The design of equity trading markets in Europe

An economic analysis of price formation and market data services

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compelling economics

1 Introduction and context

The Federation of European Securities Exchanges (FESE) commissioned Oxera to undertake an independent economic analysis of the design of the market for equity trading in Europe, focusing on the role of price formation and market data services. The analysis builds on Oxera's work, published in 2014, on the pricing of market data services.[1]

This document provides a short summary of the report. The full report is available:

www.oxera.com/publications/trading-markets-europe

1.1 Context: MiFID I and II

Equity markets are where investors meet to buy and sell shares in a company. These markets lie at the heart of modern economies. Strong equity markets can unlock investment and channel it to firms that need to expand and create jobs. They provide households with better options to meet their retirement goals, and they better connect financing to investment projects.

The past decade has witnessed a fundamental change in the market for equity trading in Europe due to technological development and entry by new players, supported by regulatory changes.

Historically, only one or possibly two exchanges offered trading in a given stock. In 2007, the introduction of the European Markets in Financial Instruments Directive (MiFID I) opened up competition for equity trading, delivering more choice and lower trading costs for European businesses.

In addition to the changes brought about by MiFID I, there have been other important changes in European equity trading. In particular, the ten years that followed were associated with significant growth in algorithmic and high-frequency trading (HFT) strategies, as well as a steep rise in dark trading, such as trading on dark venues and over the counter (OTC), without pre-trade transparency.

Since 2018, the implementation of successor legislation (MiFID II) has continued the trend of promoting competition for equity trading, with a focus on improving transparency and price formation in financial markets. New rules were put in place to limit the amount of dark trading, and to promote trading on the more transparent exchanges, which lie at the heart of the price formation process in equity markets.

1.2 Objectives of this report

There is an ongoing debate about the provision by stock exchanges[2] of market data services. This debate often overlooks the links between market data services, trading and price formation, and the design of the equity trading market more generally.

[1] Oxera (2014), 'Pricing of market data services: An economic analysis', https://www.oxera.com/wp-content/uploads/2014/02/Pricing-of-market-data-services-3.pdf.
[2] This report uses the terms 'stock exchange' and 'primary market' interchangeably to refer to a country's primary stock exchange, which is usually also a 'regulated market'. For a definition of regulated market, see the glossary at the end of this short report.

One year on from the implementation of MiFID II, the objective of this report is to inform the debate on the design of equity trading markets in Europe—in particular, market data services—by providing an economic analysis of:

- the role of the price formation process;
- the impact of regulatory change on the market design of equity trading and price formation;
- the value chain for market data services;
- the impact of different charging structures for market data.

The analysis is based on the following:

- an extensive review of the theoretical and empirical academic literature on financial market microstructure;
- interviews with industry experts and leading academics in the fields of equity markets, asset pricing and market microstructure;
- publicly available pricing schedules for trade execution and market data services provided by European trading venues;
- confidential information on revenues from market data and trade execution services provided by FESE members.[3]

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[3] The participating FESE members are Bolsas y Mercados Españoles (BME), Budapest SE, Deutsche Börse, Euronext, Luxembourg SE, Nasdaq, Oslo Børs, SIX Swiss Exchange and Wiener Börse.

2 Key messages from the report

- Transparent trading on stock exchanges plays a central role in price formation, which contributes to fairer and more efficient markets and lower costs of capital for European businesses.
- The MiFID framework has facilitated the emergence of alternative transparent trading venues as well as increased dark trading. Both have used the quality of the price formation provided by transparent trading on stock exchanges.
- While MiFID I and II have delivered greater choice and lower trading fees, there is a risk that the growth in off-exchange trading threatens the quality of price formation going forward. Any further changes to the market design of equity trading would need to ensure that the price formation process is not negatively affected.
- Market data is the outcome of a dynamic price formation process, and is a joint product with trade execution—i.e. it is not possible to generate one without the other, and most activities undertaken by a stock exchange deliver both trading and price formation. The economics literature suggests that, in the case of joint products, it is efficient to generate revenues through fees from both products. Indeed, this is what exchanges do in practice: they recover their joint costs through a combination of market data fees and trade execution fees.
- MiFID II introduced rules on the provision and pricing of market data by trading venues. This is a small part of a longer value chain which includes data vendors and other distributors of data (analytics) services. If we consider the contribution of market data provided by European stock exchanges, we estimate that it represents around 15% of the total European spending on market data and analysis.
- In relation to the market data supplied by stock exchanges, our analysis finds the following:
  - the share of revenues coming from market data services ranges between approximately 20% and 50% of joint (trade execution and data) revenues across exchanges and has been relatively stable over time—on average 31% in 2018, unchanged from 2017, and compared to 32% in 2016 and 30% in 2015.
  - In terms of fee trends for market data, for most exchanges any increases in the fees have been small (e.g. for Level 1 and Level 2 data, less than around 1.5% per year in real terms). Aggregate market data revenues (of stock exchanges that are members of FESE) amounted to approximately €245m in 2018 and increased in recent years by around only 1% per year in real terms.
- From a public policy perspective, the key question is whether the current practice of recovering costs (i.e. partly through trade execution fees and partly through market data fees) has any negative implications for the functioning of equity markets and their end-users—i.e. investors and companies raising capital. The economic framework in this report shows that current charging structures for market data are unlikely to have detrimental effects on market outcomes for investors.

