The Study on the Creation of an EU Consolidated Tape

FINAL REPORT

Appendices

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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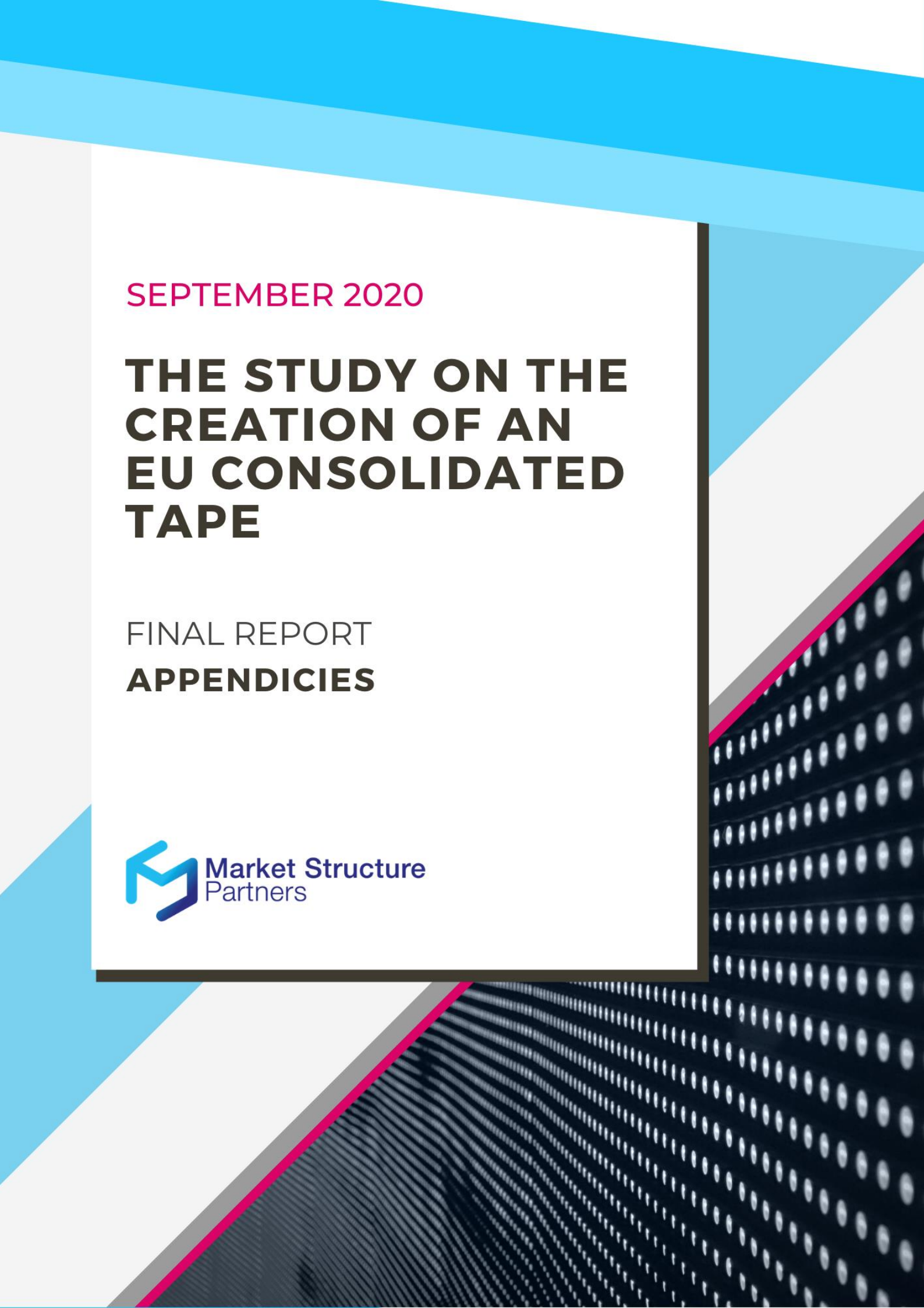

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APPENDICES

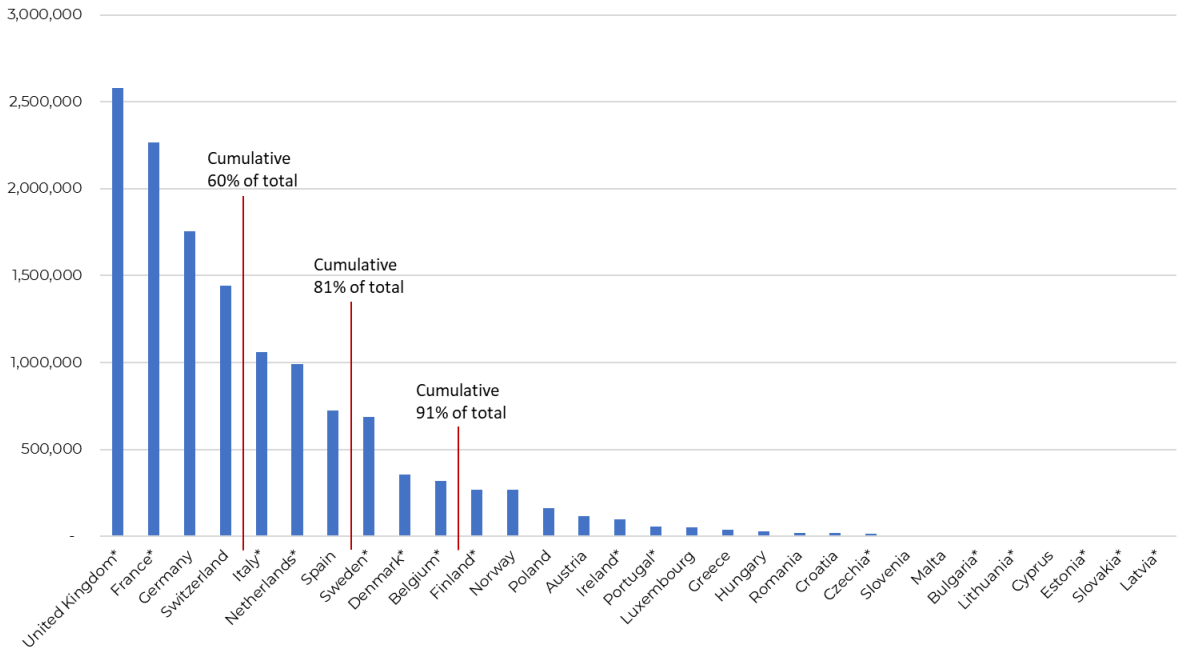
Project Number: 2019.5426				
Title: Study on the creation of an EU consolidated tape				
Linguistic version	Media/Volume	Catalogue number	PDF ISBN	DOI
EN PDF	PDF/Volume_01	EV-03-20-519-EN-N	978-92-76-20940-9	10.2874/357808 EV-03-20-519-EN-N

