

# The Structure, Regulation, and Transparency of European Equity Markets under MiFID



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ISBN 978-0-938367-38-3  
January 2011

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## Executive Summary

The structure and regulation of European equity markets have been the focus of much scrutiny by investors and policymakers in the three years since the implementation of the Markets in Financial Instruments Directive (MiFID). Over this period, new trading venues and execution facilities have developed—spurred by regulatory changes and technology—which have increased competition and have fragmented markets.

Within this diversified landscape, market transparency—the visibility of prices, trading interest, and details of executed trades—has been adversely affected by a regulatory framework that imposes different transparency obligations according to the type of trade and type of execution venue. As a result, the volume of trades executed outside of so-called lit markets has increased.

For investors, transparency is important because it facilitates price discovery and underpins confidence, which, in turn, supports liquidity. Investors' interests are best served by market structures that provide ample transparency and by a regulatory framework that provides for a level playing field amongst trading venues, not the least with respect to the application of transparency rules.

In this report, we examine the structure of European equity markets and the regulatory framework applicable to the different types of trading venues, focusing on the transparency obligations pertaining to each venue and type of trade. We examine reported trade data to determine the transparency of the markets and consider the relationship between transparency and market quality, measured by bid–offer spreads. We offer policy considerations on the basis of the findings.

### Summary Policy Considerations

Policy measures should support greater transparency and greater consistency in the application of transparency rules within the regulatory framework. To support these transparency goals, we recommend the following key policy considerations:

1. **Market structure: encourage more trading on transparent organised trading venues.**
  - a. *Prevent orders up to standard market sizes from being executed outside of MiFID organised trading venues (regulated markets, multilateral trading facilities, and systematic internalisers). OTC (over-the-counter) business is acceptable for ad hoc, large, or non-standard transactions. However, there is little economic rationale for standard marketable order flow to be executed through OTC channels. Such a measure would also mitigate regulatory arbitrage between organised trading venues and OTC activity.*
  - b. *Maintain the existing 'large-in-scale' pre-trade transparency waiver thresholds. A reduction of the large-in-scale thresholds could have adverse unintended consequences on market transparency. The fall in average order and transaction sizes since the implementation of MiFID has increased the gap between 'large' order sizes and average order sizes. A lowering of these thresholds, however, would necessarily result in a greater proportion of dark transactions—which already account for between approximately 40 percent and 50 percent of all transactions.*
2. **Regulatory framework: level the playing field so that venues conducting similar types of business, and orders of similar types and sizes, are subject to the same rules.**
  - a. *Require broker crossing networks that facilitate multilateral order execution, and that engage in a similar size of business as MTFs, to register as MTFs and be bound by the same regulatory framework that applies to MTFs. This recommendation would ensure that all 'marketplaces' are subject to the same market-oriented rules. It would also uphold the proportion of trading being transacted through organised trading venues and mitigate regulatory arbitrage amongst venues.*
  - b. *Establish a minimum size threshold for dark reference price systems (dark pool MTFs) that provide for executions at prices inside the quoted spread on the stock's reference market. Average transaction sizes on such systems are broadly equivalent to those on transparent order book markets. A minimum size threshold is necessary to provide consistency in the application of*

transparency rules for similarly sized orders. This recommendation upholds the principle that only large or non-standard orders should be exempt from pre-trade transparency requirements. Such a threshold would also help uphold the proportion of trading on transparent venues (Consideration 1).

- c. *Require residual orders ('stubs') that fall below the large-in-scale thresholds to be pre-trade transparent.* This recommendation is appropriate to ensure fair treatment with other similarly sized orders.

Other considerations relevant to improving market transparency include:

### 3. Improve the quality and utility of post-trade data.

- a. *Shorten the permissible trade reporting delays under the MiFID deferred publication framework, as recommended by CESR (Committee of European Securities Regulators).* The current maximum permissible time delay of three days undermines the timeliness and usefulness of post-trade data. In general, exceptions to real-time trade publication should not extend beyond the current trading day (or the start of the next trading day). Trades published with a delay should also be identified as such in trade reports.
- b. *Implement CESR's recommendations to introduce Approved Publication Arrangements to improve the accuracy, consistency, and reliability of post-trade data.* MiFID should require trade data to be published in a standardised format, utilising consistent symbology, with appropriate quality-control procedures to ensure data quality. Such measures are necessary to facilitate the consolidation of post-trade data.
- c. *Implement a consolidated tape.* Investors need access to a complete and clear picture of market prices and trading interest to facilitate the investment decision-making process and to assist the accomplishment and measurement of best execution. Accordingly, MiFID should mandate the requirement for a consolidated tape. Authorities should task industry to develop a consolidated tape according to clear standards and time frames that meet the needs of investors.

## Summary of Findings

### Market structure

- Market structures can be classified as being either multilateral or bilateral according to the manner in which trades are executed.
- Multilateral trading venues include regulated markets (RMs) and multilateral trading facilities (MTFs). These venues predominantly operate limit order book markets, which match orders from multiple third parties on a non-discretionary basis according to pre-defined rules that establish price and time priority. In general, RMs and 'lit' MTFs are highly transparent trading venues that provide pre-trade visibility of the limit order book as well as details of executed trades. In contrast, 'dark' MTFs (or 'dark pool' MTFs) do not display any orders, offering no pre-trade transparency. Post-trade data, however, are published in an analogous fashion to lit MTFs. Indeed, all transactions, irrespective of the execution venue, must be published as close to real time as possible unless the transaction is large relative to normal market sizes.
- Bilateral structures include systematic internalisers (SIs), which are investment firms that internalise order flow to deal on their own account, acting as the counterparty to all buy and sell orders. Systematic internalisation, by its bilateral nature, is a subset of OTC execution. Pre-trade transparency requirements for SIs are limited in scope compared with RMs and MTFs, only applying to dealings up to standard market sizes in liquid markets. Overall, systematic internalisation is less transparent than trading on RMs and MTFs.
- All transactions executed outside of the MiFID trading venue classifications (RM, MTF, and SI) are generically classed as OTC. Such transactions include non-systematic bilateral trades executed on an ad hoc basis by an investment firm acting in a principal or agency capacity. Another type of activity classified as OTC is trading transacted through internal crossing networks operated by banks and brokerages (dark pool crossing systems). These systems operate on a discretionary basis and facilitate transactions by crossing client orders or by executing such orders against the broker's own account. Broker-operated internal networks provide anonymity and reveal very little about an order prior to execution, providing no pre-trade transparency.



## Regulatory framework

- Pre-trade transparency obligations under MiFID require RMs and MTFs to publicly post current bid and offer prices and depth of trading interests at those prices and to make such data available on a continuous basis. These requirements ensure visibility of the order books operated by RMs and MTFs, making them the most transparent types of trading venues. The equal application of the transparency requirements to RMs and MTFs ensures that these venues compete for liquidity against each other on an even regulatory footing.
- MiFID allows regulatory authorities to grant exemptions to RMs and MTFs from pre-trade transparency for orders and trading systems satisfying one of the following criteria: (a) orders that are large in scale, (b) 'reference price' systems, (c) systems that formalise 'negotiated transactions', and (d) orders held in an order management facility pending disclosure to the market (i.e., reserve orders). Dark pool MTFs most commonly benefit from the reference price system waiver by providing passive order matching at prices pegged to a reference market.
- For SIs, pre-trade transparency is restricted to specific classes of shares and sizes of business. SIs that only deal in sizes above standard market size are exempt from pre-trade transparency requirements. As such, the requirements are limited in comparison with RMs and MTFs.
- Pre-trade transparency requirements do not apply to OTC transactions that fall outside of the MiFID 'trading venue' definitions.
- Post-trade transparency requirements apply equally to RMs, MTFs, and investment firms, irrespective of whether the investment firm is acting as an SI or engaging in other OTC transactions.
- The price, volume, and time of execution for all transactions, irrespective of where they take place, must be published as close to real time as possible. However, transactions that are large relative to normal market sizes are exempt from immediate trade reporting.
- Trades reported with a delay are the least transparent type of transaction because, in addition to their reduced timeliness, such large trades are also not pre-trade transparent. They either are executed OTC or benefit from the large-in-scale waiver if the trade is executed through an RM or MTF.
- Whilst the post-trade transparency requirements and associated deferred publication arrangements apply equally to trading venues and to OTC transactions, the publication mechanisms may differ, which means that the quality, consistency, and reliability of reported data may differ. Moreover, the provisions for delayed trade publication mean that transparency varies amongst different classes and sizes of orders.

## Trade transparency

### *Stylised Facts*

- European equity trading is split roughly in half between those trades executed through transparent order book markets operated by RMs and MTFs and those executed in a less transparent OTC capacity. There is no significant upward or downward trend in either half over the period from January 2008 to October 2010.
- Dark trading (representing all trades in which both sides of an order are not pre-trade transparent) constitutes a significant proportion of European equity trading, averaging 46.4 percent over the period from January 2008 to October 2010. Dark trading comprises OTC transactions (of which broker crossing network dark pools are a subset), non-order-book trades reported to exchanges (including large and negotiated transactions), and dark MTF trades. For comparability, as of October 2010, OTC trading in Europe amounted to 37.6 percent of total turnover (of which broker crossing networks amounted to 3.2 percent of OTC turnover and 1.2 percent of total turnover); non-order-book on-exchange reported transactions amounted to 9.6 percent; and dark MTF trades amounted to 1.3 percent. In total, therefore, dark trading amounted to 48.5 percent of total turnover. Combining broker crossing network activity with dark MTFs, total dark pool trading amounted to 2.5 percent of total turnover for the same month.
- Trades reported with a delay under the MiFID deferred publication framework represent approximately one-fifth of all trades, on average.
- The data also suggest that transaction sizes, on average, are getting smaller. This trend is most pronounced for dark MTFs.

*Empirical Analysis*

- We assign a transparency ranking to the different classifications of trades. Based on these rankings and the respective market shares of each trade type, a transparency index is constructed which reflects the weighted average transparency score (or rank) for the market concerned.
- Analysis of transparency measures for select European markets—France, Germany, Spain, the United Kingdom, and the Netherlands—suggests that:
  - High average transparency scores broadly correlate with low average bid–offer spreads, and stable levels of transparency correlate with stable spreads.
  - Changes in market transparency metrics are negatively associated with changes in bid–offer spreads in most months—such that spreads typically narrow when transparency metrics increase. Evidence supports this assertion in four out of the five markets examined.
  - A review of the academic literature related to transparency and market quality is broadly consistent with these findings. Although somewhat mixed, the literature reviewed is balanced in favour of greater transparency.
- In aggregate, we conclude that greater market transparency is beneficial for investors.

# 1. Introduction

The Markets in Financial Instruments Directive (MiFID) is a wide-ranging piece of legislation governing securities markets, financial intermediation, and investment services in the European Union (EU). The implementation of MiFID in November 2007 unleashed competitive forces in the provision of trading venues and execution facilities. Combined with technological developments and advancements in automated trading, MiFID catalysed the evolution in equity markets from a largely centralised structure to a decentralised, fragmented structure.<sup>1</sup>

The ensuing competition among trading venues has delivered certain benefits to investors, such as lower average bid–ask spreads and explicit fees. At the same time, the decentralised market structure has increased the propensity for regulatory arbitrage. As new trading venues and execution facilities have proliferated, it has become unclear whether all venues engaged in similar activities are subjected to the same rules.

In this respect, an uneven regulatory playing field raises concerns over fair treatment of market operators and investors alike. Most perniciously, it may encourage regulatory arbitrage toward execution on opaque or more lightly regulated trading venues. As a consequence, therefore, an uneven regulatory playing field can have adverse effects on the transparency of the markets as certain types of trades and trading venues are subject to different transparency obligations.

The types of trading venue defined by MiFID include regulated markets (RMs), multilateral trading facilities (MTFs), and systematic internalisers (SIs).<sup>2</sup> In broad terms, RMs and MTFs operate in a similar fashion, providing an electronic platform for users to transact orders multilaterally. These venues generally match orders on a non-discretionary basis according to pre-defined rules that establish price and time priority for submitted orders. RMs and MTFs are required to publish pre-trade quotes and report details of executed trades to the market. However, there are exceptions to these transparency rules depending on the structure of the venue and the type of order it executes.

SIs are investment firms that internalise order flow to deal on their own account on an ‘organised, frequent and systematic basis’. Internalisation is a form of bilateral order execution, whereby the investment firm (the SI) acts as the counterparty to all buy and sell orders. SIs are required to report trades to the market and to publicise pre-trade transparency information under certain conditions; however, these requirements are less comprehensive than for RMs and MTFs.

Trades executed through SIs are reported as over-the-counter (OTC) trades because they are bilateral transactions. In fact, a large proportion of equity trading—varying between one-quarter and one-half of trading volume in major EU markets—is reported as OTC.