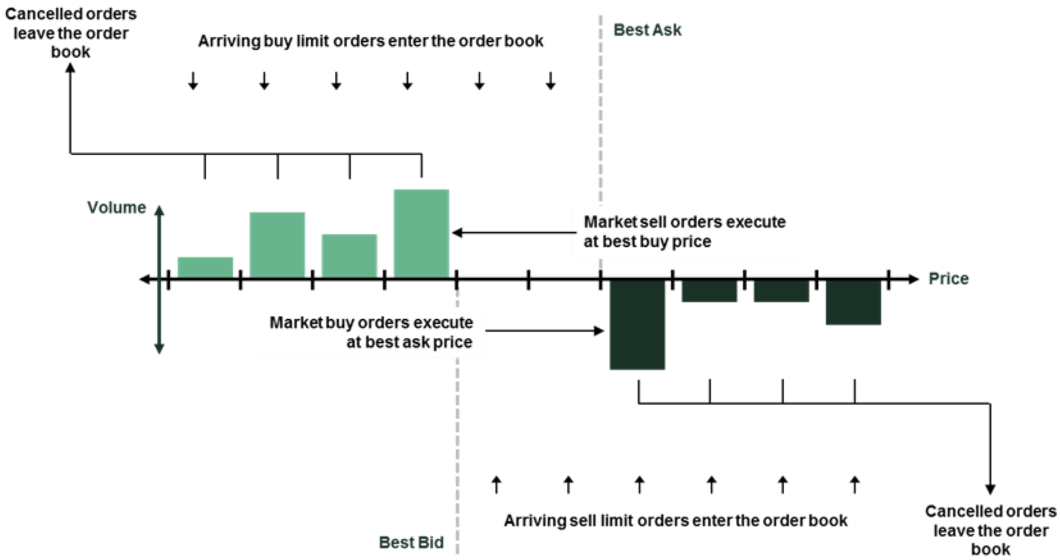
3 The design of the market for equity trading and the price formation process

Stock exchanges are the typical meeting place for investors in equity markets. They bring together buyers and sellers and establish prices to match demand with available supply. Typically defined in terms of their trading function (or liquidity provision) and listing services, another of their key economic functions, however, is price formation. This plays an important role for investors, by allowing them to (re)allocate their asset holdings and in turn to manage their financial risks according to their personal preferences.

The price formation function stems from the fact that the 'goods' being exchanged in equity markets are claims to uncertain future cash flows. Therefore, an important function of a stock exchange is an information-gathering and distribution process which ensures that market participants are sufficiently informed about the prices of the assets being traded in the market such that they can make informed commercial decisions.

At the heart of price formation on a stock exchange is the Central Limit Order Book (CLOB), the electronic platform that aggregates outstanding orders submitted to the exchange, organises the orders based on priority, and matches corresponding buy and sell orders according to trading rules.

Figure 3.1 Illustration of a central limit order book



Note: The horizontal axis represents the price of each order in the CLOB. At each price, the CLOB specifies a volume available to buy (dark green) or sell (light green). Prices on the CLOB are discrete, with the minimum interval known as the tick size. Market buy orders execute at the lowest ask price and market sell orders execute at the highest bid price. Traders posting limit orders can also cancel these orders, in which case they are removed from the CLOB.

Source: Oxera.

Orders are instructions to trade. They specify what traders want to trade, whether to buy or sell, how much, when and how to trade, and, most importantly, on what terms. Orders reflect trading strategies and, by extension, the different information held by different traders.

Price formation can be seen as the process that takes us from one efficient price to the next, as new information gets processed by traders and incorporated into the consensus value.

The mechanisms of, and wider benefits from, price formation are well covered in the established literature on market microstructure (albeit this literature is arguably complex and not always easily accessible), and are widely recognised by financial regulators such as the European Securities and Markets Authority (ESMA).The literature on price formation highlights three important implications for the design of the market for equity trading.

1. The quality of price formation (and liquidity) is affected by the relative proportion of different types of trader on a particular trading venue—trading venues need traders motivated to profit from information (referred to in the literature as ‘informed traders’), and traders motivated to trade owing to their a need to rebalance portfolios and smooth their consumption streams over time (referred to in the literature as ‘uninformed traders’).

2. The order flow to and from the order book on a stock exchange conveys information that makes a meaningful contribution to price formation.

3. By setting out the rules of the game and undertaking market surveillance, as well as coordinating and managing the flow of information, the activities of the stock exchanges facilitate the price formation process in equity markets.

In contributing to accurate prices, the activities of the stock exchanges lead to a variety of benefits, as illustrated in Figure 3.2.

Figure 3.2 Benefits of price formation

Source: Oxera

Accurate prices lead to the following.

- More efficient markets—better price formation leads to reduced frequency of costly price shocks.

- Fairer markets—fairness in markets requires a reliable price formation process with effective detection and deterrence against improper trading. Confidence in the prices leads to the use of these prices.

- Lower costs of capital for businesses—if information is incorporated quickly and effectively into asset prices, this contributes to lower asset volatility and lower cost of capital for businesses.
- Improved products and new business models—the price formation provided by exchanges has led to new products and business models, resulting in more choice and competition for trading and new propositions for consumers.
- Wider benefits—for example, the accurate prices formed on stock exchanges are used by the broader finance and valuation industry to determine the value of other assets.

The flow of information and the price formation process are both vital to the efficient functioning of equity markets. Indeed, it could be argued that the whole purpose of financial markets, more broadly, is to incorporate information. It is therefore no surprise that regulators and the academic community recognise the importance of price formation; nor is it surprising that market data, as the outcome of the price formation process, is of value to different types of market participant and trading venue, such as those that do not have their own price formation process.

