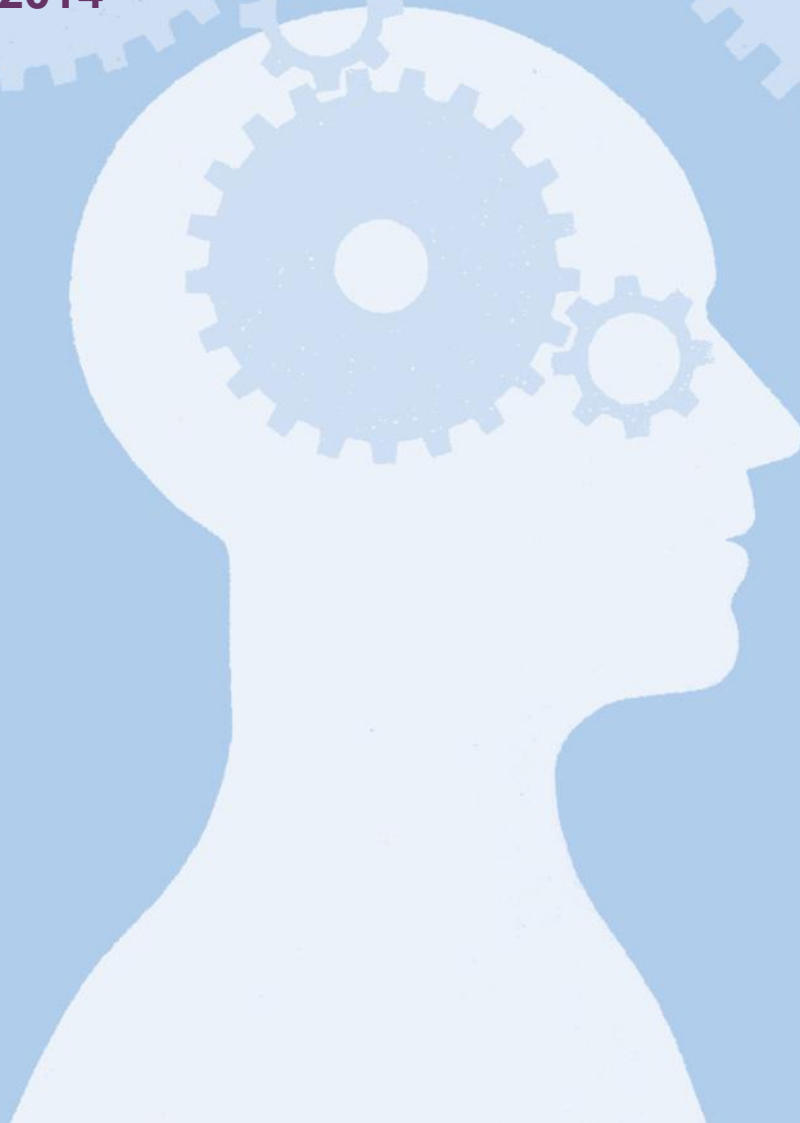


# **Pricing of market data services**

**An economic analysis**

**February 2014**



## How to read this report

This is quite a technical report and is best to read from beginning to end. If you don't have sufficient time then you may want to read the executive summary and perhaps section 4. Although each section builds on the analysis in the preceding sections, each section can also be read on its own.

Section 1 provides the context and sets out the objectives. If you are familiar with the debate on market data services and the European Commission MiFID II proposals then you can probably skip this section.<sup>1</sup>

Section 2 describes the value chain and the role of market data in the trading of European equities. It provides a detailed description (with further detail provided in Appendix 1), but the main points can be summarised as follows.

- Trading venues offer market data, but this is only one element in the value chain for market data services. Other services include the value-added services offered by data vendors, software applications, IT infrastructure and in-house market data expertise. Some would say that this point is often overlooked in the debate on the pricing of trading venues' market data.
- The value chain for market data services is, in turn, part of the larger value chain for trading in European equities. This value chain is quite complex but has been analysed in detail in previous Oxera reports for the European Commission.
- Brokers, fund managers, institutional and retail investors, academics and other researchers all use market data but tend to value it (very) differently. For example, high-frequency traders typically need very fast access to market data at the maximum level of detail, while retail investors and some researchers are more likely to be content with delayed, and much less detailed, data that is offered for free. It is useful to know this—the different valuations also explain why trading venues have different pricing schedules for different types of user. From an economics perspective, this can be an efficient outcome, providing benefits to all stakeholders.

Importantly, section 2 also provides a framework within which the pricing of market data can be analysed. It explains that trade execution and market data services are joint products and have joint costs. We explain in section 2 (and in more detail in Appendix 2) what this means. The main implication for our analysis is that the pricing of market data services cannot be analysed in isolation from the pricing of trade execution services. Trading venues can recover their costs through fees for trade execution services and/or fees for market data services, and these two services therefore need to be analysed together. This is done in sections 3 and 4.

Section 2 also explains some of the other key economic characteristics of trading venues and the implications for the pricing of their services.

Section 3 contains the main empirical analysis of the costs of trade execution and market data services. It is based on new data (provided by the four exchanges that participated in this study) and consists of two important parts.

<sup>1</sup> At the time of publication of this report, the European Parliament and the European Council had reached an agreement regarding the European Commission's proposals to amend the Markets in Financial Instrument Directive (MiFID), but the final text had not yet been published.

The first part focuses on the costs of market data services to brokers. It shows that the order of magnitude of these costs, compared with trade execution costs, can vary significantly by broker. This is not surprising and is driven by the pricing schedules as well as the fact that different brokers have different needs, particularly in how market-data-intensive their investment or trading strategies are.

In terms of the revenue data from trading venues, the market data services revenues as a proportion of the total core revenues of exchanges (ie, combined revenues from trade execution and market data services provided by trading venues) range between 19% and 35% in Europe. This range is quite similar to that observed in the USA, and these ratios have been relatively stable in the past few years.

The main policy debate in Europe has focused on the costs of market data services to brokers. However, brokers are intermediaries and pass on the market data costs they incur to end-investors. To really understand the impact of the pricing of market data services on the functioning of the market for trading, it is important to look at how these costs affect end-investors.

This is the focus of the second part of section 3, which assesses the significance of the market data costs compared with other costs in relation to trading that are incurred by end-investors. It shows that the costs of market data services to investors are quite small—less than 2% of the total annual costs of the trading in, and the holding of, securities.

This is an important finding. If the market data costs are relatively small compared with other costs of trading and holding, it would seem unlikely that, at a general level, changes in the fees for market data services would significantly affect the overall level of activity of trading.

In other words, changing how trading platforms recover their costs by, for example, making market data services free—and, therefore, increasing the fees of trade execution services—would be unlikely to radically change the motivations of end-investors to undertake particular trades or adopt particular investment strategies. It is, therefore, very unlikely that changing the balance of prices between market data and transactions can significantly change the overall performance of the (equity) capital markets. More detail on how this conclusion is reached is set out in section 4.

Interestingly, one conclusion is that radically reducing market data prices could actually increase the total that brokers would pay to trading venues, as they would now cover more of the costs of these venues—while other, non-trading stakeholders (eg, fund managers) who currently buy market data would pay less (section 4.1.1 explains why this is).

Finally, in section 5, we compare the costs of market data services in Europe with those in the USA. It is often argued that European market data is far too expensive. The analysis shows that, at first sight, Europe indeed looks more expensive than the USA. However, a more detailed analysis shows that this is driven by large differences in economies of scale, and a number of other factors such as the complexity of the European markets, the specifics of the regulatory requirements around Reg NMS, and the consolidated tape. It is well known that trading fees in the USA are lower than in Europe and that this is driven partly by differences in economies of scale (see section 2.1.1 in Appendix 2)—similarly, data fees are lower in the USA, and this is also driven partly by the same differences in economies of scale.

This leads us to conclude that, from a public policy perspective, there is no real justification for regulating trading venues' pricing of market data services. Trading venues can recover their costs through fees for trade execution services and/or fees for market data services (and various access and membership fees), but how they actually do this is unlikely to have a significant impact on the functioning of the trading market for end-investors.

It is also clear that regulating the pricing of market data services would be far from straightforward. It would not be practicable to impose regulation and there would be a risk that it would actually distort the functioning of the market. On the other hand, it may be beneficial to offer more transparency and provide everyone with a better understanding of how trading venues recover their costs. Some of the metrics presented in section 3 could be used for this.

We use some technical economics terms (joint products, network externalities, etc), but explain most of these in the report itself. We also use some technical language (level 1 and level 2, best-bid-offers, etc), and provide a list of terminology in section 1.5.

There is a certain amount of new and interesting data analysis in this report. The analysis and the conceptual framework build on previous analysis of the securities trading and post-trading value chain undertaken by Oxera for the European Commission.<sup>2</sup>

For any questions about this report, please contact Oxera: [enquiries@oxera.com](mailto:enquiries@oxera.com)

<sup>2</sup> Oxera (2007), 'Methodology for monitoring prices, costs and volumes of trading and post-trading activities', prepared for European Commission and DG Internal Market and Services, July; Oxera (2009), 'Monitoring prices, costs and volumes of trading and post-trading services (MARKT/2007/02/G)', report prepared for European Commission DG Internal Market and Services, July; and Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission, DG Internal Market and Services, May.

# Executive summary

## Context

Over the past ten years, there have been some considerable changes in terms of market structure and trading techniques in European capital markets.

Where once only one, or possibly two, exchanges offered trading in a particular equity, for most European equities multiple trading venues now compete for liquidity due to the full implementation of the Markets in Financial Instruments Directive (MiFID) in 2007. One effect of introducing competition has been the fragmentation of trading data on particular stocks across a number of venues. This, together with the creation of new trading strategies (such as algorithmic and high-frequency trading), has generated demand for market data and faster access to the full order books for a wider coverage of markets.

In response to the growing variety of market data needs, exchanges and multilateral trading facilities (MTFs) have introduced new types of data licences, such as non-display licences that cover the whole institution's use of market data for algorithmic trading, post-trade data separated from pre-trade data in order to support the planned EU post-trade consolidated tape, and a harmonised delay period of 15 minutes for data free of licence fees.

Data vendors, independent software vendors, MTFs and exchanges provide products to meet the demand for market data from different types of market participants. While trading venues make their data available, as wholesalers, it is typically offered to market participants by market data vendors, acting here as the retailers. Brokers sometimes also offer data services themselves—for example, when they provide the relevant trading venue's data to retail customers via their web-based offerings.

Market data vendors such as Bloomberg and Thomson Reuters offer market data from more than 500 trading venues across Europe, the USA and Asia via one desktop terminal in a single format. Data sources can be chosen separately or, where relevant, in a consolidated form. The data is usually presented in additional applications (analytics and news services etc.).

After the introduction of MiFID I, the industry (under the lead of the Federation of European Stock Exchanges (FESE)) decided to standardise market data across multiple markets within the EU through projects like the Market Model Typology. The aim of this project is to ensure a more efficient consolidation of data from different trading venues.

The current European Commission proposals to amend MiFID include a number of provisions in relation to trading venues' market data.<sup>3</sup> Trading venues will be required to unbundle pre- and post-trade data, provide post-trade data (published with a 15-minute delay) free of data licence fees, and provide pre-trade and post-trade data on a reasonable commercial basis.

Although most of these requirements have already been implemented by most of the trading venues ahead of the adoption of MiFID II, there has been some debate over whether a definition of 'reasonable commercial basis' would be required, and the way in which it should be interpreted, with some stakeholders advocating the need for detailed rules and others

<sup>3</sup> Proposal for a Regulation of the European Parliament and of the Council, Title II, Articles 3, 5, 7, 9, 11, 12 and 18.

promoting a principles-based approach with greater reliance on market forces—and some questioning the necessity of a definition.

The market structure and value chain in which market data is produced and consumed is complex, making it challenging to assess the role of regulation. This report aims to provide an economic framework within which the pricing of market data services can be evaluated. To contribute to the regulatory debate, the report provides economic analysis of the following:

- the role of market data in the value chain for trading in European equities;
- the key economic characteristics of trade execution and market data services;
- the current pricing and costs to users of market data services in Europe, drawing comparisons with the prices and costs to users in the USA;
- the potential impact of different pricing schedules and cost recovery mechanisms on market outcomes for end-investors.

The report is written specifically in the context of European equity trading, and thus all statements refer to European equities unless otherwise specified.

## **The role of market data in the trading of European equities**

The production and consumption of market data is part of a larger value chain that includes the trading of financial instruments and the trading of European equities. The latter is the focus of this report.

The objective of the trading system is to provide an efficient mechanism to transfer the ownership of equities from one party to another. In order for this to take place, market participants require access to the market data that is produced by the trading services provided by the trading venues.

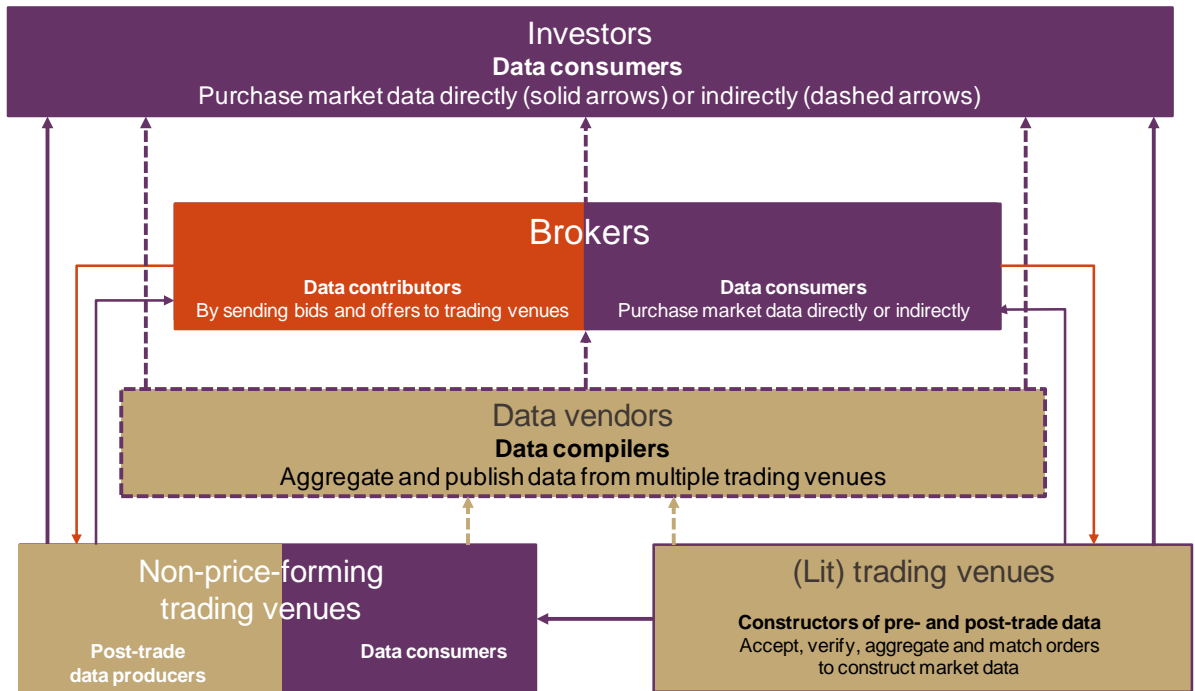
The production and consumption of market data across the trading value chain is complex. Figure 2.2 of the report, repeated below, sets out the main data flows in terms of the contribution of trading data by brokers (red arrows and shading); the consumption of that processed data by investors, brokers and other market participants (purple arrows and shading); the production of market data by trading venues (through the provision of trade execution services); and the further processing of market data by data vendors (brown shading), including value-added services offered by data vendors, software applications, and IT infrastructure providers.

The market data offered by trading venues is only one element in the value chain for market data. Other services include the value-added services offered by data vendors, software applications, IT infrastructure and in-house market data expertise. According to research in 2010,<sup>4</sup> exchange market data licence fees were estimated to account for 8% to 15% of customer market data expenditure; IT infrastructure was estimated to account for 10% to 16%; and data vendor services were estimated to account for the remaining 65% to 80%.

Market data is often complemented by other sources of information and data to which market participants may have different levels of access, and which they may interpret in different ways. For example, investment decisions typically draw on a broad mix of information sources in addition to market data such as annual reports, financial statements and more general news services.

<sup>4</sup> Atradia (2010), 'The cost of access to real time pre & post-trade order book data in Europe', August, p. 21.

## Information flows in the trading of European equities



Source: Oxera.

There is significant variation in the use of market data by market participants, which is analysed in more detail in the report. Users can choose between several types of data products, and whether they purchase the data directly from trading venues (usually reducing latency) or indirectly via data vendors or brokers (which may also provide analysis software, and combine market data from multiple trading venues). Market data products vary according to depth (ie, how much information about the demand and supply of a particular stock is included in the data product); the speed at which data is received by the market data recipient; and coverage of the types of stocks or asset classes captured in the data product.

In addition to anonymised market data sets for publication, trading venues generate non-anonymised data for surveillance purposes. This data is used only by the trading venues' market surveillance, and by regulators. The confidential nature of the information included in such data, such as trader IDs or Algo Trading IDs, means that it is not suitable for public dissemination.

## An economic framework to assess the pricing of market data services in Europe

Market data and trade execution are linked not only at the level of consumption (ie, market data is required in order for traders to take decisions on trading), but also at the level of production.

Market data is a by-product of the overall operation of the trading system. Given the general structure of electronic order books and electronic order matching, it is not possible to provide transaction services without generating market data, and it is not possible to generate trade transaction—or market depth—data without also supplying a trade execution service. In economic terms, trade execution and market data are joint products.

The joint product nature of trade execution and market data has two important implications.

- With joint products, the production costs of the outputs cannot be separated—ie, they are joint costs. This has been well established in the economic literature and regulatory practice. Joint costs are incurred when production facilities simultaneously produce two or more products in fixed proportions, such that an increase in the output of one product will necessarily mean a corresponding increase in the output of the other product.

This means that the recovery of costs by a trading venue cannot be assessed effectively by the independent analysis of either trade execution services or market data services. The appropriate frame of reference for the economically efficient recovery of the costs of the secondary market activities of trading venues is at the level of combined transaction revenues and data revenues.

- This, in turn, means that the economic characteristics of the production of the trade execution service are also relevant. Trading venues are characterised by high fixed costs and low marginal costs, and significant economies of scale. In industries with these characteristics, the pure competitive outcome—where prices are set at forward-looking marginal costs—may not be economically efficient. Marginal cost pricing would not be sufficient to recover the total cost of production, and therefore trading venues would exit the market. Furthermore, charging the same price to all customers would not account for the different valuations that different types of customers may have. Different market participants often have very different valuations of what is essentially the same information. This suggests that a single price for all users may not be efficient.

With this framework in mind, this report analyses the way in which trading venues in Europe currently recover their costs through fees for both trade execution and market data services, and assesses the implications of the current (and potentially different) cost recovery mechanisms for the functioning of the equity markets, and their impact on end-investors.

## **Analysis of the current pattern of cost recovery by trading venues**

The current pattern of cost recovery has been analysed on the basis of a number of specific metrics using data from the participating exchanges and that available in the public domain (in annual reports and pricing schedules). These metrics are as follows.

- **The revenues from market data services as a proportion of combined revenues from market data and trade execution services, including membership fees**
  - This analysis shows that, within both Europe and the USA, there is a certain amount of variation in the relative importance of market data revenues. In 2012, market data revenues accounted for about 19–35% of market data and trade execution revenues combined for the European markets of the participating exchanges. For the US markets (of the participating exchanges) the range was fairly similar, at about 14% to 29%.
  - Over the past four to seven years, the proportion of revenue accounted for by market data services by each exchange appears to have been relatively stable. Analysis of historical data licence pricing schedules from European exchanges suggests that this is because licence fees have not generally increased. While faster or more detailed market data products have been introduced, for which higher fees are charged, licence fees have not been frequently increased. There are some exceptions to this general trend, and some trading venues have increased their fees for market data services at a time when revenues from trade execution services have been falling (due to lower trading volumes).
- **The fees incurred by brokerage firms (hereafter referred to as brokers) to purchase market data services, compared with the fees incurred for trade execution services**



- This analysis was undertaken by designing user profiles and applying these to the pricing schedules for trade execution and market data services. The analysis shows that the relative importance of data licence fees can vary significantly between brokers according to their business model.
- Large brokers generally pay exchanges between 0.05bp and 0.15bp of their value of trading in market data licence fees, compared to around 0.08bp and 0.55bp in trade execution fees and less than 0.01bp in membership fees—ie, as a proportion of total fees for trade execution and market data services paid to exchanges, market data fees are usually in the range of 10% to 30%. The breadth of this range reflects the observed differences in the use of market data products by different brokers transacting similar volumes. Large brokers are here defined as executing around 50,000 trades a day, or around €100 billion a year (assuming an average trade size of €8,000), at a particular trading venue.
- In terms of a ‘mid-active broker’ at a trading venue, market data fees cover a broader range as market data needs can vary more widely, but they are typically in the range of 15% to 40% of total fees paid to exchanges. A mid-active broker is here defined as a brokerage firm that executes around 1,000 trades a day, or around €2 billion a year (assuming the same average trade size of €8,000).
- There is some variation in pricing schedules for market data services across trading venues. For example, most but not all trading venues in Europe offer market data for free to registered traders for trading on that venue.
- **The cost of consolidated tapes in Europe and the USA**
  - When expressed in absolute amounts, European trading venues are typically more expensive for both data and transaction services than those in the USA. However, a more detailed analysis shows that this is driven by large differences in economies of scale, and a number of other factors such as the complexity of the European markets, and the specifics of the regulatory requirements around Reg NMS. It is well known that trading fees in the USA are lower than in Europe and that this is driven partly by differences in economies of scale—similarly, data fees are lower in the USA, and this is also driven partly by the same differences in economies of scale.
- **Market data costs as a proportion of the total costs (in relation to trading and holding securities) incurred by end-investors**
  - The relative importance of market data fees compared to other costs incurred by end-investors (ie, the cost of trading and post-trading and the costs of fund management) can be estimated in two ways.
  - The ‘top-down’ approach compares market data revenues of an exchange (as a proxy for the market data fees incurred indirectly and directly by end-investors) against the domestic market capitalisation of stocks traded on the exchange (as a proxy for the value of investments held by the end-investors in the local market). This suggests that annual market data costs represent less than 0.01% of the value of an investor’s assets under management.
  - The ‘bottom-up’ approach considers all the services provided to an end-investor, from fund management, brokerage and trading, to clearing and custody); estimates the expenditure by each intermediary on market data; and compares this to the total costs of these services charged to the end-investor. This approach estimates that annual market data costs represent less than 0.02% of the value of an investor’s assets under management.

The precise relationship between market data fees and the total costs incurred in making a transaction will vary depending on the investment style (and other factors) adopted by the end-investor or fund manager. However, taking both a top-down and a bottom-up approach, the annual market data fees received by trading venues are likely to account for less than 2% of the total annual costs associated with trading and holding securities incurred by institutional investors.<sup>5</sup> This is typically equivalent to less than 0.02% of assets under management.<sup>6</sup> (The significance of market data fees charged by trading venues for retail investors in Europe is even smaller, as many European trading venues offer market data to retail investors for licence fees of €1 a month or for free.)

This shows that the market data costs (in relation to the market data provided by stock exchanges) are relatively small compared with the total costs that investors incur in relation to trading and post-trading.