Ostensibly, the term ‘OTC’ captures all trading activity not transacted through the trading systems operated by RMs or MTFs. Therefore, in addition to internalisation, OTC encompasses bilateral principal or agency trades not conducted ‘systematically’, such as ad hoc transactions. It also includes trading executed through broker/dealer crossing networks, a type of discretionary order-matching or crossing system that facilitates the interaction of non-displayed liquidity.<sup>3</sup> Such crossing networks share similarities in economic substance with both MTFs and SIs, although they are not legally defined as such.

Consequently, there is a range of trading activity—and a significant trading volume—that is not classified under the existing MiFID organised trading venue definitions. As such, OTC trading is not subject to the same formal transparency framework that applies to, for example, RMs and MTFs. Furthermore, the absence of sufficient differentiation amongst reported OTC trades can reduce the utility of post-trade data to investors.

<sup>1</sup>Further detail on MiFID and market fragmentation is provided in *Market Microstructure: The Impact of Fragmentation under the Markets in Financial Instruments Directive* (CFA Institute, 2009): [www.cfapubs.org/toc/ccb/2009/2009/13](http://www.cfapubs.org/toc/ccb/2009/2009/13).

<sup>2</sup>The types of trading venues and their regulatory framework are discussed in detail in Sections 2 and 3.

<sup>3</sup>Such crossing networks are also referred to as broker/dealer ‘dark pools’.

In short, transparency differences exist between the different types of trading venues defined under MiFID and between those venues and the various forms of OTC trading. This latter discrepancy raises the scope for regulatory arbitrage.

Transparency underpins investor confidence and is thus a critical component of strong and resilient markets. Transparency deficiencies, exacerbated by uneven rules, raise the potential for distortionary effects on price discovery and quantity discovery as participants act on incomplete information. This can discourage investors from committing capital, thereby reducing liquidity. Ultimately, transparency deficiencies harm the efficient functioning of markets and investor trust.

In this report, we examine the structure and regulation of equity markets in Europe, focusing on the prevailing transparency framework. We examine reported trade data and consider how transparency is related to measures of market quality. Finally, we offer policy considerations to support transparent trading structures and provide greater consistency in the application of transparency rules within the regulatory framework.

First, we begin with a review of the structure and operation of the different types of trading venues.

## 2. Market Structure

The organisation, operation, and design of trading venues establish the framework for order interaction. In essence, the structure of markets determines the process by which prices and quantities are discovered, and through which investors' needs are met. The structure of each type of trading venue defined under MiFID is examined in turn.

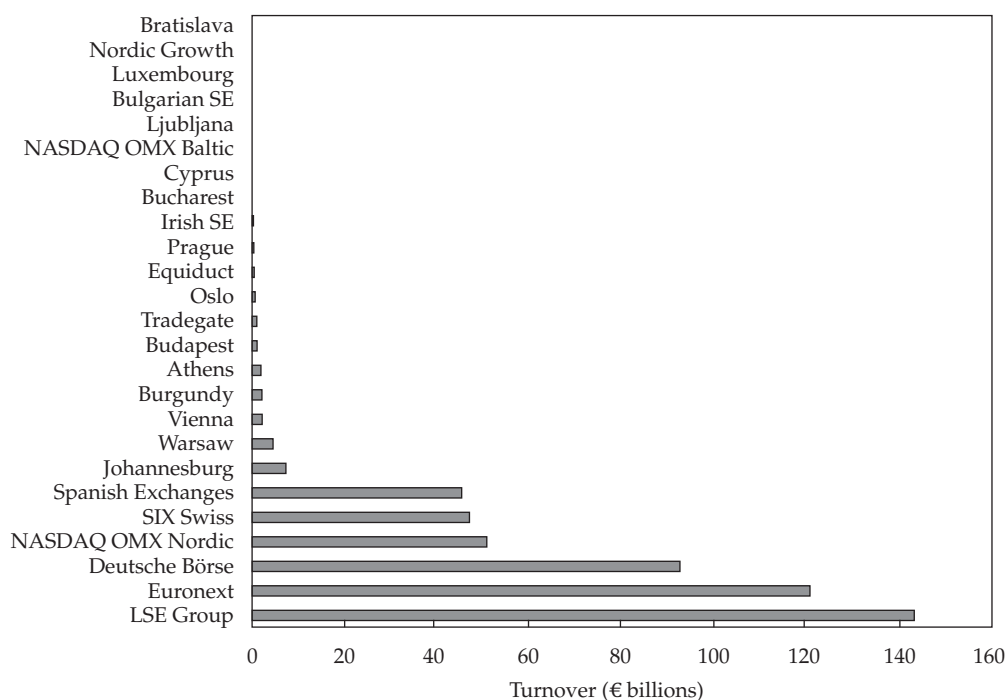
### 2.1. Regulated Markets

MiFID broadly defines a regulated market to be a multilateral system operated and/or managed by a market operator that brings together multiple third-party buying and selling interests in financial instruments in accordance with non-discretionary rules.<sup>4</sup>

There are 91 RMs listed in the Committee of European Securities Regulators' (CESR's) MiFID database as of August 2010.<sup>5</sup> The largest RMs include LSE Group (operator of the London Stock Exchange and Borsa Italiana), NYSE Euronext (which operates exchanges in France, Belgium, the Netherlands, Portugal, and the United Kingdom), and Deutsche Börse Group (operator of the Frankfurt Stock Exchange and the Xetra trading system).

**Figure 1** illustrates RM turnover for trading of shares listed in the EU and Switzerland. With the exception of Deutsche Börse (which provides both manual and electronic trading),<sup>6</sup> all RMs operating in Europe are fully automated, electronic systems. The dominant market model operated by European RMs is the limit order book.

**Figure 1. RM Turnover for Shares Listed in the EU and Switzerland, October 2010**



*Note:* Includes trades executed during auction phases.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

<sup>4</sup>A full definition is set out in Directive 2004/39/EC Article 4, paragraph 1(14).

<sup>5</sup>Includes venues that serve other asset classes as well as equities. Effective 1 January 2011, CESR became the European Securities and Markets Authority (ESMA). All subsequent uses of 'CESR' refer to ESMA as appropriate.

<sup>6</sup>The Deutsche Börse continues to provide floor trading on the Frankfurt Stock Exchange. The vast majority of its equity trading, however, takes place electronically through the Xetra platform.

Limit orders specify a quantity and a maximum (for a buy order) or minimum (for a sell order) acceptable price for a given security. Limit orders entered into the RM's central limit order book execute when an acceptable match between buy and sell orders occurs. This requires either a buy or a sell order to cross the spread between the highest bid and lowest offer submitted so that acceptable prices for both buyer and seller overlap.<sup>7</sup>

Order flow is asynchronous in a continuous limit order market. Priority rules are therefore necessary to provide fair treatment of limit orders. Typically, the order book algorithm establishes price and then time priority for the sequencing of order execution.

For example, a new sell order with a limit price of 105 obtains priority over an existing sell order with a limit price of 106. Similarly, a new buy order for 104 receives priority over an existing bid for 103. The bid for 104, however, is not acceptable to the seller asking 105, and vice versa. For an execution (or fill) to occur, a new order must enter the order book at a price that crosses the bid–ask spread. For example, a new bid for 106 would result in an execution at 105. The price of 105 is acceptable to both buyer and seller, whilst the order priced at 105 predates the order priced at 106. If the quantity offered by the seller does not exhaust the quantity demanded by the buyer (or vice versa), the unfilled portion may remain in the order book as a limit order with a limit price equal to the price of the original order (depending on the operating rules of the venue). However, the automation and process efficiency of limit order book markets mean that the state of the order book is in flux, with orders being entered and cancelled in rapid succession during continuous trading.

The screenshot display below illustrates the limit order book for Nokia Corporation as illustrated by FactSet. The strip at the top of the order book highlights the best bid and ask price and quantity that are available for the security. The depth of the book is shown in strips beneath, in order of price priority:

Num	MPart	Bid Size	Bid	Ask	Ask Size	MPart	Num
7		19,386	10.69 - 10.70	10.69 - 10.70	55,918		10
7		24,166	10.68 - 10.71	10.68 - 10.71	24,889		5
16		65,095	10.67 - 10.72	10.67 - 10.72	90,548		12
15		69,740	10.66 - 10.73	10.66 - 10.73	47,374		13
20		43,376	10.65 - 10.74	10.65 - 10.74	23,646		4

Source: FactSet Research Systems Inc.

Limit order book markets are multilateral, in that buyers and sellers trade directly against each other's limit orders according to non-discretionary rules and procedures. The role of brokers in such markets is limited to facilitating execution of client orders.

However, many RMs also include market makers who provide liquidity and ensure smooth market functioning. The activities of liquidity providers supplement the interaction of customer orders and help to maximise the 'fill rate' of submitted orders. In this respect, the market models utilised by RMs can be considered hybrid models.

On most RMs, a call auction precedes the commencement of continuous trading. Similarly, the trading session typically ends with a closing call auction.<sup>8</sup> The specifics of the auction vary amongst exchanges; however, each has the objective of establishing a clearing price that maximises tradeable volume. The opening and closing call auction is preceded by a fixed time window (the 'pre-open') during which market participants submit bids and offers at specified prices and quantities. Orders are ranked in price from highest to lowest. The algorithm for the call auction then establishes a

<sup>7</sup>The terms 'offer' and 'ask' are used interchangeably throughout this report.

<sup>8</sup>There may also be periodic call auctions throughout the trading day according to the market, liquidity characteristics, and stock-specific events.

single equilibrium price that clears the maximum tradeable quantity.<sup>9</sup> The purpose of the call auction is to minimise noise in the price discovery process. Opening and closing calls are thus popular given the importance of the opening and closing phase of the trading session.<sup>10</sup>

In addition to limit orders, there are a number of different order types that may interact with the limit order book. Common examples include, among others, market orders (which seek the best price obtainable when the order reaches the order book, rather than a specific price limit), stop orders (which are triggered when a specified price limit is reached), immediate or cancel orders (any part of the order not immediately executed is automatically cancelled and thus does not rest in the order book),<sup>11</sup> and iceberg orders (a reserve order where only a portion of the order is displayed in the order book; when the displayed portion executes, the quantity held in reserve is used to refresh the displayed order to its original size).

As this discussion implies, some order types provide less transparency than limit orders. In particular, certain types of ‘hidden’ or ‘dark’ orders may interact with the book of displayed limit orders.

MiFID permits waiving the obligation to display orders to the market (‘pre-trade transparency’) for orders and trading systems satisfying one of the following criteria: (a) orders that are ‘large in scale’, (b) ‘reference price’ systems, (c) systems that formalise ‘negotiated transactions’, and (d) orders held in an order management facility.<sup>12</sup> RMs most commonly permit order types that satisfy a, c, and d, although such trading accounts for a relatively small proportion of overall trading.<sup>13</sup>

Irrespective of the type of hidden order, the exchange’s priority rules typically provide execution priority to displayed orders over hidden orders at the same price. In this way, market participants are incentivised to post displayed orders, unless such orders do not meet the customer’s specific needs.

In general, RMs are highly transparent trading venues, providing visibility of the limit order book as well as details of executed trades. Transactions on RMs are reported immediately,<sup>14</sup> accessible directly from the exchange (for a fee) or through commercial vendors. RMs also typically make their post-trade data available free of charge after a delay of 15 minutes. Consequently, overall, trades executed on RMs are amongst the most transparent.

## 2.2. Multilateral Trading Facilities

Multilateral trading facilities are defined under MiFID as ‘a multilateral system operated by an investment firm or a market operator, which brings together multiple third-party buying and selling interests in financial instruments—in the system and in accordance with non-discretionary rules—in a way that results in a contract’.<sup>15</sup> This definition differs from the RM definition in that investment firms also may operate MTFs. Moreover, MTFs generally offer pan-European trading of shares whereas most RMs focus on domestic markets.

There are 136 MTFs listed in the CESR MiFID database as of August 2010.<sup>16</sup> The largest MTFs include Chi-X Europe, BATS Europe, and Turquoise Services.

**Figure 2** illustrates displayed or ‘lit’ MTF order book turnover for shares listed in the EU and Switzerland. The largest MTF—Chi-X Europe—generated turnover of EUR 120.2 billion, establishing it as the third largest trading venue in Europe after LSE Group and NYSE Euronext (turnover of EUR 143.3 billion and EUR 120.7 billion, respectively, as per Figure 1).

<sup>9</sup>A secondary objective might be to minimise surplus (the volume of unexecuted orders).

<sup>10</sup>Opening and closing prices are commonly used for reference pricing and for marking of positions.

<sup>11</sup>Similarly, ‘fill or kill’ orders require immediate execution of the entire order; otherwise, the entire order is cancelled.