Stock exchanges compete on the quality of this price formation via their activities—investing in hardware and software, setting trading rules, and monitoring compliance with these rules.

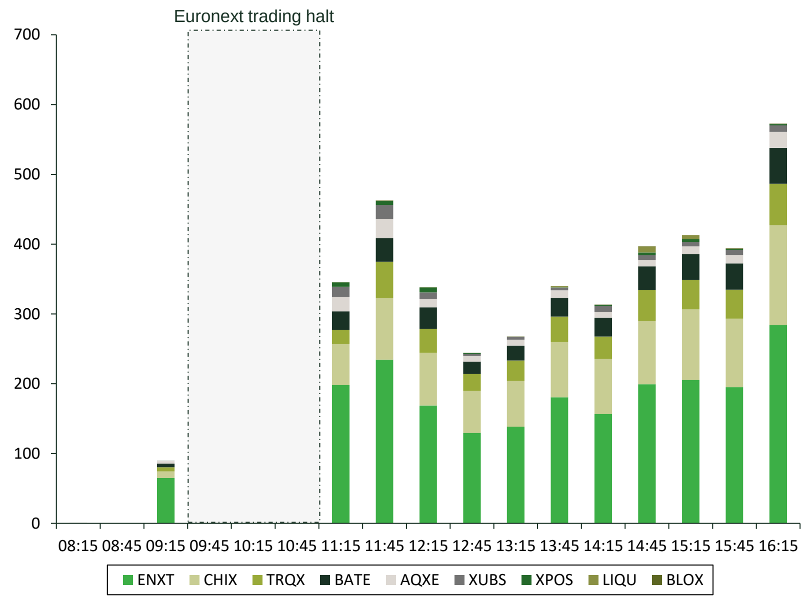
4 MiFID and the market design for equity trading

A primary objective of MiFID I was to increase competition in equity trading. Since implementation of the Directive, there has been a significant and persistent decline in the proportion of equity trading taking place on the traditional primary exchanges, with around 60% of trades currently taking place on regulated markets (RMs).[4]

Given the importance of the price formation process to equity markets, the impact of liquidity 'fragmentation' across multiple trading venues on price formation has been a source of academic and policy debate.

There is some empirical evidence that suggests that new-entrant 'lit' venues contribute to price formation, despite lower levels of trading activity. However, there are limits to this. For example, significant falls in market-wide trading activity following trading halts on stock exchanges illustrate the value that traders place on the quality of price formation provided by primary stock exchanges. (Figure 4.1 shows trading activity for French stocks before, during and after a trading halt on Euronext.)

Figure 4.1 CAC 40 value (€m) traded on 29 October 2018



Note: The horizontal axis represents discrete time periods on 29 October 2018. The shaded region represents the period when trading was halted on Euronext.

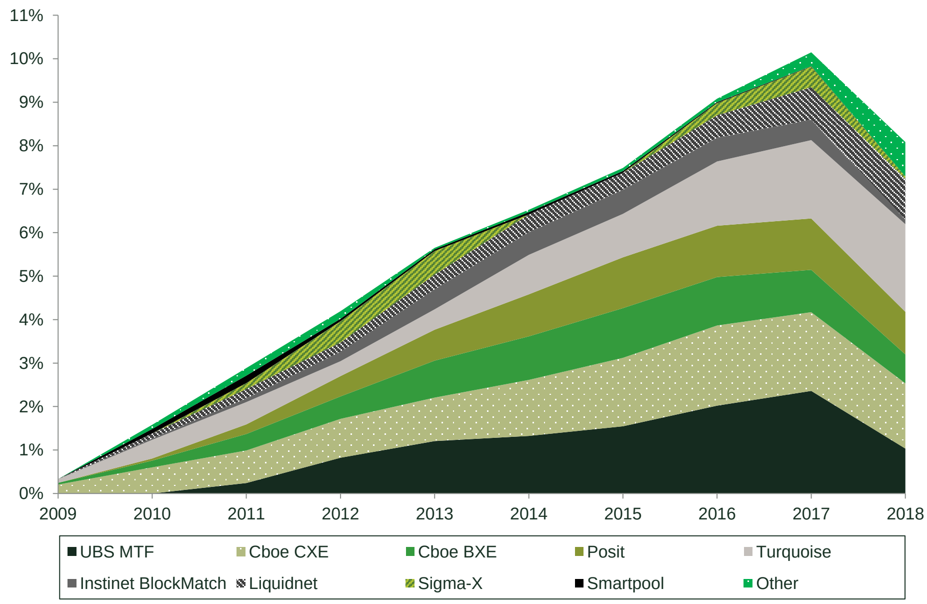
Source: Liquidmetrix.

Alongside the trend of falling market shares of the traditional primary exchanges, there has been a growth in dark trading—i.e. trades where orders are hidden prior to execution. Figure 4.2 shows the growing market share of 'dark pools' prior to the MiFID II Double Volume Cap Mechanism (DVCM) on dark trading in 2018. Dark trading has generally occurred on dark trading venues or through broker crossing networks (BCNs), away from lit exchanges. When off-venue trading is taken into account, the proportion of equity trading

[4] Oxera analysis of Cboe data. The proportion of equity trading taking place on primary exchanges in each European market is on average 60%, when only on-exchange trading (i.e. trading on RMs and multilateral trading facilities, MTFs) is taken into account.

taking place on primary exchanges in each European market has been consistently less than 40% in recent years.[5]

Figure 4.2 Growth in dark pool market share for European equities trading, 2009–18



Note: The y axis shows dark trading percentage of total volume traded on-exchange, by value. The period analysed is from 1 January 2009 to 31 December 2018. The drop in dark pool volumes observed from 2018 can be explained by the volume caps introduced by MiFID II.