APPENDICES

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

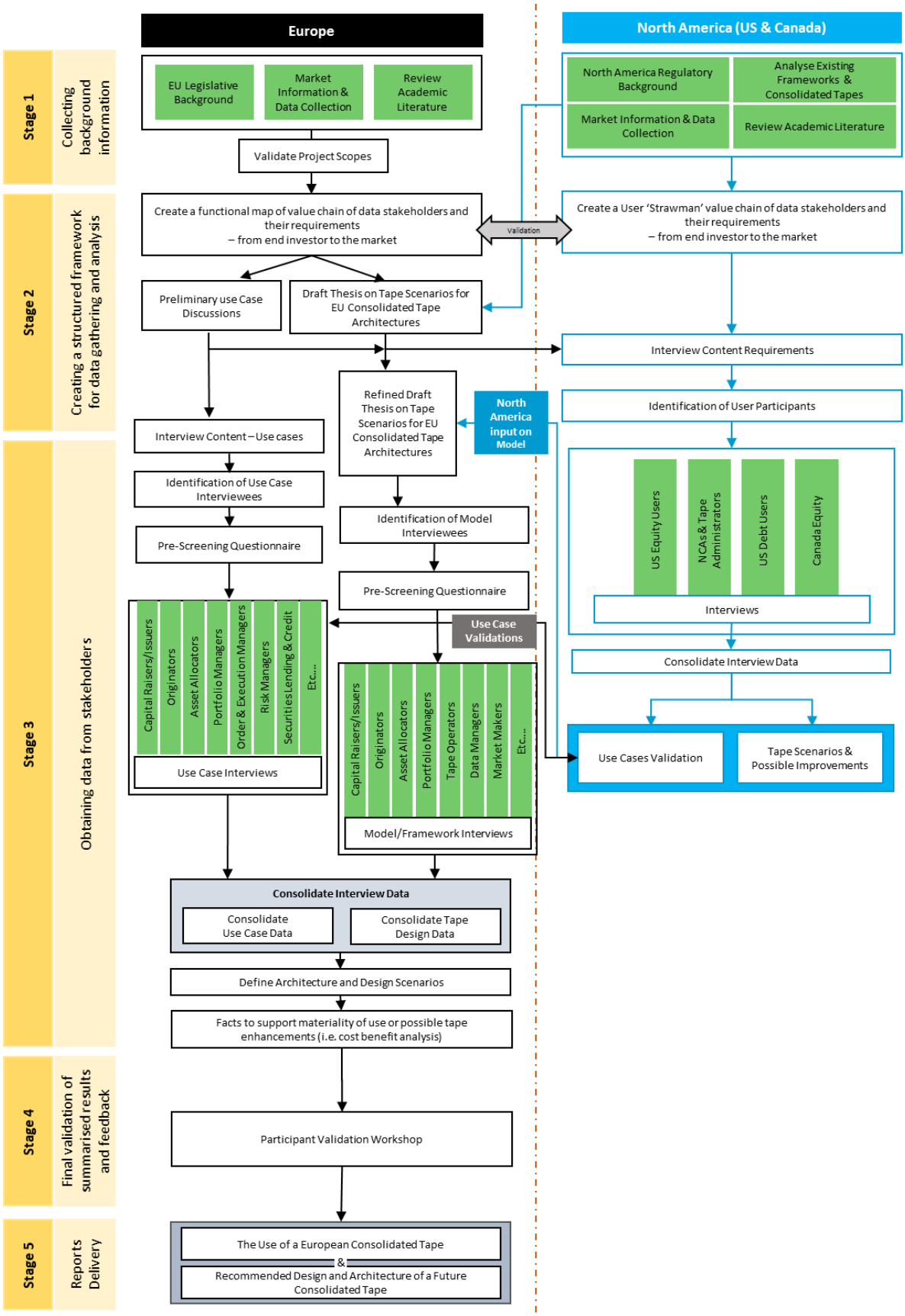
A2.1. APPROACH

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
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
(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
• Bonds – 4.6%
• Shares – 8.8%
• Mutual funds – 9.4%
Assume all bondholders are also shareholders; 8.8% x 144 million = 12.7m
Assume one holder per household.</td><td>ECB paper 2016 –
https://www.ecb.europa.eu/pub/pdf/scpsps/ecbsp18.en.pdf?d2911394a25c444cd8d3db4b77e8891a
• Page 7 footnote 7: 144.4m households in Euro area countries plus Ireland, excluding Hungary and Poland.
• 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 -
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/797786/Full_ISA_Statistics_Release_April_2019.pdf
• 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

OEICs/SICAVs (inc. ManCos and Fund Administrators)

Insurance Companies

Pension Funds

Endowment Funds</td>
<td>4,366
(= 2860 AIFM + 1506 UCITS)</td>
<td>ESMA*</td>
<td>
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)
• Multilateral Trading Facilities (MTFs)
• Organised Trading Facilities (OTFs)
• Approved Publication Arrangements (APAs)
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
• Alternative Investment FM (AIFM)
• Investment Firm (IF)
• Systematic Internaliser (SI)</td></tr>
</table>
It covers the following 31 countries:
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
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.
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.
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.
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>
</table>

Wealth Managers		
Investment Banks (inc. SIs)	10,576 (= 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
			LITHUANIA	1				1	1
			LUXEMBOURG	1	1			2	2
Proprietary Traders (inc. SIs)			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. 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) • Multilateral Trading Facility (MTF) • Organised Trading Facility (OTF) • Approved Publication Arrangement (APA)	-	411

Regulated Markets (RIE)	136	ESMA*
MTFs (Multilateral Trading Facility)	220	

<table>
<tr><td>OTFs (Organised Trading Facility)</td><td>74</td><td></td><td>
<table>
<tr><td>Data producer permission registrations – firms that produce and use data</td><td>Producer registrations for firms with both IF permissions and RM/ MTF/ OTF/ APA permissions (this is only the RM/ MTF/ OTF/ APA count)</td><td>-</td><td>41</td></tr>
<tr><td colspan="2"></td><td>subtotal</td><td>452</td></tr>
<tr><td>Data user permissions</td><td>• UCITS • IF</td><td>-</td><td>14942</td></tr>
<tr><td colspan="2"></td><td>total</td><td>15394</td></tr>
</table>
</td></tr>
<tr><td colspan="4">Custodians/Third-Party Risk Managers</td></tr>
<tr><td>Custodian Banks</td><td>20 (est.)</td><td>20 (est.)</td><td>20 (est.)</td></tr>
<tr><td>CCPs (Central Counterparty)</td><td>15 (ESMA)</td><td>15 (ESMA)</td><td>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.</td></tr>
<tr><td>3rd Party Clearers (GCMs)</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td>CSDs/ICSDs (Central Securities Depository / International Central Securities Depository)</td><td>30</td><td>ECSDA</td><td>https://ecsda.eu/members-2/list-of-members
ECSDA full members</td></tr>
<tr><td colspan="4">Regulators</td></tr>
<tr><td>Regulators</td><td>57</td><td>ESMA + FCA</td><td>ESMA + 56 regulators as sourced from https://www.fca.org.uk/firms/passporting/regulators-eu-eea</td></tr>
<tr><td colspan="4">Data Analytics & Benchmark Providers</td></tr>
<tr><td>Benchmark Providers</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Data Analytics Providers</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td colspan="4">Other</td></tr>
<tr><td>Research Providers</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Chartered Financial Planners</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Independent Financial Advisors</td><td>-</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Software providers</td><td>-</td><td>n/a</td><td>n/a</td></tr>
</table>