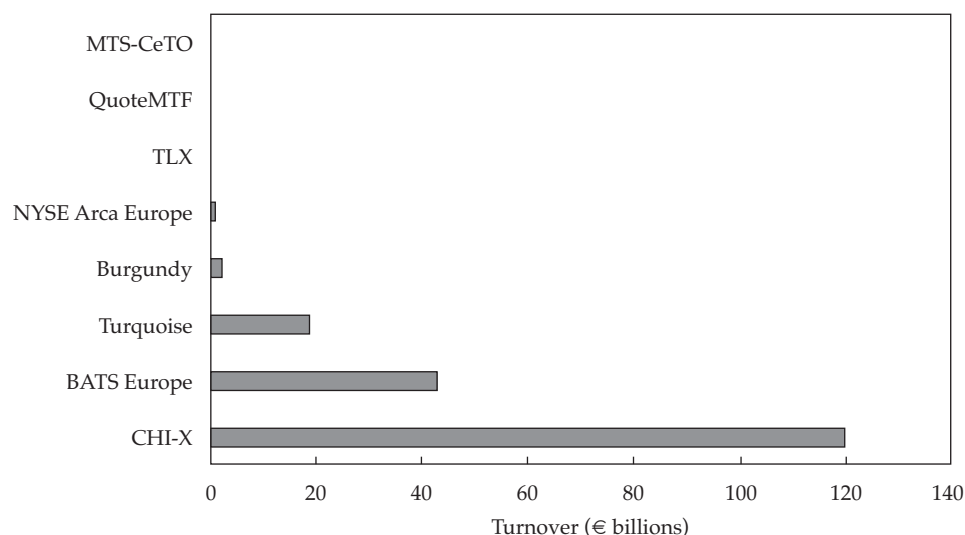
<sup>12</sup>The MiFID transparency framework and pre-trade transparency waivers are discussed further in Section 3.

<sup>13</sup>See CESR’s *Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (July 2010). Less than 4 percent of all trading on RMs and MTFs in the European Economic Area took place in the first quarter of 2010 using the large-in-scale waiver. Similarly, less than 4 percent of such trading took place using the negotiated trade waiver.

<sup>14</sup>Exemptions exist for ‘large’ trades. Refer to Section 3.

<sup>15</sup>Directive 2004/39/EC Article 4, paragraph 1(15).

<sup>16</sup>The list of MTFs is not exclusive to equity platforms.

**Figure 2. Lit MTF Turnover for Shares Listed in the EU and Switzerland, October 2010**

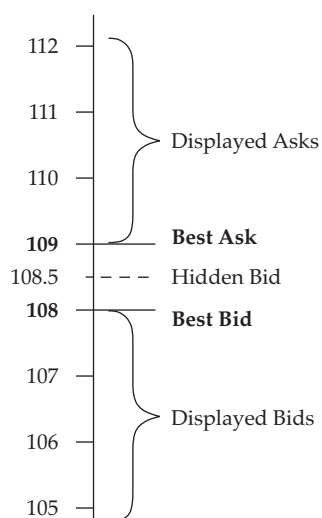
*Note:* Includes trades executed during auction phases.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

Most MTFs operate an integrated limit order book model that provides for non-discretionary, anonymous order matching amongst participants. MTFs also typically allow non-displayed order types (such as large-in-scale orders) to interact with the displayed order book. Whilst this practice is also permissible on RMs, hidden order transactions are more prevalent on MTFs. Overall, the operations of MTFs are very similar to those of RMs, as detailed in Section 2.1.<sup>17</sup>

The priority rules enforced by MTFs typically operate according to price, visibility, and then time of submission. As noted in the previous section, the visibility criterion ensures that displayed orders execute before same-priced dark orders.

**Figure 3** illustrates the process of order interaction on a representative integrated order book of an MTF (numerical values are for ease of illustration). Buy and sell orders are ranked in order of price. The bid–ask spread displayed in the order book is 1. However, a dark order (such as a large-

**Figure 3. Order Interaction for a Representative Integrated Order Book**

<sup>17</sup>The discussion of limit order markets in Section 2.1, therefore, also applies here.

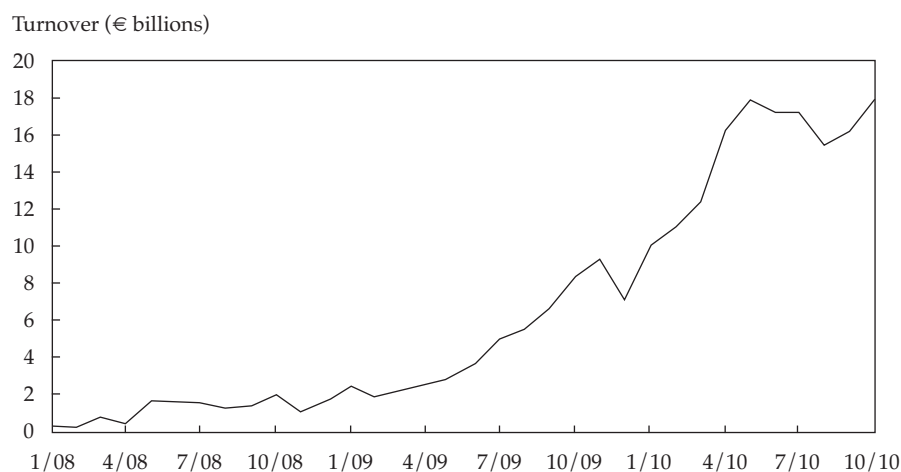


in-scale order) to buy at 108.5 rests in the order book invisible to market participants. Because the hidden bid offers price improvement on the best visible bid, it receives execution priority. Accordingly, an incoming sell order that crosses the spread will execute first against the available quantity in the hidden bid. If we assume the incoming sell order specifies a limit price of 108 (equal to the best displayed bid), the seller will be pleased with obtaining execution at 108.5. If the hidden bid is a 'large' order, it is likely that the incoming sell order will fill in its entirety, whilst the unexecuted portion of the hidden bid rests invisibly in the order book (depending on the specifics of the order and the operating rules for the venue). If the hidden quantity is insufficient to exhaust the incoming ask, execution occurs first at the available quantity specified by the hidden bid for 108.5, followed by execution at the limit price of 108. Any unfilled portion of the displayed bid for 108 may then rest as a displayed limit order or be cancelled from the order book.

Several MTFs also operate a separate dark order book platform, distinct from the main displayed or lit order book. Such platforms are commonly referred to as 'dark pools' run by market operators. Whilst lit order books do permit interaction with certain types of dark orders, dark pools facilitate the interaction of purely dark liquidity.

Trading in dark pools has increased significantly over the past two-and-a-half years. **Figure 4** illustrates turnover transacted on dark order books for stocks listed in the EU and Switzerland. Although dark order book trading still accounts for a relatively small proportion of overall trading—the turnover of EUR 18.0 billion in October 2010 amounts to 2.5 percent of all order book turnover (including auctions) of EUR 728.9 billion<sup>18</sup>—dark volumes have trended sharply upward.

**Figure 4. Dark Order Book Turnover for Shares Listed in the EU and Switzerland, January 2008–October 2010**



Source: Based on data from Thomson Reuters Equity Market Share Reporter.

Dark order books operated by MTF operators are often organised as reference price systems, thus benefitting from the MiFID pre-trade transparency waiver (b) that is applicable to such systems. Ostensibly, reference price systems are passive systems that do not contribute to the price discovery process; instead, they provide order execution at prices referenced to other systems. According to CESR, reference price systems account for a small proportion of trading in shares listed in the European Economic Area, although this proportion is rising. Specifically, CESR estimates that the value of trading on reference price systems had risen to 1.0 percent of all trading on RMs and MTFs by the first quarter of 2010, up from 0.1 percent in the first quarter of 2008.<sup>19</sup>

A prominent example of an MTF operator that operates both a lit and dark order book is Chi-X Europe.<sup>20</sup> The Chi-X Europe platform is a lit central limit order book that provides non-discretionary order matching according to price, visibility, then time priority. Separately, the Chi-X

<sup>18</sup> Thomson Reuters Equity Market Share Reporter.

<sup>19</sup> Figures taken from CESR's *Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (July 2010).

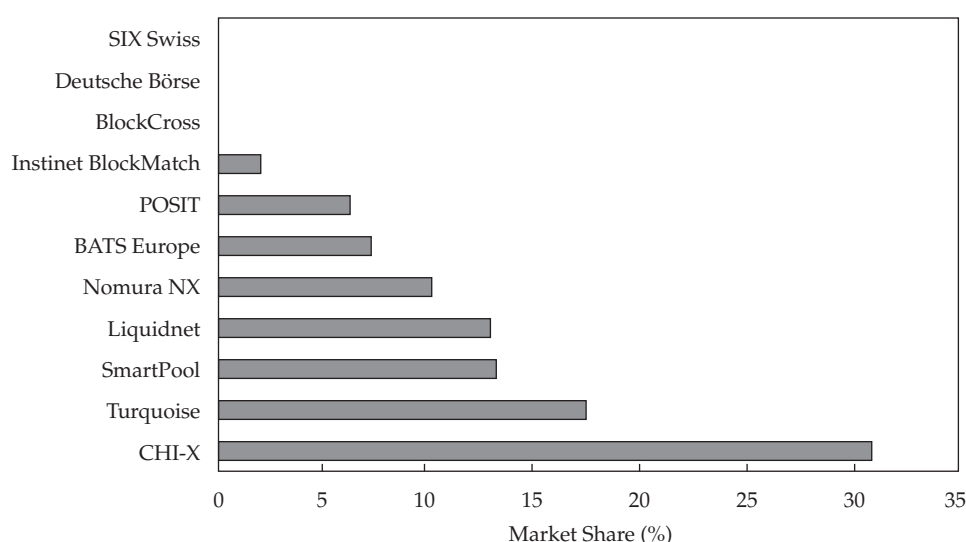
<sup>20</sup> See 'Chi-X Europe Exchange Guide' for further details ([www.chi-x.com/document-library-sub-sections/trading-guides-and-rules.asp](http://www.chi-x.com/document-library-sub-sections/trading-guides-and-rules.asp)).

Delta platform is a purely dark order book satisfying the MiFID reference price system pre-trade transparency waiver. Chi-X Delta provides continuous order matching at the mid-point of the primary market best bid and offer (PBBO) price. The mid-point PBBO reference price refers to the primary listing venue for the security. For example, the primary listing venue for the stock of a large U.K. company would be the London Stock Exchange. Orders entered into the dark pool passively take the price established by the mid-point of the bid–ask spread on the primary exchange. Such passive order matching means that the priority rules specify time as the primary criterion.

The reference prices used by dark pools for order matching vary amongst operators. Two further examples are SmartPool and Nomura NX. On SmartPool, the continuous trading session begins with an opening crossing based on the mid-price established on the stock's reference market (the primary listing venue or, for stocks listed on several venues, the most liquid venue).<sup>21</sup> The opening crossing is preceded by a pre-open call phase during which orders may be submitted, modified, and cancelled. Once the crossing commences, orders cannot be entered or amended. The opening call and crossing are triggered randomly within a pre-set time window at the start of the trading session. This element of randomisation discourages participants from waiting until the very last moment to submit their orders. Following the opening crossing, continuous trading commences in which order matching is pegged to the mid-point of the best bid and offer of the stock's reference market. The priority rules for order matching give priority first to maximisation of tradeable quantity/minimisation of number of trades, then to time of order submission. The trading session ends with a closing call resulting in a crossing based on the closing price established on the reference market for the stock. Consequently, two reference prices—mid-point and closing—are utilised by the trading system.

A third type of reference price utilised by MTFs is volume weighted average price (VWAP).<sup>22</sup> Nomura's NX Strategy Match (NXSM) is an example of a dark MTF based on the VWAP reference price.<sup>23</sup> NXSM provides continuous order matching based on the VWAP established on the primary exchange determined over a specified time interval. Orders must specify the volume and time period (in units of 15 minutes) desired for matching—for example, 'buy 1 million shares over 2 hours' at the 2-hour VWAP. At the end of the specified period over which two orders are matched, the trade is executed at the VWAP for that period. By nature of the VWAP reference price, the trade price cannot be determined until the period in question has elapsed. **Figure 5** illustrates the relative market shares of dark MTFs that trade shares listed in the EU and Switzerland.

**Figure 5. Dark Order Book Market Share for Shares Listed in the EU and Switzerland, October 2010**



*Note:* Figures are a percentage of total dark order book turnover.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

<sup>21</sup>See 'SmartPool Rulebook' for further details ([www.tradeonsmartpool.com/Assets/Documents/SmartPoolRulebookMay2010.pdf?1273679620](http://www.tradeonsmartpool.com/Assets/Documents/SmartPoolRulebookMay2010.pdf?1273679620)).

