standards of the ECTP.
- The core set of mandated data fields that must be submitted for a pre-trade tape should be stipulated in the law (e.g. five levels of depth, auction imbalance data and administrational event data). Flexibility should be retained within the law for this to change over time.
- Introduce complete certainty that the ECTP can set the price to the venues at which it acquires pre- and post-trade data and empower the ECTP to determine the revenue share allocation scheme that would be used to share revenues with the venues or other parties as agreed under the ECTP governance.
- Create an official European list or an alternative to overcome the scoping issue of 'traded on a trading venue' (TOTV) as this is the only way to define the scope of instruments for a tape.
- Mandate a vendor display rule for the pre-trade tape to be shown to retail investors at the point of trade which should be free.
- Systematic Internalisers should be subject to the same rules as venues so that clock synchronisation and display of quotes are harmonised (in preparation for consolidation of quotes).
- Ambiguities should be removed in the legislation that allow firms to avoid being SIs by being registered liquidity providers on venues but quoting outside of the BBO and then creating an on-exchange report within the "rules" of the exchange.

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167 REGULATION (EU) 2019/2175 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2019 amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority), Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority), Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority), Regulation (EU) No 600/2014 on markets in financial instruments, Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds, and Regulation (EU) 2015/847 on information accompanying transfers of funds.

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