Competition in the markets for fund management, market making and brokerage services keeps the fees charged by intermediaries for such services close to the costs incurred in providing them. This means that any change in the cost of providing such services—for example, an increase in market data licence fees—would be expected to be passed on to end-users in the form of higher fees charged by intermediaries for them.

Changes in fees for market data and trading services may affect the demand for them. However, given the relatively small proportion of the total costs represented by market data fees, it would seem unlikely that, at a general level, changes in the licence fees for market data would significantly affect the overall level of activity of trading.

This is not to say that a different balance between market data service fees and the fees for trade execution services provided by trading venues would have no impact on either end-users or other intermediaries. The next section looks at what would happen were trading venues to implement different pricing structures.

## Potential impact of different pricing structures on market outcomes

Changing the pricing schedules for trade execution and market data services may have a number of potential effects on market participants and market outcomes for end-investors, which are analysed in detail in the report. These effects can be summarised as follows.

**Distributional effects**—changing the balance of cost recovery may create winners and losers among market participants. Shifting costs from market data services to trading services, for example, would improve the competitive position of those brokerage firms with the highest data needs given their trading activity.

However, the number of customers purchasing data services tends to be higher than the number purchasing transaction services—it is likely that anyone who purchases trading services will also purchase market data services, while there are a number of customer groups who will purchase market data services but not directly purchase trading services or other related services for which an exchange charges a fee (for example, fund managers).

This means that the general pattern would be that those purchasing both transaction services and market data services would be worse off, while those purchasing only market data would be better off. It should be noted that market data is free for some brokers—so

<sup>5</sup> The services considered are: fund management services; trade execution services provided by brokerage firms and trading platforms; market impact costs experienced by funds; clearing services provided by clearing firms and CCPs; and custody services provided by custodians and CSDs.

<sup>6</sup> This cost is based on a fund with a turnover ratio of 50%—ie, a fund in which 50% of the assets held are changed each year, such that the value of assets under management is the same as the value of trading each year.

such brokers will not benefit from lower data fees, and experience only the higher trading fees.

From an end-investor perspective, this may not matter so much. If trading fees were increased and market data fees reduced, the fund management fee would reduce but commissions paid to brokers (often directly by the funds) would increase.

**Impact on market efficiency**—although there is some assessment in the economic literature of the impact of charging or not charging for market data services on market efficiency, there is not sufficient evidence from these models to draw a conclusion on the relationship between the efficiency of markets and the pricing of market data. In theory, charging for market data services could reduce the demand for data and therefore potentially have a negative effect on the price discovery process. However, if there are multiple trading platforms, individual platforms have incentives to ensure that they are attractive both in terms of fees (for trade execution and market data services) and non-fee elements (such as price discovery and liquidity).

**Impact of different pricing schedules on volume of trading**—trading platforms can recover their costs in a number of ways and design different types of pricing schedules.

In the report, two extreme scenarios are analysed: a scenario where all costs were recovered through market data fees (and trade execution fees were set at zero), and a scenario where all costs were recovered through trading fees (and market data fees were set at zero).

The analysis shows that the effect is not clear-cut. In the first scenario, the volume of trading may go up (since transaction fees are set at zero), but the volume of trading may go down as a result of the increase in market data costs leading to a reduction in the consumption of market data by fund managers, and this in turn could lead to a reduction in the demand for trading services (ie, decisions are made not to trade when, with access to the data, the decision would be to trade). The overall net effect is an empirical question—in the first scenario, the net effect is likely to be more marginal transactions, and in the second scenario it is likely to be fewer marginal transactions.

Furthermore, the first scenario is likely to encourage consolidation among brokerage firms, as the largest brokers are likely to find it easier to increase the average value/volume of trading per data user. Niche brokers that trade smaller amounts per trader would be disadvantaged. However, this increase in concentration is unlikely to result in a significant reduction in the degree of competition, and is therefore unlikely to affect the end-investors.

In sum, the analysis shows that, even in extreme scenarios of recovering all costs through trade execution fees or market data services fees, there is no evidence that the impact on market outcomes in terms of efficiency and volume of trading would be detrimental to end-investors.

## Conclusions

As explained, market data and trade execution services are joint products. Therefore, from an economic perspective, an assessment of the pricing of market data services requires an analysis of the revenues from both trade execution and market data services. Furthermore, both services are intermediate products, which means that the analysis needs to focus on the market outcomes in terms of the efficiency of the market, the volume of trading, and the total costs of trading for the end-users—ie, investors.

The analysis in this report shows that the current cost of market data as a percentage of total costs to end-investors is low, at less than 2% of the total annual costs associated with trading and holding securities incurred by institutional investors. This is typically equivalent to less than 0.02% of assets under management. This indicates that a change in market data fees is

unlikely to have a significant effect on behaviour in terms of—for example—the volume of trading.

The conceptual analysis also shows that, even if the pricing of market data services were changed significantly, there would be unlikely to be a significant detrimental effect on market outcomes for end-investors.

This suggests that there is no justification for regulating the pricing of market data services. Although this report has not analysed potential options for the regulation of the pricing of market data services, it is clear that it would be very challenging to design a framework that is practicable and there would be a risk that it would actually distort the functioning of the market—defining the relevant services and regulating the prices would be far from straightforward.

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# 1 Introduction

Deutsche Börse, Nasdaq OMX, NYSE Euronext and SIX Swiss Exchange (the participating exchanges) have commissioned Oxera to undertake independent economic analysis into the pricing of market data services. This report presents the findings of this analysis. At the time of publication, the European Parliament and the European Council had reached an agreement regarding the European Commission's proposals to amend the Markets in Financial Instrument Directive (MiFID), but the final text had not yet been published.<sup>7</sup>

## 1.1 Context

Over the past ten years, there have been some considerable changes in terms of market structure and trading techniques in European capital markets.

In 2004, the European Commission introduced the Markets in Financial Instruments Directive (MiFID),<sup>8</sup> with the objective of increasing competition and consumer protection in investment services. MiFID included pre- and post-trade transparency requirements but, with the break-up of the monopoly of national exchanges, trading and—therefore—market data has become fragmented across a number trading venues. Where once only one, or possibly two, exchanges offered trading in a particular equity, for most European equities multiple trading venues have competed for liquidity since the full implementation of MiFID in late 2007.

In addition to the fragmentation of trading, technology has revolutionised the data and order execution business. Automation of processes has been introduced throughout the trading and post-trading value chain, facilitating new trading strategies (such as algorithmic and high-frequency trading), and generating demand for new types of data.

The European Commission proposals to amend MiFID include a number of provisions in relation to market data.<sup>9</sup> Trading venues will be required to make pre- and post-trade data available on reasonable commercial terms, unbundle pre- and post-trade data, and provide post-trade data published with a 15-minute delay free of data licence fees.

Furthermore, currently most European exchanges offer data with a 15-minute delay without a data licence fee. Both changes have been applied to European exchanges ahead of the introduction of MiFIR/MiFID II. Some of the initiatives are already reflected in data vendors' product offerings, which typically include the provision of delayed data from all venues for no additional licence fee other than the cost of the terminal itself.

However, there has been some debate over the way in which a 'reasonable commercial basis' should be interpreted, with some parties advocating the need for detailed rules and others promoting a principles-based approach with greater reliance on market forces.

What characterises reasonable commercial terms for the provision of market data is not a simple question. The (very wide) range in the value of the market data between different market participants suggests that a single price is unlikely to be considered reasonable for all users. For example, technological advances have facilitated the development of new high-frequency trading strategies, increasing the value of very low-latency trading data. At the

<sup>7</sup> According to the following press release, the European Parliament and the European Council reached an agreement on 14 January 2014: [http://europa.eu/rapid/press-release\\_MEMO-14-15\\_en.htm?locale=en](http://europa.eu/rapid/press-release_MEMO-14-15_en.htm?locale=en).

<sup>8</sup> The European Commission's MiFID directive, implementing regulations and other documents can be found at [http://ec.europa.eu/internal\\_market/securities/isd/mifid/index\\_en.htm](http://ec.europa.eu/internal_market/securities/isd/mifid/index_en.htm).

<sup>9</sup> Title II, Chapter 3, Articles 3, 5, 7, 9, 11 and 12.

same time, retail investors would probably not be able to take full advantage of low-latency direct feeds. Usually, the retail customer accesses market data via their broker, who displays market data from those markets covered by their best execution policy.

## 1.2 Objectives of this report

The market structure and value chain in which market data is produced and consumed is complex, making it challenging to assess the role of regulation. This report aims to provide an economic framework within which the pricing of market data services can be evaluated. To contribute to the regulatory debate, this report provides economic analysis of the following:

- the role of market data in the value chain for trading in European equities;
- the key economic characteristics of trade execution and market data services;
- the current pricing and costs to users of market data services in Europe, drawing comparisons with the prices and costs to users in the USA;
- the potential impact of different pricing schedules and cost recovery mechanisms on market outcomes. The report is written specifically in the context of European equity trading, and thus all statements refer to European equities unless otherwise specified.

## 1.3 Information sources

Oxera has gathered and analysed information from a number of sources, as follows.

- Interviews were held with various parties including data vendors, investors, brokerage firms, and stock exchanges and MTFs. These discussions were used to inform Oxera's understanding of the data needs and uses of different market participants, the interactions between different market participants seeking to consume or distribute market data, and general views of the potential role for regulation.
- Publicly available pricing schedules for trade execution and market data services provided by a selection of US and European trading venues were analysed to assess the costs of these services for different types of brokerage and fund management firms. The stylised user profiles in the analysis were informed by confidential information provided by the participating exchanges.
- Confidential information on revenues received from market data, trade execution and listing services was provided by the participating exchanges and analysed to further assess the current pricing of market data in Europe. This was combined with (publicly available) information on the volume and value of trading at each exchange in order to consider the effects of economies of scale.

## 1.4 Terminology

Throughout this report, the terminology below has been adopted.

- **Access fee:** this refers to the 'per-firm' market data licence fee, charged by some trading venues, for a firm wishing to license market data and distribute internally only. Where such access fees are charged, user and device fees are typically not.
- **Best bid and offer (BBO):** the lowest ask price and the highest bid price offered for a security.



- **Data aggregators (aggregators) and data vendors (vendors):** organisations that take market data from one or more trading venues and re-sell that information to data users. This service is often combined with an enhanced ability to analyse that information and to display information from more than one venue in an integrated manner.
- **(Market) depth:** bids and offers below BBO. Trading venues often offer different market data products that vary in the depth of market data provided.
- **Full order book:** the complete list of orders to buy or sell a particular security on a trading venue.
- **Last price:** price information on the last executed trade per instrument.
- **Latency:** the time delay with which the data is available to the data user. In terms of market data provision, 'low-latency' is commonly used to refer to speeds in the range of milliseconds or nanoseconds.
- **Level 1 data:** information on the BBO for each security as well as all executed trades.
- **Level 2 data:** as per level 1 data, but including market depth data to various degrees.
- **Multilateral trading facility (MTF):** MTFs provide similar or competing trading services to stock exchanges and can have similar structures, such as rulebooks and market surveillance departments, but do not have listing processes and cannot change the regulatory status of a security.
- **Post-trade data:** executed trades per security.
- **Pre-trade data:** quotes and orders per security. This can vary in depth from including only BBO to including various levels of market depth.
- **Regulated market (RM):** as defined by MiFID, this 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 a way that results in a contract, in respect of the financial instruments admitted to trading under its rules and/or systems, and which is authorised and functions regularly and in accordance with the provisions of Title III of Directive 2004/39/EC. One example is a stock exchange.
- **Trading venue:** an RM or MTF.

## 2 Economic analysis of the pricing of market data services

### 2.1 Role of market data in the trading of European equities

This section identifies the key economic characteristics of market data services, and provides a description of the value chain in which market data services are provided. Further detail is provided in Appendix 1.

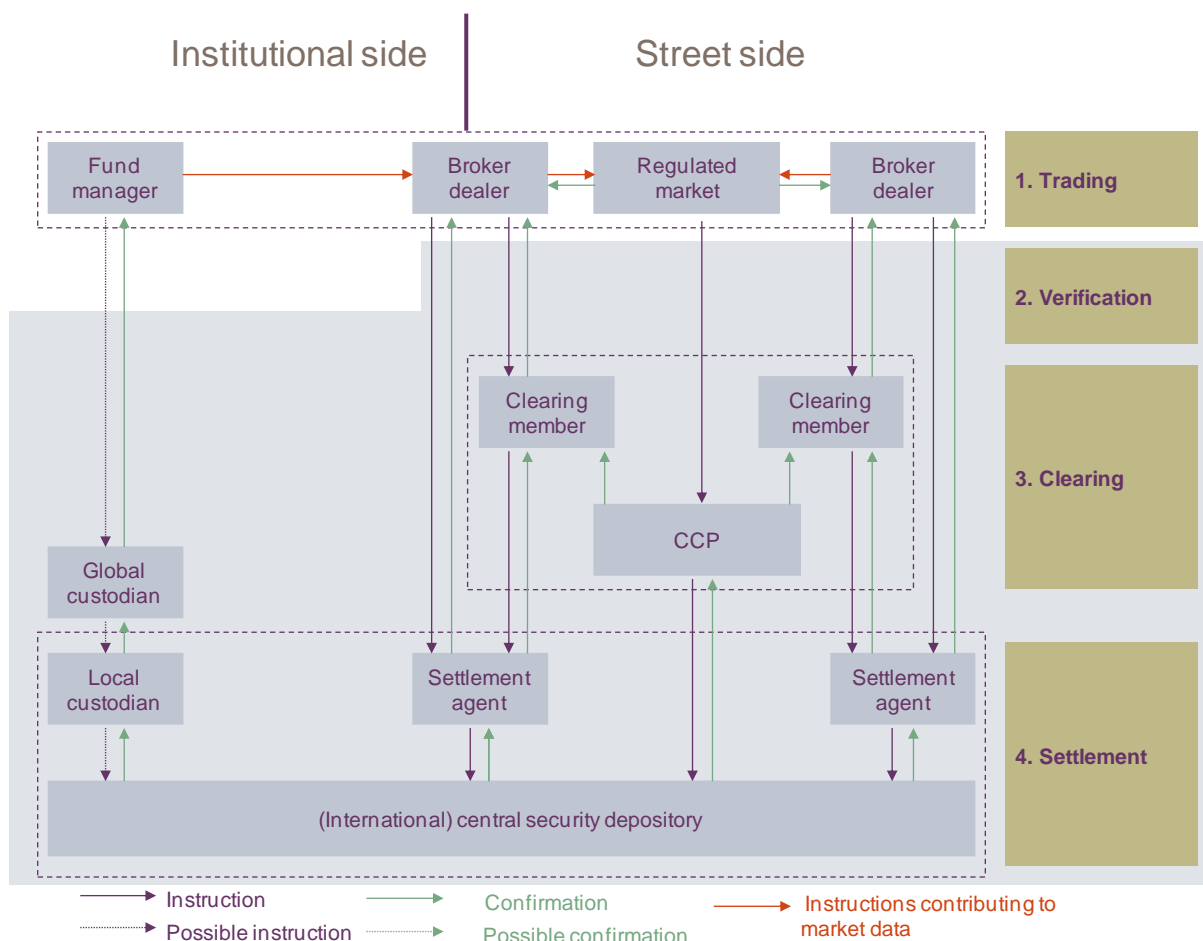
#### 2.1.1 Market data within the value chain for the trading of European equities

The production and licensing of exchange market data is part of a larger industry value chain that includes the trading of financial instruments such as European equities, which is the focus of this report.

The objective of the trading system is to provide an efficient mechanism to transfer the ownership of equities from one party to another. In order for this to take place, market participants require access to the data that is an output from the operation of the relevant trading venues. In few, if any, circumstances is the use (or consumption) of market data the end objective of those using/consuming that data. Consumption of market data is, therefore, an intermediary activity, or a means to an end, rather than an end in itself.

Figure 2.1 below illustrates the complex value chain for equity trading services, through which market data is jointly produced. Post-trading services, shaded in grey, are a further necessary component for the transfer of ownership of equities from one party to another. A further function of regulated markets, not included in Figure 2.1, are the listing and issuance services provided to companies seeking to raise finance.

**Figure 2.1 Trading and post-trading services**



Source: Adapted from Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', prepared for European Commission DG Internal Markets, available at: [http://ec.europa.eu/internal\\_market/financial-markets/docs/clearing/2011\\_oxera\\_study\\_en.pdf](http://ec.europa.eu/internal_market/financial-markets/docs/clearing/2011_oxera_study_en.pdf).

### 2.1.2 Information flows in the trading of European equities

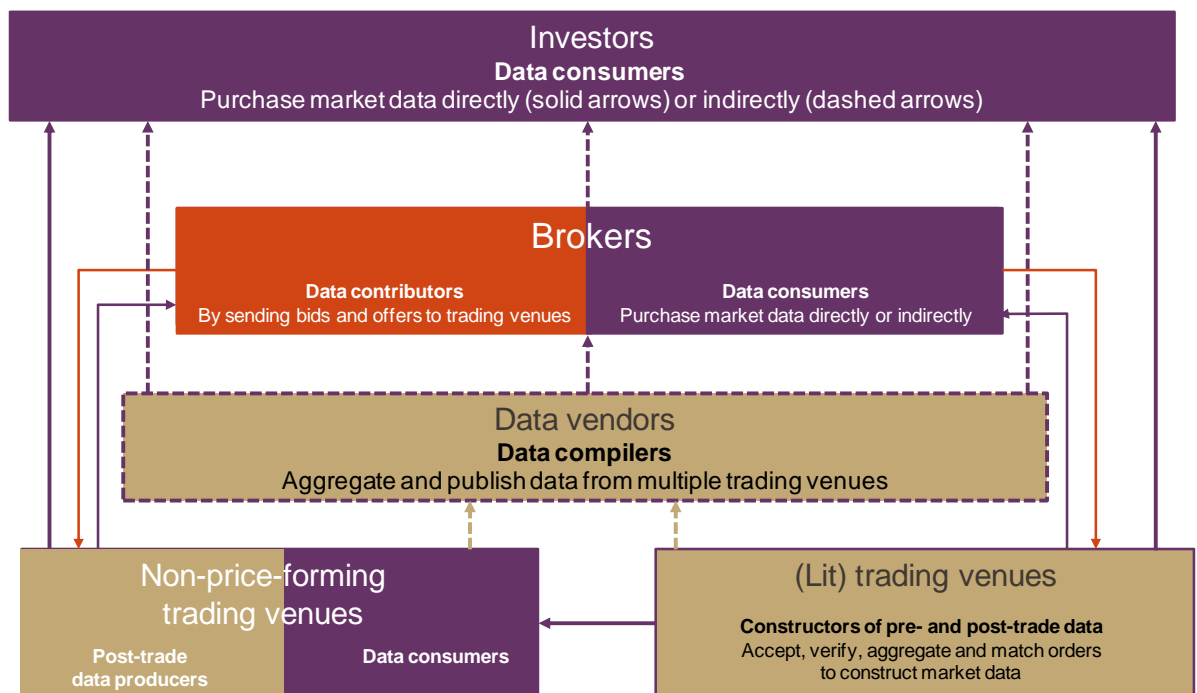
The production and consumption of market data across the trading value chain is complex. Figure 2.2 below sets out the main data flows in terms of the trading instructions sent by investors and brokers (red arrows and shading); the consumption of that data by investors, brokers and other market participants (purple arrows and shading); and the construction of market data by trading venues (through the provision of trade execution services, involving the confirmation and cleansing of bids and offers, matching of bids and offers, and market supervision and surveillance); and the further processing of market data by data vendors (brown shading).

The market data offered by trading venues is only one element in the value chain for market data. Other services include the value-added services offered by data vendors, software applications, and IT infrastructure costs. According to research in 2010,<sup>10</sup> expenditure on IT infrastructure costs (including telecommunications, hardware, network infrastructure and software) accounted for roughly the same amount as expenditure on exchange market data licence fees for sell-side and buy-side firms—exchange market data licence fees were estimated to account for 8% to 15% of customer market data expenditure; IT infrastructure was estimated to account for 10% to 16%; and data vendor services were estimated to account for the remaining 65% to 80%.

<sup>10</sup> Atradia (2010), 'The cost of access to real time pre & post-trade order book data in Europe', August, p. 21.

Market data is often complemented by other sources of information and data to which market participants may have different access, and which they may interpret in different ways. For example, investment decisions typically draw on a broad mix of information sources in addition to market data such as annual reports, financial statements and more general news services.

**Figure 2.2 Information flows in the trading of European equities**



Source: Oxera.

As explained above, there is significant variation in the use of market data by market participants. Based on Oxera’s interviews with various parties, the main entities producing and/or consuming market data—and their rationale for doing so—can be summarised as follows.

- **End-investors (‘long-term’)**: end-investors with (relatively) long holding periods, such as pension funds, and their agents (eg, fund managers), typically consume market data in the form of transaction data relating to the (execution) price and, possibly, volume. Immediate access (ie, within seconds) to current data is unimportant for most long-term investors. Non-trading data (eg, information about the fundamental characteristics of the entity being invested in) is also likely to be important. Although their actions do not produce market data directly, the instructions that they send to brokers underpin the bids/offers that contribute to market data.
- **End-investors (‘short-term’)**: investors with more emphasis on short-term trading strategies (eg, hedge funds) are likely to need access to more immediate transaction data. As the trading time horizon shortens, the minimum profitable price movement falls, all else being equal.<sup>11</sup> The short-term volatility of prices (ie, minute to minute, second to second, and much shorter time periods) observed in the market is, therefore, more important in successful trading strategies executed over a short term than in those executed over a longer time period. This means that the value of access to immediate market data will be higher for this group than for long-term investors. As with long-term

<sup>11</sup> As one of the costs of investing is the time cost of capital, the absolute value of profit required to deliver a particular rate of return reduces the quicker that profit can be generated. With no transaction or other costs, buying at 100 and selling at 101 makes an annual return on capital of 240% if it is done every working day, but only 2% if it is undertaken only every six months.

investors, unless this group has direct market access to trading venues it is unlikely that their trading decisions contribute to the production of market data directly. Rather, the instructions they send to brokers underpin the bids/offers that contribute to market data.

- **Brokers:** long-term and, often, short-term investors will interact with a trading venue through one or more agency brokers. The broker takes instructions from the investor (or fund manager) and translates these into instructions and messages (bids, offers and cancellations) to be sent to the venue. This submission of bids, offers and cancellations by brokers to trading venues contributes to the production of market data.

Brokers in Europe have an obligation to provide clients with a ‘best execution’ policy, an important element of which can be achieving the best possible trade price (lowest, if buying; highest, if selling).<sup>12</sup> Short-term price fluctuations, and knowledge about the availability and volume of counterparties’ offers, affect the broker’s ability to achieve the best price. This means that not only is immediate market data valuable from a commercial perspective, but immediate market data from (and membership at) multiple trading venues can also be important from a regulatory point of view. Within the EU, except at London Stock Exchange, registered traders at a trading venue can access the trading venue’s market data direct from the trading venue, free of licence fees.

- **Principal traders and market makers:** the provision of services that involve traders being counterparties to investors will generally involve short holding periods (or, in the case of high-frequency traders, very short holding periods). In light of the short-term price volatility, immediate access to market data is important to the economics of their activities. In addition, access to market data (and, indeed, non-market data) that allows participants to make successful predictions in relation to short-term price movements enables short- and very short-term trading strategies to be successful. The limited nature of the availability for any particular transaction at a particular (good) price makes the relative time delay between the supply of market data and the receipt of that data by a user also important.<sup>13</sup> That is, because an order or bid can be filled only once, delayed information can be of less use as, by the time the information is received, the trading opportunity may have passed. The economic value of market data may, therefore, depend on the speed at which it can be obtained and processed relative to the speed at which those competing for the same transaction can obtain and transact it, and being the fastest can have a significant economic value.<sup>14</sup>

Like brokers, those sending bid, offer and cancellation messages to the trading venue are contributing to the production of market data.