Source: Oxera analysis of data from Petrescu and Wedow (2017), Cboe and Fidessa.

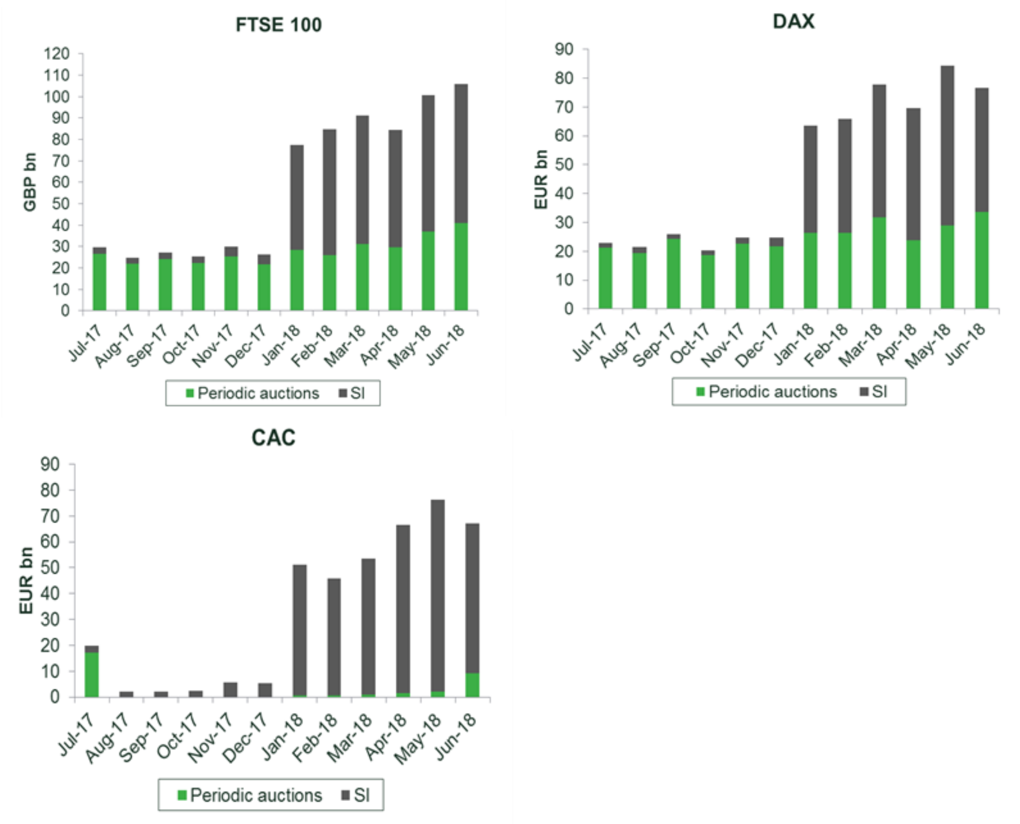
Although improving transparency is a key goal of MiFID II, more trading occurring off-exchange has resulted in less transparency and a risk to the quality of price formation. While an intention of dark trading is to protect investors from market impact, this is mainly relevant to larger trades—it does not contribute to price formation and dark trading may also include smaller transactions, which do not necessarily require protection from market impact.

Although it will take time for the effects of MiFID II to be fully realised, some changes in the market design for equity trading can already be observed. Since the implementation of a DVCM on dark trading and a ban on the use of BCNs, systematic internalisers (SIs) have grown to capture a 20% market share in pan-European equities trading.[6]

[5] Oxera analysis of Fidessa data. The proportion of equity trading taking place on primary exchanges in each European market is on average 40%, when trading venue trades (i.e. trading on RMs and MTFs and all OTC trading, including SIs and periodic auctions, are taken into account.

[6] (SIs are investment firms that regularly deal on their own account by executing client orders outside an RM or MTF. They are generally large banks and brokers that trade on a bilateral basis by executing orders directly against their own books. As an SI trades on its own account, trading occurs on a bilateral basis, with the SI acting as a counterparty to a client order. This contrasts with RMs and MTFs, which organise trading on a multilateral basis—i.e. bringing together different buyers and sellers.

Figure 4.3 Value of trading through SIs and periodic auctions before and after the introduction of MiFID II



Note: Data on OTC trading should be interpreted with care. Due to the lack of a standardised reporting format and a centralised collecting entity, the data on OTC trades may not be fully accurate, for example.

Source: Fidessa.

The changes brought about by MiFID have been successful in creating wider choice in trade execution venues and lower trading fees. At the same time, regulators and policymakers must ensure that any further changes to the market design for equity trading do not impair the price formation process and transparency in European equity markets.