* *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.*

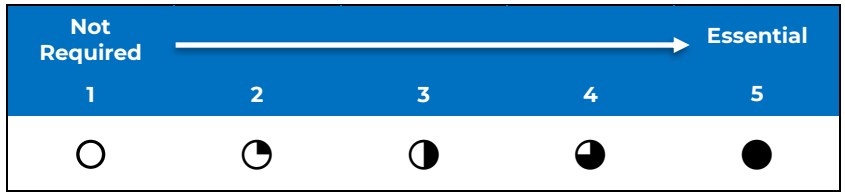
A5 / MARKET, MODELS, SYSTEMS AND PROTOCOLS

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 RFQ (Request for Quote) 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 RFQ Request to Stream Click to Trade Request for Market 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 company). 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	
1. a) **Pre-Issuance Analytics & Pricing**	• **Issuers**: Government, Supranational, Agency, Corporate, Issuers of Funds including ETFs • **Sell-Side:** Originators / Advisors	**Pricing of New Debt and Equity issues** • All issuers of Equity or Debt Capital need to ensure that new issues are correctly priced • 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 • The less liquid is the issue, the higher the dependency on historical data for pricing purposes • Issuers may rely on cross-asset class analysis, (e.g. looking and debt prices when assessing an equity issue and vice-versa) • Advisors to issuers will be modelling scenarios to help their clients determine the best timing and pricing of an issue. **Issuance of ETFs and other Financial Instruments** • 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. • 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. • Inability to raise capital due to poor availability of pricing data – may particularly impact less liquid instruments • 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 • Failure by issuers to engage with all relevant sources/ providers of liquidity due to their insufficient knowledge about how and where instruments are traded • 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. • New market makers cannot easily establish relationships with issuers as their activity may not be visible to them.	EQ Orderbook RT	○
				EQ Trades RT	◑
				EQ EOD	●
				EQ Ord & Trades, Hist	◔
				Bonds Trades RT	◑
				Bonds EOD	●
				Bonds Trades Hist	●
1 b) **Improved visibility of Small and Mid-Cap Issuer Instruments**	• **Issuers**: Government, Supranational, Agency, Corporate, Issuers of Funds including ETFs • **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. • 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. • 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	○
				EQ Trades RT	●
				EQ EOD	◔
				EQ Ord & Trades, Hist	◑

		• Data vendors will often exclude the data because they do not want the extra administrational overhead of managing who receives the data. • Data vendors may compromise by aggregating the data after 15 minutes, but individual trades cannot be seen. • 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. • 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) **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. • Data vendors also publish yield curves based on more frequent data sets. • 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 EQ Trades RT EQ EOD EQ Ord & Trades, Hist Bonds Trades RT Bonds EOD Bonds Trades Hist	○ ○ ○ ○ ○ ● ○
1. d) **Decisions and Disclosures at Issuance and On-going**	• **Issuers:** Issuers of Funds including ETFs • **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.** • 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. • 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 • This can affect both retail and institutional investors and the viability of a fund. • Inaccurate liquidity information may put investors at risk.	EQ Orderbook RT EQ Trades RT EQ EOD EQ Ord & Trades, Hist Bonds Trades RT Bonds EOD Bonds Trades Hist	○ ○ ● ○ ○ ● ○

1. e)
Cash and Capital Structure Management
	• **Issuers:** Corporate
	• **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)
		
		Firms with excess cash that cannot find these opportunities within their company have options for deploying this capital, e.g.
		• Acquisitions
		• Dividends
		• Return of Capital
		• Share buybacks
		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.
			  ○ The overall liquidity of their shares/bonds
			  ○ Trading Venues where they trade most
			  ○ Predominant investor profile
			• 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.
			• 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.
			• 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 ○
				EQ Trades RT ◑
				EQ EOD ●
				EQ Ord & Trades, Hist ●
				Bonds Trades RT ◑
				Bonds EOD ○
				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
2. a) **Asset Allocation**	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers • **Other**: Chartered Financial Planners, Independent Financial Advisors	Generation of "Asset Mix" • The asset allocation process relies on the correct assessment of risk/return profiles for each of the asset classes being considered. • 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. • 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) • 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 ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● 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 ◔ EQ Trades RT ◑

Asset movements/ Transition Management	• **Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers • **Other**: Chartered Financial Planners, Independent Financial Advisors	to do so e.g. when a government has to buy distressed assets). • 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). • 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. • 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. • 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. • Lack of consolidated data means that specialist firms may be required to help with valuations of certain assets.	EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ◑ Bonds EOD ● 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
3. a) Portfolio Construction	• **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers • **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) • Active and semi-active managers rely on their expertise to generate excess returns. This involves micro-research at the individual instrument level • 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. • 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 ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ●

			• 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) **On-Going Monitoring**	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers	This covers: • Monitoring the overall fund value at the portfolio and individual levels to ensure alignment with the mandate • Handling cash inflows/outflows due to redemptions, new entrants etc These can result in new orders being submitted to the fund's internal trading desk or an agency desk (as the case may be) 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. 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. • 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 ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●
3. c) **Portfolio Rebalancing**	• **End Investors**: Direct Retail Customers • **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. This is done via periodic "rebalancing" of positions, with any positions exceeding (or falling short) of targets being reduced (or increased) Portfolio Rebalancing is necessary to ensure alignment with client mandate but is a drag for portfolio performance as it incurs costs: • Tax Liabilities • Explicit (commissions, fees, etc) costs • Implicit costs (spread, slippage etc) 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. 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. • 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. • 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 ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ◑ Bonds EOD ● 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
4. a) **Pre-Trade Analytics for Investors**	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers • **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: • The size of the order to execute: larger orders have a higher adverse price impact. • The time horizon within which the purchase/sale must be completed • The risk profile of the instrument, including liquidity 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. 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. • Information asymmetries are rife across the industry and lead to many issues daily. • 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) • Lack of understanding about true volumes in equities may be diverting more trading away from lit equity environments • 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 • 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 ● EQ Trades RT ● EQ EOD ◑ EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●
4. b) **Pre-Trade Analytics for Smart Order Routers/Venue Selection**	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers • **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 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. 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 • 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. • More innovative liquidity providers may not be rewarded. • Buy-side firms may not see the best performers to route their orders to. • 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 ◕ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●

4. c)
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
	• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)
	• **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.
		