- **Trading venues:** through the provision of trade execution services, trading venues construct post-trade market data and, in the case of lit trading venues (those with observable price formation), pre-trade market data.
- The process of producing market data is as follows:
  - orders and quotes are submitted by (or under the sponsorship of) registered traders under the rules of the trading venue;
  - trading instructions are accepted in the form of orders (usually detailing price, volume and other characteristics);

<sup>12</sup> Other elements of best execution in Europe may include minimising the total cost of execution (including post-trading fees), likelihood of execution and time of execution.

<sup>13</sup> The speed with which the recipient can process the data and implement a decision based on that information also affects the value of the information received.

<sup>14</sup> For a description of high-frequency traders (HFT) and high-frequency trading strategies, see Oxera (2012), ‘What is the Economic Impact of the MiFID Rules aimed at Regulating High-Frequency Trading?’, available at: <http://www.bis.gov.uk/assets/foresight/docs/computer-trading/12-1080-eia21-economic-impact-mifid-rules-high-frequency-trading.pdf>.

- order data is organised, disseminated and displayed to trading participants;
  - order data is matched under the rules of the venue by its matching algorithm and under market surveillance;
  - the anonymised data of the resulting trades is published to the market;
  - personal and enriched data may also be provided to regulators for surveillance purposes, and to post-trade service providers for clearing and settlement purposes.
- **Data aggregators and vendors:** an additional economic activity exists in the aggregation of information from different trading venues into formats that provide enhanced ease of use for market data users—for example, via a vendor terminal or a trader’s front end trading system. In addition, data vendors and independent software vendors (ISVs) may incorporate non-market transaction data (eg, news) into the services they sell and/or additional analytical tools. The services offered by data vendors and ISVs provide market data users with choice over the format and scope of information they wish to receive. In addition to providing consolidated data direct to data users, some vendors also sub-vend consolidated data to smaller vendors to display to their customers.
  - **Non-price-forming trading venues and off-exchange trading:** market data provides a reference price that can be used by other trading venues as an input to the trade execution service they provide (or by traders trading off-exchange). Where a venue is not, itself, price-forming, the reference price is a necessary input to the provision of their trade execution service. The value of immediate data is, therefore, very high for this group.

A number of other individuals and institutions interested in market data are not included in Figure 2.2. From a public policy perspective, companies seeking capital and considering issuance are perhaps most important. Such companies require information on the prevailing stock price and the volatility of stock prices, to establish the potential capital to raise from issuance, for which post-trade information is commonly sufficient.

### 2.1.3 Different types of market data

An end-user can choose between several types of data and product, and whether they purchase the data directly from trading venues (usually reducing latency) or indirectly via data vendors or brokers (which may also provide analysis software, and combine market data from multiple trading venues but adding latency).<sup>15</sup>

The dimensions along which market data products can vary include the following.

- **Depth**—ie, how much information about demand and supply of a particular stock is included in the data product.

The first distinction in terms of depth is between pre-trade data and post-trade data. The former provides information on execution prices and volumes, while the latter includes information on unfilled quotes and orders. Trading venues often provide multiple pre-trade data products that vary in the volume of bids and offers for a particular stock available at a particular time that information is being provided for. Level 1 data products commonly provide information on the last execution price and the BBO available, while level 2 data products also provide information on bids and offers lower down the order book.

- The **speed** at which data is received by the market data recipient.

<sup>15</sup> Legally speaking, the brokers do not purchase market data but purchase a licence to use the market data. In this report, this is referred to as brokers purchasing market data.

‘Delayed’ data refers to data that is published 15 minutes or more after the publication of the transaction. In line with the MiFID guidelines discussed in sections 1.1 and 5.1, this data is normally provided free of charge by trading venues. Real-time data usually requires payment of data licence fees and can be subdivided into the ‘standard’ real-time product (which is fast enough for a human user to experience it as real-time) and ‘low-latency’ connections. The latter are more bespoke and can involve on-site computer location to achieve connections with low millisecond or even micro-second speeds.

- **Coverage** of the number and types of stocks or asset classes captured in the data product.

Market data can be consolidated (or split) in a number of ways, including consolidating information on all equities traded on a trading venue versus splitting out stocks according to (for example) market or listing rules; consolidating market data provided by different trading venues (for example, as provided in Europe by data vendors or via the consolidated tape administrators in the USA); and consolidating across different asset classes (eg, equity and exchange-traded fund data are often provided together by European stock exchanges).

Endogenous to the decision about the data product is the choice of provider. One advantage of purchasing data directly from trading venues can be the speed of delivery, and an advantage of purchasing data indirectly from data vendors can be the consolidation of market data from multiple venues within one analytical interface.

In addition to commercial data products, trading venues also provide surveillance data that is able to identify participants and analyse trading behaviour. This is used internally and by regulators for regulatory and surveillance purposes only. The confidential nature of the information included in such data, such as trader ID information, means that it is not suitable for public dissemination.

#### 2.1.4 Data requirements for different users

Table 2.1 below summarises the typical data requirements of the different market data users, based on the views expressed by market participants, data vendors and data providers who were interviewed during the course of the study.

Depending on the price of data products, some users may, of course, choose to purchase data offering a greater level of detail or coverage than strictly required. For example, since exchanges offer substantial discounts on pre-trade data to retail investors, some may choose to purchase level 1 or level 2 data rather than rely on delayed data that is (generally) free. For example, Euronext offers level 1 and level 2 data to non-professional users for the same price of €1 per user.

Data licensed from a trading venue is not always used to inform trading on that particular platform. For example, a trader on BATS Chi-X Europe may use London Stock Exchange data feeds to inform their strategy when buying and selling, even when the trader does not use the London Stock Exchange platform for trade execution.

**Table 2.1 Typical data requirements for different users**

User		Purpose (use) of data	Type of data required
Trader—broker, prop trader, HFT, etc	Front office	To execute trades	Real-time (often low-latency) level 2 <sup>1</sup>
	Middle office	Risk, credit and strategy management, including forecasts and some modelling	Generally delayed or real-time level 1, but some activities (eg, testing strategies) can require level 2
	Back office	To monitor and administer settlement and clearing obligations, regulatory compliance (including evaluation of best execution), and reconciliation of trades	Delayed
Market maker		Observing the liquidity and depth in the market to fulfil quoting obligations, generate prices and calculate risk	Real-time (often low-latency) level 2 <sup>1</sup>
Fund manager		Research and strategy, including forecasts and modelling, assessment of brokers and other service providers	Dependent on individual manager. Often, delayed data is sufficient. Some managers may choose to receive real-time data at level 1 or 2 according to their strategy
Retail investor		To assess investment prospects and strategy	Dependent on individual investor. Often post-trade is sufficient
Issuer		To form a correct pricing and demand estimation at issuance; to assess listing venues	Delayed post-trade
Competitor trading venue (MTF, organised trading facility, Dark Pool, Systematic Internaliser)		To inform traders/market makers of pricing on other venues	Real-time level 1 or level 2
		To provide a reference price when the venue does not have its own price discovery mechanism	
		To provide order pegging services—ie, where a trader enters an order that does not contain a price, but the instruction to execute only at a price better than available on other venues	
Indexing (CDS, benchmarks)		To analyse and group companies' risk profiles to form CDS indexes or to form and manage an index	Real-time level 1 or level 2
Market surveillance, regulators and governments		Identify illegal behaviour of participants	Non-public, private information (including Member ID per trade). Not part of the MiFID commercial requirements
Other research/academic		To model markets and market mechanisms, and investigate specific relationships between economic variables	Historical data

Note: <sup>1</sup> At several European stock exchanges, registered members of the exchange are entitled to free data for trading on the exchange.

Source: Oxera analysis, based on views expressed by market participants, data vendors and data providers.

## 2.2 Economic framework to assess the pricing of market data services

This section summarises some of the key economic characteristics of the value chain for market data, in particular the role of market data within the broader context of the trading of



European equities, to identify the implications for an economic analysis of the pricing of market data services.

### **2.2.1 Key economic characteristics of market data services**

As set out in section 2.1, the licensing of market data is only one part of a more complex industry that exists to enable companies to raise finance and investors to earn a return on their capital—ie, the European capital markets.

Many consumers of market data are market intermediaries of some sort, and for most of them their main objective is to participate in trading/transactions. As intermediaries, their costs of operation will need to be covered if they are to remain in business and, either directly or indirectly, these costs will have to be (largely) recovered from end-investors and paid out of the returns available to those end-investors.

In addition to often being consumed in combination with trade execution services, market data is produced as part of the trade execution process—a process with high fixed costs, low marginal costs and significant economies of scale.

Exchanges, MTFs and other trading venues have a number of mechanisms by which they can recover their costs (as do other intermediaries in the value chain). In particular, they provide a number of services that are potentially valuable to their customers (and hence will provide a means of raising revenue), including trade execution and market data.

Another characteristic of market data is that different market participants often have very different valuations of what is essentially the same information. For example, a trader wishing to execute a large order in a particular stock will value real-time information on the current depth of liquidity for such a stock across a number of trading venues more highly than a fund manager in the process of developing a long-term investment strategy, or a back-office department tasked with reconciling trades, orders and instructions for which post-trade information may be sufficient.

Market data, like all (digital) information, is also non-rivalrous in consumption. In comparison to (for example) ice cream, one person's consumption of market data does not stop someone else from consuming the same information.<sup>16</sup>

### **2.2.2 Implications for an economic efficiency assessment**

The key economic characteristics of market data services, as identified above, have a number of implications.

First, the recovery of costs by a trading venue cannot be assessed effectively by the independent analysis of either trading services or data services. Given the general structure of electronic order books and electronic order matching, it is not possible to provide transaction services without generating market (transaction) data, and it is not possible to generate transaction or bid and offer data without also supplying a transaction service. From an economic perspective, trade execution and market data are joint products and this means that the appropriate frame of reference for the economically efficient recovery of trading venues' costs is at the level of combined transaction revenues and data revenues.

In turn, this means that the economic characteristics of the production of the trade execution service itself is also relevant. Trading venues are characterised by high fixed costs and low marginal costs, and significant economies of scale (see Appendix 2).

<sup>16</sup> However, the economic use of trading data, unlike other types of information, is often limited—this is because the information relates to something that itself has a limited supply. For example, for many purposes, market data on the price and volume of an offer to sell or buy a particular security reduces in value once the offer has been removed or met.

The implication is that the pure competitive outcome—where prices are set at forward looking marginal costs—may not be economically efficient. First, marginal cost pricing would not be sufficient to recover the total cost of production, and therefore trading venues would exit the market. Second, charging the same price to all customers does not account for the different needs and valuations that different types of customers may have.

The next section analyses the way trading venues in Europe currently recover their costs through fees for both trade execution and market data services, and assesses the implications of the current recovery mechanisms for the functioning of the equity markets, and their impact on end-investors.

## 3 Analysis of the current pattern of cost recovery

This section analyses the current pattern of recovery of costs by trading venues through fees for market data services and fees for trade execution services, on the basis of a number of metrics:

- the fees paid by brokers to license market data services compared with the fees incurred for trade execution services. These calculations are based on an analysis of the pricing schedules of various European exchanges (section 3.1);
- the revenues from market data services as a proportion of combined revenues from market data and trade execution services. These calculations are based on data collected from the participating exchanges and annual reports, and include both European and US markets (section 3.1);
- market data per-user and per-subscriber licence fees, drawing comparisons between fees in Europe and the USA (section 3.2);
- the revenues from market data services as a proportion of combined revenues from market data and trade execution services *over time*, based on an analysis of revenue data and an analysis of fee schedules (section 3.3);
- market data costs as a proportion of the total costs of providing trade execution services (section 3.4).

### 3.1 The brokers' perspective: exchange market data fees as a proportion of trade execution and market data fees

Most trading venues around the world recover their costs through both trading fees and data licence fees and, if relevant, fees for listing and post-trade services. These fees can be applied on a variable basis (eg, transaction services often attract a fee per transaction or a fee according to the value of the transaction), or on a fixed basis (eg, brokerage firms are often charged monthly or annual membership fees to access the trading services). An exception to this pattern is seen particularly in the process of market entry by new trading venues (for example, the entry of BATS and Chi-X in Europe, and BATS in the USA, where proprietary market data services were initially offered for free).<sup>17</sup>

The costs of market data and trade execution services to brokers can be measured based on a user-profile analysis (section 3.1.1) and revenues received by trading venues (section 3.1.2).

#### 3.1.1 User-profile analysis

To analyse the pattern of cost recovery, a user-profile approach can be used, in which illustrative user profiles (in relation to both trade execution and market data services) are designed and subsequently applied to the pricing schedules of different trading venues to give an estimate of the total charges that each user pays.<sup>18</sup>

<sup>17</sup> As reported by Inside Market Data (2013), 'BATS Takes Swing at US Market Data Access Fees', April 19th, available at: <http://www.waterstechnology.com/inside-market-data/news/2262915/bats-takes-swing-at-us-market-data-access-fees>, accessed October 18th 2013. Since entry, BATS has received revenues for market data contributed to the US consolidated tapes.

<sup>18</sup> This is a standard approach for estimating the costs of services when the costs incurred depend on the profile of the user, and has been used by Oxera and infrastructure providers in studies of securities trading and post-trading, as well as in studies in other sectors. See, for example, Oxera (2013), 'The Oxera Trading and Post-trading Monitor', note prepared for ASX Group,

Table 3.1 below describes six stylised profiles of brokerage firms active in the European equities market, for which the relative and absolute amount paid in membership, trading and market data licence fees to various European and US trading venues is presented in Figures 3.1–3.4 below.

The average transaction size on SIX Swiss Exchange is considerably higher than on other European stock markets, at about €16,000 in 2012 compared to around €8,000 elsewhere. As SIX Swiss Exchange imposes a minimum fee per transaction, which binds for transactions smaller in value than around €13,000 and €17,000 (according to the monthly value of transactions undertaken by the broker), the analysis presented for SIX Swiss Exchange in Figures 3.1–3.4 below represents the fees paid by brokers, assuming an average trade size of €16,000. This adjustment has been adopted to generate results for SIX Swiss Exchange that are more representative of the fees paid by brokers in this market, as observed from revenue data provided by SIX Swiss Exchange. All other user characteristics are as set out in Table 3.1.<sup>19</sup>

**Table 3.1 Summary of stylised user profiles active in the European equities market**

	'Very active' brokerage firm			'Mid-active' brokerage firm		
Average trade size	€8,000			€8,000		
Number of trades a year	12,500,000			250,000		
Number of level 2 data user licences in a typical month <sup>1</sup>	1,000	650	500	45	25	15

Note: <sup>1</sup> The number of level 2 data user licences purchased in a typical month has been informed by considering total fees paid for data licences by the top 20 brokers at the participating exchanges, and therefore also includes other data products licensed for the local market.

Source: Oxera analysis of confidential information on the top 20 brokerage firms (by trading volumes), provided by participating exchanges. Brokerage firms trading European equities are a heterogeneous group. These profiles have been informed by confidential data provided by the participating exchanges for a random selection of their top 20 brokers (by trading volumes), with information on the top ten brokers informing the 'very active' profile, and information on the next ten informing the 'mid-active' profile. These profiles should be considered illustrative rather than directly representative, as the core ratio for this analysis (the number of data terminals paid for relative to trading activity) varies widely between different firms and within firms (eg, for different markets) according to their trading strategies and middle office data needs. The range of market data use considered in this analysis has been selected to cover the majority of brokers active within the markets operated by the participating exchanges, but is not intended to be comprehensive.

Figures 3.1 and 3.2 show that there is considerable variation in both trade execution fees and market data fees between different trading venues, with the US trading venues typically offering lower fees than trading venues in Europe. In terms of market data fees, since this analysis does not take into account the cost of purchasing the consolidated tape, total market data costs incurred by brokers may be understated in the USA compared with the EU. Under RegNMS, the consolidated tapes are necessary inputs for any broker who is dealing in NYSE-, Nasdaq- or AMEX-listed equities regardless of whether Level 2 market data products covering the same markets are also purchased. As brokers in Europe are not required to license market data from multiple venues, in both absolute and relative terms, total market data costs incurred by brokers may be understated in the USA compared with the EU.

April; Oxera (2012), 'What would be the costs and benefits of changing the competitive structure of the market for trading and post-trading services in Brazil?', Prepared for Comissão de Valores Mobiliários, June; Oxera (2010), 'Costs of securities trading and post-trading—UK equities', prepared for Euroclear, February 26th; and EuroCCP (2008), 'The Clearing Industry in Europe: Cost Comparison'. For an example of the user-profile approach outside the area of securities trading and post-trading, see Oxera (2006), 'The price of banking: an international comparison—a study prepared for the British Bankers' Association', November.

<sup>19</sup> The average transaction size on Deutsche Börse is around €12,000 and Deutsche Börse also imposes a minimum fee. However the results of the user profile analysis for Deutsche Börse presented in Figures 3.1–3.4 are robust to this smaller change in average transaction size.

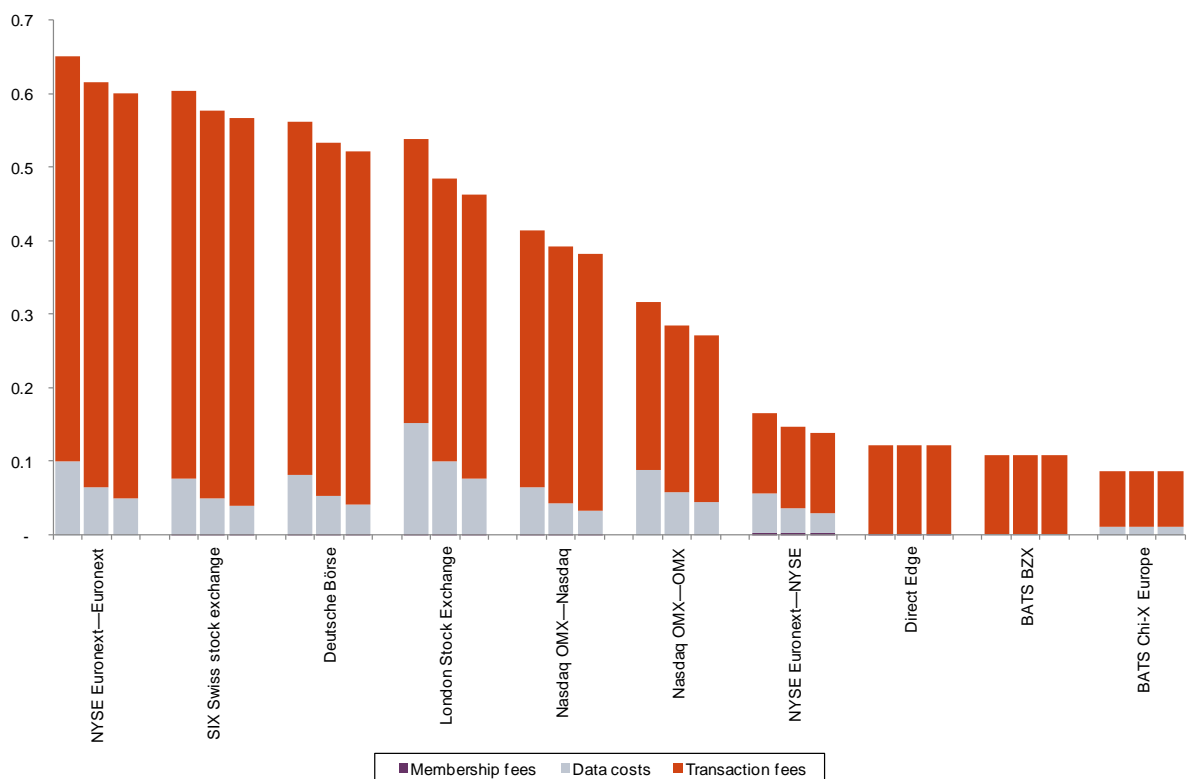
In terms of market data licence fees, as shown in Figure 3.1, large brokers generally pay exchanges between 0.05bp and 0.15bp (of their value of trading) in market data licence fees, compared to between 0.08bp and 0.55bp on trade execution fees and less than 0.01bp on membership fees. Or, as shown in Figure 3.2, market data fees are usually in the range of 10% to 30% of total fees paid to exchanges for trade execution and market data services.

The analysis of the ‘mid-active’ broker presented in Figures 3.3 and 3.4 shows much more variation in both trade execution fees and data fees paid to different exchanges. At some exchanges on both sides of the Atlantic, for this activity of trading (250,000 trades a year, equivalent to an annual value of trading of €2 billion), data fees can account for more than 30% of trade execution, membership and market data fees combined. This is not surprising given the fixed-cost nature of market data fees: the relative importance (but not absolute level) of data fees increases for brokers executing fewer trades. This is particularly evident for trading venues that charge on a per-firm rather than a per-user or per-device basis, for example, BATS Global Markets, Direct Edge and Bats Chi-X Europe.

In sum, market data costs as a proportion of total costs (in relation to trade execution and market data services) clearly vary and will depend on the profile and needs of the individual broker. Generally speaking, large brokers will pay a lower unit price for market data services than medium brokers—however, due to the very substantial discounts often available to retail investors, retail investors typically pay a much lower unit price for market data services than institutional investors.

The next section looks at the *average* ratio of market data costs to total costs (ie, in relation to trade execution and market data services) across the market, based on revenue data from exchanges.