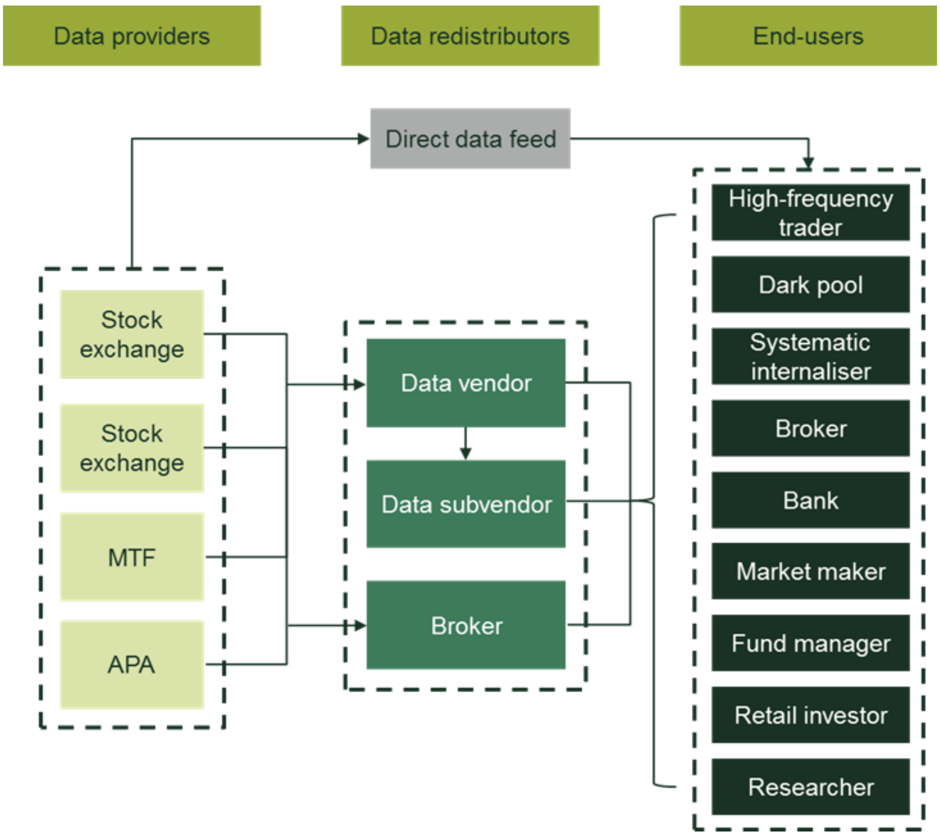
5 Market data services—value chain and economic characteristics

Market data provided by exchanges is the outcome of the price formation process. As an exchange improves its price formation process, its market data (both pre- and post-trade) becomes more valuable because the prices become more reliable to prospective users of the information.

MiFID II introduced some significant changes to the rules governing market data offered by trading venues. These include strengthened provisions underpinning the pre-existing requirement on trading venues to provide access to market data on a reasonable commercial basis, and new requirements on disaggregation of market data.

This data is a small element of a much longer value chain (see Figure 5.1), in a broader market data industry that is large and growing. Stock exchange market data is often aggregated and complemented by other sources of data and value-added services, with stock exchange data revenues accounting for around 15% of the total value chain.[7]

Figure 5.1 Value chain for market data



Note: This is a simplified representation of the value chain. Certain end-users, such as academic researchers and retail investors, are unlikely to source a direct feed from a trading venue and tend to use delayed data. Brokers may also redistribute market data to their clients. Data vendors may also redistribute to other data vendors (subvendors).

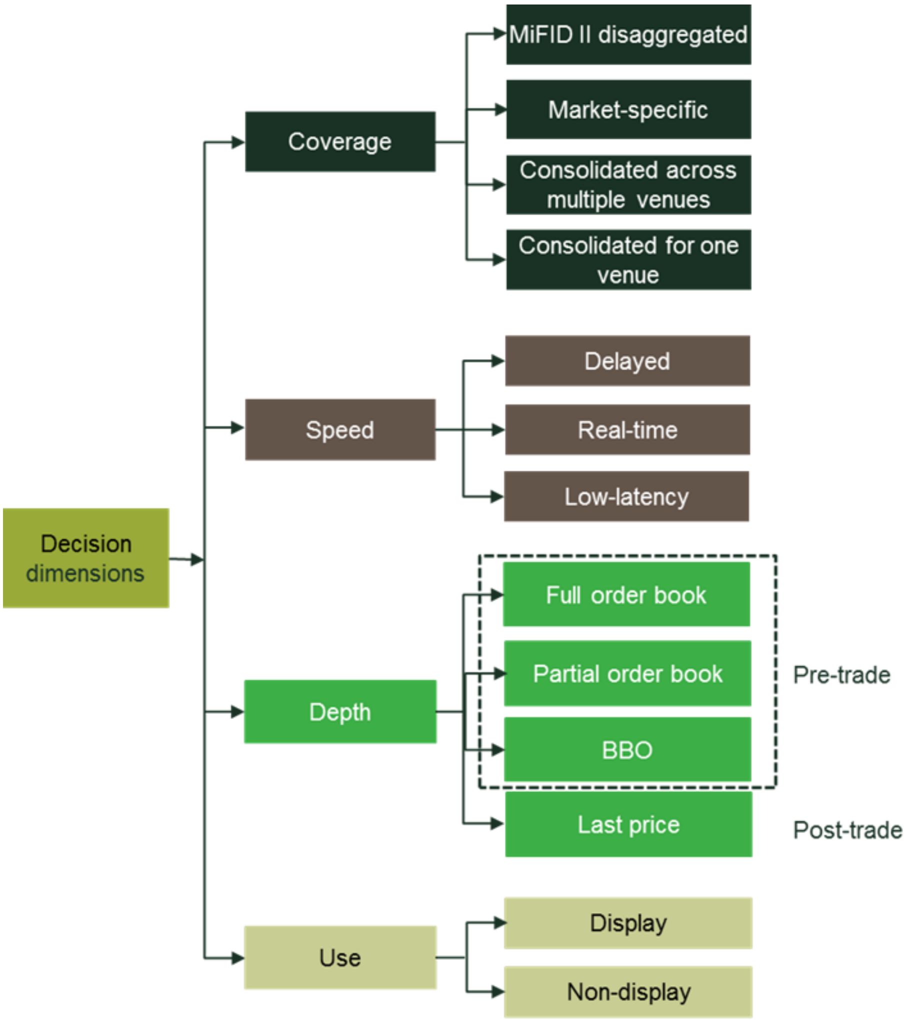
Source: Oxera.