<sup>22</sup>VWAP is calculated as the total value of shares traded (price times quantity) divided by total number of shares traded over a given time period.

<sup>23</sup>See 'Nomura NX User Guide' for further details ([www.nomura.com/europe/resources/upload/NX-User-Guide4.pdf](http://www.nomura.com/europe/resources/upload/NX-User-Guide4.pdf)).

In summary, lit order book MTFs are structurally and operationally similar to RMs. As such, these venues are very transparent, providing limit order book visibility as well as immediate reporting of completed transactions.<sup>24</sup> Post-trade data are often publicised directly by the MTF operator as well as through commercial vendors. Trading on lit MTFs thus provides an equivalent level of transparency to trading conducted on RMs.

In contrast, dark MTFs do not display any orders, thus offering no pre-trade transparency. Post-trade data, however, are published in an analogous fashion to lit MTFs. Consequently, overall, trading transacted on dark order book systems is less transparent than on RMs and other MTFs.

### 2.3. Systematic Internalisers

MiFID defines an SI as ‘an investment firm which, on an organised, frequent and systematic basis, deals on own account by executing client orders outside a regulated market or an MTF’.<sup>25</sup> A distinguishing feature of SIs that separates them from RMs and MTFs is bilateral trade execution. Rather than acting as a conduit for multilateral order interaction, SIs act as the counterparty to customer orders. The list of SIs contained in the CESR MiFID database as of October 2010 is shown in **Table 1**. The list includes some of the largest banks operating in Europe.

**Table 1. SIs Contained in the CESR MiFID Database, October 2010**

Systematic Internaliser	Country
Royal Bank of Scotland/ABN Amro Bank N.V.	Netherlands
BNP Paribas Arbitrage	France
Danske Bank	Denmark
Goldman Sachs International	United Kingdom
Nordea Bank Danmark A/S	Denmark
Knight Capital Europe Ltd	United Kingdom
Nomura International PLC	United Kingdom
Citigroup Global Markets Ltd	United Kingdom
Citigroup Global Markets U.K. Equity Ltd	United Kingdom
UBS Ltd	United Kingdom
UBS AG (London Branch)	United Kingdom
Credit Suisse Securities Europe Ltd	United Kingdom

*Source:* Based on data from the CESR MiFID database.

Structurally, systematic internalisation is quote driven. SIs quote prices and quantities at which they are prepared to buy or sell shares for their own account and trade accordingly by executing bilaterally against the customer. Alternatively, investment firms (that otherwise act as SIs) receiving customer order flow may route some orders to an RM or MTF if the orders are not conducive to internalisation.

SIs generally trade in relatively small sizes with either retail or professional customers (or both) and are required to publish quotes only for trades up to ‘standard’ market size in ‘liquid’ markets, as defined under MiFID.<sup>26</sup> The limited scope of their quoting obligations means that trading transacted with SIs is somewhat less transparent than trading conducted on RMs and lit MTFs. Furthermore, SI quotes are not widely disseminated or readily accessible; SIs may decide which investors they wish to give access to their quotes. For the vast majority of investors, the current calibration of the SI regime offers little utility or choice—such is the narrow focus of the transparency framework. More meaningful quoting obligations, and more widely disseminated quotations, are necessary to better meet investors’ needs.

Trades conducted with SIs are reported as OTC trades by virtue of their bilateral nature. Such transactions are typically published through OTC reporting venues. Whilst SI trades are reported immediately, SIs generally do not identify themselves as the execution venue in trade reports.

<sup>24</sup>As with RMs, exemptions exist for certain large trades. Refer to Section 3.

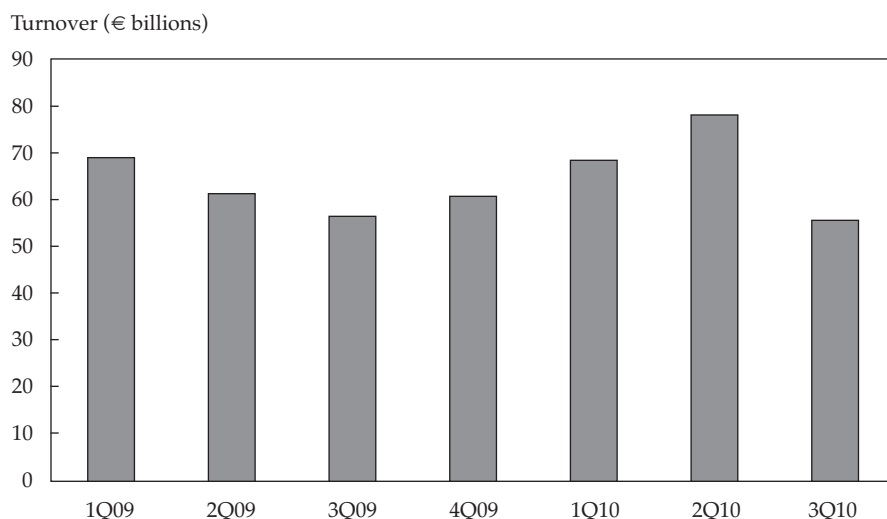
<sup>25</sup>Directive 2004/39/EC Article 4, paragraph 1(7).

<sup>26</sup>Refer to Section 3 for details.

Instead, they typically use a generic ‘SI’ identifier. MiFID currently permits this practice provided that SIs publish quarterly information about their internalisation business.

The level of systematic internalisation is presented in **Figure 6**. The estimated turnover of EUR 78.5 billion for the second quarter of 2010 is small—approximately 3 percent—relative to total turnover transacted on RM and MTF order books, which amounted to EUR 2,823.6 billion for the same period.<sup>27</sup> Similarly, estimated SI turnover represents approximately 3 percent of total OTC turnover for the second quarter of 2010. A breakdown of systematic internalisation for the second quarter of 2010 is provided in **Figure 7**.

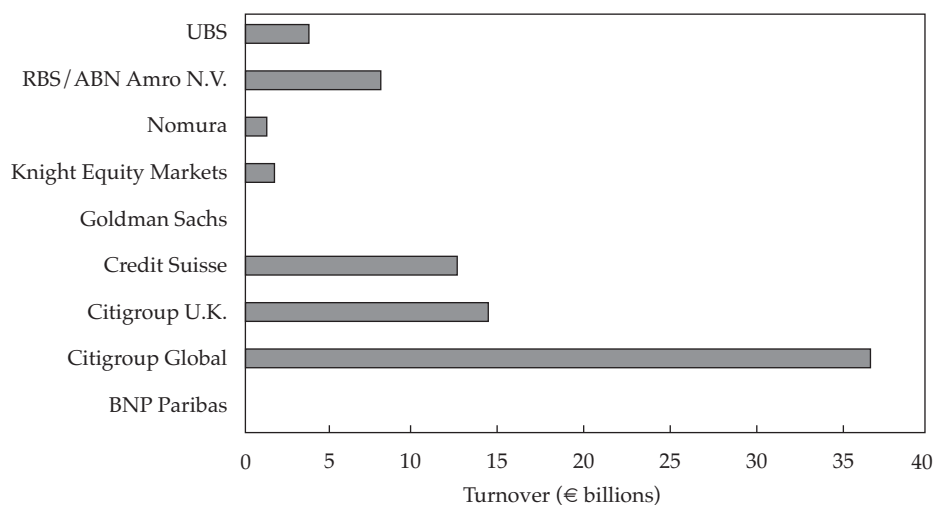
**Figure 6. SI Activity, First Quarter 2009 through Third Quarter 2010**



*Source:* Based on data from Markit BOAT.

*Notes:* Figures have been estimated as follows. For each transaction reported, the number of shares traded has been multiplied by the average price (in euros). Values have then been summed over all reported transactions in the quarter for each SI. Quarterly aggregate values have then been summed across all SIs. There are two caveats to the figures: (i) The turnover presented is an estimate only, because it is based on average prices reported rather than actual transaction prices (which are not reported); (ii) the data relate only to SI reports available through Markit BOAT. There are no reports for Danske Bank and Nordea Bank, which are listed in the CESR database.

**Figure 7. SI Activity, Second Quarter 2010**



*Source:* Based on data from Markit BOAT.

<sup>27</sup> Thomson Reuters Equity Market Share Reporter. Figure includes lit, dark, and hidden order book trades (including auction phases).

Overall, systematic internalisation is less transparent than trading on RMs and MTFs. Pre-trade information is limited in scope and availability, whilst post-trade information is included in OTC data and identified generically at the time of initial publication.

## 2.4. Other

Transactions executed outside an RM, MTF, or SI fall outside the scope of the regulatory requirements applicable to such ‘trading venues’ and are classified as OTC transactions. The OTC market makes up a significant proportion of overall trading activity, accounting for between one-quarter and one-half of overall turnover in most major European markets. As such, a large volume of equity trading is transacted outside the regulatory framework applicable to MiFID organised trading venues.

MiFID characterises OTC transactions as ‘... ad hoc and irregular and are carried out with wholesale counterparties and are part of a business relationship which is itself characterised by dealings above standard market size, and where the deals are carried out outside the systems usually used by the firm concerned for its business as a systematic internaliser’.<sup>28</sup> Accordingly, such activity includes non-systematic bilateral trades executed on an ad hoc basis by the investment firm acting in a principal or agency capacity. Trades of this nature enable customers to quickly and efficiently manage their positions and minimise market impact when the specifics of the order do not lend themselves to a quick ‘fill’ on organised trading venues. The investment firm conducting such ad hoc OTC transactions may use its own inventory to meet the customers’ specific needs, and then seek to lay off its risk exposure in subsequent trades with other counterparties. OTC transactions also involve ‘give-up’ trades, where the executing broker acts on behalf of another broker with whom the client has a business relationship.

Another type of activity classified as OTC includes trading transacted through internal crossing networks operated by banks and brokerages. CESR has defined broker crossing systems as ‘internal electronic matching systems operated by an investment firm that execute client orders against other client orders or house account orders’.<sup>29,30</sup>

Structurally, broker crossing networks are automated systems that internally match order flow in an orderly or systematised fashion between counterparties utilising the network. Orders are typically crossed at a point within the spread of the best bid and offer reference prices. Broker-operated internal networks provide anonymity and reveal very little about an order prior to execution, providing no pre-trade transparency.<sup>31</sup> These networks facilitate the aggregation of liquidity from different sources and are thus attractive for execution of block orders.

The matching of dark liquidity in broker crossing networks operates on a discretionary basis, meaning that order matching does not take place according to the pre-defined parameters of a conventional order book system. Executions may occur at any point within the bid–ask spread. This practice differs from dark MTF reference price systems, which execute orders only at a fixed peg, typically the mid-point of the spread. Additionally, access to the internal network may be limited to only certain counterparties. Transactions may occur by crossing client orders or by executing such orders against the broker’s own account. In contrast, dark MTF reference price systems only facilitate multilateral crossing.

Trades executed through crossing networks are classified as OTC because the network is not classified as a non-discretionary multilateral system run by a market operator (i.e., an RM or MTF), nor is it classified as an SI because the activity conducted within the network is not constrained to bilateral internalisation. Accordingly, the legal form of broker crossing networks is such that they escape classification as either MTF or SI under the MiFID framework, although in economic substance they share certain similarities with these venues.

The level of activity transacted through broker crossing networks is estimated in **Figure 8**, based on data reported through Markit BOAT. The firms contributing to Markit’s broker crossing system data include Citigroup, Credit Suisse, Deutsche Bank, JP Morgan, Morgan Stanley, and UBS.

<sup>28</sup>Directive 2004/39/EC Recital 53, p. 9.

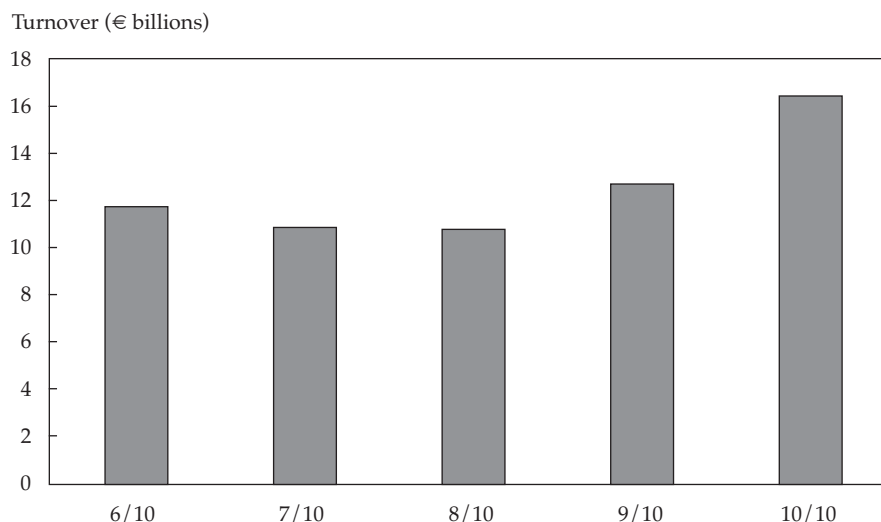
<sup>29</sup>Excerpt from definition in footnote 21, p. 27 of CESR’s *Consultation Paper—CESR Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (April 2010).