		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.
			• Information asymmetries generate potential profits for one set of participants who have superior data processing skills and an informational edge over the rest.
			• This results in higher overall execution costs and the flight of liquidity to less transparent models of trading
			• 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.
			• 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:
			  ○ "True" liquidity of instruments/asset classes
			  ○ Actual prices of instruments, especially less liquid ones
			  ○ Potential sources of liquidity
				EQ Orderbook RT ●
				EQ Trades RT ●
				EQ EOD ◑
				EQ Ord & Trades, Hist ●
				Bonds Trades RT ●
				Bonds EOD ◑
				Bonds Trades Hist ●

4. d) **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. 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. 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. 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: • A block may be wrongly priced to the detriment of the end investor. • 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 • Poor data impacts the willingness of liquidity providers to commit capital and the prices offered due to higher uncertainty about unwinding positions	EQ Orderbook RT ◕ EQ Trades RT ● EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●

			• Competing market makers find it harder to enter the market because there is no data available with which to price risk • 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 • 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) **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. Historical market data is used: • To assess the potential addition of new profitable trading strategies and to improve existing ones. • 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. 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. 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. 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. 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. 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) • Innovative venues and liquidity providers may not be rewarded. • Imprecise risk metrics reduce liquidity provision efficiencies across Trading Venues.	EQ Orderbook RT ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● Bonds Trades Hist ●
4. f)				EQ Orderbook RT ●	

Sales/Trade Idea generation	• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)	Salespeople monitor information about their clients and a CT would give a more comprehensive view of the market and possible ideas for clients. 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.	• 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 markets to gain a better understanding of the broader depth of the market could make the difference between some ideas being taken or not. • 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 Trades RT ●
				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
5. a)				EQ Orderbook RT ●

Investor's In-Flight Execution Management (Buy-side Trading Desk)	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth 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. "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.	**The absence of a consolidated tape may lead to the following issues for buy-side traders** • Miscommunication arising from the mismatch between buy and sell-side perception of current market dynamics due to the use of different data feeds • Difficulty in challenging agency brokers' trades on a real-time basis due to lack of complete real-time market data • 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 • Missed opportunities to see liquidity spikes • The wrong signals are transmitted to the market and other market participants react on those signals thus compounding the problem.	EQ Trades RT ● EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●
5. b) **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. "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 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. Those same feeds are less reliable for pricing of less liquid Asset Classes (including bonds), for the following reasons: • The nature of the products means that they have long holding periods and thus only trade sporadically	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. • Participants cannot easily monitor the execution together without the same data. • Less data makes it harder to find potential sources of liquidity • Pricing of orders is less reliable because there are fewer price points and less accurate risk profiling for the instrument • Competing venues with better liquidity may be losing out. • The wrong signals are transmitted to the market and other market participants react on those signals thus compounding the problem.	EQ Orderbook RT ● EQ Trades RT ● EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●

		• As a result of the above, there are few price points to use as references • The types of firms that hold these instruments are very diverse and therefore trading has remained highly decentralised with most negotiations being bilateral • Trade data in those instruments is reportedly inaccurate and hard to consolidate 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. 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) **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) • **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. 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. These firms need to perform basic risk checks. These need reliable reference prices that do not need to be updated at low latency. Most firms are using the primary market as reference for Equities, which is a proxy for all liquid stocks 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 • There is no reliable utility data that offers complete pricing reference data. • 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 ● EQ Trades RT ● EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ○

5. d)
Harmonised Taxonomies
	• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers
	• **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.
		
		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
			• 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
			  ○ Triggering of circuit breakers/price bands
			  ○ Short Selling restrictions
			  ○ Other regulatory data
			• Market participants currently receive information about admin events in equities at different times or not at all. A consolidated tape
				EQ Orderbook RT ●
				EQ Trades RT ●
				EQ EOD ○
				EQ Ord & Trades, Hist ●
				Bonds Trades RT ○

		relevant event are informed in a timely manner via the corresponding Market Data API. In addition, all trading venues have different codes and descriptions for the disclosure of those admin events. This has been identified as another source of inefficiency due to the confusion it creates.	would disseminate information all at the same time. • In bond markets, participants struggle to deal with each bank's individual taxonomy which makes aggregating data harder.	Bonds EOD ○ Bonds Trades Hist ○
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 • **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs), Originators / Advisors • **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. 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: • 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 • 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 • 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 ● EQ Trades RT ● EQ EOD ◑ EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ◑ 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

6. a)
Transaction Cost Analysis (TCA)
	• **End Investors**: Direct Retail Customers
	• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers
	• **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.
		• 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.
		• This difference will be attributable to explicit and implicit costs
		• 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)
		• It requires a limited number of price inputs, such as:
		  ○ Benchmark Price (Price at time of decision to trade)
		  ○ Execution price(s)
		  ○ Closing Price on cancellation day (if relevant)
		  ○ 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.
			• As liquidity of the instrument decreases the reliability of inputs obtained from incomplete datasets decreases.
			Key issues:
			• It is currently possible to manipulate the outcome of TCA by "picking" certain prices or venues over others without challenge
			• 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 ●
				EQ Trades RT ●
				EQ EOD ●
				EQ Ord & Trades, Hist ●
				Bonds Trades RT ●
				Bonds EOD ●
				Bonds Trades Hist ●

6. b)	• **Sell-Side**: Investment Banks (inc. SIs) Institutional Agency Brokers, Inter-dealer	**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.**	• Pricing of risk may be less accurate and influence willingness to commit capital in future.	EQ Orderbook RT ◕ EQ Trades RT ●

Post-Trade Analytics, Liquidity Providers	Brokers, Retail Brokers, Proprietary Traders (inc. SIs)	• The post-trade data being received will have an immediate impact on the pre-trade decisions about the next price made in the market. • For block trades, the post-trade data will also be used to monitor how successful trading risk with 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 • 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.	• Capital may be not be allocated to less liquid instruments if the available information is not sufficient. • It may impact individual client relationships as firms measure their ability to be profitable on each client trade.	EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● Bonds Trades Hist ●
6. c) Provision of Best Execution (Retail Clients)	• **Issuers**: Corporates • **End Investors**: Direct Retail • **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. • 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. • 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: • Retail brokers do not include other venues in their best execution policies because they are not requested by their clients, • Retail investors do not demand access to a wider number of venues because they are unaware of this possibility • Retail broker service models are almost entirely based on commission costs rather than service models	EQ Orderbook RT ● EQ Trades RT ● EQ EOD ◑ EQ Ord & Trades, Hist ◑ Bonds Trades RT ● Bonds EOD ◑ 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
7. a) **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 • **Sell-Side**: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) • **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. It can be difficult to know that the data is accurate for larger sizes and less liquid assets 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	• NAV calculations could be incorrect. • Client statements/reporting could be incorrect. Investors may be relying on incorrect valuations of their investments • If there are significant redemptions in a fund, the last investors out may be severely disadvantaged if liquidity changes dramatically. • 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 Orderbook RT ○ EQ Trades RT ◔ EQ EOD ◑ EQ Ord & Trades, Hist ● Bonds Trades RT ◑ Bonds EOD ○ Bonds Trades Hist ●
7. b) **Reconciliations**	• **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers • **Sell-Side**: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs)	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).** 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 • If tolerances are not used, differences may be investigated unnecessarily and identification of more significant or systemic issues may be delayed or missed • The need to independently source prices, identify and then investigate differences creates unnecessary cost and inefficiencies	EQ Orderbook RT ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ● Bonds EOD ○ Bonds Trades Hist ○