Stock exchange market data is distributed directly and indirectly (through data vendors) to brokers, asset managers, and other market participants. There is

[7] See section 4.4 of the full report.

significant variation in these different participants' use of market data. (Figure 5.2 highlights some of the dimensions of data that a user may consider.)

Figure 5.2 Data dimensions



Note: Data dimensions can also vary between the type of user (i.e. professional or non-professional); however, this is not a decision dimension for data, as users fall into one of these categories in accordance with the data agreements of exchanges. Under MiFID II, exchanges must offer pre- and post-trade data separately (disaggregated).

Source: Oxera.

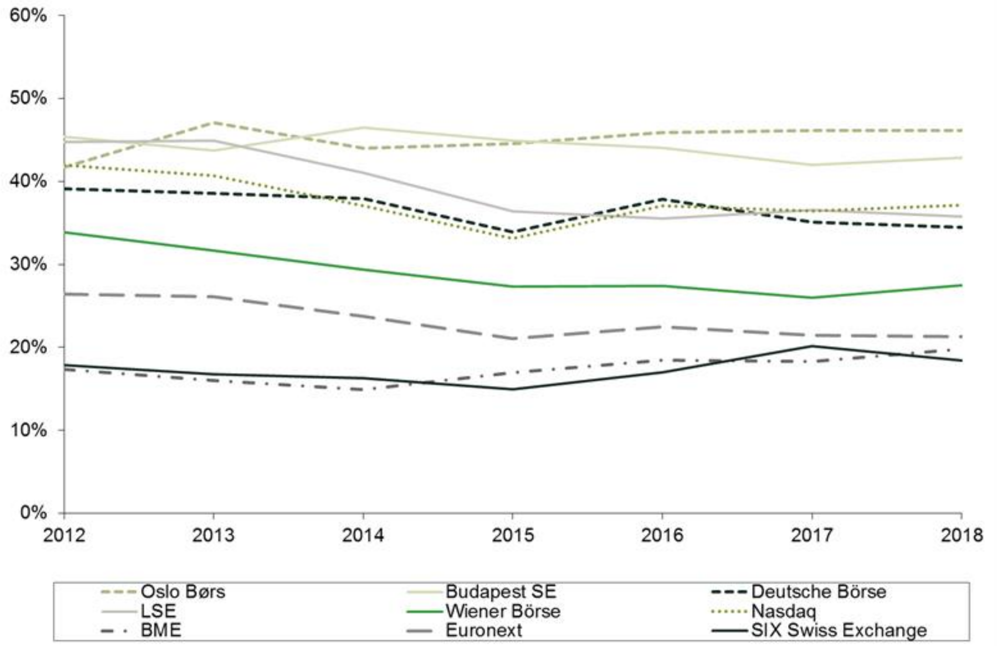
Despite the heterogeneity across users of market data, there has been a general upward trend in market data consumption. This has been driven by a rise in trading strategies that require more data, in particular from the significant growth in electronic trading, and an increase in data used to inform regulatory and commercial assessments.

Analysing market data fees and revenues, this report finds the following.

- For most exchanges, market data fee increases have been small (e.g. for Level 1 and Level 2 data, less than 1.5% per year in real terms).
- In 2018 market data revenues as a share of joint (trade execution and market data) revenues ranged from around 20% to 50% across exchanges (31% on average), and have remained fairly stable over the past five years (see Figure 5.3).

- Unit costs (calculated as the joint revenue from trade execution and market data as a proportion of the value of trading in relevant securities) have declined in recent years for all participating exchanges except one.

Figure 5.3 Proportion of total joint revenues attributed to market data revenues



Note: All stock exchanges provided direct data except for London Stock Exchange, whose revenues have been sourced from annual reports (2018 based on preliminary results). The ratios for BME, Nasdaq and Budapest SE are based on equity-only figures. Wiener Börse, Deutsche Börse and Euronext ratios are cash markets only. Remaining stock exchanges are calculated using total revenues. Ratios are all calculated using revenue attributable to matching products. Luxembourg Stock Exchange is excluded from this analysis due to the very limited share of equity trading in its business model. 2018 data is provisional and unaudited.

Source: Oxera analysis of data provided directly by participating stock exchanges, and annual report data.

Overall, there is no evidence to support the claims of broad increases in the total effective cost of trades levied by exchanges. The costs to end-investors are small—aggregate market data revenues were approximately €245m in 2018,[8] which represents 0.003% of total assets under management (estimates for individual markets are presented in Table 5.1 below).[9]

[8] Data covers the following exchanges: BME, Budapest SE, Deutsche Börse, Euronext, Nasdaq, Oslo Børs SIX Swiss Exchange and Wiener Börse. 2012 data for Nasdaq is estimated. 2018 revenue for Oslo Børs is indicative. 2018 revenues for other stock exchanges are provisional and unaudited. Market data revenues were provided directly by participating FESE member exchanges in local currencies (SIX Swiss Exchange and Oslo Børs revenues were converted to euros). The revenues for BME, Nasdaq and Budapest SE are based on equity-only product revenue. Wiener Börse, Deutsche Börse and Euronext revenue covers cash market products only. The revenues for the remaining stock exchanges are calculated using total market data revenues. For all exchanges, market data revenues include revenue from non-equity market data. Luxembourg Stock Exchange is excluded from this analysis due to the very limited share of equity trading in its business model.
[9] Market capitalisation as at December 2018. Data provided by FESE.