<sup>30</sup>We use the terms ‘broker crossing systems’ and ‘broker crossing networks’ interchangeably in this report.

<sup>31</sup>For this reason, internal crossing networks operated by banks and brokers are also commonly referred to as ‘dark pools’ run by investment firms.

A caveat is that the list of contributing firms is not exhaustive. Accordingly, the figures are an estimate only and may understate the full extent of broker crossing network activity in Europe.

**Figure 8. Broker Crossing Network Activity, June 2010–October 2010**



*Notes:* According to Markit, broker crossing system data 'is a subset of total volume reported across all publication venues as "OTC" and "SI" and is presented in aggregate form at a country level'. The data relate to crossing network activity in EU countries and Switzerland. The monthly figures presented have been obtained by summing all daily figures reported.

*Source:* Based on data from Markit BOAT.

For comparability, the turnover estimated for October 2010 of EUR 16.6 billion amounts to 1.2 percent of total turnover (across all trade types) of EUR 1,380.0 billion. Relative to total OTC turnover, broker crossing network activity for October 2010 amounted to approximately 3.2 percent of the total.<sup>32</sup> When combined with dark MTF turnover for October 2010 of EUR 18.0 billion, one can see that total dark pool activity in Europe amounted to 2.5 percent of total turnover. For comparison purposes, the U.S. Securities and Exchange Commission (SEC) estimates that dark pools accounted for 7.9 percent of total trading volume at the end of the third quarter of 2009.

In summary, the types of OTC trading addressed in this section represent the least transparent forms of trading. Such activity falls outside the scope of the MiFID pre-trade transparency framework. Whilst OTC trades are required to be reported to the market in a comparable fashion to trades executed through organised trading venues, such trade reports do not detail where the trade took place. The various forms of OTC trading—such as ad hoc, internalisation, and crossing network activity—are identified only generically and as such the granularity of OTC post-trade data may provide insufficient utility to investors.

We expand on the regulatory framework applicable to the types of trading venues in Section 3.

<sup>32</sup>Data are from Thomson Reuters Market Share Report. Total OTC turnover for all European equities in October 2010 amounted to EUR 524.2 billion. See also CESR's *Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (July 2010). CESR estimates broker crossing network activity amounted to 4.4 percent of OTC trading in the first quarter of 2010, up from 1.5 percent in the first quarter of 2008. The CESR data are based on information reported by 11 investment firms to EU regulatory authorities.

## 3. Regulatory Framework

This section focuses on the regulatory provisions related to transparency that apply to the different types of trading venues under MiFID. The purpose of the proceeding analysis is, first, to elaborate on how transparency requirements differ and, second, to facilitate understanding of how trading transparency is affected by the regulatory framework.

The essence of the MiFID pre-trade and post-trade transparency framework is captured in Recital 44 of the directive, which states: ‘In order to enable investors or market participants to assess at any time the terms of a transaction in shares that they are considering and to verify afterwards the conditions in which it was carried out, common rules should be established for the publication of details of completed transactions in shares and for the disclosure of details of current opportunities to trade in shares’ (p. 8).

The importance and relevance of transparency is best characterised by Recital 5 of the implementing regulation<sup>33</sup>, which notes that ‘A high degree of transparency is an essential part of this framework, so as to ensure a level playing field between trading venues so that the price discovery mechanism in respect of particular shares is not impaired by the fragmentation of liquidity’ (p. 2). The transparency obligations apply to equities.<sup>34</sup> In this report, we examine pre-trade and post-trade transparency separately as it relates to equity markets in Europe.

Although the focus of this study is transparency, we also examine other facets of the regulatory framework that may provide an uneven playing field between trading venues in Section 3.3.

### 3.1. Pre-Trade Transparency

#### 3.1.1. Regulated markets and multilateral trading facilities

The pre-trade transparency obligations set out under MiFID require RMs (Article 44) and MTFs (Article 29) to publicly post current bid and offer prices and depth of trading interests (or quantities) at those prices. RMs and MTFs must make bid and offer prices available on a continuous basis throughout the trading day on reasonable commercial terms.<sup>35</sup>

These requirements ensure visibility of the order books operated by RMs and MTFs, making them the most transparent types of trading venues. The equal application of the transparency requirements to RMs and MTFs ensures that these venues compete for liquidity against each other on an even regulatory footing.

As noted in Section 2, MiFID allows regulatory authorities to grant RMs and MTFs exemptions from the obligation to display orders to the market for orders and trading systems satisfying one of the following criteria: (a) orders that are large in scale, (b) reference price systems, (c) systems that formalise negotiated transactions, and (d) orders held in an order management facility. Each waiver type is summarised below.

**3.1.1.a. Large-in-scale waiver.** Orders exempt from pre-trade transparency under the large-in-scale (LIS) waiver must exceed certain minimum size thresholds depending on the liquidity of the stock in question. The thresholds are determined according to average daily turnover (ADT). The purpose of this waiver is to protect large orders from market impact costs. **Table 2** illustrates the applicable LIS thresholds. Orders exceeding these thresholds on RMs and MTFs may be invisible to market participants.

Accordingly, for the least liquid stocks, a large order qualifying for the pre-trade transparency waiver starts at EUR 50,000. For the most liquid stocks, where average daily turnover exceeds EUR 50 million, a large order starts at EUR 500,000.

<sup>33</sup> Commission Regulation (EC) No 1287/2006, implementing Directive 2004/39/EC (MiFID).

<sup>34</sup> Member states may choose to extend the transparency obligations to financial instruments other than shares by exercising the option set out in Recital 46 of MiFID.

<sup>35</sup> Further details are set out in the implementing regulation, Articles 17–20.

**Table 2. Orders Large in Scale Compared with Normal Market Size (EUR)**

Class in Terms of ADT	Minimum Size of Order Qualifying as LIS
ADT < 500,000	50,000
500,000 ≤ ADT < 1,000,000	100,000
1,000,000 ≤ ADT < 25,000,000	250,000
25,000,000 ≤ ADT < 50,000,000	400,000
ADT ≥ 50,000,000	500,000

*Source:* Based on data from Commission Regulation (EC) No 1287/2006, Annex II Table 2.

**3.1.1.b. Reference price waiver.** RMs or MTFs operating trading systems that match orders passively according to a reference price generated by another system may waive pre-trade transparency requirements. The reference price must be widely published and regarded by market participants as a reliable reference price. As noted in Section 2, a common reference price is the mid-point of the bid–offer spread on the stock’s primary liquidity venue.

**3.1.1.c. Negotiated transactions.** Transactions negotiated privately between counterparties that involve non-standard terms not suited to the trading algorithm run by RMs or MTFs may be executed away from the central order book of the venue in question and exempted from pre-trade transparency.

Negotiated transactions generally must be made at or within the current volume weighted spread reflected on the order book (or within a percentage of a suitable reference price where the stock is not traded continuously). Otherwise, negotiated transactions must be determined by factors other than the current market price of the share.

**3.1.1.d. Order management facility waiver.** The order management facility pre-trade transparency waiver applies to orders held in an order management facility operated by an RM or MTF ‘pending disclosure to the market’. This type of waiver is most commonly used by RMs for iceberg orders.

Iceberg orders are a type of reserve order that display only a fraction, or the ‘tip’, of the whole order in the order book. The remainder of the order is held in the order management facility pending disclosure to the market. As the tip of the order is filled, the portion held in reserve is used to refresh the displayed order to its original size as determined by the parameters of the order management facility. The non-displayed reserve portion is, therefore, gradually depleted as it successively refreshes the displayed order.

### 3.1.2. Systematic internalisers

The pre-trade transparency obligations pertaining to SIs are set out in Article 27 of MiFID. SIs are required to publish firm bid and/or offer quotes for those shares in which they conduct systematic internalisation and where a liquid market<sup>36</sup> exists. These requirements only extend to dealings up to ‘standard market size’.<sup>37</sup> There is no minimum quoting size. SIs that only deal in sizes above standard market size are exempt from pre-trade transparency requirements.

SIs must make their quotes available on a continuous basis throughout the trading day and on reasonable commercial terms. Whilst quotes must be ‘easily accessible’ to other market participants, SIs are allowed to decide, on the basis of their commercial policy, the investors to whom they give access to their quotes.

Overall, the pre-trade transparency requirements applicable to SIs are less comprehensive than the requirements for RMs and MTFs. For SIs, pre-trade transparency is restricted to specific classes of shares and sizes of business. Because the requirements are limited, there is no comparable ‘waiver’ framework for exemptions from pre-trade transparency, as is the case for RMs and MTFs. Consequently, SIs are generally less transparent trading venues than RMs and MTFs.

<sup>36</sup>The criteria for determining whether the shares in question have a ‘liquid market’ are set out in the MiFID implementing regulation (Commission Regulation (EC) No 1287/2006) Article 22.

<sup>37</sup>The standard market size is determined by reference to the average value of orders executed. Standard market size begins at EUR 7,500 for shares where the average value of transactions (AVT) is less than EUR 10,000. Annex II Table 3 of the implementing regulation sets out the standard market size thresholds for each successive AVT band.



### 3.1.3. Other OTC

There are no pre-trade transparency requirements for other types of OTC trading. As such, all other forms of OTC trading may be classified as ‘dark’ or ‘non-displayed’.

## 3.2. Post-Trade Transparency

The MiFID post-trade transparency requirements apply equally to RMs (Article 45), MTFs (Article 30), and investment firms (Article 28), irrespective of whether the investment firm is acting as an SI or engaging in other OTC transactions.

The price, volume, and time of execution for all transactions, regardless of where they take place, must be publicised as close to real time as possible and on reasonable commercial terms.<sup>38</sup> Transactions that are large relative to the normal market size for the shares in question, however, are exempt from immediate trade reporting. Delayed reporting of large trades allows counterparties time to hedge their positions and minimise the market-impact risk associated with large trades.

The deferred publication framework for large trades is detailed in Article 28 and in Annex II Table 4 of the implementing regulation. The publication delays for large trades start at 60 minutes for the least liquid stocks (where average daily turnover is less than EUR 100,000 and the transaction concerned is at least EUR 10,000) and extend up to a maximum of three days for the largest transactions—those that constitute 250 percent of the ADT of the stock in question.<sup>39</sup>

Trades reported with a delay are the least transparent types of transactions. This is because, in addition to their reduced timeliness, such large trades are also not typically pre-trade transparent; they are either executed OTC or may benefit from the LIS waiver if the trade is executed through an RM or MTF.

Whilst the post-trade transparency requirements and associated deferred publication arrangements apply equally to trading venues and to OTC transactions, the publication mechanisms may differ. Trades executed on RMs and MTFs are immediately publicised by those venues and are also accessible through commercial data vendors. Many exchanges also make their post-trade data available free of charge after a delay of 15 minutes. The automation and process efficiency provided by limit order book markets operated by RMs and MTFs, coupled with operational procedures to ensure data quality and integrity, mean that post-trade reports are in nearly all cases reliable and of a high quality.

For trades executed outside of these venues, post-trade transparency information may be reported either through the facilities of an RM or MTF, through the facilities of a third party (such as a specialist OTC trade reporting service), or via proprietary arrangements. The latitude afforded to investment firms in fulfilling their trade reporting obligations under MiFID, coupled with a lack of sufficient clarity over what constitutes a single trade and who has responsibility for reporting it, has, in some cases, diminished the quality and reliability of trade data.<sup>40</sup> Additionally, OTC trade data often provide investors with limited granularity. As such, it is difficult to differentiate the different types of OTC transactions (ad hoc, broker crossing network, etc.) and the counterparties involved when these trades are first reported.<sup>41</sup> Furthermore, as noted in Section 2, systematic internalisers may use the acronym ‘SI’ in OTC trade reports instead of identifying themselves as the venue as long as they provide quarterly aggregated information regarding their systematic internalisation business.<sup>42</sup> Such information may not be disclosed until up to a month after the end of the calendar quarter to which the business relates.

<sup>38</sup>Further details are set out in Article 27 of the implementing regulation and in Annex I Table 1, which lists all applicable data fields to be reported, such as, among others, instrument identification code, price, currency, quantity of shares traded, and the execution venue.

<sup>39</sup>At the time of the writing of this report, CESR had issued recommendations to reduce the maximum time delays permissible under the deferred trade publication framework. Among others, these recommendations would reduce the maximum three-day delay to the end of the current trading day (or the start of the next trading day if the trade was executed near the end of the current trading day).