	• **Custodians / Risk Managers**: Custodian Banks, CCPs, 3rd Party Clearers, CSDs/ICSDs			
7. c) **CSDR Penalties Calculation**	• **Sell-Side**: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) • **Custodians / Risk Managers:** Custodian Banks, CCPs, 3rd Party Clearers, CSDs/ICSDs	**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.** 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 venues will use the same price, especially where ISINs are traded OTC. The CSDR Penalties price is also used to calculate cash compensation where buy-ins fail	• 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 • External parties (CCPs, Custodians, direct CSD/ICSD participants as well as their clients) that want to validate CSDR Penalties using independent price sources will struggle to define a rule for which price to use • A standard price from a single source would simplify both the calculation and verification processes	EQ Orderbook RT ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ○ Bonds EOD ○ Bonds Trades Hist ○
7. d) **Initial Consistency checks/Product Improvements**	• **Sell-Side**: 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. • Trade reporting checking to ensure timely post-trade reporting • Peer data/checking of data fields being used • ISIN inconsistencies 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 • Post-trade reporting errors or other data inconsistencies may not be identified at early stages or at all • It is hard to improve the client product offering with the current data set	EQ Orderbook RT ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ○ 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 CCPs. 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
8. a) **Initial and Variation Margin calculations**	**Issuers:** ETF Issuers **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) **Custodians / Risk Managers:** CCPs, 3rd Party Clearers	Instrument price and liquidity is a key input into CCPs' calculations of initial and variation margins. • 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. • 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 • Clearing costs too high: the amount of IM/VM could be reduced for instruments where full liquidity is not currently visible • Market stress management could be improved by more complete data, including depth • Would create more transparency between CCP models if all using the same CT data set to determine liquidity risk.	EQ Orderbook RT ○ EQ Trades RT ◔ EQ EOD ◑ EQ Ord & Trades, Hist ● Bonds Trades RT ◑ Bonds EOD ○ 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 **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) **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. A Market Maker's (MM's) costs & ability to make efficient prices is directly affected by financing markets: • 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 • The existence of a stable, competitive borrow market: • Improves settlement rates, reducing potential Broker frictional costs (especially important with the introduction of the CSDR Penalties regime in	Securities lending may not work effectively, and the impact may be: • Reduced liquidity • Wider bid and offer spreads • Increased volatility • Higher dealing costs and reduced ability to deal in smaller sizes • 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 ◑ EQ Trades RT ◑ EQ EOD ●

		2021 which introduces new penalties + mandatory buy-ins) • 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 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. 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. • 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) • 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.		EQ Ord & Trades, Hist ○ Bonds Trades RT ● Bonds EOD ○ Bonds Trades Hist ●
8. c) **Less Liquid Instruments e.g. ETFs for lending and use as collateral**	**Issuers:** ETF Issuers **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. 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.	ETF funding rates are artificially high. • 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) • The higher funding rates for ETFs has a negative impact on liquidity • ETFs have not met the share trading obligation	EQ Orderbook RT ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ● Bonds EOD ○ Bonds Trades Hist ●

		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. 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. 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 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. 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) **Standardised Collateral Agreements**	**Issuers:** ETF Issuers **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) **Custodians / Risk Managers:** CCPs, 3rd Party Clearers	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. 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. • Non-cash collateral is not being taken as the risks and pricing are not well understood. • Bespoke contracts create a lot of inefficiencies in the industry. • Unnecessary haircuts may be taken on certain instruments.	EQ Orderbook RT ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ●

	Buy-Side: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers			Bonds EOD ● Bonds Trades Hist ○
8. e) Credit / Counterparty Risk, OTC Derivatives	**Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds, **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. • 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. • Key amongst those requirements is the obligation imposed on BOTH counterparties entering into uncleared OTC Derivatives contracts to calculate and exchange IM upon execution of trades. • Calculation of IM can be based on 2 methodologies: 1. Standard Methodology Approach (AKA "grid") based on a table model whereby margin is calculated per contract type as a fixed % of notional 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. • The industry approach has been to adopt the IM Model Approach (more specifically ISDA SIMM). 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: • Sensitivities must be based on continuous historical data series with a minimum duration of 3 years and a maximum duration of 5 year • At least 25 % of that market data shall be representative of a period of significant financial stress • 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. 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.	Lack of a CT results in the following: • The outcome of the calculations is only as accurate as the underlying sensitivities, which in turn are derived from market data • 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 • All data requirements relate to historical data, which would be much harder to source and consume without consolidation.	EQ Orderbook RT ◔ EQ Trades RT ◔ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ◔ Bonds EOD ● 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
9. a) Detection of Insider Trading	• **Buy-Side**: Asset Managers & Portfolio Managers, Wealth Managers • **Sell-Side:** Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks, Institutional Agency Brokers, Inter-dealer Brokers, Retail Brokers, Proprietary Traders (inc. SIs) • **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. • 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. • Creating historical look back data is an issue. • A lack of aggregated, standardized, timestamp tolerant data makes it hard to expose insider trading identified in the Market Abuse Regulation (MAR) • Consolidated timestamps may be critical in insider trading cases because they are related to when a participant may have had inside information. • 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 ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ◑ Bonds Trades RT ○ Bonds EOD ● 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	• 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.	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.	EQ Orderbook RT ● EQ Trades RT ● EQ EOD ◔

	Brokers, Proprietary Traders (inc. SIs) • Trading **Venues:** Regulated Markets (RIE), MTFs, OTFs	• 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. • 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.	• 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. • 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. • 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). • It is impossible to build up a picture of completely fungible instruments that are related to stocks e.g. ETFs or convertible bonds. • Availability of reliable historical data for lookback purposes is expensive or not consistently available and requires significant resource to rebuild cross-market activities • Firms may not be able to fulfil their duties under MAR. • Confidence in the ability to detect such behaviour is currently low.	EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ◑ Bonds Trades Hist ●
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. • 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. • 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. 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. • Information may not be available in the same format and may take considerable resources to piece it together. • NCAs will often have to make compromises in terms of the cases they choose to progress due to the above implications. • Confidence in the ability to detect such behaviour is currently low.	EQ Orderbook RT ● EQ Trades RT ● EQ EOD ◔ EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ● 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 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
10. a) Liquidity Risk Management (Portfolio Managers)	• **End Investors**: Direct Retail Customers • **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. 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 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. 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 • A rush to redeem cash by investors means last man standing gets a poor deal (see Woodford scandal in the UK) • The opportunity cost to issuers as one instrument may be wrongly favoured over another	EQ Orderbook RT ◑ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ◑ Bonds EOD ● Bonds Trades Hist ●

10. b) **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. • 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. • 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. • Everyone relying on the same (poor) sets of data	EQ Orderbook RT ◔ EQ Trades RT ◔ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ◔ Bonds EOD ● Bonds Trades Hist ◑
10. c) **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. • 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 • 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. • 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. • The fluctuations in the trading book must be recorded daily and recognised in the profit and loss (P&L). • In the case of banks, positions in the banking book are presumed to be held until maturity and valued differently • 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. • Hence, accurate assessment of liquidity will have a direct impact on Profit and Loss and overall capital requirements • 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 ○ EQ Trades RT ● EQ EOD ◔ EQ Ord & Trades, Hist ● Bonds Trades RT ● Bonds EOD ◑ 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. • 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. • Firms report that they would ultimately like this data on a real-time basis. • Historical data is currently very difficult to access.	Errors arising from: • Manual processing errors during data linkage process • Lack of access to data available in real-time • Lack of access to historic data	EQ Orderbook RT ○ EQ Trades RT ◑ EQ EOD ● EQ Ord & Trades, Hist ○ Bonds Trades RT ◑