Table 5.1 Market data revenues as a proportion of market capitalisation

Trading venue	Market data revenue as a % of market capitalisation of stocks traded on exchange, 2018
Wiener Börse	0.009
Budapest Stock Exchange	0.008
Oslo Børs	0.005
BME	0.004
Deutsche Börse	0.004
Nasdaq	0.004
London Stock Exchange Group	0.003
SIX Swiss Exchange	0.002
Euronext	0.002

Note: London Stock Exchange Group data is taken from the preliminary results for 2018, released on 1 March 2019; other stock exchanges directly reported data for 2018. Market capitalisation data represents the value on December 2018.

Source: World Federation of Exchanges and FESE; market data revenues provided directly by Budapest Stock Exchange, Wiener Börse, BME, Oslo Børs, Nasdaq Nordic, SIX Swiss Exchange and Euronext, or retrieved from London Stock Exchange Group 2018 annual report.

It is also possible to consider the significance of market data costs to end-investors by considering the amount spent on the market data by each of the financial intermediaries using that market data (such as fund managers and brokers). This can be compared to the fees typically charged to end-investors (see Table 5.2).

Table 5.2 Market data costs as a proportion of other costs incurred by end investors

Service provider	Activity provided	Typical fees ultimately charged to end-investors	% of fee attributed to market data
Fund manager	Management of fund	0.3–1.5% of AUM	0.001–0.005
Large[1] broker	Execution of trades	2bp of value of trading	1.2
Clearing member and custodian	Clearing and settlement of trades, and management of assets	3bp of AUM	0
CCP	Clearing of trades	0.12bp of value of trading	0
CSD	Settlement and custody of assets	0.17bp of AUM	0

Note: The analysis in this table is based on 2017 data. Fund manager and large broker analysis conducted on data sourced from stock exchanges. [1]Transacting more than €50bn per year, as defined by one participating exchange.

Source: Oxera analysis.

We have analysed the trends in market data fees and revenues and find that the current charging structures for market data are unlikely to lead to detrimental effects on market outcomes for end-investors.

6 An economic framework for assessing the impact of different charging structures for market data

Regulators such as ESMA have widely recognised that trade execution and market data are joint products. Given the structure of electronic limit order books, it is not possible to generate one without the other. Most of a stock exchange's activities (investing in hardware and networks, setting trading rules, and monitoring and enforcing compliance with these rules) are undertaken to deliver both trading and price formation. Market data and trade execution are also interdependent (more trading makes market data more attractive, and vice versa) and are linked at the level of consumption (market data on a specific market is used by traders active in that market to take commercial decisions on trading).

The economic concept of joint products has important implications when considering how exchanges can recover their fixed costs. The total return that a stock exchange earns reflects the revenues it receives from the joint products and the total cost of the joint products. This means that the appropriate point of reference for recovering the costs in an economically efficient way is to look at the combined transaction and data revenues.

The economics literature suggests that, for joint products, it is efficient to generate revenues through fees from both products. Indeed, this is what stock exchanges do in practice: they recover their joint costs through market data fees and trade execution fees.

The core business model of trading venues is to maximise order flow, by attracting traders to submit bids. Investors are more likely to submit orders to venues providing access to reliable market data, low trade execution fees and deep liquidity, enhancing the likelihood of execution. Thus, there is competitive pressure on trading venues to ensure that the pricing of their services—for both market data and trade execution—incentivises market participants to trade on their venue.

Different charging structures may have distributional consequences, generating winners and losers. For example, shifting costs from trade execution services to market data services could worsen the competitive position of the brokerage firms with the highest data needs given their trading activity. Conversely, shifting cost recovery from market data to trade execution would be likely to harm trading participants. This is because there are market data users who do not also require trade execution services but most trade execution users also require market data to inform their trading. Therefore charging less for market data would require costs to be recovered from the smaller base of consumers that use both market data and trade execution.

However, from a public policy perspective, the key question is whether the current practice of recovering costs through a combination of trade execution and market data fees has negative implications for the functioning of equity markets and their end-users.

These implications can be summarised as follows.

- **Market efficiency**—there is some recent academic literature on the impact of stock exchanges charging for market data on wider market efficiency. These are theoretical contributions and suggest that, under certain very specific conditions (e.g. no competition in equity trading), charging for market data could impair price formation. However, as competition for equity trading is present, the stock exchange has the incentive to maximise order flow. This in turn prevents it from setting market data fees at a level that would negatively affect the price formation process.

- **Competition**—the analysis indicates that there are no significant effects on competition. For example, the concern could be that market data fees may have a greater effect on smaller brokers and fund managers (who may make fewer trades per data user) than on larger players. However, in the unlikely event that this would encourage consolidation, this is unlikely to have a significant impact on competition due to the large number of fund managers and brokers in the market.

In sum, the economic analysis suggests that the current charging structures for market data are unlikely to have detrimental effects on market outcomes for investors.

7 Market design

This report provides an economic framework to assess the impact of stock exchanges charging for market data services on end-users and the functioning of equity markets.