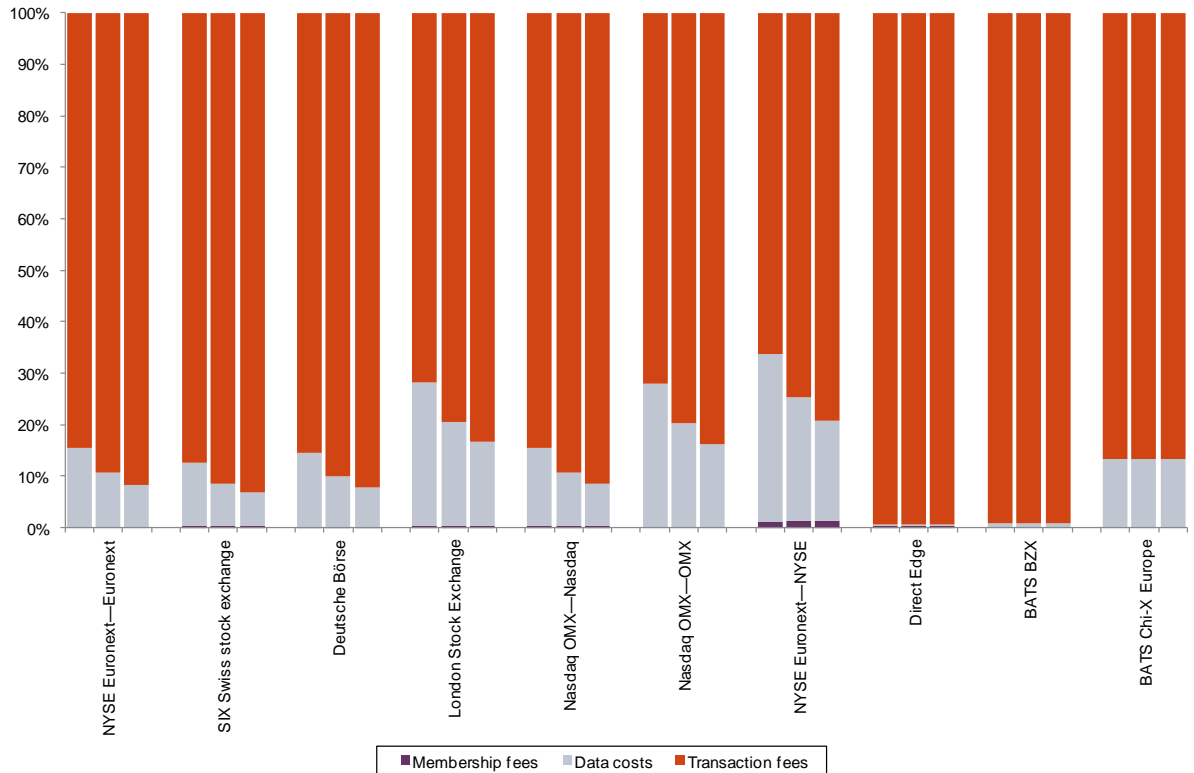
**Figure 3.1 Membership, trading and data licence fees as a proportion of transaction value, for an illustrative ‘very active’ brokerage firm (basis points)**



Note: The three columns presented for each stock exchange represent the fees paid by the ‘very active’ brokerage firm with decreasing data needs. The first column corresponds to the first profile in Table 3.1, in which the firm is assumed to purchase 1,000 level 2 data user subscriptions a month; the second column corresponds to 650 level 2 data user subscriptions a month; and the third column corresponds to 500 level 2 data user

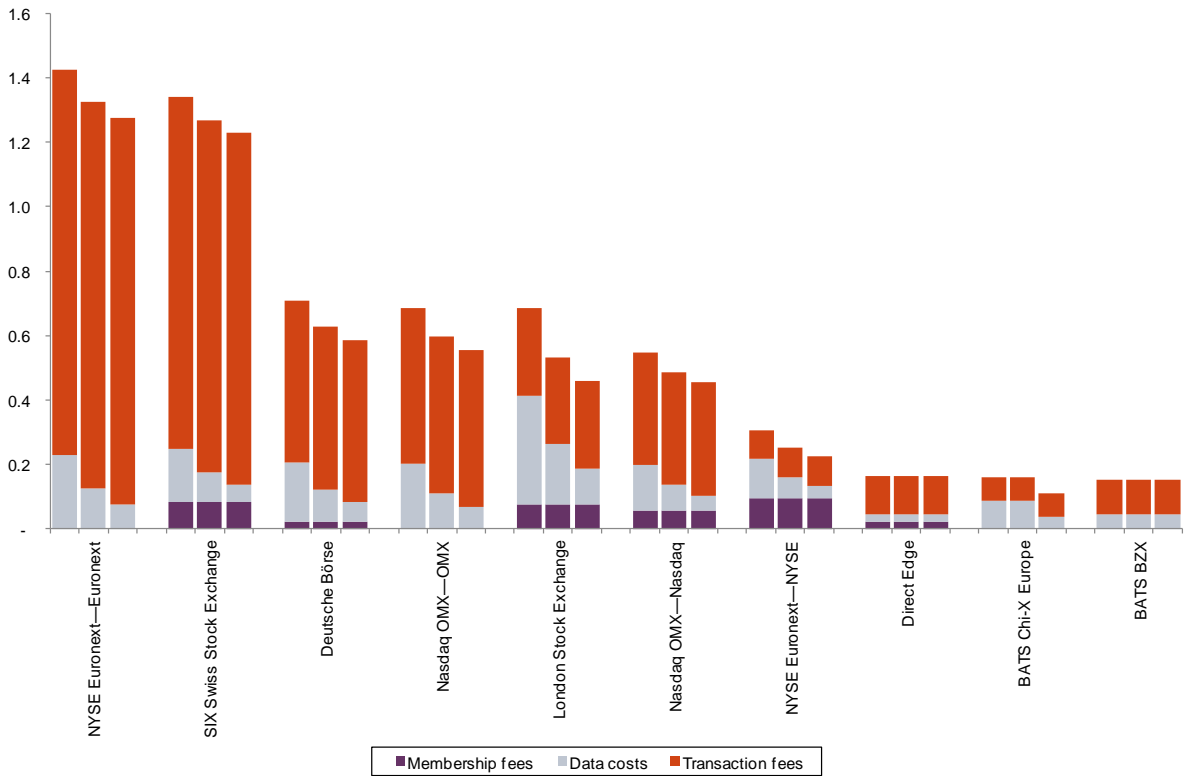
subscriptions a month. Market data fees are based on the per-user or per-device fees charged. Transaction fees include fees charged on a per-transaction or per-value-of-a-transaction basis. Fees paid are estimated for a typical month, such that annual membership and access fees are divided by 12, and trading fees are calculated assuming there are 21 trading days per month. For Deutsche Börse, a market data product that offers BBO 10 is used. For all the other exchanges a full order book product is used.  
 Source: Oxera analysis of stock exchange pricing schedules.

**Figure 3.2 Relative amounts spent on membership, trading and data licence fees, for an illustrative ‘very active’ institutional brokerage firm**



Note: See note to Figure 3.1.  
 Source: Oxera analysis of stock exchange pricing schedules.

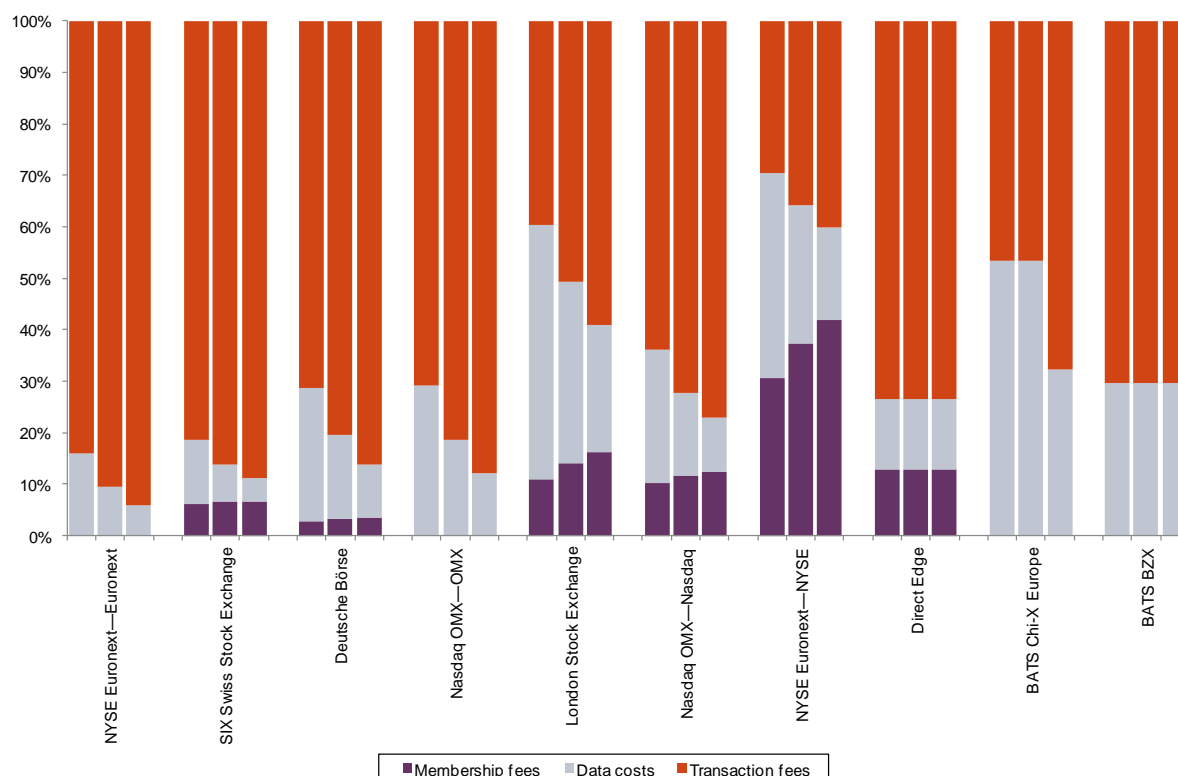
**Figure 3.3 Membership, trading and data licence fees as a proportion of transaction value, for an illustrative ‘mid-active’ brokerage firm (basis points)**



Note: The three columns presented for each stock exchange represent the fees paid by the ‘mid-active’ brokerage firm with decreasing data needs. The first column corresponds to the fourth profile in Table 3.1, in which the firm is assumed to purchase 45 level 2 data user subscriptions a month; the second column corresponds to 25 level 2 data user subscriptions a month; and the third column corresponds to 15 level 2 data user subscriptions a month. For other notes, see note to Figure 3.1.

Source: Oxera analysis of stock exchange pricing schedules.

**Figure 3.4 Relative amounts spent on membership, trading and data licence fees, for an illustrative ‘mid-active’ brokerage firm**



Note: See note to Figure 3.3.

Source: Oxera analysis of stock exchange pricing schedules.

### 3.1.2 Relationship between market data service revenue and trade execution service revenue

Table 3.2 sets out the relationship between revenues generated directly from trading services and revenue from the provision of market data services for a number of large US and European trading venues, based on data collected from the participating exchanges. It shows that revenues from market data services account for between 15% and 35% of total revenues (where total revenues is the sum of revenues from data services and trade execution services).

**Table 3.2 Relationship between market data service revenue and trade execution service revenue (2012)**

Trading venue	Market data revenues as a proportion of total revenues (ie, market data and trade execution revenues)
Deutsche Börse	35%
Nasdaq OMX—OMX market	28%
NYSE Euronext—Euronext market	20%
SIX Swiss Exchange	19%
Nasdaq OMX—Nasdaq market	23–29%
NYSE Euronext—NYSE market	14%

Note: The US exchanges are highlighted by shading. The market data revenues reported focus on the revenues from the sale of equity market data, and in general exclude revenues from technology services, index licensing, sales of non-equity data products, and the sales of news and other non-market data-type information. In the case of SIX Swiss Exchange and Deutsche Börse (where equity, ETFs and fixed income market data are sold as an overall cash market product) and Nasdaq OMX (where revenue data was sourced from the annual report), market data revenues include revenues from the sales of non-equity data products. Trade execution revenues include trading fees and membership fees and are net of transaction-based rebates (eg, where the trading venue offers



rebates to liquidity providers). In the case of SIX Swiss Exchange, Deutsche Börse and Nasdaq OMX, where market data revenues include revenues from non-equity data sales, transaction revenues from the relevant asset classes were also included.

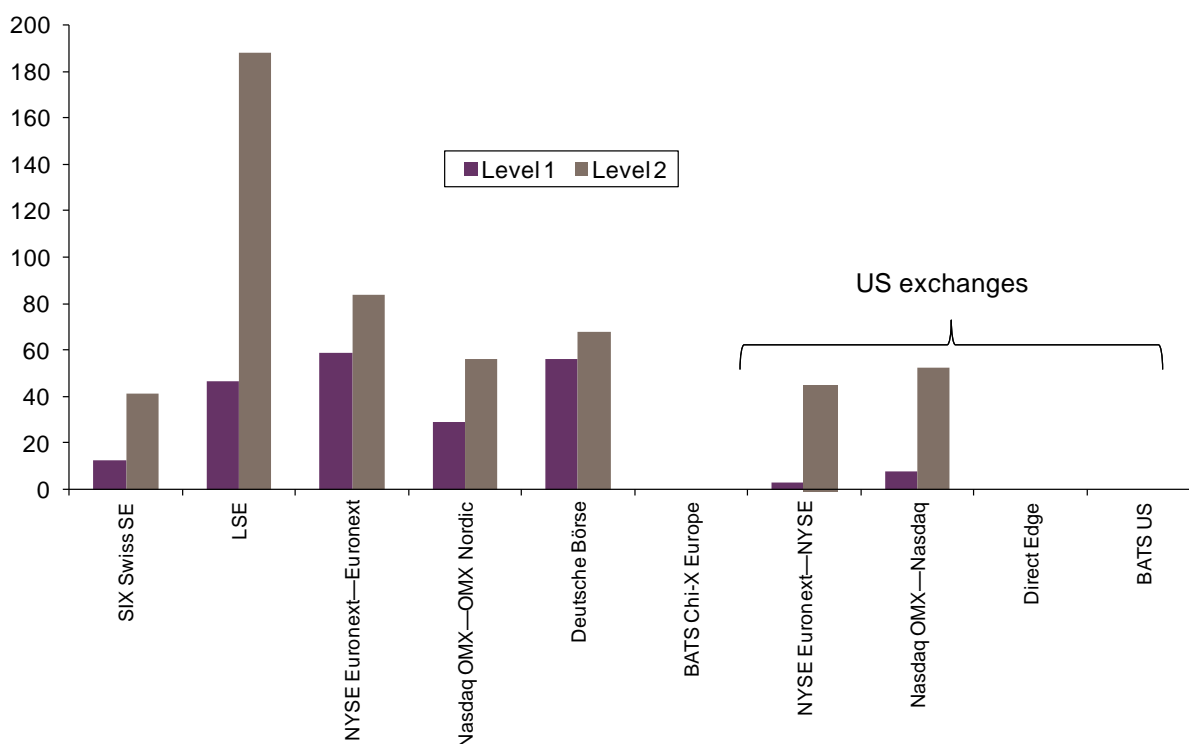
Source: For the following exchanges, market data revenues and trade execution revenues were provided directly by the exchange and verified against annual reports: Deutsche Börse, NYSE Euronext and SIX Swiss Exchange. Data for Nasdaq OMX was sourced from annual reports.

## 3.2 Comparing the EU with the USA—economies of scale

When expressed in *absolute* amounts, another pattern is clear—European trading venues are typically more expensive for both trading services and data services. This is shown in Figures 3.1 and 3.3, which order the exchanges according to total fees paid by brokers—only BATS Chi-X Europe falls within the range of fees charged by US exchanges.

Figure 3.5 below sets out the licence user (device) fees for a selection of European and US exchanges' level 1 and level 2 market data products, further illustrating the difference in licence fees between the USA and the EU. This finding is not particularly surprising, given the economies of scale present in trading venue operation (see Appendix 2).

**Figure 3.5 User (device) fees for direct licensing of level 1 and level 2 products (€)**



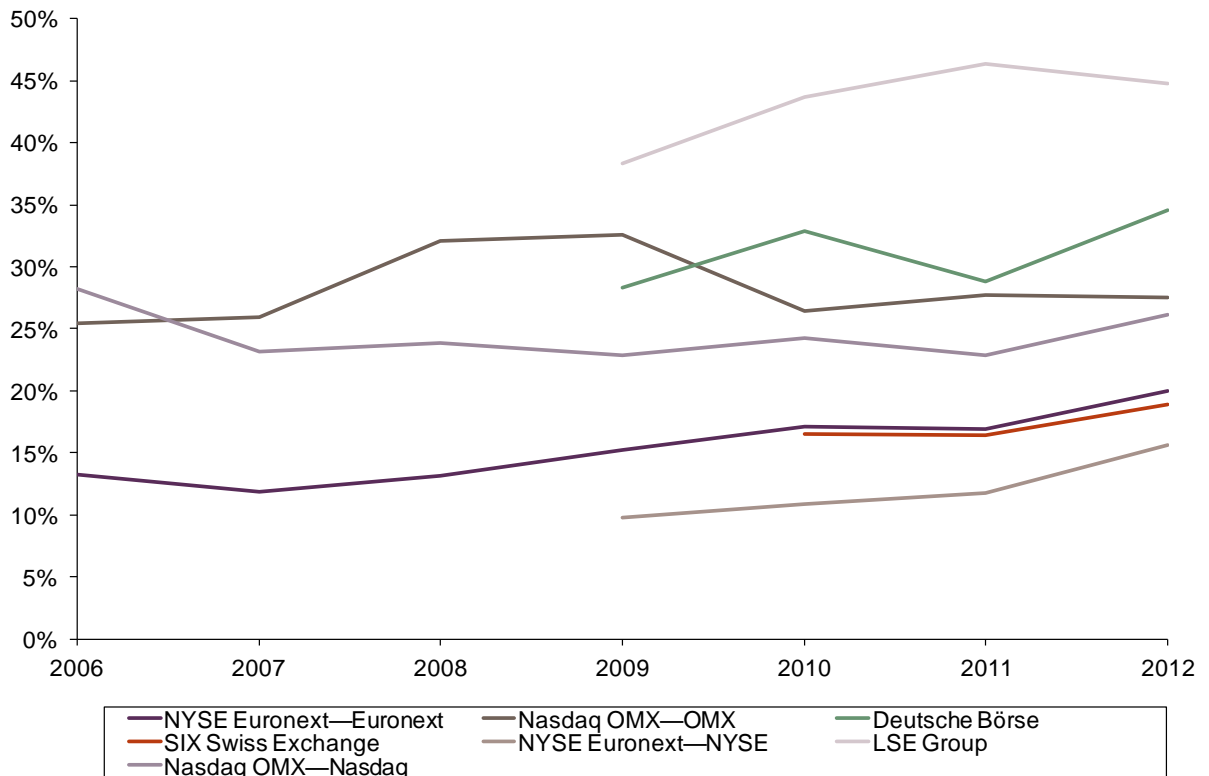
Note: The level 1 product includes the BBO. The level 2 product includes the best ten bids and offers. NYSE Euronext and London Stock Exchange currently do not offer a level 2 product as defined here (BBO 10), so the fee for the full order book product is used instead. For Nasdaq OMX—Nasdaq, the full order book product (Nasdaq Totalview) is used, as the level 2 product is market maker prices only. For SIX Swiss Exchange and Deutsche Börse, the fees reflect the fees for the overall cash market data products. The licence fees reported are as charged for non-members for local equities data. For the following exchanges, the chart depicts the per-user fee: SIX Swiss Exchange, NYSE Euronext—Euronext, and NYSE Euronext—NYSE; and for London Stock Exchange and Deutsche Börse the chart depicts the per-device fees. Nasdaq OMX charges on a per-subscriber basis. Data access fees are not included and are charged by the following exchanges as follows: Direct Edge (€375 for level 2 data), and BATS US (€750 for level 2 data). For BATS Chi-X Europe, access fees increase with the number of users in a firm, from €149 to €9,545 for level 2 data.

Source: Oxera analysis of the most recent available stock exchange pricing schedules.

### 3.3 Revenues from market data services over time

Figure 3.6 presents the revenues earned from market data services as a proportion of combined revenues from market data and trading services (including membership and access fees). This shows that, over the last four to seven years in both the USA and Europe, market data revenue has been between around 10% and 45% of trading and market data revenues combined. This is consistent with previous research on market data revenues in the USA, which found that, in 2004, market data revenues constituted 10% to 20% of total revenues (ie, more than just trading and market data revenues combined) for US exchanges.<sup>20</sup>

**Figure 3.6 Proportion of trading and market data revenue attributed to market data revenues**



Note: For the following exchanges, market data revenues and trade execution revenues were provided directly by the exchange: Deutsche Börse, NYSE Euronext, and SIX Swiss Exchange. Data for Nasdaq OMX and London Stock Exchange Group, which includes London Stock Exchange and Borsa Italiana, has been sourced from their annual reports and, in the case of Nasdaq OMX, includes revenues from derivative trade execution services and market data.

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

Figures 3.7–3.9 summarise how licence fees for different types of market data products have changed since 2005, and show that, in general, fees have not increased significantly (particularly once inflation is taken into account). Faster or more detailed market data products have been introduced for which higher fees are charged, and this may have resulted in an increase in costs to some brokers and/or other data users.

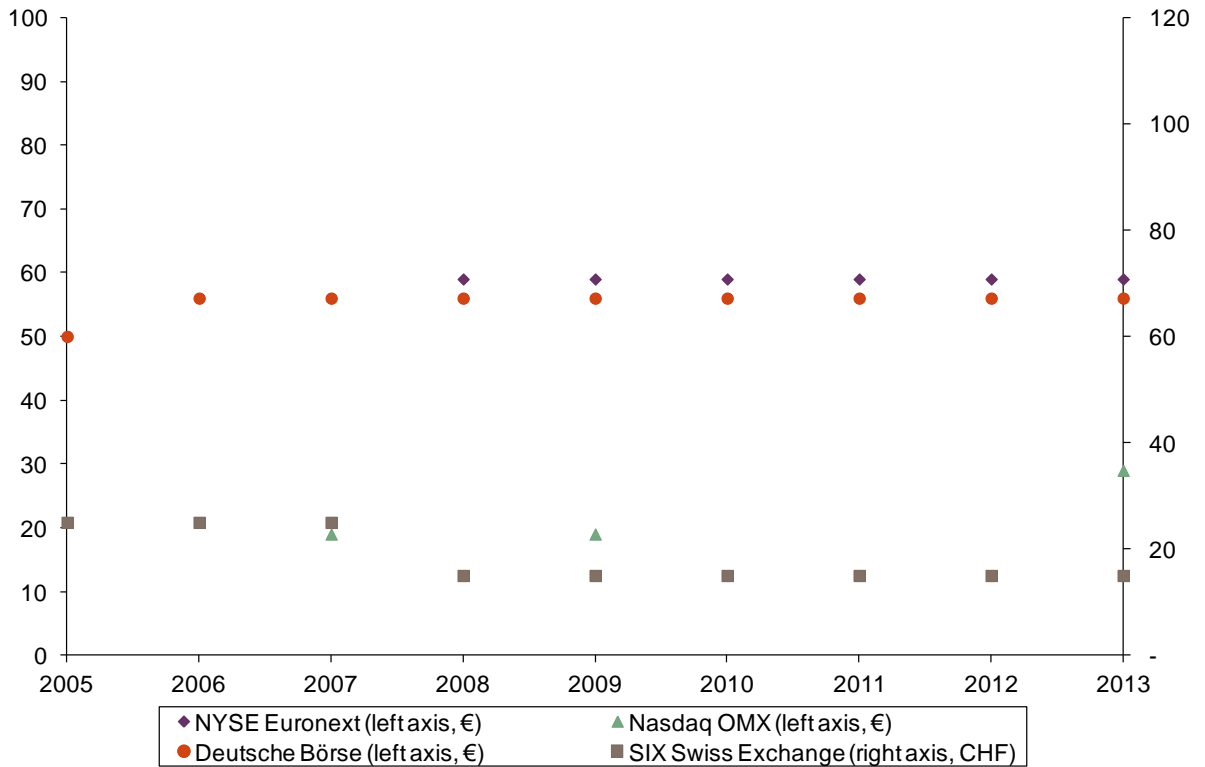
There are some exceptions to this general trend, and some trading venues have increased their fees for market data services at a time where revenues from trade execution services

<sup>20</sup> Caglio, C. and Mayhew, S. (2008), 'Equity Trading and the Allocation of Market Data Revenue', Feds Working Papers 2012-65, Federal Reserve Board.

have been falling (due to lower trading volumes). At such exchanges, the proportion of revenue accounted for by market data services can be expected to increase.

Figure 3.7 considers a benchmark level 1 product, defined to include the last price and BBO available, and shows a mixture of trends: one exchange charges the same fees as in 2008 when the product was introduced; two exchanges have increased their fees, one significantly from €19 to €29; and the fourth has reduced its fees from CHF25 to CHF15.