		• Linking data currently requires manual intervention and introduces risk.		Bonds EOD ● Bonds Trades Hist ○
10. e) 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 • 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 pooling of observable transaction would reduce implementation challenges of FRTB, reduce potential capital charges and enhance the ability to perform analysis. Regulators have emphasized that they would prefer banks to utilize the IM model. 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. • Real data is defined as: 1. A price on which the institution has conducted a transaction 2. A verifiable price for an actual transaction between arms-length parties or, 3. A comingled quote • 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. • 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.	• Banks may choose not to trade and hold certain products to avoid higher capital charges. • 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. • Banks may have to use standard models and may have less capital available as a result.	EQ Orderbook RT ○ EQ Trades RT ○ EQ EOD ◑ EQ Ord & Trades, Hist ○ Bonds Trades RT ◔ Bonds EOD ● Bonds Trades Hist ○
10. f) Credit / Counterparty Risk,	**Buy-Side**: Asset Managers & Portfolio Managers, Insurance Companies, Pension Funds, Endowment Funds,	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	• The outcome of the counterparty risk calculations is only as accurate as the underlying sensitivities, which in turn are derived from market data.	EQ Orderbook RT ◔ EQ Trades RT ◔ EQ EOD ●

	Sell-Side: Investment Banks (inc. SIs), Commercial / Retail Banks, Development Banks,	counterparties. They constantly monitor the firm's exposure. • 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 probability of mismatches will increase if both external or internal parties have used different datasets to derive their sensitivities. • All data requirements relate to historical data, which would be much harder to source and consume without consolidation.	EQ Ord & Trades, Hist ● Bonds Trades RT ◔ Bonds EOD ● Bonds Trades Hist ●
10. g) **Operational Risk -** **Back-up Source of Market Data**	**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 tasks, as a consequence of which ensuring backup sources of market data is key to reduce operational risk. 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.	• A CT would reduce operational risk across firms by making an additional source of market data available for use in non-latency sensitive processes, or even in latency-sensitive processes in extreme situations	EQ Orderbook RT ● EQ Trades RT ● EQ EOD ● EQ Ord & Trades, Hist ◑ Bonds Trades RT ● Bonds EOD ● 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)				EQ Orderbook RT ◔

Calculation of the rate of return	• **End Investors**: Direct Retail Customers • **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. 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 • Rates of return for accounts invested in illiquid or less transparently priced assets are likely to be particularly suspect and/or unreliable • If investment returns or benchmark returns are not calculated correctly, the risk will not be calculated correctly.	EQ Trades RT ◔ EQ EOD ● EQ Ord & Trades, Hist ◔ Bonds Trades RT ◔ Bonds EOD ● Bonds Trades Hist ◔
11. b) Index/benchmark creation and pricing	• **End Investors**: Direct Retail Customers • **Buy-Side**: Asset Managers & Portfolio Managers, OEICs/SICAVs (inc. ManCos and Fund Administrators), Insurance Companies, Pension Funds, Endowment Funds, Wealth Managers • **Data Analytics & Benchmark Providers: Benchmark Providers** • 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. Inflation + 2%), or even the reported performance of other managers. 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. 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.	Reduces the accuracy with which benchmarks are priced, and by extension, the accuracy of the Macro and Micro attribution Analysis. • 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 Orderbook RT ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● Bonds Trades Hist ●
11. c) Macro Performance Attribution	• **End Investors**: Direct Retail Customers • **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? It identifies how much of the total return is attributable to • Asset Allocation decision • Choice of "right" Portfolio / Asset Manager • The manager's style as opposed to his "active" decisions There are three main inputs to Macro Attribution: • Allocations to Asset Classes and Weights	• 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. • 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. • 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 ○

		• Benchmark Returns (for Asset Classes, Market Indices, Investment. Styles) • Fund Returns		Bonds Trades Hist	○
11. d) **Micro Performance Attribution – Equities**	• **End Investors**: Direct Retail Customers • **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: • Decision to invest (or not) in specific sectors • Decision to invest in specific securities (i.e. superior ability to pick stocks) • Decision to be over/underweight in specific sectors and securities • Timing of trades (residual) It is performed at the Investment / Portfolio Manager level. The inputs for Micro Attribution are: • Allocations to Sectors and Weights • Individual Instrument Returns • 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. 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.	• 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. • 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. • 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	○ ○ ● ○ ○ ○ ○
11. e) **Micro Performance Attribution - Fixed Income**	• **End Investors**: Direct Retail Customers • **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: • How well does the manager predict changes in the yield curve? • Is the manager skilled at identifying outperforming sectors or rating tiers (quality)? • Is the manager skilled at picking winning bonds? • Can the manager add alpha through trading activity (residual)? Inputs for FI Micro Attribution are: • Yield Curves • Allocations to Sectors and weights • Individual Instrument Returns • 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. • 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. • 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:
		• RTS1: Determination of the trading venue that is the most relevant market in terms of liquidity.
		• RTS2: Classes of Bonds not having a liquid market, pre-trade and post-trade SSTI and LIS thresholds.
		RTS1:
		• Average Daily Trading Volume for the purposes of:
		  ◦ Identifying the size of orders that are Large in Scale.
		  ◦ Applying deferred publication thresholds and delays for shares and depositary receipts based on transaction sizes.
		• Average value of transactions for the purpose of determining the Standard Market Size.
			• 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.
			• Regulators have to overcome data quality and integrity issues. This makes it harder to ensure the full accuracy of the updated threshold values.
			• 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.
			• Inefficient use of resources at regulators.
			• 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	●

		• Deferred publication thresholds and delays for shares and depositary receipts.
		RTS2:
		• Classes of Bonds (except ETC, ETNs) not having a liquid Market requires following metrics:
		  • Average Daily Notional Amount.
		  • Average Daily Number of Trades.
		  • % of days traded over the period considered.
		• Bonds (except ETCs, ETNs), SFPs pre-trade and post-trade SSTI and LIS thresholds, Size Specific to the Financial Instrument.
		  • Normal Market Size.
		  • Large in Scale compared with Normal Market Size.
		  • 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.
		  • Threshold values below which SSTI will not be applied when the number of transactions is < 1000.		

12. b) **Ongoing monitoring of regulatory requirements**	**NCAs**	A number of Regulatory provisions require the on-going monitoring of certain metrics in order to check whether certain conditions are met. 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.	• Like other stakeholders, regulators have to overcome data quality and integrity issues to try to consolidate data. This makes it harder to ensure the completeness and accuracy of the values being monitored. • The volume cap may be triggered incorrectly depending in the completeness and accuracy of the feeds being consolidated. • 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 Orderbook RT ○ EQ Trades RT ○ EQ EOD ○ EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● Bonds Trades Hist ●
12. c) **Cross-market scenarios involving NCAs**	**NCAs**	Supervisory activities can involve cross-border scenarios that require the sharing of data between NCAs. 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	• 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.	EQ Orderbook RT ○ EQ Trades RT ○ EQ EOD ○

		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. 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.	• 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 Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● Bonds Trades Hist ●
12. d) 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. Quite often, the implementation of regulation results in unintended consequences that defeat the aim of the regulation. 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 ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● 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. An example of this is the handling of regulatory trading halts. The regulatory requirement related to dissemination of trading halts states that: "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…"	• 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). • 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 ○ EQ Trades RT ● EQ EOD ○ EQ Ord & Trades, Hist ○ Bonds Trades RT ● Bonds EOD ○ Bonds Trades Hist ○

		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)		
12. f) Regulatory oversight	**NCAs**	The current regulatory requirements require a number of periodic disclosures by investment firms, trading venues and other stakeholders. By way of example, RTS 27 & 28 requires the disclosure of certain execution statistics 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 ○ EQ Trades RT ○ EQ EOD ● EQ Ord & Trades, Hist ● Bonds Trades RT ○ Bonds EOD ● 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. 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: • 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) • 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. • Data centres use electricity, generate carbon emissions and constantly have to update their hardware which means that they annually purge metric tons of hardware. • 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.