<sup>40</sup>See also *Market Microstructure: The Impact of Fragmentation under the Markets in Financial Instruments Directive* (CFA Institute, 2009). Sixty-eight percent of investors responding to a CFA Institute survey noted problems with post-trade reporting since the implementation of MiFID.

<sup>41</sup>The initiative by Markit to publicise data on transactions executed through broker crossing systems has been a significant positive development toward improving the transparency of OTC data.

<sup>42</sup>At the time of the writing of this report, CESR had issued recommendations to require such periodic data to be reported more frequently (e.g., monthly instead of quarterly).

In summary, whilst the post-trade transparency requirements impose the same rules amongst trading venues and OTC transactions, the quality, consistency, and reliability of reported data may differ. Moreover, the provisions for delayed trade publication mean that transparency varies amongst different classes and sizes of orders.

### 3.3. Other

Some of the other key facets of the regulatory framework that differ amongst trading venues are featured below. Although this report focuses on transparency, this section highlights other areas in which the regulatory playing field may be uneven. The issues identified have been the subject of work streams addressed by other bodies (see, for example, FESE<sup>43</sup> and CESR<sup>44</sup>) and are highlighted here primarily for completeness.

#### 3.3.1. Organisational requirements

The organisational requirements applicable to RMs, as set out in Article 39 of MiFID, are more firmly defined than for other trading venues. Amongst others, RMs are required to have arrangements for identifying and managing any conflicts of interest between the owners or operators of the RM and the sound functioning of the trading venue. RMs are required to implement arrangements and systems to identify risks to their operations and to put in place measures to mitigate those risks. RMs are also required to have contingency arrangements to cope with the risks of system disruptions.

The organisational requirements for investment firms (including investment firms operating MTFs) are set out in Article 13 of MiFID. Investment firms, just like RMs, are required to have organisational procedures and arrangements to mitigate conflicts of interest. However, it is not clear that such requirements also apply explicitly to market operators directing and managing an MTF. Investment firms must also employ 'appropriate and proportionate systems, resources and procedures' to ensure business continuity. It is not explicit what 'proportionate' arrangements entail, thus affording investment firms a certain degree of discretion vis-à-vis RMs. It is also not explicit whether investment firms and market operators operating MTFs are required to put in place equivalent contingency arrangements as RMs to cope with risks of system disruptions.<sup>45</sup>

#### 3.3.2. Admission of financial instruments to trading

Under Article 40 of MiFID, RMs are required to adopt certain rules regarding the admission of financial instruments to trading on an RM. Article 40(3) requires RMs to verify that issuers comply with their disclosure obligations in respect of initial, ongoing, and ad hoc disclosures.

The most comparable requirements applicable to MTFs are set out in Article 14, which establishes obligations for MTFs with regards to the trading process. Whilst there is a certain degree of overlap in Article 14 with the provisions for RMs under Article 40, there are no equivalent disclosure verification requirements applicable to MTFs.

#### 3.3.3. Other issues

The preceding discussion highlights some of the differences in the application of the regulatory framework between RMs and MTFs (including investment firms operating MTFs). However, as noted in Section 2, a significant proportion of equity trading takes place between investment firms on a bilateral (or OTC) basis.

<sup>43</sup>Federation of European Securities Exchanges, 'Response to CESR Technical Advice to the European Commission in the Context of the MiFID Review—Equity Markets' (June 2010).

<sup>44</sup>Committee of European Securities Regulators, *Technical Advice to the European Commission in the Context of the MiFID Review and Responses to the European Commission Request for Additional Information* (July 2010).

<sup>45</sup>At the time of the writing of this report, CESR had issued recommendations to apply the same organisational requirements that apply to RMs—as set out in Article 39 (a) to (c)—to MTFs, in addition to the existing requirements for investment firms set out under Article 13.

Investment firms conducting OTC transactions are required to adhere to the applicable conduct of business requirements set out under MiFID, as opposed to the market-oriented rules applicable to RMs and MTFs. Such distinction is appropriate given the different types of business concerned.

However, as noted in Section 2, a subset of OTC trading involves order matching conducted through brokers' internal crossing networks. To the extent that such activity is (partly or wholly) multilateral and systematised in nature, crossing networks may be considered substantively akin to 'marketplaces'. As such, the absence of market-oriented rules for broker crossing networks may present a potential uneven playing field vis-à-vis RMs and MTFs.<sup>46</sup>

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<sup>46</sup>At the time of the writing of this report, CESR had issued recommendations to establish specific regulatory requirements for investment firms operating broker crossing systems. Amongst others, investment firms operating crossing systems would be required to meet the organisational requirements under Article 13 of MiFID. CESR has also proposed limiting the amount of business that may be executed through such crossing systems before requiring the systems to be formalised and regulated as MTFs.

## 4. Trade Transparency

This section examines the different classifications of reported trades in order to determine trading transparency in European equity markets.

### 4.1. Conceptual Framework

We establish a conceptual framework that links the structure and regulation of the different types of trading venues (addressed in Sections 2 and 3, respectively) to the different types of trades reported. For this purpose, we use the eight trade classifications according to Thomson Reuters Equity Market Share Reporter,<sup>47</sup> which are as follows:

- *Order Book—Lit*: trades executed on electronic order book markets during continuous trading which match displayed orders (including orders executed against iceberg orders).
- *Auction*: trades executed during auction phases of order book markets (most commonly employed by RMs).
- *Order Book—Hidden*: trades executed on electronic order book markets where one side of the trade is not visible prior to execution. This type of trade is most commonly executed on integrated order books operated by MTFs, which enable displayed orders to interact with non-displayed orders.
- *Dark Order Book*: trades executed on dark pool MTFs, such as reference price systems, which match non-displayed orders with other non-displayed orders.
- *Real-Time On-Exchange Reported*: trades reported to exchanges by member firms according to the rules of the exchange. These include trades executed away from the central order book in an OTC or market making capacity. Such trades may also include negotiated transactions.
- *Delayed On-Exchange Reported*: non-order-book trades as just described but for large trades that are subject to the deferred publication framework.
- *Real-Time Off-Exchange OTC*: trades executed OTC that are published through OTC trade publication services operated outside the rules of an exchange.
- *Delayed Off-Exchange OTC*: as just described but for large trades that are subject to the deferred publication framework.

The conceptual framework is illustrated in **Table 3**; the above trade types are presented alongside the market structure row to which they most *typically* relate.

Based on the descriptions of trade classifications and their linkages to the different types of trading venue and regulatory framework, the eight trade classifications can be ranked in terms of transparency from 8 to 1 (with 8 being the most transparent and 1 the least transparent), as shown in **Table 4**. The transparency ranking provides a means for comparing trade transparency across markets and a basis for examining relationships between transparency and measures of market quality. The transparency ranking is expanded upon further in Section 5. First, we examine various descriptive statistics on the transparency of European equity markets.

<sup>47</sup>See [http://thomsonreuters.com/products\\_services/financial/financial\\_products/equities\\_derivatives/europe/equity\\_market\\_share\\_reporter](http://thomsonreuters.com/products_services/financial/financial_products/equities_derivatives/europe/equity_market_share_reporter).

Structure		Regulatory Framework		Trade Type
		Pre-Trade Transparency	Post-Trade Transparency	
<i>RM</i>		Yes <sup>a</sup>	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Order Book—Lit</li> <li>• Auction</li> <li>• Real-Time On-Exchange Reported (i.e., non-order book)</li> <li>• Delayed On-Exchange Reported (i.e., non-order book)</li> </ul>
<i>MTF</i>	Lit	Yes <sup>a</sup>	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Order Book—Lit</li> <li>• Hidden Order Book</li> <li>• Real-Time On-Exchange Reported (i.e., non-order book)</li> </ul>
	Dark	No	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Dark Order Book</li> </ul>
<i>OTC</i>	Systematic Internalisation	Yes <sup>c</sup>	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Real-Time Off-Exchange OTC</li> <li>• Delayed Off-Exchange OTC</li> </ul>
	Broker Crossing Network	No	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Real-Time Off-Exchange OTC</li> <li>• Delayed Off-Exchange OTC</li> </ul>
	Ad Hoc	No	Yes <sup>b</sup>	<ul style="list-style-type: none"> <li>• Real-Time Off-Exchange OTC</li> <li>• Delayed Off-Exchange OTC</li> </ul>

<sup>a</sup>Subject to waiver framework.  
<sup>b</sup>Deferral for large trades.  
<sup>c</sup>Up to standard market size in liquid markets.

**Table 4. Transparency Ranking by Trade Classification**

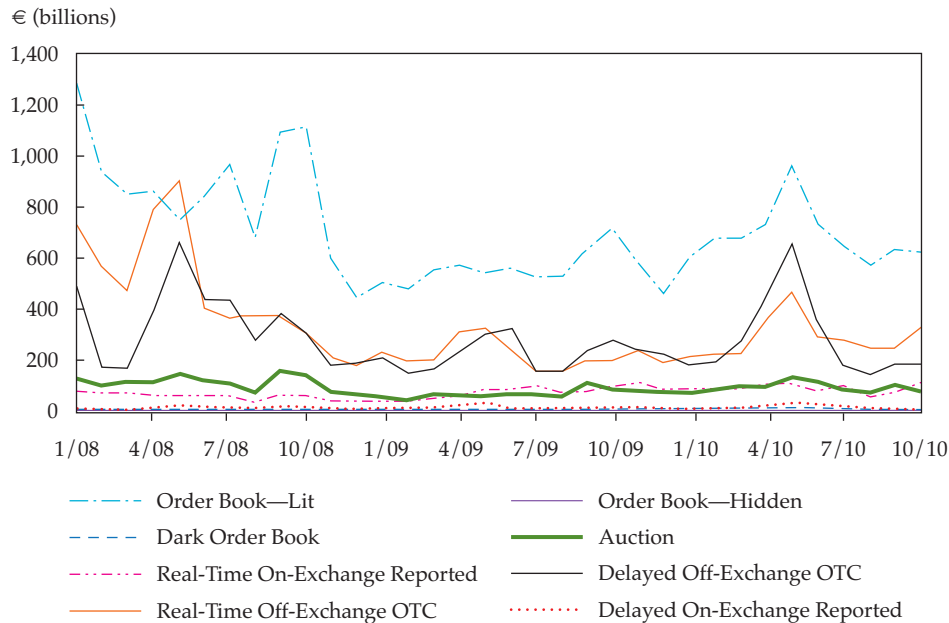
Transparency Rank	Trade Classification
8	Order book—lit
7	Auction
6	Order book—hidden
4.5	Dark order book
4.5	Real-time on-exchange reported
3	Real-time off-exchange OTC
2	Delayed on-exchange reported
1	Delayed off-exchange OTC

*Notes:* Three points are noteworthy. First, dark order book trades and real-time on-exchange reported trades are ranked equally; neither is pre-trade transparent, and both are subject to publication oversight by the execution venue. Second, trades reported in real time are deemed to be more transparent than those reported with a delay. Third, off-exchange OTC trades are ranked below on-exchange reported trades because the latter are subject to oversight by the exchange that assumes responsibility for accuracy of the trades published, whilst for off-exchange OTC trades, responsibility for publication accuracy rests only with the firm and not the publication venue.

## 4.2. Descriptive Statistics

The eight different trade classifications are illustrated in **Figure 9** and **Figure 10**, which show EUR turnover and percentage market shares, respectively, for each type of trade. These figures show that, consistent with the analysis in Section 2, lit order book trades are the primary type of transaction in Europe, averaging turnover of EUR 702.9 billion and 47.3 percent of all transactions over the period from 1 January 2008 to 31 October 2010. Off-exchange reported OTC transactions (including real-time and delayed reported) constitute an average market share of 39.4 percent over the period.<sup>48</sup> There is no significant upward or downward trend in market share for either lit order book or OTC trades.

**Figure 9. Turnover by Trade Type, January 2008–October 2010**



*Note:* Figures represent totals for stocks listed in the EU and Switzerland.