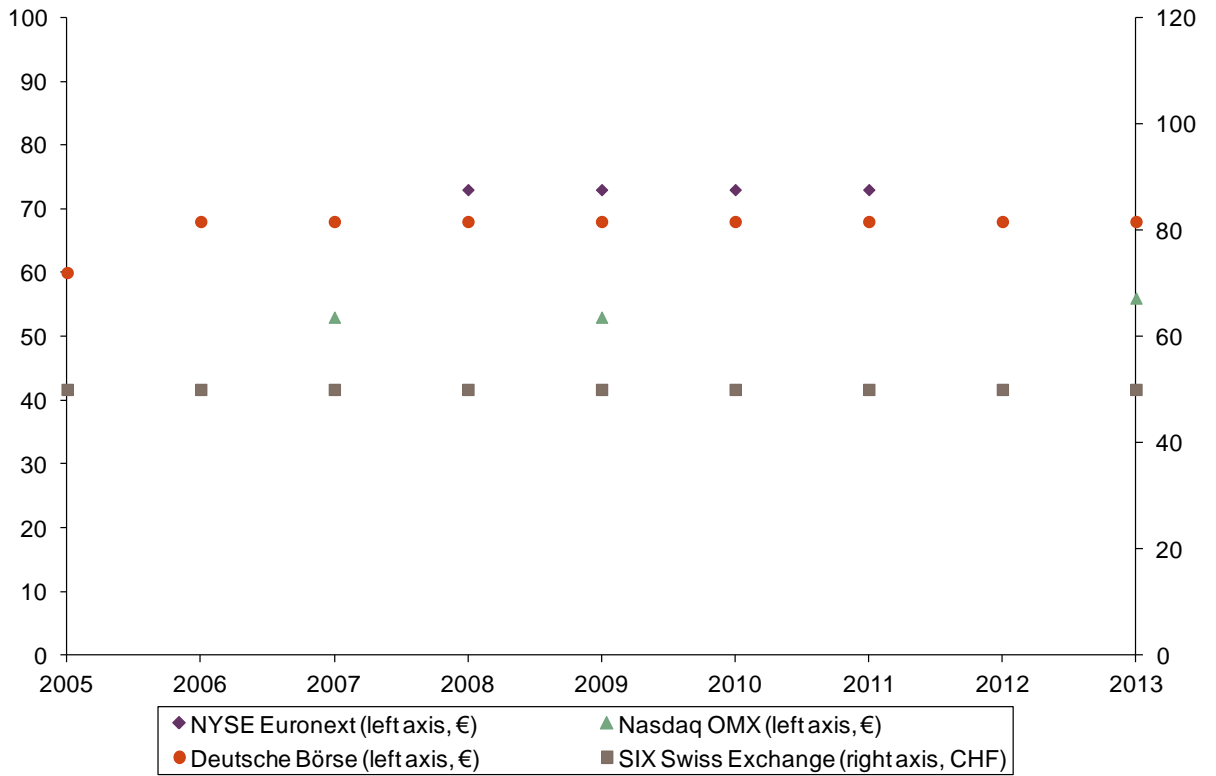
**Figure 3.7 Fees for a level 1 data product (local currencies)**



Note: The fees are in nominal terms, in the local currency. The left vertical axis is in euros (€), the right vertical axis is in Swiss Francs (CHF). The scale of the left and right vertical axis have been chosen to approximately reflect the 2013 €-CHF exchange rate and held constant across Figures 3.7 to 3.9.  
Source: Data provided by the participating exchanges.

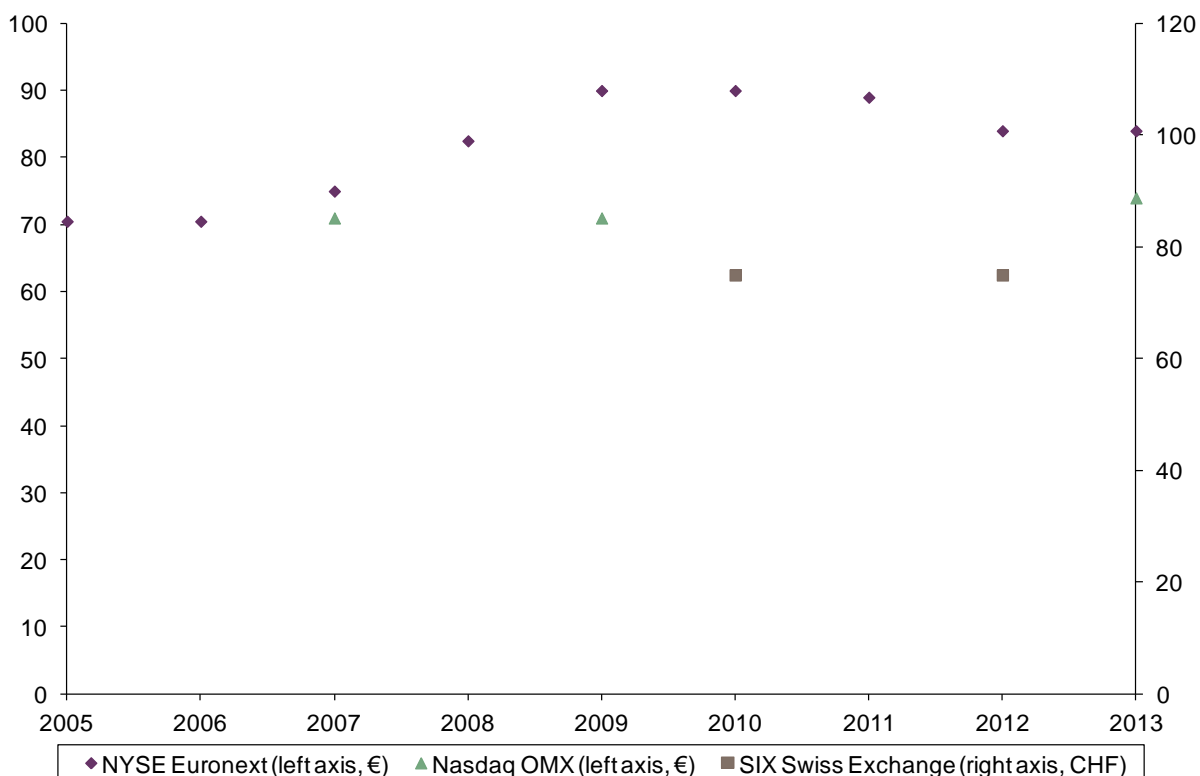
Figure 3.8 presents the fee changes for a benchmark level 2 product, defined to include the last price and best ten or five bids and offers, and Figure 3.9 presents the fee changes for the full order book. Except for a small increase in 2006 by one exchange, the price of the benchmark level 2 market data products considered here have not changed, as shown in Figure 3.8. Figure 3.9 shows that more detailed, and more expensive, market data products have been introduced, the fees for which have, in some cases, varied over time.

**Figure 3.8 Fees for a level 2 data product (local currencies)**



Note: Due to the differences in the range of data products offered by the participating exchanges, for NYSE Euronext, SIX Swiss Exchange and Deutsche Börse the level 2 product includes the last price and the best ten bids and offers, while for Nasdaq OMX the level 2 product includes the last price and the best five bids and offers. After 2011, NYSE Euronext removed its partial level 2 data product, so the data series ends. The fees are in nominal terms, in the local currency (the left axis is in €, the right in CHF).  
 Source: Data provided by the participating exchanges.

**Figure 3.9 Fees for the full order book (local currencies)**



Note: Deutsche Börse does not provide a complete full order book product for all equities listed on its exchange, and is therefore excluded from the chart. The fees are in nominal terms, in the local currency (the left axis is in €, the right in CHF).

Source: Data provided by the participating exchanges.

This analysis suggests that the pattern of cost recovery from market data services and transaction services has not changed significantly over time in the financial centres analysed in this report.

To understand the potential impact of any increases in costs on the functioning of the market for equity trading, the market data costs need to be compared with the total costs of trade execution services. This is covered in the next section.

### 3.4 The end-investors' perspective: exchange market data fees as a proportion of total costs associated with trading and holding securities

Nearly all trading and market data services will, in the end, be paid for by end-investors. This is because intermediaries that supply trading services to their clients will consider trading and market data services as inputs, and will need to recover the cost of such inputs from their customers if the activity is to remain economically viable. Ultimately, the cost of market data will thus be passed on to end-investors.

One way to generate a rough estimate of the significance of data costs to end-investors is to compare the total revenues earned by a stock exchange from equity market data services to the total market capitalisation of stock traded on such an exchange. The main end-

consumers of a particular stock exchange's market data are likely to be those investors holding the market capitalisation of stocks traded on the exchange.<sup>21</sup>

Table 3.3 below summarises the results for a selection of European and US exchanges, and suggests that market data costs represent less than 0.01% of the value of an investor's assets under management.

**Table 3.3 Market data revenue as a proportion of market capitalisation**

Trading venue	Market data revenue as a proportion of market capitalisation of stocks traded on the exchange (%)
Deutsche Börse	0.005
NYSE Euronext—Euronext	0.003
SIX Swiss Exchange	0.003
London Stock Exchange Group	0.005
NYSE Euronext—NYSE	0.001

Note: Nasdaq OMX has been excluded due to unavailability of data. London Stock Exchange Group includes London Stock Exchange and Borsa Italiana.

Source: World Federation of Exchanges statistics; data provided directly by Deutsche Börse, NYSE Euronext and SIX Swiss Exchange; and London Stock Exchange Group 2012 annual report.

Another approach to estimating the significance of market data costs to end-investors is to consider the amount spent on market data by each of the intermediaries supplying trading and investment services to a typical (institutional) end-investor, and compare this to the total cost of the services charged to the fund by each intermediary.

There are three types of intermediary providing services to end-investors that are likely to incur relatively material market data costs:

- **fund managers**—who determine the investment strategy on behalf of the end-investor and require market data to inform these decisions;
- **brokers**—who execute the trading decisions on behalf of the fund and require market data to identify where and when to submit bids and offers to achieve best execution;
- **market makers**—who are often counterparties of end-investors and require market data in order to make successful predictions in relation to short-term price movements, in order for their short-term trading strategies to be successful.

The following bullets consider the significance of market data fees to the total cost of services provided to end-investors by each of these intermediaries.

#### **Proportion of fund management costs accounted for by market data costs**

- Fund management fees vary significantly, but management fees for pension funds (for example) are typically in the range of 0.3% to 1.5% of assets under management per annum.<sup>22</sup>
- As set out in section 2.1, according to whether the end-investor has a short or longer holding period, the market data requirements of their fund managers may vary.

<sup>21</sup> This can be considered to be an upper bound, because some of the data purchased from an exchange will have been used to inform the decision *not* to purchase the listed equities, and thus be borne by investors whose assets are not included within this particular stock exchange's market capitalisation.

<sup>22</sup> ABI (2006), 'How to evaluate alternative proposals for personal pension accounts', report prepared by Oxera, October.

However, generally speaking only (real-time) level 1 data is required, and sometimes delayed data (which is often available free of charge) is sufficient, such that market data costs are unlikely to account for a significant proportion of the total management charge.

- A rough estimate of the cost of market data to fund managers can be calculated by comparing the revenues that exchanges earn from sales of level 1 data products to professional users against the market capitalisation of the stocks traded on such exchanges. Although this excludes the fees incurred by fund managers for level 2 data licences, not all level 1 data fees will relate to fund managers managing the assets included within the exchange's market capitalisation, and therefore this approach is expected to give a fair indication overall of the order of magnitude of data costs to fund managers. Based on data provided by the participating exchanges, this approach estimates that the annual market data costs to fund managers are less than 0.001% of the funds under management.

### **Proportion of brokerage and market maker costs accounted for by market data costs**

- An execution-only brokerage service in Europe was in the region of 2bp in 2010,<sup>23</sup> and in 2012 the (implicit) cost of market makers to end-investors was in the order of 30–40bp of the end-investors' transaction values.<sup>24</sup>
- The proportion of the brokerage commission and market maker costs accounted for by market data fees can be estimated by comparing the market data licence fees associated with an individual trader within a brokerage or market maker firm against other significant costs associated with employing each trader, such as salaries, bonuses, tax, rent and IT equipment. In the case of market makers, there will also be the costs associated with the use of the firms' capital to provide the market making service.
- In terms of market data costs, as reported in Table 5.2, the per-user (device) licence fees for level 2 data from the five largest European stock exchanges total €474 per month. This implies that the total data licence cost per trader employed is around €5,700 per annum.
- According to various recruitment company surveys, typical salaries for traders with three to seven years' experience are around €55,000 to €120,000 per annum, with the potential for bonuses of 30–100%.<sup>25</sup> Salaries at this level suggest that €150,000 is a conservative estimate for the total non-market data costs associated with employing each typical trader (ie, non-market data costs associated with each trader could be much higher), which in turn implies that market data costs account for approximately 1–5% of the total costs of operating as a broker. Taking account of other costs incurred by market makers, in particular the costs associated with the use of the firms' capital to provide market marking services, the proportion of their costs represented by market data services will be lower (in the order of 1–3%).

Table 3.4 below summarises this analysis of the breakdown of charges passed on to end-investors, and shows that annual market data fees are unlikely to account for more than 5% of any of the fees imposed on a fund.

<sup>23</sup> Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May. These services do not include research or 'working-on-the-trade'.

<sup>24</sup> ITG (2013), 'ITG's Global Cost Review: Q1 2013', available at: <http://www.itg.com/2013/07/30/itg%E2%80%99s-global-cost-review-q1-2013/>.

<sup>25</sup> See, for example, Robert Half Financial Services (2012), '2013 salary guide: your business and recruitment handbook'; and Michael Page Financial Services (2013), 'Financial services salary survey 2013: front office banking, markets & asset management'.

**Table 3.4 Overview of the significance of market data costs to other costs incurred by end-investors**

Service provider	Activity provided	Typical fees (or impact) ultimately charged to (or paid by) end-investors	Proportion of fee attributed to market data
<b>Fund manager</b>	Management of fund	0.3% to 1.5% of assets under management	<0.001%
<b>Broker</b>	Execution of trades	2bp of value of trading	3–5%
<b>Market maker</b>	Counterparty to (some) trades	30bp to 40bp of value of trading	1–3%
<b>Trading venue</b>	Matching of trades	0.5bp of value of trading	0%
<b>Clearing member and custodian</b>	Clearing and settlement of trades, and management of assets	3bp of assets under management	0%
<b>CCP</b>	Clearing of trades	0.12bp of value of trading	0%
<b>CSD</b>	Settlement and custody of assets	0.17bp of assets under management	0%

Source: Oxera analysis.

To draw all these cost estimates together and compute an estimate of the significance of total market data costs imposed on a fund by each service provider requires an assumption about the turnover of the end-investor’s fund. Suppose this is 50%—ie, that the end-investor changes 50% of the assets it holds in a year, and therefore has the same value of trading each year as the value of its assets under management. In this case, fees charged based on the value of trading and assets under management are of equal significance and, based on the typical fees set out in Table 3.4, total costs incurred by a fund are in the range of 0.6% to 2% of assets under management (or the annual value of trading), of which 0.2–1.5% are accounted for by annual market data fees received by trading venues (or less than 0.01% of assets under management or annual value of trading).

The precise relationship between market data fees and the total costs incurred in making a transaction will vary depending on the investment style (and other factors) adopted by the end-investor or fund manager. However, taking both a top-down (see Table 3.3) and bottom up approach (as described directly above Table 3.4), the annual market data fees received by trading venues are likely to account for less than 2% of the total annual costs of trading in, and holding of, securities incurred by investors.

### 3.5 Conclusion: impact of current pricing schedules on market outcomes for end-investors

Competition in the markets for fund management, market making and brokerage services keeps the fees charged by intermediaries for such services in line with the costs incurred in providing these services. This means that any change in the cost of providing such services—for example, an increase in market data licence fees—will be passed on to end-users in the form of higher fees charged by intermediaries for these services.

Changes in fees for market data and trading services may affect the demand for these services. However, given the relatively small proportion of the total costs represented by market data charges (as shown in the analysis above), it would seem unlikely that, at a general level, changes in the licence fees for market data will significantly affect the overall level of activity of trading.

However, this is not to say that a different balance between market data service fees and the fees for trade execution services provided by trading venues would have no impact on either



end-users or other intermediaries. The next section looks at what would happen were trading venues to implement different pricing structures.

## 4 Potential impact of different pricing structures

The analysis presented in section 3 shows that the current pricing pattern observed in Europe and the USA is for trading venues to recover around 15–35% of their total trading venue costs through fees for market data. The analysis in this section considers the potential impact of different pricing structures on market outcomes.

### 4.1 Conceptual framework

Since the full implementation of MiFID in late 2007, and the breaking up of the monopoly of national exchanges, the provision of trading services for European equities has become a competitive market. For most European equities, multiple markets are competing for liquidity. Even where only one provider currently exists, the low barriers to entry as evidenced by the successful entry of a number of new trading venues (eg, Chi-X, BATS Global, Turquoise), and thus the credible threat of new entry, imposes competitive constraints on the incumbent (see Appendix 2.2 for a summary of the recent competition authority findings in this regard).

The competitive pressure in the market means that any reduction in market data fees by trading venues can be expected to result in higher fees for some of the other services they provide (or a worsening in quality of service). In the absence of any 'super-normal' profits, total revenue cannot be reduced and therefore any reduction in market data fees will result in a compensatory increase in other services provided by trading venues.

The other services that trading venues provide, for which fees could potentially be increased to compensate for a reduction in market data fee revenues, can be categorised into:

- services that **are not** closely related to the provision of trading—eg, the provision of exchange software to other trading venues, or the provision of broker software services; and
- services that **are** closely related to the provision of trading—eg, trading fees, membership fees, and co-location fees.

If the services not closely related to the provision of trading are provided in competitive markets, with a significant number of suppliers that are not also trading venues, then trading venues will not be able to increase their fees and continue to compete in the markets for these services. This is because consumers would simply switch to the non-trading venue providers, which are able to offer lower fees.

This, in turn, means that the impact of any change in the price of market data services will be felt in the market for trade execution services, since in this market all suppliers are trading venues and therefore all will experience the same cost shock should (for example) market data fees be artificially lowered.

In this context, when considering whether to restrict the price of market data fees, it becomes relevant to focus on assessing the welfare implications of a system-wide re-focusing of recovering the costs of trading away from market data fees and towards trading fees. The impact of such a re-balancing of trading venue fees can be analysed in relation to the following aspects:

- the potential direct effect on the purchasers of market data and trading services (considered in section 4.1.1);

- the potential indirect effect on price efficiency (considered in section 4.2) and trading volumes (considered in section 4.3).

#### 4.1.1 **The potential direct impact on purchasers of market data and trading services**

One general feature is that the number of customers purchasing market data services will tend to be higher than the number purchasing transaction services. This is because it is likely that anyone who purchases trading services will also purchase market data services, while there are a number of customer groups who will purchase market data services but who do not directly purchase trading services or other related services for which an exchange charges a fee—such as fund managers and middle office staff.

As a result of there being a higher number of customers purchasing market data services than trading services, reducing market data fees and increasing trade execution fees will tend to leave those paying for both services (eg, primarily brokers) paying, in aggregate, more to trading venues, while those who use only market data services will pay less. This is because a larger proportion of costs are now being recovered through trading fees, for which there is a smaller consumer base. This distributional effect is particularly the case for direct members of an exchange, for whom registered traders are entitled to level 2 market data free of licence fees when accessed via the trading platform.

The change in the structure of trading venue prices is also likely to have a differential relative effect within different customer groups. For example, a shift to lower market data fees can be expected to put firms that use a lot of market data but make relatively few transactions (ie, traders who focus on identifying trading opportunities with particularly expected returns) at a potential cost advantage compared to the status quo.

Ultimately, different patterns of consumption of different services provided by the trading venues will mean that a shift to lower data fees and higher trading fees will create both winners and losers, in terms of the total fees paid to those venues. However, the general pattern will be that those purchasing both transaction services and market data services will be worse off, while those purchasing just market data will be better off.

## 4.2 **The impact on market efficiency of charging for market data**

Another potential context in which to consider market data is the possibility that it brings wider benefits to financial markets as a whole, and that wider and/or cheaper dissemination of market data would further fulfil the transparency and efficiency objectives of MiFID.

There is some economic literature about the impact of charging or not charging for market data services on market efficiency. Easley, O'Hara and Yang (2013) find that, within their model, charging for market data can increase the cost of capital and volatility, worsen market efficiency and liquidity, and discourage the production of fundamental information relative to a world in which all traders freely observe prices.<sup>26</sup>

This conclusion is sensitive to the assumptions in their model. Using a different structure for the release of information to the market, Cespa and Foucault (forthcoming) find the opposite conclusion—namely, that market data is over-consumed when offered free of charge, and average welfare is maximised when investors pay for data.<sup>27</sup> They show that this efficient outcome is achieved by a for-profit exchange charging for data. The authors allow a group of homogeneous investors to receive a private signal of the value of an asset and pay to receive real-time price data, or to receive a delayed price data free of charge. In contrast,

<sup>26</sup> Easley, D., O'Hara, M. and Yang, L. (2013), 'Differential Access to Price Information in Financial Markets', Johnson School Research Paper Series no. 11-2011.

<sup>27</sup> Cespa, G. and Foucault, T. (forthcoming), 'Sale of Price Information by Exchanges: Does it Promote Price Discovery?', *Management Science*, available at: <http://www.esrc.ac.uk/my-esrc/grants/RES-000-22-4653/outputs/Download/bb740b1f-acd6-4586-8f7e-14c08ef24730>.

Easley, O'Hara and Yang's model relies on two groups—'rational' traders and 'liquidity' traders—interacting in a market where they must choose to pay for price data to submit orders conditional on the market price, or must trade based on their private value signal alone.

The contrasting conclusions of these two studies characterise the general theme of the relevant literature: that there is not sufficient evidence to draw a conclusion on the relationship between the efficiency of markets and the pricing of market data from these models.

Both academic papers discussed above consider a single monopolistic exchange. While this increases the simplicity and tractability of the models, information efficiency can also be analysed in the context of competitive markets—see, for example, Reisinger (2011)<sup>28</sup>—which can result in different efficiency implications.

The two papers assume that the quality of the price-discovery process is something generated by the participants' actions, without allowing participants to choose between venues of different quality. Allowing such a choice results in an important insight: because participants will prefer the market with the best price discovery, if data fees harm or reduce this price discovery, any venue charging such fees will become less attractive and therefore less competitive. This is analogous to the aforementioned competition over the 'total cost of trading' on a particular venue, in which market data licence fees, trading fees and spread costs are all taken into account by users when choosing where to trade. This means that the competition between venues can ensure that if price discovery is poor (and therefore spread costs are high), the trading venue will need to offer lower data fees and/or trading fees in order to remain an attractive venue. Indeed, when new platforms enter the market and initially have low liquidity, their data and/or trading fees tend to be low, while often having higher spread/liquidity costs.

### 4.3 Distributional effects and impact on volume of trading

The analysis set out above suggests that there may not be a unique optimal cost recovery pattern for trading venues—re-balancing fees between variable fees (eg, trading fees) away from fixed fees (eg, market data licence fees) will generate both winners and losers.

However, it is still useful to consider simple stylised examples that can indicate if there are obvious benefits, or costs, of moving to a significantly different cost recovery pattern from the one that has been generated without regulatory intervention.

Boxes 4.1 and 4.2 analyse whether the current pricing schedules are likely to have negative consequences on the economy, based on two extreme examples, both using a scenario with a monopolist trading venue and a fee structure imposed on two participant types: traders/brokers (who charge a commission fee per trade), and fund managers (who consume data and send trade orders to brokers).

Assuming that the only relevant costs are a fixed data fee and a per-unit trading fee, the balance of data and execution fees results in different unit costs for users with different volumes of activity and different marginal costs for each trade.