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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

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/

best offer, on 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 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

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

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

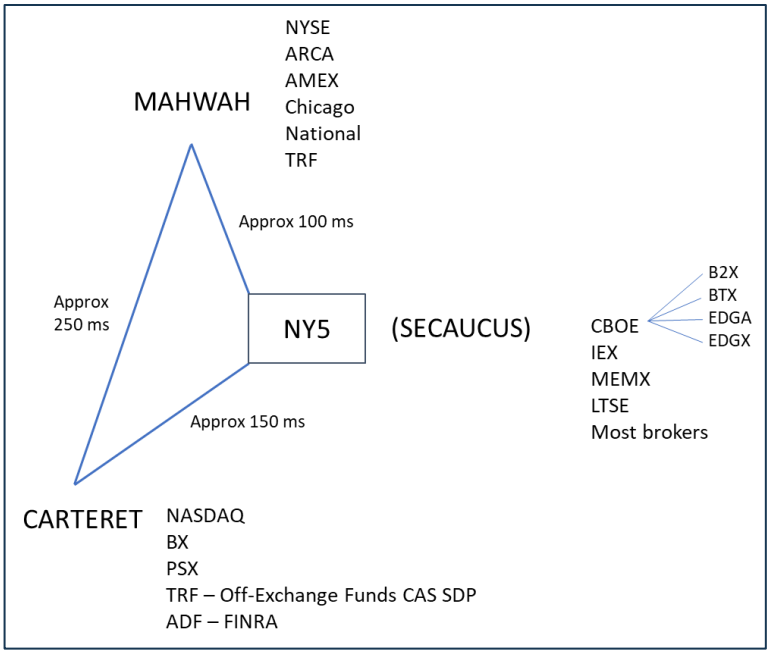
Figure D: Oversight and Tape Plan Structure.

	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

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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.*

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 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).

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)

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.

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. 2) Could reward the reporting of larger trade sizes.	1) Rewards contribution to price formation. 2) Incentive to move bond trading to CLOBs in order to participate in quoting revenue allocation. 3) Potential to address some of the undesired side-effects of fragmentation, by incentivising: a. Price formation through addressable liquidity. b. Quoting practices that generate deeper and/or more stable liquidity. 4) Potential to re-align pricing policies for two clearly different subset of users: a. Exchanges retain control over all aspects of pricing for HFT/Latency sensitive client base. 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. 2) Does not address current structural problems: a. Flight of liquidity to un-displayed or unilateral trading models (SIs). b. "Hyperactive" behaviour of CLOB. c. Unmanageable amounts of Mkt data. 3) May discourage price formation via addressable liquidity (i.e. visible order books). 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: • Marketplace requirements; (in terms of operations but also transparency requirements). • ATS requirements where different • 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.

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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).

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. 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 (Double-sided if two FINRA firms involved).	Single-sided reporting	Single-sided reporting (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

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

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.

- 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: 1) Marketplace requirements (in terms of operations but also transparency requirements). 2) ATS requirements where different. 3) Information Processor requirements.
2.	Rule 2800C – Transaction Reporting for Debt Securities, October 2014.	Includes: 1) Requires debt transaction reporting to IIROC.
3.	NI 21-323 – Proposal for Mandatory Post-trade transparency of Trades of Government Debt.	Includes: 1) Introduces the reporting requirement of government debt. 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

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,

would be discussed and agreed 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. • Via IIROC (an SRO).	●	• Yes, in both equities and debt. • 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. • 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. • 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). • New designation order gives CSA licencing power to regulate organization, fees.	◐	• Yes; SEC. • Enforcement rights.	●

Framework Feature	Canada	Rating	United States	Rating
Governance structure of the consolidated tape	• Informal structure – only there to provide feedback. • Meets 4 times a year. • No voting rights. • No say on fees.		• SIP operating committee has representation from exchanges + SEC – some exchanges have multiple votes. • Separate advisory board of other market stakeholders (recent) but no voting rights. • 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. • 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. • Pass through model of all underlying fees. • Regulator now reviewing pricing schedules of exchanges.		• Plans control the fees; SEC has oversight and is starting to scrutinise data fee schedules. • Would be better if governance were fixed.	
Overall Equity Tape Structure Offerings	• One IP with a choice of 6 different feeds available. • 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. • Users save on connectivity, set up/admin costs.		• Content of the feed is based on where the securities are listed. • Three Tape Plans. • Unlimited Trading Plan (Nasdaq, Tape C): UTP Quotation Data Feed (UQDF) for quotes and UTP Trade Data Feed (UTDF) for trades. • Two plans are under the CTA: Consolidated Tape System (CTS) Plan and Consolidated Quote System (CQS) Plan. • 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. • 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. • A standard contract exists with the IP, but users must enter a bilateral arrangement with each marketplace. • 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. • Some tapes also have different tiers for different types of subscribers or separate data streams adding burden to the reporting process • 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. • 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. • 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. • Contracts for the underlying data are with each venue and they can impose an audit on users.	• Long and often duplicated processes. • Exchanges often use third parties that are paid by contingency. • 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. • 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. • Costs for proprietary and retail feeds are high. • 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. • 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. • Several fees for storing, redistributing, streaming.	• Exchanges often charge a fee for official close which is different than last trade. • 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. • 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. • 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. • Issue with arbitrage. • IP would not provide latency figures.	• Issue with arbitrage. • Nasdaq: medium 20 microseconds. • NYSE: medium 350 microsecond.
Trading Obligation (OPR)	• Based on depth of book. • 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. • But smaller dealers often only take data from primary exchange as proxy.	• Auction and imbalance information. • 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. • No depth of book. • Tick size harmonization. • 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:

 Optimum Approach

 Neutral

 Approach to be avoided

Tape Feature	Canada	Rating	US	Rating
SRO undertakes aggregation and dissemination of the data	• Yes (IIROC). • Delayed.		• Yes (FINRA). • 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. • Robust structure - 14 advisory committee and informed by FIMSEC (SEC advisory group)	
Cost of the data	• Free.		• Reasonable fees imposed. • $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. • Government securities – yes.		• Yes. • 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. • 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. • Rules are sensible, straightforward and clear. • 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. • Real-time TRACE reporting has contributed to a decline in block size liquidity. • Reporting time is too short to manage blocks – some think the reporting time should increase to 48 hours for blocks. • ETF and electronic market makers do not think it is fast enough.
Impact of Transparency	• Reduced transactions costs. • Increase in market quality.	• Although TRACE has reduced the cost of trading, it has led to a greater amount of time to trade risk. • TRACE has also incentivized people to be more technical rather than value-driven - so market participants try to arbitrage the dealers. • 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. • For illiquid bonds, it informs traders ahead of entering an order; less likely to get picked off. • Aids in the understanding of liquidity risk of ETFs.	• None given.
Execution	• Important input into both sell-side pricing algorithm and automated execution processes. • 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. • More accurate end of day pricing to calculate NAV and ETFs. • Controllers use it for month-end price validation. • 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

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

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]

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.