A review of the extensive academic literature on market microstructure highlights the crucial role that stock exchanges play in the price formation process. By contributing to better price formation, stock exchanges contribute to fairer and more efficient markets and a lower cost of capital for businesses.

Regulatory and technological changes have had an impact on the market design of equity trading and price formation. Increased competition for equity trading in recent years has resulted in lit exchanges losing market share to trading venues that contribute less to price formation, but that are using the price formation process of lit exchanges to conduct their business.

The key objectives of MiFID II for equity markets were to protect price formation and address some problems caused by dark trading and market fragmentation. MiFID II introduced some measures aimed at protecting price formation and addressing some of the problems caused by dark trading and market fragmentation. New rules were put in place to limit the amount of dark trading, and to promote trading on the more transparent exchanges, which lie at the heart of the price formation process in equity markets.

One year on from the introduction of MiFID II, the European Commission and ESMA are closely reviewing the outcomes of this scale of regulatory intervention. ESMA is currently reviewing measures put in place to preserve price formation, including the effectiveness of the caps on dark trading, and it has recently proposed changes[10] to level the playing field for on- and off-exchange trading in terms of minimum tick sizes. The analysis in this report suggests that although MiFID I and MiFID II have been successful in introducing competition and creating a market that delivers well in terms of choice and low trading fees, there is a risk that the growth in equity trading off-exchange will threaten the quality of price formation going forward. Any changes to the design of the market for equity trading would need to ensure that the price formation process is not further affected.

[10] European Securities and Markets Authority (2018), 'ESMA publishes final report on the tick size regime', 14 December, https://www.esma.europa.eu/press-news/esma-news/esma-publishes-final-report-tick-size-regime.

Glossary

BBO	best bid and offer
BCN	broker crossing networks
BME	Bolsas y Mercados Españoles
CAPM	capital asset pricing model
CDS	credit default swap
CLOB	central limit order book
DVCM	double volume cap mechanism
ESMA	European Securities and Markets Authority
ETF	exchange-traded fund
EU	European Union
FESE	Federation of European Securities Exchanges
HFT	high-frequency trading
IOSCO	International Organization of Securities Commissions
LOB	Limit order book
MAR	Market Abuse Regulation
MiFID I	Market in Financial Instruments Directive
MiFID II	the second Market in Financial Instruments Directive
MiFIR	Markets in Financial Instruments Regulation
MTF	multilateral trading facility
NYSE	New York Stock Exchange
OECD	Organisation for Economic Co-operation and Development
OTC	over the counter
OTF	organised trading facility
RM	regulated market
SE	stock exchange
SI	systematic internaliser
YTM	yield to maturity

Definitions of terms and concepts

Term/concept	Definition
Broker crossing networks (BCNs)	BCNs are not formally defined in legislation but are generally understood to be computerised trading systems operated by investment firms away from trading venues. Firms operating BCNs typically use them to match combinations of in-house principal liquidity flows, client orders and electronic liquidity provider (ELP) flows. BCNs are prohibited under MiFID II.
Dark pool	Venues where there is no pre-trade transparency i.e. orders are hidden prior to execution. Dark pools are not formally defined under MiFID but the term commonly refers to both dark MTFs (MTFs that utilise the MiFIR waiver pre-trade transparency waiver system) and certain BCNs. Examples include SIGMA X, POSIT and Liquidnet.
Dark trading	A form of equity trading where orders (prices and volumes) are hidden prior to execution. This may include trading on dark pools and OTC.
Lit trading	A form of equity trading where orders (prices and volumes) are visible prior to execution.
Multilateral trading facility (MTF)	One of the three categories of trading venue defined under MiFID II. According to Article 4(22), an MTF is 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.
Off-exchange trading	In this report, trading activity that does not occur on a primary stock exchange.
Organised trading facility (OTF)	One of the three categories of trading venue defined under MiFID II. According to Article 4(23), an OTF is a multilateral system that is not a regulated market or an MTF, and in which multiple third-party buying and selling interests in bonds, structured finance products, emission allowances or derivatives are able to interact in the system in a way that results in a contract.
Over-the-counter (OTC)	Trading that occurs between two parties away from a trading venue. OTC trading is an example of off-exchange trading.
Regulated market (RM)	One of the three categories of trading venue defined under MiFID II. According to Article 4(21), an RM is a multilateral system operated and/or managed by a market operator, which brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments, in the system and in accordance with the RM’s non-discretionary rules, and in a way that results in a contract, in respect of the financial instruments admitted to trading under the RM’s rules and/or systems. RMs are generally operated by traditional national stock exchanges (e.g. London Stock Exchange, Frankfurt Stock Exchange).
Stock exchange	The main trading venues that provide a market for the trading of equity instruments. Under the MiFID II framework, they are generally classified as RMs. This report refers interchangeably to ‘stock exchanges’, ‘primary stock exchanges’, and ‘primary exchanges’.
Systematic internaliser (SI)	Defined under MiFID II as an investment firm that, on an organised, frequent systematic and substantial basis, deals on own account when executing client orders outside an RM, an MTF or an OTF without operating a multilateral system. The European Securities and Markets Authority (ESMA) is responsible for measuring the threshold for a ‘frequent and systematic basis’ to inform which investment firms qualify for the SI regime. SI activity must take place against the proprietary account of the operator (risk-facing) and generally does not include matching client orders against other client order or third-party liquidity.
Trading venue	Defined under MiFID II Article 4(26) as an RM, an MTF, or an OTF.

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