#### **Box 4.1 Case 1: high fees for market data and low fees for trade execution**

In the extreme, if the exchange charges a high data fee and a zero trade execution fee, participants are incentivised to maximise their volume of transactions per data user in order to spread their fixed cost of market data across as many trades (for which they receive commission revenue) as possible.

<sup>28</sup> Reisinger, M. (2011), 'Unique Equilibrium in Two-Part Tariff Competition between Two-Sided Platforms', University of Munich Publications, January.

This is likely to encourage consolidation among brokerage firms, as the largest brokers are likely to find it easier to increase the average trading per data user. Niche brokers that trade fewer amounts per trader would be disadvantaged. There is also likely to be an advantage to those brokers who are continuously in the market (for example, market makers), so the sell side may be advantaged relative to the buy side.

As marginal transaction costs would be lower, spreads would tend to narrow, although this would also be offset by the need for the spread to still pay for market makers' (now higher) data fees.

- **Impact on brokers:** purely from a brokers' perspective, more trading could be expected, with improved liquidity.
- **Impact on fund managers:** those further back in the production chain (ie, fund managers) would be paying more for their data services. If they continued to purchase the same quantity of data then the increased price should *not* affect their own trading activity, as their own marginal costs of trading (in terms of fees paid to brokers) will have remained the same. However, if the increase in data costs leads to a reduction in the consumption of market data, and this in turn leads to a reduction in the demand for trading services (ie, decisions are made *not* to trade when, with access to the data, the decision would be to trade) then trading volumes would tend to decrease.

There are, therefore, two potentially opposing dynamics in terms of trading volumes. The marginal cost of trading would fall, but the costs for fund managers of developing their trading strategy would rise.

However, the current cost of market data to fund managers is likely to be a very small proportion of their total costs. As set out in section 3.4, currently annual market data is likely to account for less than 2% of total costs incurred by end-investors—ie, less than 0.01% of assets under management.

### Conclusion

Although there are clearly two mechanisms working in opposite directions in terms of the impact on total levels of trading, the relative insignificance of market data fees to fund managers suggests that, even in the case of relatively extreme changes in the pricing structure, the potential negative impact on trading would be small, and would in any case be (at least partially, if not completely) balanced by an increase in trading as a result of the reduction in marginal trading costs.

Overall, high data fees combined with low trade fees can therefore be expected to result in fewer traders and/or brokerage firms, and more marginal transactions.

## Box 4.2 Case 2: low fees for market data and high fees for trade execution

In this scenario, market data is offered for free but trading venues now have to recover their total costs from trade execution fees (or other fee levels such as membership fees).

The fixed costs of providing brokerage services reduces, but the variable (ie, per transaction) costs increase. Traders with lower volumes per data device are relatively advantaged, while brokers with high volumes per screen are relatively disadvantaged.

The total costs to be recovered from traders would also rise, as those not directly involved in trade execution but currently paying market data fees (eg, fund managers) would no longer contribute directly to covering the costs of trading venues.

### Conclusion

The same two dynamics in relation to trading volumes (as analysed in the scenario in Box 4.1) will be in play. To the extent that fund managers have greater access to market data, they may identify more trading opportunities, but those trading opportunities would now need to be more profitable in order to cover the higher costs of each transaction (ie, the higher trade execution fees).

Overall, low data fees combined with high trade fees can therefore be expected to result in more traders and/or brokerage firms, and fewer marginal transactions.

In this simplified example, the main drivers of transaction volumes are subject to conflicting pressures. The balance of the outcome will depend on how strong each dynamic is. From an economics perspective, overall consumer welfare (in this case, investor welfare) will be maximised when the fixed joint costs of a number of services are recovered more from the

service(s) with the least elastic demand.<sup>29</sup> So if transaction services are generally more price sensitive than data services, welfare will be maximised by recovering more of the fixed costs from data services and less of the fixed costs from transaction services.

This is also the pattern of cost recovery that would be expected where there are competing suppliers, who will respond to the relative price elasticities they face when setting their own pricing levels.<sup>30</sup>

#### 4.4 Conclusion: potential impact of different pricing structures

The extent to which trading venues recover the joint costs of trading and market data services through transaction-based fees, membership-based fees and data-based fees may have an effect on their customers.

First, reducing market data fees and increasing trade execution fees will tend to leave those buying both services paying more in aggregate terms. This is because the number of customers purchasing data services from any trading venue is generally greater than the number purchasing transaction services (because market data is a necessary input for trading, but not all who purchase market data also directly trade on an exchange—eg, fund managers, middle office staff and index providers).

Second, any shift in the balance of trading and market data fees is likely to have distributional impacts within the brokerage and fund management industry. This is because within the brokerage and fund management industries, the relationship between the value of trading or assets managed, and the type and number of data terminals used, can vary. Those with business models that are relatively data-intensive will find their competitive position improve relative to their peers should data fees fall and trading fees rise.

This section also considered whether the balance between transaction-based fees and market data fees would affect the volume of trading and the efficiency of price formation. In both cases the effect is not clear-cut. In terms of volume of trading, lower transaction-based fees can be expected to result in more marginal transactions, but higher data costs could mitigate this effect if it results in reduced participation in the industry. In terms of the efficiency of price formation, the emerging academic literature has mixed findings, suggesting that there is not yet a robust conclusion on the relationship between the pricing of market data and the efficiency of capital markets.

<sup>29</sup> The elasticities referred to here are industry elasticities.

<sup>30</sup> Although a sub-optimal outcome may arise if the pattern of firm elasticities is very different to the overall product elasticities. For example, supermarkets will tend to have quite different gross margins on different products and will also flex these in response to local market conditions. One dimension of this pricing is the price elasticity they face, and the results can be that supermarkets will sell some goods below cost, and make up for the loss by raising margins on other goods that they sell to the customers attracted by the that loss leader. See Competition Commission (2008), 'The supply of groceries in the UK', Market Investigation, April, para 5.69.

## 5 Regulatory context and the consolidated tape

The analysis in this section builds on the empirical analysis of the costs of market data services in section 3 and considers different regulatory contexts for market data services in Europe and the USA. It also assesses whether there are alternative justifications for the regulation of market data services.

### 5.1 Comparison between the USA and Europe

The regulatory requirement to use a consolidated tape of bids and offers and transactions for securities listed on NYSE, Nasdaq and AMEX creates a contrast between the market structure for the provision and use of market data between the USA and the EU. The information in the (bid and offer) consolidated tape is required by trading venues in order to operationalise the regulatory requirement for one trading venue to pass on to another any (protected) marketable orders it receives that can be immediately executed at the prevailing BBO if that order cannot be fully executed at the BBO at the recipient trading venue. This regulatory structure is known as rule 611 of Reg NMS (Order Protection or Trade Through Rule)—see Box 5.1 below.

There are currently 12 trading venues in the USA that are required by regulation to ensure that their relevant market data is supplied to the aggregators, who then create the consolidated tape that is then supplied to market participants.<sup>31</sup> As a result of regulatory requirement, the consolidated tape is a necessary input for any broker who is dealing in NYSE-, Nasdaq- or AMEX-listed equities. One implication of this requirement is that brokers that purchase level 2 data in the USA pay twice for level 1 information, because it is included in both the consolidated tape they are required to purchase, and the level 2 market data they are choosing to purchase.

Although market data is regulated under MiFID (see Box 5.2 below) and national regulation, there are no equivalent regulatory requirements of Reg NMS in Europe. Each trading venue is free to execute (if possible) all orders sent to it, without reference to the prevailing price and/or availability of the same security at an alternative execution venue. However, brokers and market vendors in Europe can—and many do—aggregate the market data from trading venues to create a single ‘consolidated’ tape relating to any particular security.

Therefore, although the regulatory structures are very different in the USA and the EU, consolidated tapes are available in both. Table 5.1 below sets out the constituent parts of the regulated consolidated tape available in the USA, and compares them to one form of the consolidated tape available in Europe—a tape consolidating level 1 data from the ten largest (by value/volume of trading) trading venues in Europe.

<sup>31</sup> The 12 trading venues are: BATS, Chicago Board Options Exchange, Chicago Stock Exchange, Direct Edge, International Securities Exchange, Nasdaq OMX BX, Nasdaq OMX PHLX, National Stock Exchange, NYSE, NYSE AMEX, NYSE Arca and the Nasdaq Stock Market.

**Table 5.1 Comparison of real-time, level 1, consolidated tapes available in the USA and the EU**

	<b>US consolidated tape (tapes A, B and C)</b>	<b>EU ‘consolidated’ tape (as provided by data vendors)</b>	<b>Notes</b>
Trading venues covered	BATS, Chicago Board Options Exchange, Chicago Stock Exchange, Direct Edge, International Securities Exchange, Nasdaq OMX BX, Nasdaq OMX PHLX, National Stock Exchange, NYSE, NYSE AMEX, NYSE Arca and the Nasdaq Stock Market	Deutsche Börse, BATS Chi-X Europe, NYSE Euronext, London Stock Exchange, Borsa Italiana, Madrid Stock Exchange, Nasdaq OMX Nordic, Oslo Stock Exchange, SIX Swiss Exchange, Warsaw SE	European trading venues reflect all the European trading venues that, in 2012, executed at least as much as the smallest annual value of trading executed in 2012 by each of the US exchanges that contribute to one of the US consolidated tapes
Price per month—level 1 data	\$74 (€58)	Bloomberg: \$555 (€430) Thomson Reuters: \$430 (€340)	Tape A offers volume discounts for the user profile. This analysis includes the price for tape A, assuming that the number of devices per entity is between 3 and 999
Number of trading venues in tape	12	10	
Total value of transactions (per annum 2012) (trillion)	\$53 (€41)	\$9.5 (€7.5)	Includes all participants (except ISE in USA)
Number of listed companies	5,000	6,500–7,000	
Number of connections to US consolidated tape	At least 370,000	n/a	In each quarter of 2012 there were between 250,000 and 370,000 professional subscriptions to tapes A, B and C. Most professional subscribers to one tape will also consume another tape, and therefore the numbers of subscribers to each tape are not mutually exclusive. However, as some subscribers will subscribe to only one tape, 370,000 can be considered to be a lower bound
Estimated number of potential users for EU consolidated tape	n/a	At most around 80,000	In 2012 there were 10,000 professional users of SIX Swiss Exchange level 1 data, 24,000 users of Euronext level 1 data, and 90,000 level 1 and level 2 terminals for London Stock Exchange data. As in the USA, there is likely to be an overlap between these users, such that the total number of professional users of level 1 European market data is likely to be at most 80,000

Source: Data from the Consolidated Tape Association, Nasdaq Price List – UTP/FINRA, Bloomberg pricing list, Thomson Reuters pricing list, U.S. Stock Exchanges Market Summary (available at: [www.batstrading.com/market\\_summary](http://www.batstrading.com/market_summary)), Pan-European Stock Markets Market Data (available at: [www.batstrading.co.uk/market\\_data/market\\_share/market/all/](http://www.batstrading.co.uk/market_data/market_share/market/all/)), World Federation of Exchanges statistics, data provided by the participating exchanges, and London Stock Exchange Group annual reports.

As indicated by Table 5.1, the US system differs from the EU financial markets in three significant ways:

- trading venues in Europe are much smaller than in the USA. There are only ten European trading venues that execute the same annual value of trading as the smallest US exchange that contributes to one of the consolidated tapes. The combined total value of transactions for these ten exchanges is less than one-fifth of the total executed by the US exchanges contributing to the consolidated tapes;

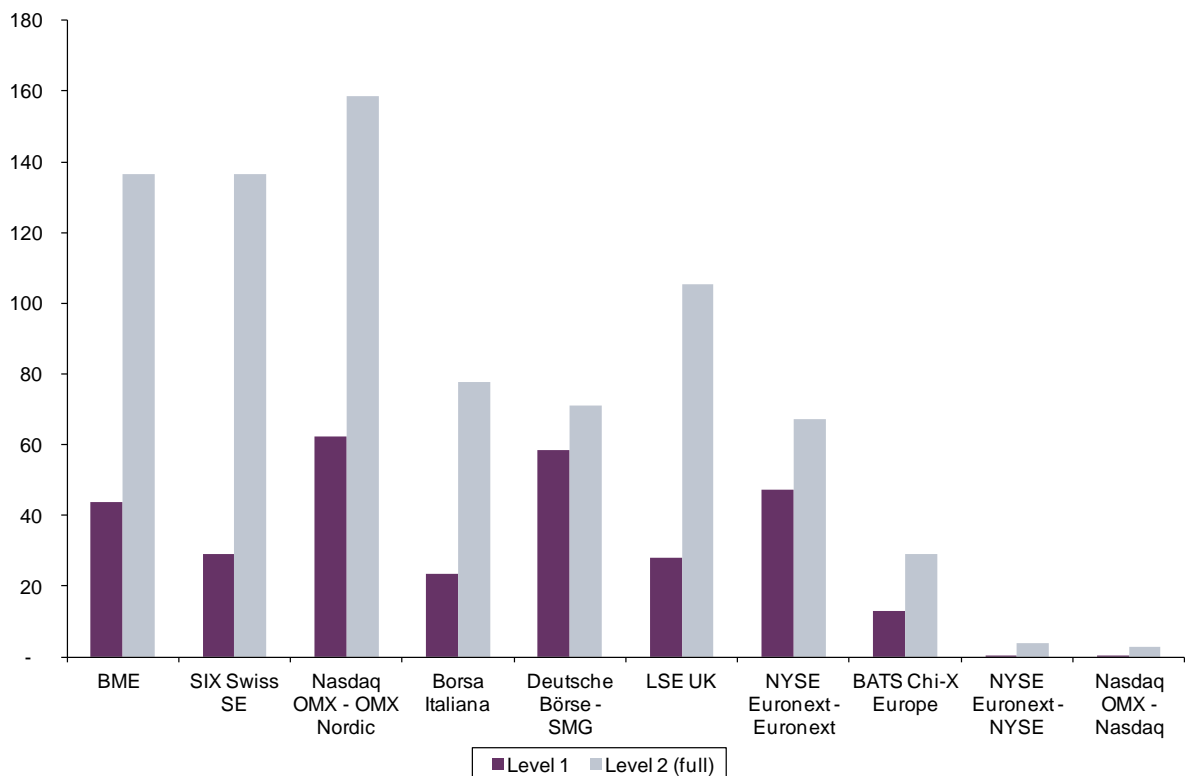


- there are many more users of the USA consolidated tapes than of a comparable European consolidated tape. As a result of the regulatory requirement, any broker dealing in NYSE-, Nasdaq- or AMEX-listed equities is required to license the USA consolidated tapes. This results in a much greater base (of around 370,000 users) to recover the cost of provision compared to the estimated 80,000 users of a comparable European consolidated tape;
- the USA has a smaller number of stocks traded on the regulated system than the equivalent EU number of stocks—there are around 5,000 companies listed on the exchanges contributing to the US consolidated tape, versus 6,500–7,000 listed on the ten largest European exchanges.

Given the economies of scale that trading venues benefit from, it is not unexpected that the cost of a consolidated tape on a per-user basis is greater in Europe than in the USA. It is not clear to what extent the different regulatory framework in the USA has further reduced the costs of a consolidated market data tape in the USA compared to what would otherwise occur, particularly given that the trading venues in both the USA and Europe recover about 15–30% of their joint costs of trading and market data services from market data services (see Table 3.2).

Figure 5.1 below presents the per-user data fees charged by seven European exchanges and two large US exchanges (Nasdaq and NYSE), as a proportion of the value of trading executed by each exchange (multiplied by  $10^9$  to improve readability). Although the sample is limited, the decrease in the bars from left to right shows that, as exchanges transact significantly higher volumes, the data cost element per transaction falls.

**Figure 5.1 Scaled data fees per unit value traded (per professional user per month)**



Note: The vertical scale represents data fee divided by notional traded amount in 2012 scaled by  $10^9$ . The market data products from the European exchanges encompass a wider set of instruments (including, for example, index data and/or fixed income data) than the market data products from the US exchanges.

Source: Oxera, fee schedules of exchanges and MTFs, and World Federation of exchanges and BATS Chi-X Europe data on trading volumes.

The analysis set out above compares the US consolidated tape with an equivalent European product made available by two data vendors. However, as set out earlier, for brokers and other market participants that require depth of book information, and/or are concerned about the delay in the messaging they receive from trading venues, the consolidated tape in the USA is unlikely to provide the level of detail (and speed) they require. To purchase level 2 market data from the 12 US trading venues that contribute to the regulated consolidated tape would cost significantly more than receiving consolidated tape data.

Table 5.2 compares the cost of purchasing level 2 data from the five largest US and European exchanges, and shows that the difference in cost is much less marked.

**Table 5.2 Costs comparison between USA and Europe, level 2 data for five largest exchanges**

	US exchanges	European exchanges
<b>Sum of user (device) fees</b>	€132	€447
<b>Sum of access fees<sup>1</sup></b>	€1,125 (€1,500) <sup>2</sup>	€0
<b>Exchanges included</b>	Nasdaq, NYSE Arca, NYSE, BATS BZX, Direct Edge, (BATS BYX)	BATS Chi-X Europe, NYSE Euronext—Euronext, London Stock Exchange, Deutsche Börse, Borsa Italiana

Note: <sup>1</sup> The access fees included are the fees charged by some trading venues for internal distribution within a firm, external distribution fees are not included. The total US per-user fee is based on the following fees: Nasdaq (€57), NYSE (€45) and NYSE Arca (€30); BATS and Direct Edge do not charge a per-user fee. The total US access fee is based on the following fees: BATS BZX (€750) and Direct Edge (€375); Nasdaq, NYSE and NYSE Arca do not charge access fees in addition to the user fees. <sup>2</sup> Including the access fee for BATS BYX of €375, increases the estimate of the total US access fee to €1,500. BATS Chi-X Europe fees are based on the vendor distribution model which includes only a per-user fee, therefore the total access fees for the European exchanges considered is zero. The total European per-user fee is based on the following fees: BATS Chi-X Europe (€45), NYSE Euronext (€84), LSE (€210 which includes the UK and European order books), Deutsche Börse (€68) and Borsa Italiana (€40). The level 2 data product includes BBO 10 for Deutsche Börse and full order book for the other exchanges.

Source: The most recent available pricing schedules of the exchanges (as at November 2013).

Furthermore, arguably, in the EU, the relevance of pricing information on different stocks to each participant is likely to vary more widely than in the USA. For example, a small Bulgarian firm is unlikely to be of any interest to a UK-based large cap investor, whereas most of the Reg NMS stocks are frequently traded on all the venues and relevant to all investors in the US equity market.

## 5.2 Current regulatory context

The following sub-sections provide a short overview of the key aspects of the prevailing regulations encompassing market data services in the EU and USA.

### 5.2.1 MiFID and the regulation of market data in the EU

In the EU market data is regulated by MiFID, the EU regulation for financial markets.<sup>32</sup> Recently, the European Commission proposed an update to MiFID, with the main aims of providing a 'level playing field' in financial markets (in line with the EU objective of fostering a single market), improving investor protection, and enhancing the efficiency of financial markets in the EU.<sup>33</sup>

<sup>32</sup> The European Commission's MiFID directive, implementing regulations and other documents, can be found at: [http://ec.europa.eu/internal\\_market/securities/isd/mifid/index\\_en.htm](http://ec.europa.eu/internal_market/securities/isd/mifid/index_en.htm).

<sup>33</sup> European Commission (2011), 'New rules for more efficient, resilient and transparent financial markets in Europe', press release, IP/11/1219, October 20th, available at: [http://europa.eu/rapid/press-release\\_IP-11-1219\\_en.htm?locale=en](http://europa.eu/rapid/press-release_IP-11-1219_en.htm?locale=en).

The proposed regulation amending MiFID sets out requirements in relation to the disclosure of trade transparency data to the public.<sup>34</sup> Regulated markets, MTFs and organised trading facilities (OTFs) will be required to:

- unbundle pre- and post-trade data:<sup>35</sup>
  1. Regulated markets and market operators and investment firms operating MTFs and OTFs shall make the information published in accordance with Articles 3 to 10 available to the public by offering pre- and post-trade transparency data separately
  2. The Commission may adopt, by means of delegated acts in accordance with Article 41, measures specifying the offering pre- and post-trade transparency data, including the level of disaggregation of the data to be made available to the public as referred to in paragraph 1. (Title II, Chapter 3, Article 11)<sup>36</sup>
- provide pre- and post-trade data separately on ‘reasonable commercial terms and on a non-discriminatory basis’ (Title II, Chapter 3, Articles: 3, 5, 7, and 9)
  1. Regulated markets, MTFs and OTFs shall make the information published in accordance with Articles 3 to 10 available to the public on a reasonable commercial basis. The information shall be made available free of charge 15 minutes after the publication of a transaction.
  2. The Commission may adopt, by means of delegated acts in accordance with Article 41, measures clarifying what constitutes a reasonable commercial basis to make information public as referred to in paragraph 1. (Title II, Chapter 3, Article 12)<sup>37</sup>

Although the regulation is focused more generally on the availability of data and efficiency of markets, a key applied concern relating to market data is best execution by brokers and other agents. Although specific conditions vary by country within the EU, brokers are generally required to have a best execution policy, make clients aware of this policy, and monitor the attractiveness of venues in improving their execution (which can be done on delayed data or analytics provided directly by the trading venues).<sup>38</sup> The regulation does not require brokers to be active participants in all markets within the EU, or even all markets trading a certain security, and brokers have adopted a variety of methods and strategies to achieve best execution—while some will enlist to many venues, others may specialise in particular markets, resulting in different data usage.

<sup>34</sup> European Commission (2011), ‘Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on markets in financial instruments and amending Regulation [EMIR] on OTC derivatives, central counterparties and trade repositories’, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0652:FIN:EN:PDF>.

<sup>35</sup> Although many exchanges have already unbundled these products.

<sup>36</sup> European Commission (2011), ‘Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on markets in financial instruments and amending Regulation [EMIR] on OTC derivatives, central counterparties and trade repositories’, p. 34, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0652:FIN:EN:PDF>.

<sup>37</sup> European Commission (2011), ‘Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on markets in financial instruments and amending Regulation [EMIR] on OTC derivatives, central counterparties and trade repositories’, p. 34, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0652:FIN:EN:PDF>.

<sup>38</sup> For example, the Financial Services Authority (FSA; now the Financial Conduct Authority, FCA) provides guidance in a section of its website: <http://www.fsa.gov.uk/about/what/international/mifid/background/key-topics/best-execution>. The key document is Financial Services Authority (2006), ‘DP06/3: Implementing MiFID’s best execution requirements’, May, available at: [http://www.fsa.gov.uk/pages/library/policy/dp/2006/06\\_03.shtml](http://www.fsa.gov.uk/pages/library/policy/dp/2006/06_03.shtml). This states: ‘Under MiFID Article 21, a firm must take all reasonable steps to obtain the best possible result, taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order. In support of this process-based approach, a firm is also required to: have effective arrangements for complying with Article 21; have an ‘execution policy’ explaining the factors the firm will consider; when executing orders and providing information about the ‘execution venues’ it will use; inform clients about its execution policy and obtain their consent; assess the execution venues in its execution policy at least yearly and consider including other execution venues; monitor the effectiveness of its execution arrangements; and if requested, show that a client’s order has been executed in line with the firm’s execution policy.’