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113 James J. Angel, 'Consolidation in the Global Equity Market, An Historical Perspective' (1998)
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

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 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

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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

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.

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]

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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

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.

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

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

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.

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 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. 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*". 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. 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. 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 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. 2. Market forces can be relied on to ensure that pricing remains fair and venues are not exploiting their monopoly positions. 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. 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. 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] 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. 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. 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. 4. The majority view was that a CT only needed to be real-time but not low latency (nano-seconds). 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. 6. The benefits of a CT include: o Improved data quality and a more level playing field. o Improved liquidity, market resilience and price formation. o Confidence that there is a neutral and reliable source of current market prices. o Increase market competition and limit the power of trading venues and data providers. o Help European markets to develop further and contribute to the CMU. 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). 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.

148 December 5, 2019

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]

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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.

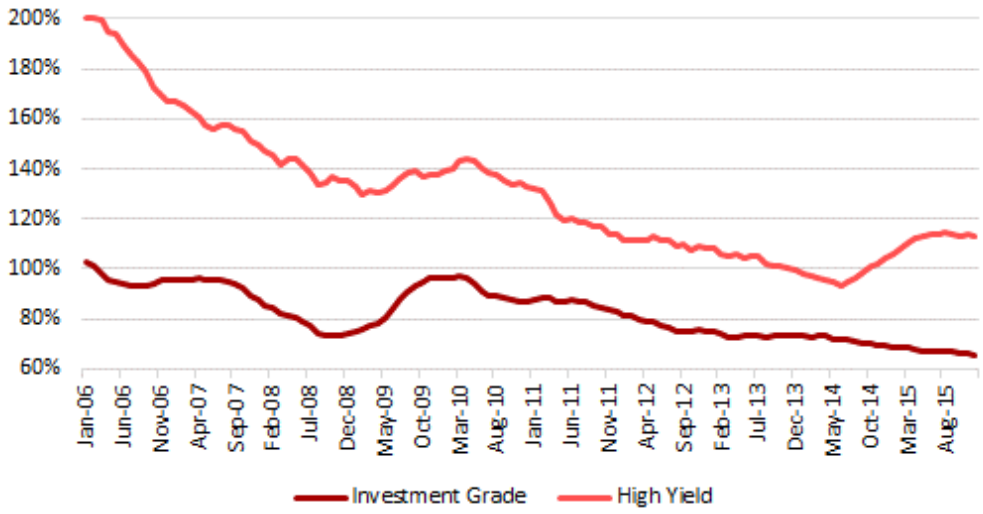
150 Bessembinder H., Maxwell W., Venkataraman K. (2006), *"Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds"*, see Main Study Bibliography

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.

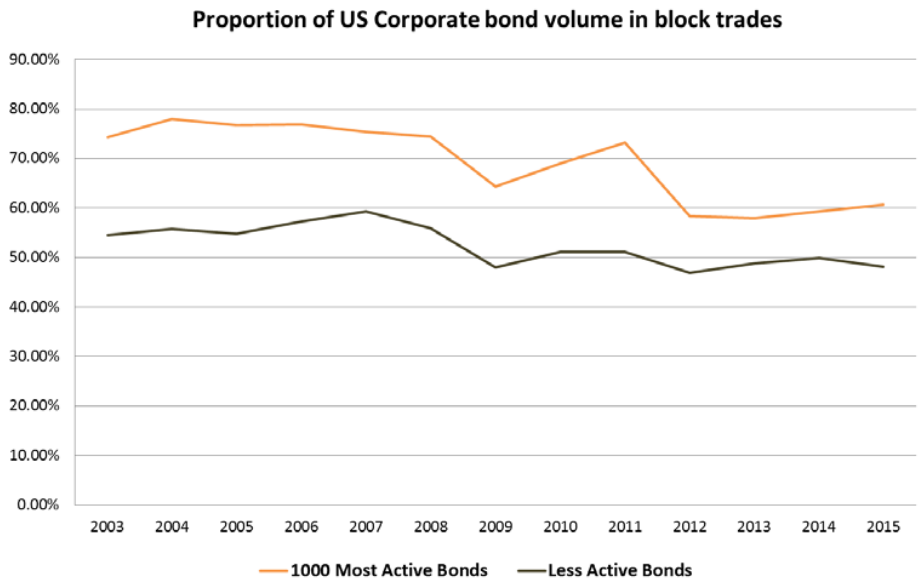
Many market participants profess that trading has become more difficult for sell-side firms, leading to a reluctance to operate as a principal and commit capital.[158] This shift has a negative effect on the overall market as it can increase the time and the cost to locate bonds. The longer a buyer/seller 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

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.

masked, it can be relatively easy for certain market participants to identify when a block trade has taken 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 costs by 20-45 basis points for customers even for roundtrip trades of shorter

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.*"

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

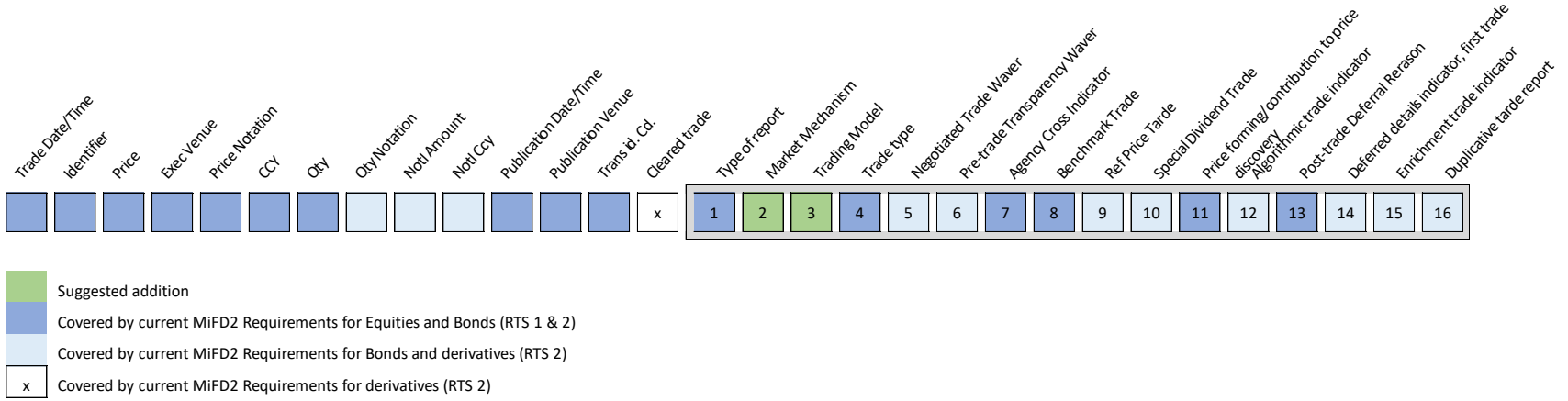
A17 / RECOMMENDED CT DATA OFFERING

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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Luxembourg: Publications Office of the European Union, 2020

PDF ISBN 978-92-76-20940-9 doi: 10.2874/357808 EV-03-20-519-EN-N

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