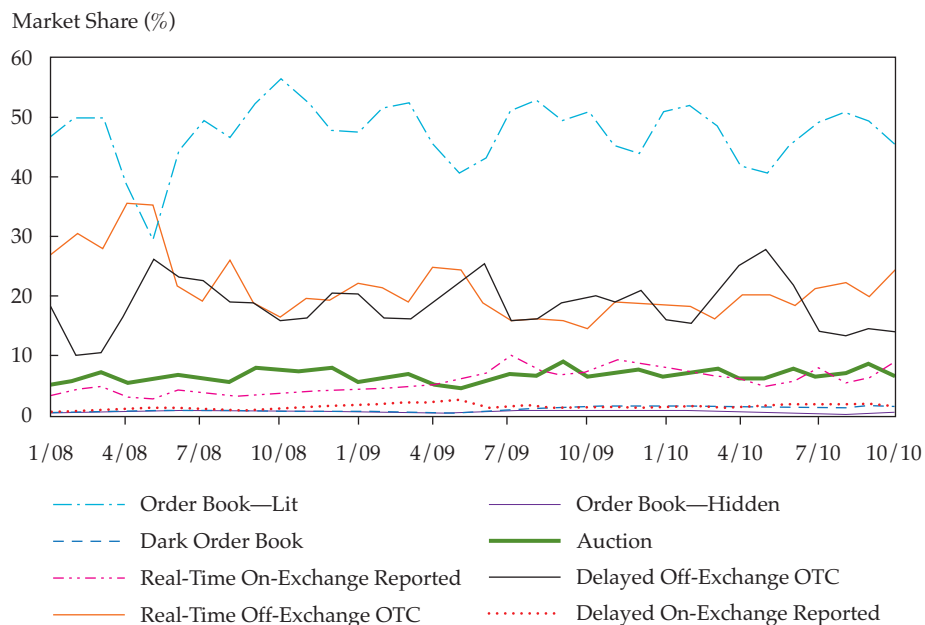
*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

Further details are provided in **Figure 11** and **Figure 12**, which illustrate lit versus dark trades (representing all trades in which both sides of the transaction are not pre-trade transparent) and delayed versus real-time reported trades, respectively.

Dark trading comprises OTC transactions (of which broker crossing network dark pools are a subset), non-order-book trades reported to exchanges (including large and negotiated transactions), and dark MTF trades. As **Figure 11** illustrates, the proportion of dark trades constitutes a significant percentage of European equity trading, averaging 46.4 percent over the review period. Whilst there are monthly fluctuations, there is no discernable upward or downward trend over the period. The proportion of dark trades has accounted for between approximately 40 percent and 50 percent in most months over the past three years.

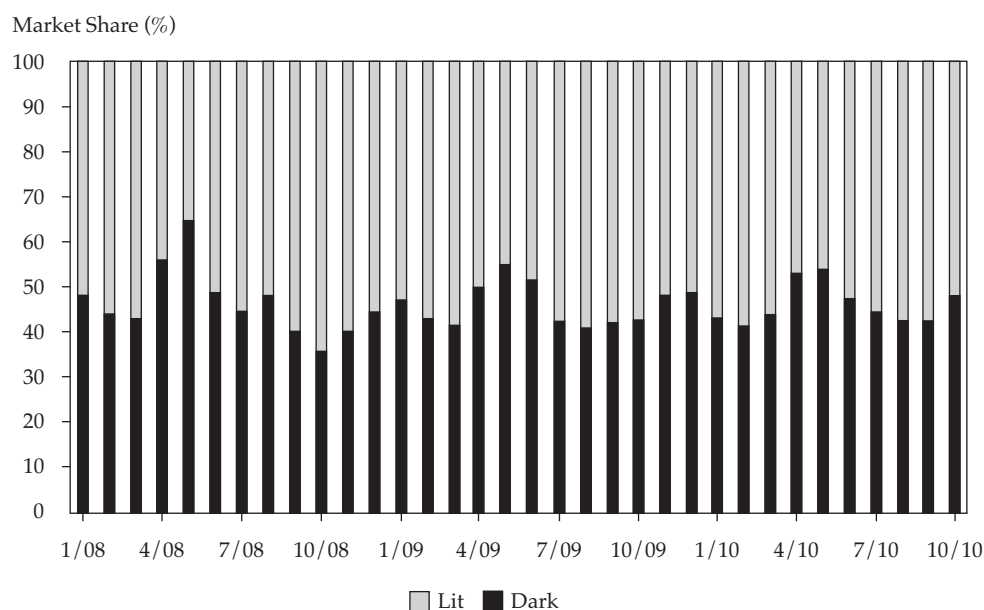
For comparability, the dark trading market share of 48.5 percent for October 2010 can be broken down into the following components: OTC trading at 37.6 percent (of which broker crossing networks constitute 3.2 percent of OTC turnover and 1.2 percent of total turnover), non-order-book on-exchange reported transactions at 9.6 percent, and dark MTF trades at 1.3 percent. If we combine broker crossing network activity with dark MTFs, the total dark pool trading amounted to 2.5 percent of total turnover for the same month.

<sup>48</sup> OTC transactions are a subset of dark trading. A breakdown of dark trading in October 2010 is provided later in this section and in the executive summary.

**Figure 10. Market Share by Trade Type, January 2008–October 2010**


*Note:* Figures represent totals for stocks listed in the EU and Switzerland.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

**Figure 11. Market Share by Trade Type: Lit vs. Dark, January 2008–October 2010**


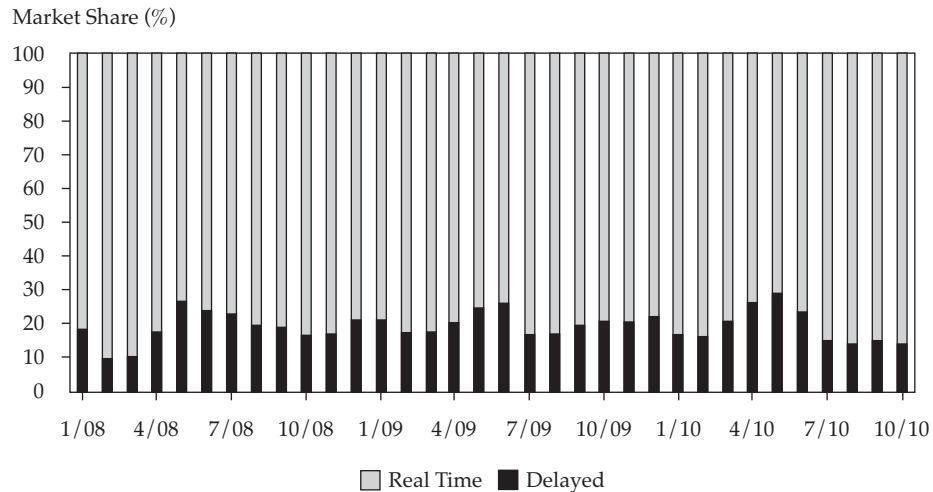
*Note:* Figures represent totals for stocks listed in the EU and Switzerland.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

Trades reported with a delay under the MiFID deferred publication framework constitute an average market share of 19.5 percent over the review period. This proportion ranges between 10.2 percent in February 2008 and 29.0 percent in May 2010. Trades reported with a delay also provide an approximation of the proportion of large trades transacted in Europe (because only large trades are eligible for delayed reporting). Figure 12 demonstrates that this proportion has not trended either upward or downward over the period. As such, large trades represent approximately one-fifth of all trades on average.

Further detail is provided in **Figure 13**, which shows average turnover per trade for trades published with a delay for the same sample. The data can be considered as a proxy of average transaction sizes

**Figure 12. Market Share by Trade Type: Delayed Reported vs. Real-Time Reported, January 2008–October 2010**



*Note:* Figures represent totals for stocks listed in the EU and Switzerland.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

for large trades. The figure shows a fairly consistent pattern in average turnover per trade for delayed on-exchange reported transactions, averaging EUR 395,000 per trade over the period. In contrast, delayed off-exchange OTC transaction sizes average approximately EUR 1.01 million (in terms of average turnover per trade) and have fallen over the review period. However, the greater variability of these data and less oversight over its accuracy obfuscate drawing firm conclusions.

For comparison purposes, the average turnover per trade on order book markets is illustrated in **Figure 14**. It is noteworthy that average transaction sizes on dark order book markets (such as MTF reference price systems) are now approximately equal to those on lit order book markets; for both, average turnover per trade was less than EUR 11,000 by the end of the review period. Given the convergence in average trade sizes, it is questionable whether the reference price system pre-trade transparency waiver, as currently calibrated, provides appropriate regulatory treatment for reference price systems compared with lit order book markets when both types of trading venue are engaging in a similar size of business.

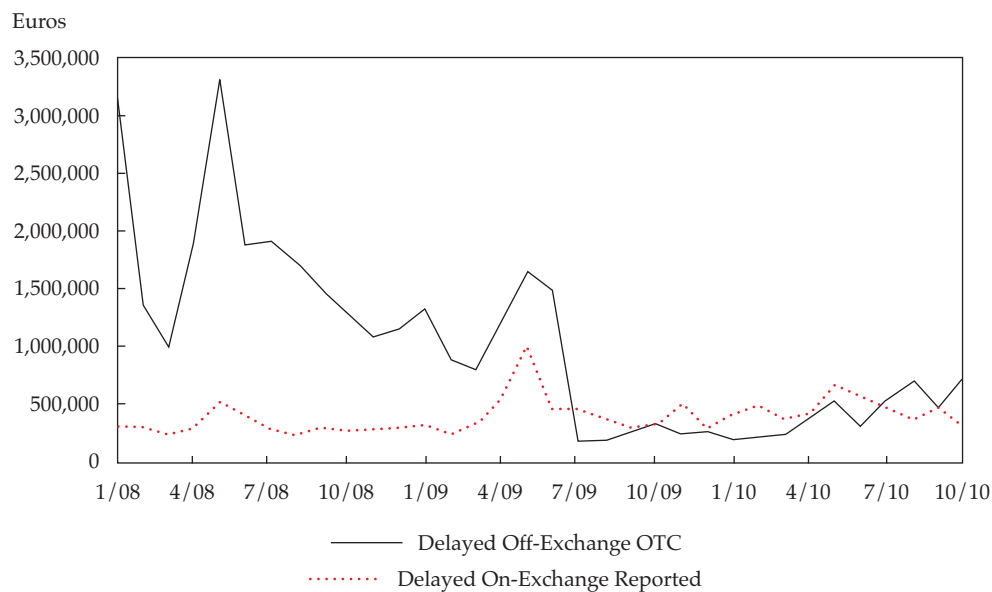
In summary, European equity trading can be characterised as being split roughly in half between those trades executed through transparent order book markets operated by RMs and MTFs, and those executed in a less transparent OTC capacity. There is no significant upward or downward trend in either half over the review period. There is, however, evidence to support the common perception that transaction sizes, on average, are getting smaller.



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**Figure 13. Average Turnover per Trade: Large Trades, January 2008–October 2010**


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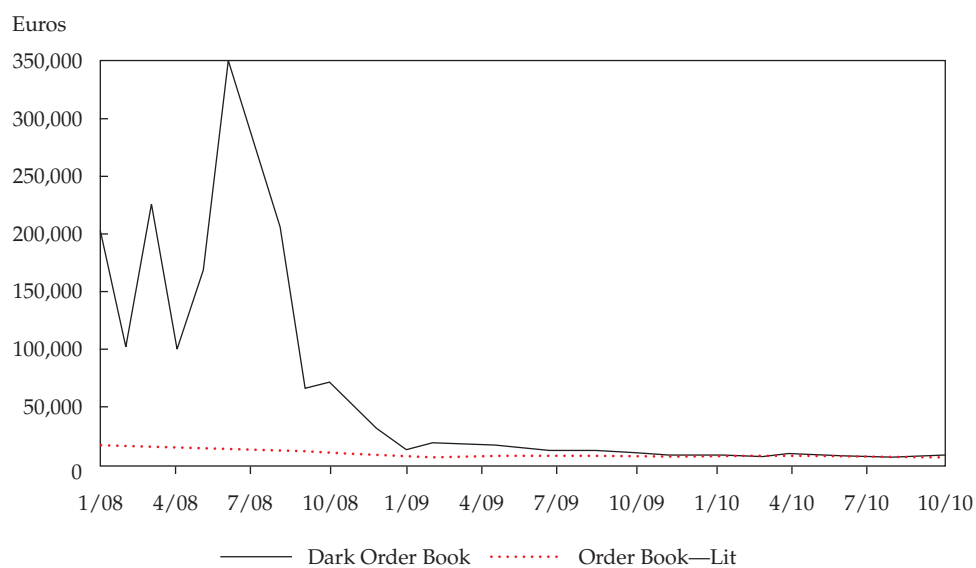
*Note:* Average turnover per trade calculated as monthly EUR turnover divided by monthly trade count for each category of trade.

*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

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**Figure 14. Average Turnover per Trade: Order Books, January 2008–October 2010**


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*Source:* Based on data from Thomson Reuters Equity Market Share Reporter.

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## 5. Empirical Analysis

In this section, we examine market transparency and consider the nature and extent of any relationship between transparency and market quality. The purpose is to evaluate whether more transparency, or less, is beneficial for investors.

For these purposes, we return to the conceptual framework and transparency ranking set out in the previous section.<sup>49</sup> The objective is to establish how market quality is linked to transparency, which itself is a function of the regulatory framework.