## 5.2.2 Reg NMS and the regulatory framework encompassing market data in the USA

The regulatory framework in the USA is often used as a benchmark in discussions of data dissemination and pricing. The USA does not actively regulate the price of data and data products, but instead mandates that all trades on a number of venues must be included on the 'consolidated tape system' (CTS), and all quotes on these venues must be included on the 'consolidated quote system' (CQS). These two systems are run by the Consolidated Tape Association, which states:

Since the late 1970s, all SEC-registered exchanges and market centres that trade Network A or Network B securities send their trades and quotes to a central consolidator where the Consolidated Tape System (CTS) and Consolidated Quote System (CQS) data streams are produced and distributed worldwide.<sup>39</sup>

The CTS and CQS include volume and price information, and, in the case of the consolidated quote system, a 'national best bid-offer' (NBBO) is calculated. In many ways, this broadly corresponds to the level 1 data package discussed above. The system does not preclude the selling of other data products, and many market participants purchase additional data packages or pay to minimise their latency or to receive more detailed data.

In addition to the CTS and CQS, which govern quote and trade data dissemination for exchange-listed securities and therefore the provision of tape A (NYSE-listed stocks) and tape B (AMEX-listed stocks), the 'OTC/UTP Plan' governs quote and trade data dissemination for Nasdaq-listed securities (tape C).

This system is combined with the 'regulated national market system', which relates to best execution. Although the USA and EU have similar standards in requiring brokers to have and publish best execution policies and monitor execution, the USA has an additional order routing requirement. The essence of this process is best illustrated using a simple example. If a broker sends an order to buy 200 Citi shares to the NYSE, and the best offer price on NYSE is \$40.00 per share, but on Nasdaq the best offer is \$39.99, NYSE must route the buy order to Nasdaq for execution. However, this requirement covers only the best offer, so if the order arrives at NYSE and the disposition of the resting offers (of 100 shares each) is NYSE \$40.00 and \$40.01, and Nasdaq \$39.98 and \$39.99, the actual execution would be 100 shares at \$39.98 on Nasdaq and 100 shares on NYSE at \$40.00, notwithstanding the availability of 100 shares at \$39.99 on Nasdaq.

The USA is an example of close interaction between trading regulations and data regulations—without the CTS, the Reg NMS system could not be properly implemented. EU market infrastructure participants compete for volume in a more open, commercial fashion than the direct intervention of a system like Reg NMS.<sup>40</sup> Indeed, as shown by Caglio and Mayhew (2008),<sup>41</sup> the exact particulars of the regulatory system have substantial effects on behaviour in the US market. Any EU regulatory system should therefore be considered with the awareness that market participants are highly sophisticated and will rationally attempt to profit from any arbitrage opportunity in the system, potentially at a cost to investors. In contrast, a market-based data and trading system may be able to internalise such problems as part of the attractiveness of a venue in a way that direct intervention would exclude.

<sup>39</sup> See <http://www.nyxdata.com/cta>.

<sup>40</sup> Section 2.2 discusses how exchange data is part of a joint product, including trading and data, and that operators compete on this 'overall' or 'joint' level.

<sup>41</sup> Caglio, C. and Mayhew, S. (2008), 'Equity Trading and the Allocation of Market Data Revenue', Feds Working Papers 2012-65, Federal Reserve Board.

### 5.3 Are there alternative justifications for the regulation of market data services in Europe?

Sections 2, 3 and 4 provide a framework within which the pricing of market data services can be assessed, and an empirical and conceptual analysis, and conclude that there is no justification for regulating the pricing of market data services. Although this report has not analysed potential alternatives for the regulation of the pricing of market data services, it is clear that it would be very challenging to design a framework that is practical, and there would be a risk that it would actually distort the functioning of the market—defining the relevant services and regulating the prices would be far from straightforward.

Various market participants have suggested, both in public discourse and to Oxera in the course of carrying out this research, a number of specific justifications for the regulation of market data services:

- request that all trading venues offer market data for free in order to reduce barriers to entry for new trading venues;
- request that trading venues unbundle market data relating to market opening and closing auctions from market data relating to the continuous trading sessions, in order to create more competition in the provision of the market data relating to continuous trading;
- request that trading venues further unbundle market data by reference to the security or security type in order to improve the ability of users to access (ie, pay for) only that information which they require.

#### **Price of market data services and cost of entry by new trading venues**

New entry of trading venues is characterised by the entrant charging low, or no, market data fees. This makes economic sense in a market with economies of scale and network effects, as the economics of entry will be helped by a rapid build-up of use to a sustainable market share, and minimising the fixed costs to potential customers of using the new trading facility (eg, offering market data free of licence fees) will help to attract new customers.

In comparison, trading venues that can offer customers greater liquidity may be able to recover a greater proportion of their joint costs of providing trading and market data services, through market data fees. This is particularly the case for trading venues whose market data customers also trade large volumes on the trading venue, as for such customers market data fees will have a smaller effect on the overall average and marginal costs of trading on this venue.

In this context, some market participants have suggested that requiring market data services to be provided free of licence fees would reduce the barriers to entry for new trading venues. The following observations can be made.

First, market data fees are only one type of trading venue fee that has a fixed fee characteristic: membership and connection fees also have this characteristic. Therefore, any impact of requiring market data to be provided free of licence fees may be muted by subsequent changes in other elements of trading venues' pricing structures.

Second, although initial market entry may be marginally easier, some new entrants may find that a restriction on fees for market data services inhibits their ability to further establish themselves. For example, new trading venues that successfully attract a critical mass of trading in certain stocks may find it more difficult to expand further (as well as into less liquid shares) if they are not allowed to recover any of their joint costs of providing trading and market data services from market data fees, and therefore cannot offer as competitive trading fees as they otherwise could. This means that there is a potential trade-off between

allowing competition to have a focus on reducing transaction fees and thereby potentially fostering growth in trading volumes, and constraining market data costs and potentially increasing the ease of initial entry by new trading venues.

Third, given the level of market fragmentation currently observed both in the USA and in Europe (where, for many equity securities, there are at least three significant trading venues), there does not seem to be an indication that the pricing of market data fees has indeed prevented firms from entering the market for trade execution services. Furthermore, given decisions to clear a number of trading venue mergers by competition authorities, it is far from clear that further fragmentation would result in significant benefits from a competition policy perspective.

In sum, this justification for regulating the pricing of market data services does not seem to be supported by existing evidence.

### Competition in the provision of ‘continuous trading’ data

Although the continuous trading elements of trading equity securities are reproduced in a number of trading venues, the opening and, in particular the closing price auctions are still almost entirely confined to one trading venue per security (usually the trading venue on which the security has its primary listing). Trading venues with the opening and closing auction do not tend to split out market data relating to these auctions from market data relating to the continuous trading, and instead provide market data for the full trading day.

Some stakeholders have argued that requiring auction data to be provided separately from continuous trading data would intensify competition between providers of continuous trading data, and thereby reduce market data fees. However, both the economic characteristics of the production of data and trading services, and the demand characteristics for market data, suggest that this theoretical improvement in market dynamics might not materialise and/or be significant. In particular:

- enhanced competition in the provision of continuous trading data can develop only if there are a significant number of customers for whom both of the following conditions apply:
  - they require real-time access to auction data;
  - they do **not** require real-time access to **complete** continuous trading data.
- the number of market participants to whom both conditions apply appears to be very limited. Although clearly this demand pattern cannot be ruled out, if it is indeed limited, it will pose limited (if any) additional competitive pressure on trading venues forced to split out auction data from their continuous trading data, and it is likely that the overall price structure offered will remain broadly the same;
- if the group of market participants that do require real-time access to auction data, but only real-time access to continuous trading data from a subset of trading venues, is material, the impact on competition for continuous trading data may still be very limited (or non-existent). Trading venues that are forced to split auction data from continuous trading data are likely to reduce the price of continuous trading data (compared to the price for the original comprehensive market data product) and increase the price of auction data. A trading venue without auction data that wished to address this part of the continuous trading data market would therefore have to ensure that its price was below this new (lower) price, and unless it could price-discriminate between those who require full market data and those that require only partial market data, it might be uneconomic for the trading venue to actually compete for this niche market.

The market dynamics described above suggest that, at best, the overall impact of requiring auction and continuous trading data to be provided separately would be minimal. The

potential group of market participants that would benefit is unlikely to be large, and even they may not benefit because of the underlying market dynamics.

With an inherent danger of unintended consequences of regulation and there being some costs for any regulatory intervention, intervention of this sort runs the distinct risk of not achieving any overall net benefit to end-users. Further, much more detailed analysis would be required to be able to finally conclude that there would, indeed, be a net benefit for the (likely to be) small group of affected end-users.

### **Unbundling individual security market data**

The main market data services offered by trading venues in Europe tend to encompass all instruments traded on each of their cash markets. Market participants may trade only a subset of the instruments available in each market and, therefore, may be interested only in a subset of the market data provided. Splitting market data into its constituent securities would enable market participants to purchase less market data and still meet their needs. In addition, providing market data in this way would enable different trading venues to match more closely the market data products provided by their competitor trading venues, potentially enhancing competition in the provision of specific market data services.

The underlying economics of the provision of market data relating to individual securities are similar to those of the provision of market data services more generally. The marginal cost of supplying an additional customer with data relating to an additional security traded on the same platform to data already being provided in relation to other securities will be very low. Put another way, the cost saving to a trading platform of not supplying data that relates to a specific security traded on that platform to a specific customer will be very low, if not zero. The cost of supplying data relating to a subset of securities traded is, therefore, virtually the same as the cost of providing the complete set of data, once the decision has been made to supply the relevant data at all.

Under these circumstances the same market dynamics arise in relation to the split of the recovery of total costs from data and trading services. Prices will tend to reflect relative demand conditions, and not (relative) marginal costs. As a result, the prices for (and volume of demand for) market data for the heavily traded securities would be expected to recover the vast majority of market data revenue, while the market data relating to less traded securities would recover little of the revenue. Although this could result in marginally lower costs for those trading and investing only in the high-volume securities, a potential negative impact arises in relation to the low-volume securities as the number of brokers, fund managers and investors with access to information on these securities could fall. This could exacerbate differences in liquidity between the most- and least-traded securities, with a potential negative consequence in the provision of capital to the small and/or growing companies listed.

Splitting market data may also result in higher costs of market data services for end-users. Market participants requiring market data on a broad array of securities may incur higher transactional costs when handling a higher number of market data subscriptions with each trading venue/data vendor. Trading venues are also likely to incur additional costs, splitting their prevailing market data packages into smaller groups.

Ultimately, for this type of unbundling to improve competition in the provision of market data there must be a material demand for market data that covers only part of the market for a particular security. Unless this condition applies, market data that covers the same security from different trading venues is complimentary and not substitutable, and the same dynamics apply as described in the subsection above.

#### **5.3.1 Summary**

The underlying economics of the production of market data, combined with the demand conditions, mean that regulatory interventions designed to intensify competition between market data providers (such as those considered above) do not have a clear justification and

may have little, or no, overall positive impact on end-users. Furthermore, such interventions may increase overall transaction and regulatory costs, which would ultimately have to be paid for by end-investors (or companies raising capital). To be absolutely definitive on any net benefits (or disbenefits) to end-users, a much more detailed analysis would be required. However, the fundamental economic characteristics of both the joint product and very low/zero incremental costs of market data, and the economies of scale in transactions, mean that interventions to address apparent market anomalies (eg, prices not set at forward marginal costs, services sold in large bundles) may have negative outcomes and/or not achieve benefits for end-users.



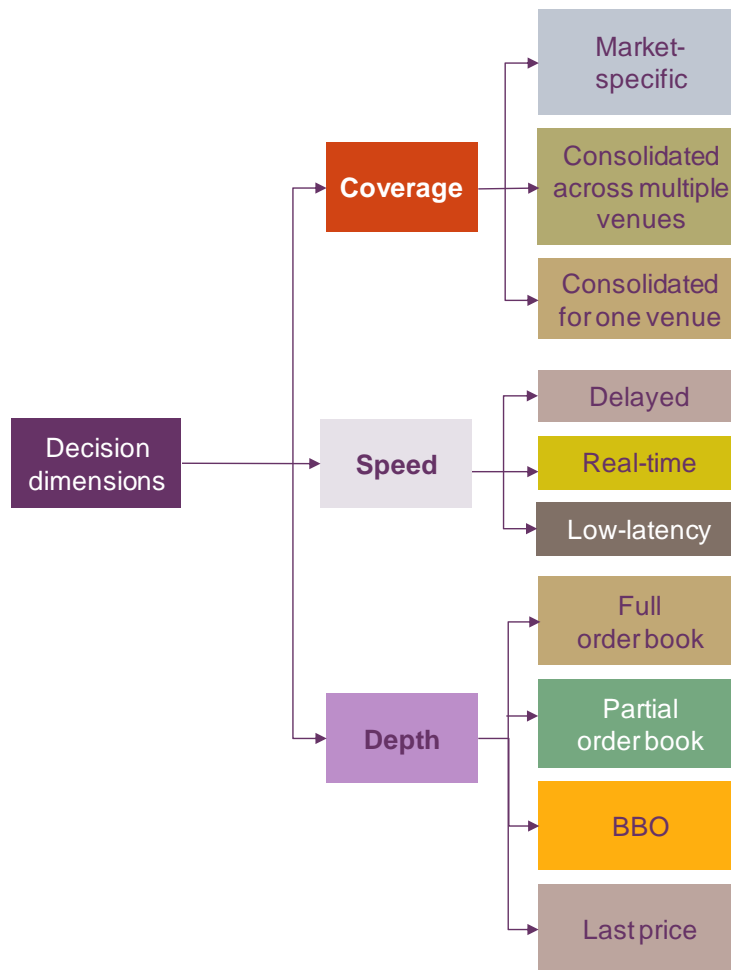
# A1 Analysis of the value chain

Exchanges, as well as MTFs, publish pre- and post-trade market data generated on their markets to brokerage and fund management firms, investors and other parties, typically via data vendors. This appendix elaborates on the multiple products and methods of accessing the data, and describes the processes by which the data reaches the end-user.

## A1.1 Different types of data

An end-user can choose between several types of data products. Figure A1.1 illustrates the three main dimensions along which market data products can vary—coverage, speed and depth—and provides some examples of the variation in data products along each.

**Figure A1.1 Data product choices**



Source: Oxera.

These dimensions are of differing importance to different clients. For example, an academic researcher building a model may require historical data with wide coverage and large amounts of detail from a vendor, whereas a high-frequency trader may require low-latency, full-detail data charged per device directly from the exchange.

## A1.2 Provider

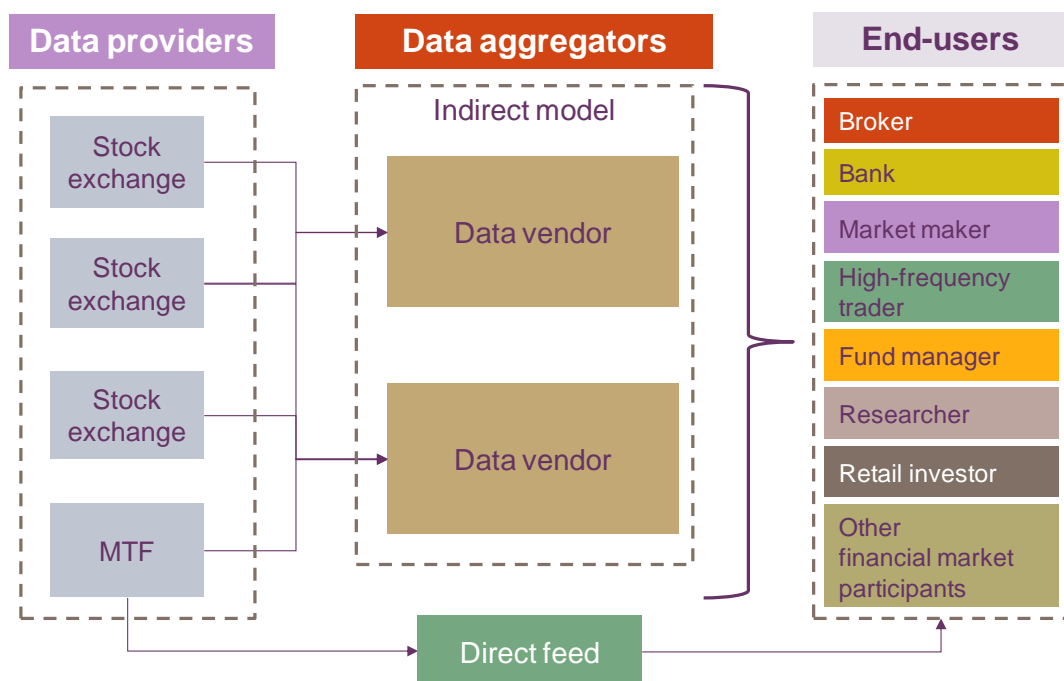
The choice of provider is endogenous to the decision about the data product. In general, exchanges make their data available for licensing on a 'wholesale' basis to data vendors and software providers, such as Bloomberg and Thomson Reuters.<sup>42</sup>

These vendors normally offer a platform that combines various data subscriptions, and the users of these platforms can purchase data from multiple exchanges and other data sources in a common format. Customers accessing market data through data vendors may also choose to purchase some of the analysis packages vendors offer, such as pre-trade analysis.

However, certain users, such as high-frequency traders, will often interact directly with the exchange to manage their data connection.

In the indirect model, the user pays the vendor for the access (which often includes a value-added/mark-up component), and then the vendor requests a subscription from the data provider on behalf of the user, as shown in Figure A1.2 below.

**Figure A1.2 Value chain**



Note: Retail investors are unlikely to ever source a direct feed from a trading venue.  
Source: Oxera.

## A1.3 Nature and detail

Data generated by exchanges and MTFs can be grouped into the following three main categories:

- pre-trade data concerning quotes and orders and respective volumes;
- post-trade data concerning execution prices and volumes;

<sup>42</sup> As also explained by the European Commission in Deutsche Börse/NYSE Euronext: 'overall, the majority of the Notifying Parties' [Deutsche Börse and NYSE Euronext] revenues from proprietary market data are derived from sales through third party data vendors, with a smaller portion of sales made directly to end-users'. See European Commission (2012), *Case No COMP/M.6166 – Deutsche Börse / NYSE Euronext*, February, pp. 31–2.

- surveillance data for identifying participants and analysing behaviour for regulatory and legal reasons.

Reflecting the different purposes of each data category, different levels of detail are provided for each. In the case of market surveillance and market supervision data, the detail of the data limits the scope of distribution. Whereas anonymised pre- and post-trade data is available to the public, market surveillance data generally contains sensitive private information (eg, trader IDs) that would not be appropriate for public distribution.

Product divisions as regards pre- and post-trade data often vary between exchange operators. For example, while some operators offer only a distinction between a ‘level 1’ product (including post-trade and BBO) and a ‘level 2’ product (including level 1 plus a number of levels in the order book), others have more nuanced distinctions.

## A1.4 Speed

Market data products may vary in speed. Normally, ‘delayed’ data refers to data that is published 15 minutes or more after the publication of the transaction. In line with the MiFID guidelines discussed in section **Error! Reference source not found.**, this data is normally free of data licence fees or at very low cost.<sup>43</sup> Real-time data is more expensive and can be subdivided into the ‘standard’ real-time product (which is fast enough for a human user to experience it as real time) and ‘low-latency’ connections. The latter are more bespoke and can involve more technical optimisation of the connection, such as on-site computer location, and are mainly of interest to fast high-frequency traders who require connections with low millisecond or even micro-second speeds (see Figure A1.3).

**Figure A1.3 Data speed and detail**

Speed/depth	Post-trade	(Pre-trade) BBO	(Pre-trade) Top of order book	(Pre-trade) Full order book
Delayed	Normally free of charge/low-cost			
Real-time				
Real-time— low-latency				

Source: Oxera analysis.

The above discussion has already suggested the purpose of this data—broadly, those directly involved in trading on the platform are more likely to be interested in the more detailed and faster products, while retail investors and researchers are more likely to be content with delayed data (at least most of the time).

## A1.5 Coverage of data

Some exchanges bundle multiple data products (ie, data covering different venues and asset classes is offered in a bundle), while others provide data separately by asset, venue or other typologies. For example, Euronext offers some single-venue data products (eg, reference prices for Amsterdam) as well as asset classes (eg, cash equities, equity indices). In

<sup>43</sup> European Commission (2011), ‘Proposal for a Regulation of the European Parliament and of the Council on markets in financial instruments and amending Regulation [EMIR] on OTC derivatives, central counterparties and trade repositories’, p. 9, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0652:FIN:EN:PDF>.

contrast, SIX Swiss Exchange offers a single-data product only, covering all equity and fixed-income data from SIX.

Data vendors do not always follow the exchange's bundling choices. It is not uncommon for vendors to offer a subset of the products offered by the data provider. For example, Bloomberg offers only three of BME's five levels of equity data, and Borsa Italiana's more comprehensive division of products according to the number of order book levels is compressed by Bloomberg into only level 1 and full order book level 2.

Oxera's discussions with operators revealed that the structure of these data divisions often stems from the underlying system used by the exchange, enabling the exchange operator to split the data without high cost.

## A1.6 Pricing structure

The structure of pricing across exchanges varies along several dimensions:

- 'unit' of data—eg, per user/device, per data request;
- type of user—eg, professional, private, display/non-display;
- number of users (as there are sometimes volume discounts);
- coverage of venues (as above);
- product detail (as above);
- product speed (as above).

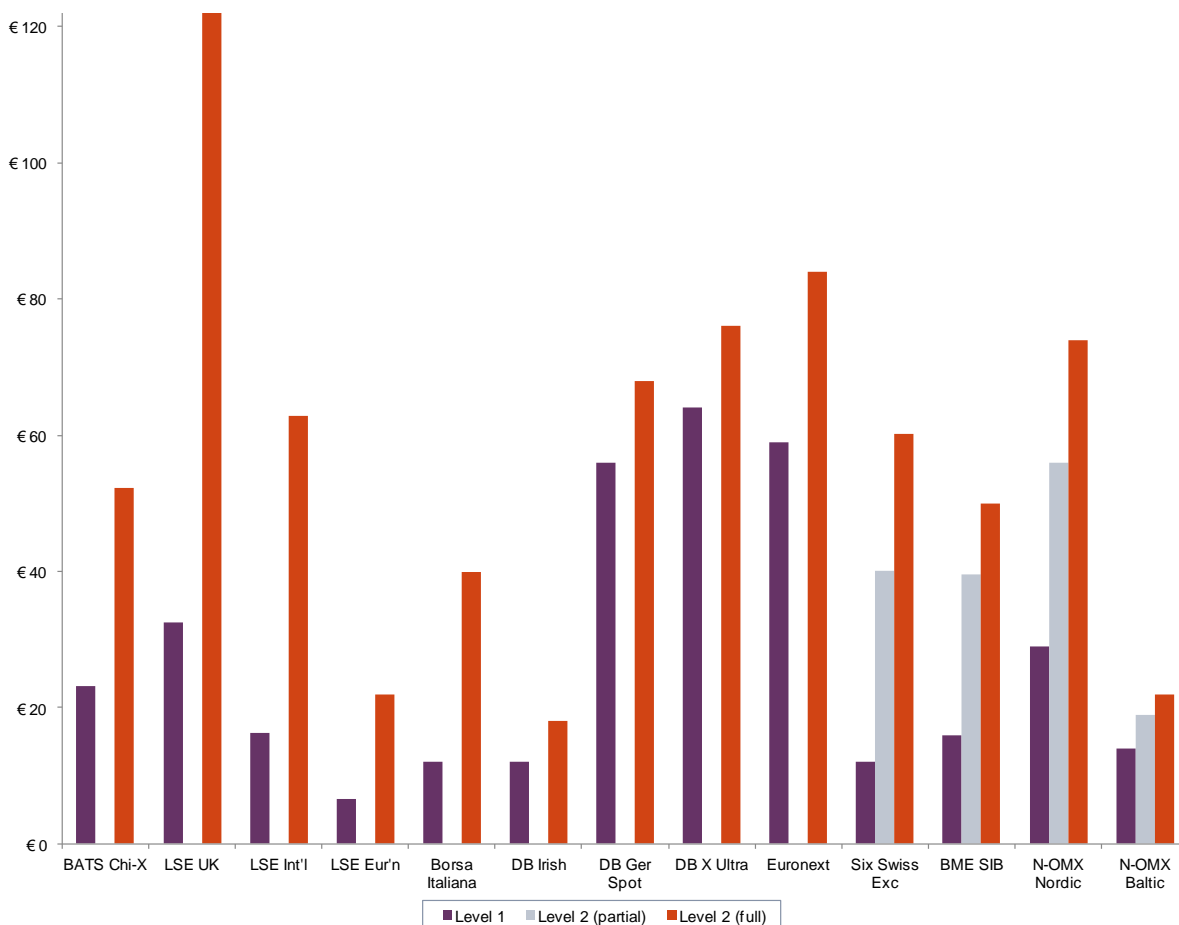
As noted above, while some exchanges offer a single product of a certain depth/speed encompassing multiple venues, others split data products by venue or asset class. Thus, 'NYSE Euronext Cash Level 1' would be a typical product, referring to level 1 real-time data for Euronext cash equity markets. These products are often sold at a per-user, per-month fee through a data vendor. However, this is only one possible fee structure. There is a wider flexibility in the 'unit' of data, which can be per user, per device, per data request or simply per annum. Moreover, the market is divided by user type, as there are also substantial discounts for non-professional users of the data. In addition, exchanges offer volume discounts for a variety of the data products. Similarly, registered traders of several European exchanges are entitled to use data free of charge for trading purposes on that particular venue.

Some price structures are more suited to certain client types than others. For example, a proportion of users want to access market data only infrequently, and do not require a constant feed. An example of such a user could be a retail investor who monitors the daily delayed price free of charge, but may require a different speed or depth of data during a certain period (perhaps in anticipation of buying/selling). For this type of usage, several exchanges offer a per-request fee structure, rather than a monthly subscription. Data vendors, including retail brokers, often use this option in order to service a wide number of infrequent clients.

Figure A1.4 below shows the professional user licence fees for data feeds from a variety of exchanges. The products are not entirely comparable, owing to different venue scope and slightly different depth and timing features. Nonetheless, it can be observed that all feeds are within an order of magnitude or so of each other. Several features deserve further mention:

- broadly, venues executing a smaller volume/value of trades have lower data fees—for example, data fees are much lower for the Irish Stock Exchange and the Baltic part of the Nasdaq OMX market than those of the London Stock Exchange;
- universally, increasing the depth of data raises the price—in price terms, level 1 is cheaper than level 2 (partial), which is cheaper than level 2 (full).

**Figure A1.4 Data subscription fees across venues by data type (per professional user per month)**



Note: London Stock Exchange member fees are used for this figure; comparable non-member fees for LSE UK-only market data are €45 for level 1 data and €183 for level 2 data. The figures avoid any level of volume discount—ie, they are for a single user applying for a single feed.  
Source: Oxera analysis of fee schedules of exchanges and MTFs.

A large number of users use data vendors, who charge their own (different) fees. Data vendors typically charge users separate fees to access real-time market data from different trading platforms. The fees charged by data vendors are generally higher than the license fees charged by trading platforms for direct access, reflecting cost recovery by the data vendor of their formatting, system provision system and add-on products. Data vendor fees (and the associated service) are also under pressure from competitor data vendors. Analysis by Atradia in 2010 suggested that the mark-up is approximately 5–30%, and varies by product.<sup>44</sup> Oxera's own analysis of comparable prices confirms this to be the case,<sup>45</sup> but as Bloomberg's fees are exclusively in US dollars the mark-up will vary according to exchange-rate fluctuations.

<sup>44</sup> Atradia (2010), 'The cost of access to real time pre & post-trade order book data in Europe', August.

<sup>45</sup> Oxera's analysis is not presented as is based on privately provided price lists from Bloomberg and Thomson Reuters, that are not in the public domain.

## A2 Competitive dynamics in capital markets

### A2.1 Key economic characteristics of trading venues

The key economic characteristics of exchanges and other trading platforms can be grouped into the following four categories:

- cost structure;
- joint products;
- network externalities;
- potential buyer power.

These characteristics determine the nature of competition and are described in the following sub-sections.

#### A2.1.1 Cost structure and economies of scale

Exchanges and MTFs are characterised by high fixed costs and low marginal costs.<sup>46</sup> A large proportion of exchange costs revolve around technology and attracting order flow to the platform,<sup>47</sup> whereas the cost of the marginal product (an extra trade) is very low, as it is simply utilisation of the existing infrastructure built to handle such trades. There are some costs that raise the marginal impact, such as increased surveillance data-gathering and potential administration tasks relating to an additional trade, bringing the marginal cost above zero.

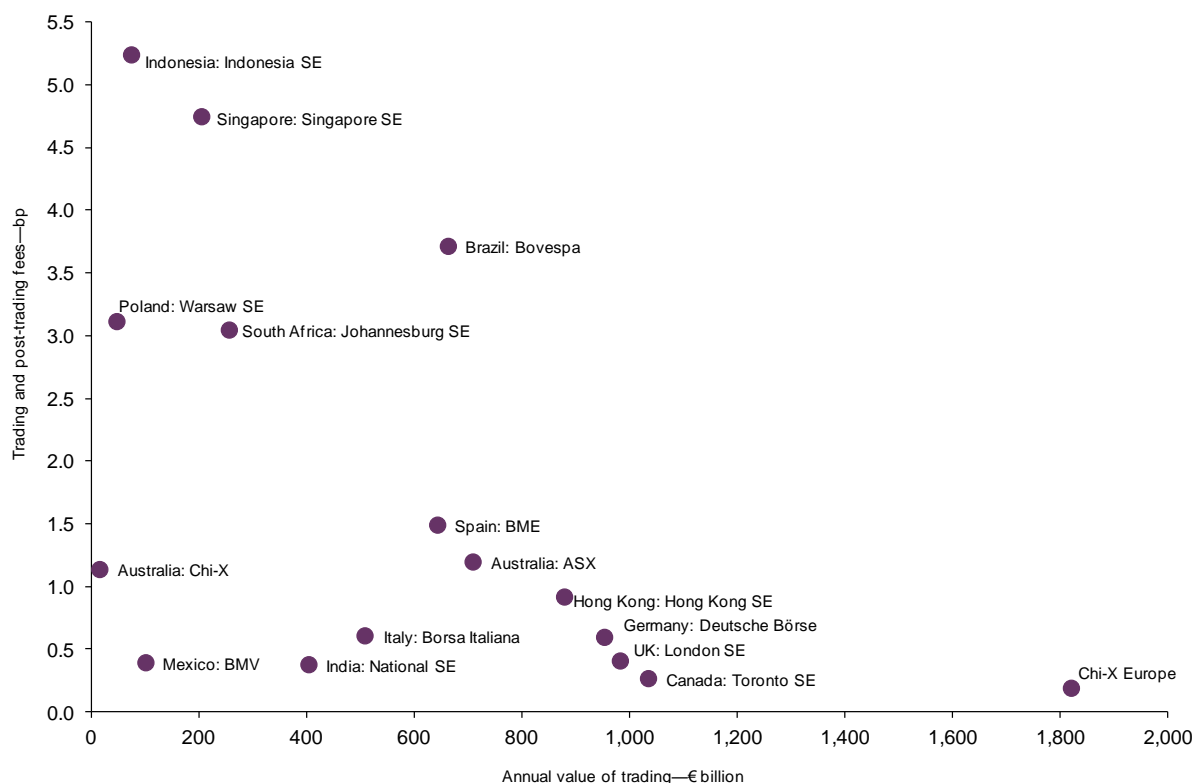
Often, markets with high fixed costs have non-standard pricing structures—ie, not simply a single per-unit fee—to enable efficient recovery of fixed costs. Common structures include two-part tariffs (a fixed entry/access fee plus a variable unit fee), volume discounting, fixed fees for unlimited usage (eg, broadband subscription), and price differentiation between different customer types (eg, students and pensioners and, in the case of trading venues, liquidator takers and liquidity providers).

As a result of the high fixed costs and low marginal costs, trading venues are characterised by economies of scale. This is shown in Figure A2.1, which shows the relationship between the cost of trading (and post-trading) and the value of trading.

<sup>46</sup> This has been widely recognised. See, for example, Office of Fair Trading (2013), 'Anticipated Acquisition by London Stock Exchange Group of Control of LCH.Clearnet Limited', January, p. 42, available at: [http://www.of.gov.uk/shared\\_of/mergers\\_ea02/2013/LSEG.pdf](http://www.of.gov.uk/shared_of/mergers_ea02/2013/LSEG.pdf).

<sup>47</sup> According to an earlier study by Lee and Kwong, approximately 20% of exchange costs are due to systems, and another 9% are due to premises. See Lee, J. and Kwong, L. (2002), 'Revenue and Cost Trends of Global Stock Exchanges and HKEx', November, available at: <http://www.sfc.hk/web/doc/EN/research/research/rs%20paper%202002.pdf>. The World Federation of Exchanges also provides a detailed breakdown of historical revenues and costs. See World Federation of Exchanges (2010), 'Cost and Revenue Survey', available at: [http://www.world-exchanges.org/files/statistics/excel/2010%20Cost%20%26%20Revenue%20Survey\\_Final.pdf](http://www.world-exchanges.org/files/statistics/excel/2010%20Cost%20%26%20Revenue%20Survey_Final.pdf).

**Figure A2.1 The relationship between the cost and value of trading and post-trading for selected exchanges**



Note: The costs of trading and post-trading in this figure are for institutional investors using large intermediaries, based on the analysis in Oxera (2013), 'The Oxera Trading and Post-trading Monitor', note prepared for ASX Group, April. The institutional investor has assets of €100m, a trading velocity of 200%, and an average order size of €125,000. The large intermediary is assumed to trade (on average) 100,000 times a day, with an average trade size of €10,000, and to hold a CSD account of €39 billion. For an overview of the infrastructures considered in each financial centre, see Oxera (2013), 'The Oxera Trading and Post-trading Monitor', note prepared for ASX Group, April. For each of the financial centres considered, the value of electronic order book (EOB) trading on the relevant trading venue during the 12-month period ending January 2013 (the latest period for which data is consistently available) is reported.

Source: Oxera (2013), 'The Oxera Trading and Post-trading Monitor', note prepared for ASX Group, April.

### A2.1.2 Joint products and cost allocation

Joint products are an economic concept designed to explain the situation where the production of one product simultaneously involves the production of one or more other products. A textbook examples is cattle livestock, which results in the production of beef and leather.

In the case of joint products, the production costs of the outputs of two or more products cannot be separated—they are joint costs. In other words, they are incurred when production facilities simultaneously produce two or more products in fixed proportions, such that an increase in the output of one product will necessarily mean a corresponding increase in the output of the other product.

In the case of trading, there are two levels of joint product. First, the trade execution is a service for the buyer and seller simultaneously, as the production of any trade requires both sides to be present. As financial market participants both buy and sell on the exchange, it is difficult to apportion the costs between 'buyers' and 'sellers'.

In the second sense of 'joint product', the exchange or trading platform actually produces two products at the same time using the same inputs—'trade execution' and 'market data services'—as each transaction is necessarily linked to the production of data.

The joint product nature can have implications for the pricing of the individual products. The total costs incurred by an exchange and trading platform can, in principle, be recovered from the fees for trade execution services or from fees for data services, or from a combination of fees for these two services. Since the costs are jointly incurred and cannot be separated, the costs of production cannot be allocated based on input drivers and are often allocated based on demand factors, such as the prices, revenues or consumers' willingness to pay.<sup>48</sup> One variant is to allocate costs using the Ramsey pricing principle, which states that it is economically efficient to recover a relatively larger part of costs from those customers whose demand is relatively more inelastic (ie, less sensitive to price).<sup>49</sup>

### A2.1.3 Network externalities

Trading platforms are characterised by network effects (or network externalities). From an economic perspective, network effects mean that an individual's demand depends not only on the individual's own preferences—as in normal markets—but also on the demand of other individuals.

Network effects generally represent positive externalities, in which case an individual's demand for a good increases not only as the price of that good falls (the 'normal' relationship), but also with the demand for that good by other individuals. In some cases network effects can represent negative externalities—for example, congestion on a road network. These effects can be between the same group of users or between different classes of users. For example, in a telephone network, externalities arise among the class of 'people wanting to make and receive phone calls', whereas a PC operating system becomes more valuable to PC users as the number of programmers that write applications for the operating system increases; moreover, it becomes more valuable to programmers as the number of users of the system increases.

Various network effects characterise the operation of stock exchanges.<sup>50</sup> These effects arise in both the primary market—where companies list their shares on the exchange—and the secondary market—where shares are traded among investors (normally through brokerage firms):

- in the primary market, network effects arise between companies and investors (through pools of capital). Companies will seek to list (or be admitted to trading) at the exchange that offers them access to the greatest pool of capital. Pools of capital will be attracted to those exchanges where most companies are listed;
- network effects arise in the secondary market between companies and brokers (through liquidity)—the more a security is traded on a given exchange, the more attractive that exchange is to issuers;
- network effects also arise in the secondary market between brokers as a class (through liquidity)—the more brokers there are that use a trading platform (or rather, a price-formation umbrella) in order to trade a certain security, the more attractive that platform is to any individual broker wishing to trade in that security.

Network externalities are illustrated in Figure A2.2 below.

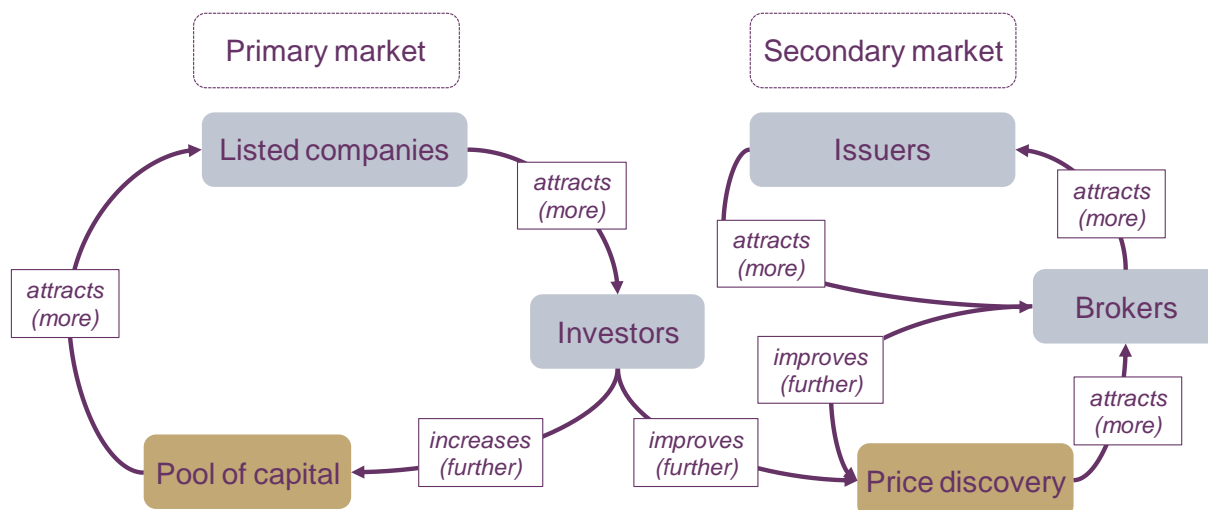
<sup>48</sup> As was already recognised in Marshall, A. (1920), *Principles of Economics*, Book V, Chapter VI.

<sup>49</sup> The efficiency of Ramsey pricing lies in the fact that it generally leads to higher total output, and hence generates higher surpluses for consumers.

<sup>50</sup> For example, as identified by the UK Office of Fair Trading in its investigation of the BATS/Chi-X merger. See Competition Commission (2011), 'A report on the anticipated acquisition by BATS Global Market, Inc of Chi-X Europe Limited', November. Section 10 of the same report describes competition and network effects extensively.



**Figure A2.2 Network externalities in stock markets**



Source: Oxera.

Markets with network externalities may be prone to ‘tipping’, where a network that has obtained a critical mass of users may have a competitive advantage over rival networks. In stock markets this is particularly relevant for liquidity: trading in a specific security may tip towards the trading platform where most market participants already trade that security, and hence where liquidity is greatest. Liquidity is the key network effect in trading and is of great importance to traders choosing a lit venue (one with observable price formation), as it represents the ease and cost with which they can build and liquidate their positions. A highly liquid platform will suffer relatively little price change from a trade of a given size compared with a venue with lower liquidity. This is because there are relatively more traders in the former wishing to buy or sell at or near the current price, which lowers the spread between the bid and offer and thus the cost of trading.

#### **A2.1.4 Potential buyer power**

Users of exchanges are often quite large, including global brokerage firms, banks and dealers. Such customers act as gatekeepers for investors, supplying trading and post-trading services to end-users and providing these services in exchange for a commission fee when a client wishes to trade. These users have been identified in competition cases as an important constraint on exchanges, through their incentive to reduce the cost of their trading and their ability to move large volumes and/or to sponsor entry of a rival provider.<sup>51</sup>

## **A2.2 Competition between trading platforms in Europe**

Competition in the EU exchange market has been studied in a number of reports and competition investigations.<sup>52</sup> In general, the following three conclusions are drawn:

- exchanges compete on a platform or combined product level (ie, not at the level of specific fees);
- liquidity and other network effects are a key part of a venue’s attractiveness and are thus important to its maintenance of market share and business; and

<sup>51</sup> See, for example, Competition Commission (2011), ‘A report on the anticipated acquisition by BATS Global Market, Inc of Chi-X Europe Limited’, November, p. 5. During the BATS/Chi-X merger the Competition Commission found that ‘customer consortia’ had previously sponsored the entry of MTFs into the exchange sector and had overcome the barriers to entry (predominantly network effects and regulatory barriers), and considered that this would continue to be feasible in the future, thus acting as a constraint on incumbents’ behaviour and ensuring that the quality of offerings would remain high, and prices would remain low.

<sup>52</sup> For further general discussion of competition in the exchange sector, see Oxera (2012), ‘What would be the costs and benefits of changing the competitive structure of the market for trading and post-trading services in Brazil?’, section 2.

- potential entry into the market is an important constraint on an exchange's behaviour.

After regulatory reforms, EU-wide trading in a particular product was not limited to the platform on which it was listed, giving rise to venues that competed for the order flow from incumbent exchanges, such as BATS, Chi-X, Turquoise and Burgundy. These operators have garnered a strong market share (BATS Chi-X Europe holds approximately 20% of European lit equity trading on either a volume or value basis) and compete for liquidity.<sup>53</sup>

Many domestic stock exchanges nowadays face competition in the secondary market from a number of other trading venues, including alternative trading systems, crossing networks, direct broker-to-broker trades, and in-house matching (internalisation of trades) by brokers, as well as other stock exchanges. For any particular trade in a security that is listed on the 'central' exchange, market participants often have a choice among these different execution venues, of which the central exchange's own trading platform is only one. The choice of venue normally depends on the type and size of the trade, and is guided by factors such as the spread, trading fees, market impact costs, and transparency requirements. Prices for trading and post-trading services have generally fallen since the introduction of platform competition in 2007.<sup>54</sup>

Exchanges and MTFs compete for trades on the basis of gaining both additional revenue and more liquidity, offering volume discounts and incentive programmes to keep volume high. As discussed, this competition may result in 'tipping points', whereby large numbers of traders will switch venue in order to benefit from increased liquidity elsewhere.<sup>55</sup> There are various examples of successful entry and competition, such as the rise of BATS Chi-X Europe and Turquoise in equities, the successful entry by Intercontinental Exchange (ICE) into Dutch natural gas trading, and fierce competition between Chicago Mercantile Exchange (CME), NYSE, Deutsche Börse and ICE over interest rate, commodity and foreign exchange contracts. As set out in section A2.1.4, the credible threat of potential entry is a key constraint and a major part of competition in exchange markets.

As an alternative to exchanges, traders can also use dark pools and OTC venues. These exist mainly to facilitate large trades that would have a significant impact on the market, providing an off-market option that does not influence the traded price. Typically, a participant wishing to make a particular trade will evaluate their on- and off-market options before choosing which venue(s) to execute on.<sup>56</sup>

As a trader, one considers the overall cost of trading in order to get the best execution outcome, and this cost has a number of components—ie, the direct cost of trading, the trade and clearing fees, and the bid–offer spread on the venue; as well as data fees, membership fees, and other features such as overall latency, counterparty risk and trading hours. This is described by the UK Office of Fair Trading in two decisions (BATS/Chi-X<sup>57</sup> and London Stock Exchange/LCH.Clearnet<sup>58</sup>), and by the Competition Commission for BATS/Chi-X.<sup>59</sup>

<sup>53</sup> BATS Chi-X Europe publishes its daily market share of European equity trades online at: [http://www.batstrading.co.uk/market\\_data/market\\_share/market/](http://www.batstrading.co.uk/market_data/market_share/market/).

<sup>54</sup> European Commission (2012), 'Case No COMP/M.6166 – Deutsche Börse / NYSE Euronext', February, p. 22. For a discussion of the fall in trading and post-trading costs, see Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', prepared for European Commission DG Internal Markets, available at: [http://ec.europa.eu/internal\\_market/financial-markets/docs/clearing/2011\\_oxera\\_study\\_en.pdf](http://ec.europa.eu/internal_market/financial-markets/docs/clearing/2011_oxera_study_en.pdf).

<sup>55</sup> Competition Commission (2011), 'A report on the anticipated acquisition by BATS Global Market, Inc of Chi-X Europe Limited', November, p. 5.

<sup>56</sup> European Commission (2012), 'Case No COMP/M.6166 – Deutsche Börse / NYSE Euronext', February, p. 15.

<sup>57</sup> Office of Fair Trading (2013), 'Anticipated Acquisition by London Stock Exchange Group of Control of LCH.Clearnet Limited', January, p. 26, available at: [http://www.of.gov.uk/shared\\_of/mergers\\_ea02/2013/LSEG.pdf](http://www.of.gov.uk/shared_of/mergers_ea02/2013/LSEG.pdf).

<sup>58</sup> Office of Fair Trading, (2011), 'Anticipated Acquisition by BATS Trading Limited of Chi-X Europe Limited', July, p. 28.

<sup>59</sup> Competition Commission (2011), 'A report on the anticipated acquisition by BATS Global Market, Inc of Chi-X Europe Limited', November, p. 15.

Park Central  
40/41 Park End Street  
Oxford OX1 1JD  
United Kingdom

Tel: +44 (0) 1865 253 000  
Fax: +44 (0) 1865 251 172

Stephanie Square Centre  
Avenue Louise 65, Box 11  
1050 Brussels  
Belgium

Tel: +32 (0) 2 535 7878  
Fax: +32 (0) 2 535 7770

200 Aldersgate  
14th Floor  
London EC1A 4HD  
United Kingdom

Tel: +44 (0) 20 7776 6600  
Fax: +44 (0) 20 7776 6601