First, transparency metrics are constructed for the United Kingdom, France, Germany, Spain, and the Netherlands based on trade data for the companies in the major stock market indices in those countries. Second, we examine the relationship between transparency metrics and bid–offer spreads for the afore-mentioned markets. Third, we evaluate academic literature related to transparency and market quality.

### 5.1. Transparency Metrics

The transparency ranking established in Section 4, Table 4, assigns an ordinal transparency score to the eight trade classifications, ranging from 1 for delayed off-exchange OTC trades (least transparent) to 8 for lit order book trades (most transparent). Based on these scores and the respective market shares for each type of trade, a transparency index can be constructed that reflects the weighted average transparency score (or rank) for the market concerned. That is,

$$\text{Transparency index} = \sum_{i=1}^8 (\text{Transparency score}_i \times \text{Market share}_i),$$

where:

$i = 1, \dots, 8$  represent the eight different trade classifications, and

$$\text{Market share}_i = \frac{(\text{EUR turnover})_i}{\sum_{\forall i} (\text{EUR turnover})}.$$

The transparency indices for the United Kingdom, France, Germany, Spain, and the Netherlands—represented by the companies in the FTSE 100, CAC 40, DAX 30, IBEX 35, and AEX 25, respectively—are presented in **Figures 15** through **19** for the period from January 2008 to October 2010. The index ranges from a minimum of 1 to a maximum of 8. The monthly variations in the index are a function of variations in the market share of the different types of trades.

The figures indicate that transparency indices follow a broadly flat trend in France, Germany, and the Netherlands. In the United Kingdom, the transparency index trends upward, whilst in Spain, it trends downward, albeit from a higher starting point than in other markets. Collectively, these trends reinforce the view presented in Section 4 that, in aggregate, there is no significant upward or downward trend in market shares of different types of trades.

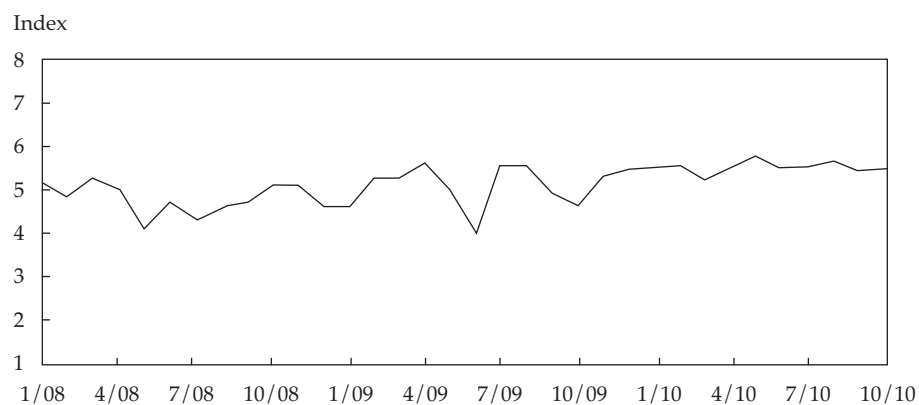
Taken over the whole period, the Netherlands is the most transparent market on average, whilst Germany is the least transparent. Germany also has the greatest variability in trading transparency. These results are summarised in **Table 5**. Also presented are the results for a second transparency metric—the ratio of lit turnover to dark turnover.<sup>50</sup> A ratio greater than 1 implies that trading is mostly pre-trade transparent; a value less than 1 indicates predominantly dark trading. The mean lit-to-dark turnover ratios give broadly the same results as the mean transparency indices—namely that the Netherlands is the most transparent market on average, and Germany the least—although the standard deviations differ.

<sup>49</sup>See Tables 3 and 4.

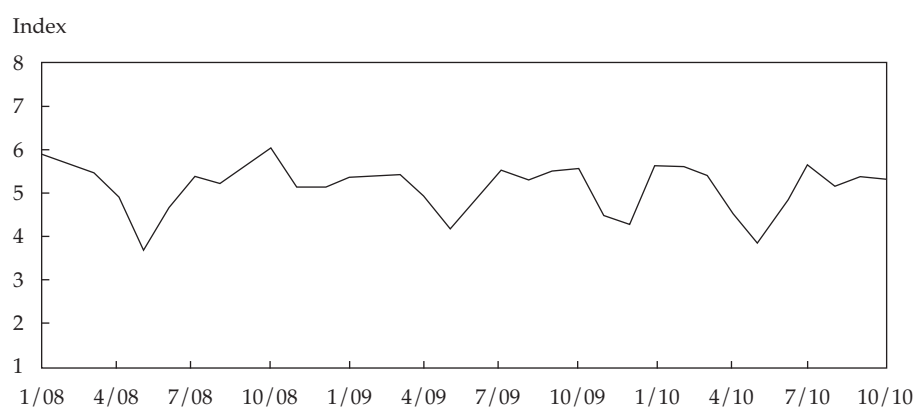
<sup>50</sup>Dark turnover represents all trades in which both sides of the transaction are not pre-trade transparent. This includes dark order book trades, non-order-book on-exchange reported trades, and all other OTC trades.

**Table 5. Summary Transparency Results**

Market	Transparency Index				Lit-to-Dark Turnover Ratio			
	Range		Mean	Std Deviation	Range		Mean	Std Deviation
	Low	High			Low	High		
Netherlands AEX 25	4.24	6.22	<b>5.35</b>	0.48	0.58	2.33	<b>1.29</b>	0.41
Spain IBEX 35	4.15	6.16	<b>5.21</b>	0.53	0.28	2.30	<b>1.07</b>	0.57
France CAC 40	3.70	6.05	<b>5.15</b>	0.56	0.41	2.08	<b>1.20</b>	0.39
United Kingdom FTSE 100	4.04	5.79	<b>5.12</b>	0.46	0.41	1.56	<b>1.02</b>	0.25
Germany DAX 30	3.18	5.81	<b>4.87</b>	0.68	0.26	1.74	<b>1.00</b>	0.38

**Figure 15. FTSE 100 Transparency Index, January 2008–October 2010**

Sources: Based on data from Thomson Reuters Equity Market Share Reporter and CFA Institute calculations.

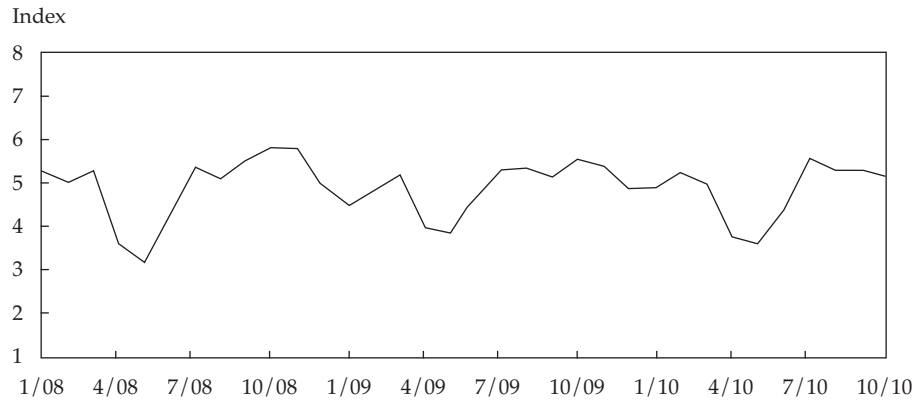
**Figure 16. CAC 40 Transparency Index, January 2008–October 2010**

Sources: Based on data from Thomson Reuters Equity Market Share Reporter and CFA Institute calculations.

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**Figure 17. DAX 30 Transparency Index, January 2008–October 2010**


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Sources: Based on data from Thomson Reuters Equity Market Share Reporter and CFA Institute calculations.

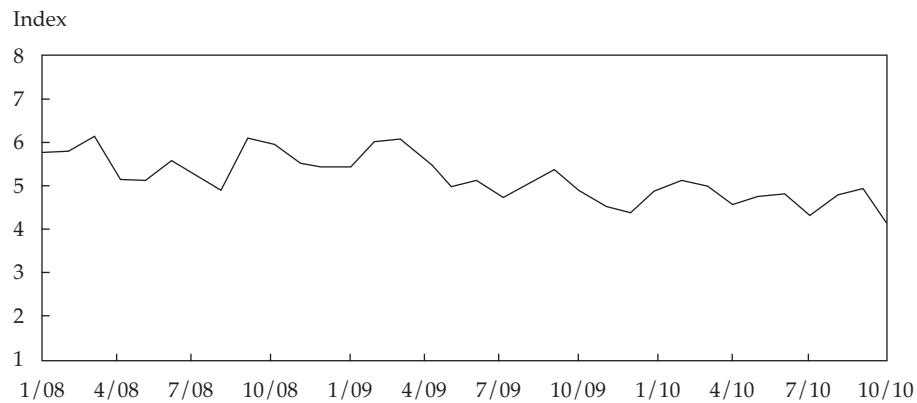
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**Figure 18. IBEX 35 Transparency Index, January 2008–October 2010**


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Sources: Based on data from Thomson Reuters Equity Market Share Reporter and CFA Institute calculations.

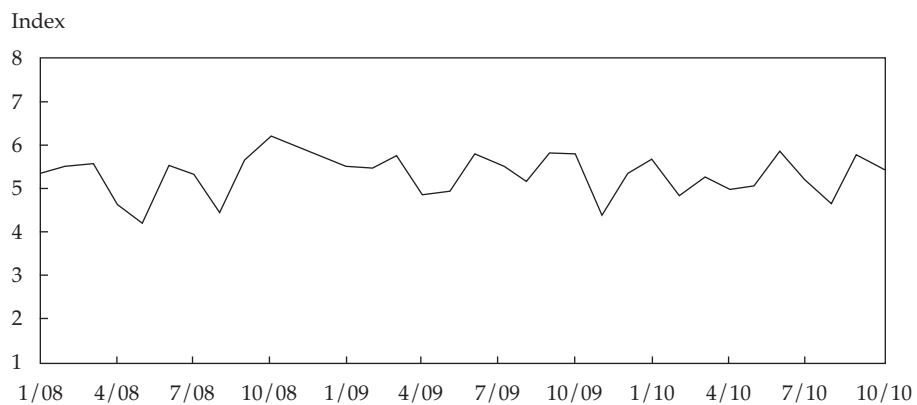
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**Figure 19. AEX 25 Transparency Index, January 2008–October 2010**


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Sources: Based on data from Thomson Reuters Equity Market Share Reporter and CFA Institute calculations.

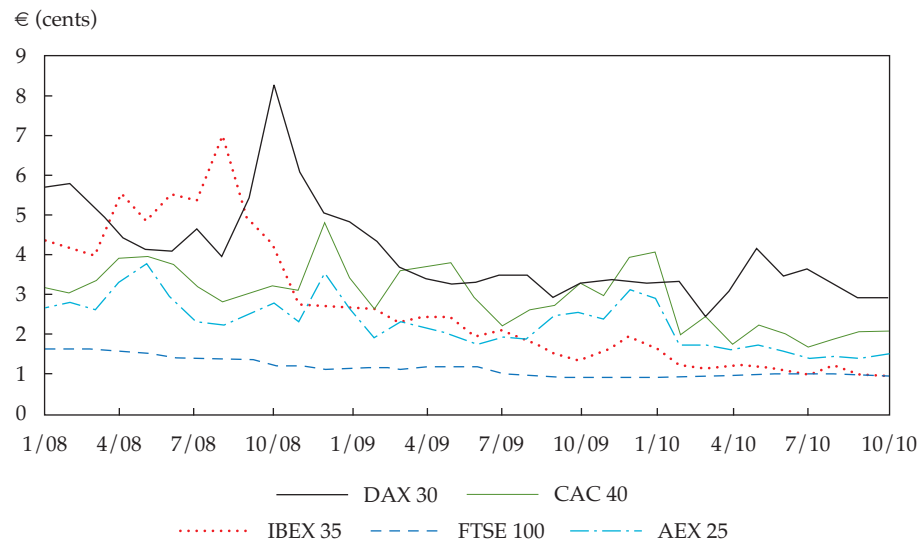
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## 5.2. Relation with Bid–Offer Spreads

### 5.2.1. Correlation

Monthly average bid–offer spreads for each constituent company of the respective stock market indices were obtained. The weighted average spread for each market index, based on average market value weights, was then calculated for each month.<sup>51</sup> Weighted average spreads for each market are illustrated in **Figure 20**. Descriptive statistics for bid–offer spreads are presented in **Table 6**.

**Figure 20. Weighted Average Bid–Offer Spreads, January 2008–October 2010**



*Source:* Based on data from FactSet.

Figure 20 and Table 6 illustrate that FTSE 100 stocks have the lowest and most stable bid–offer spreads, as one might expect given that the United Kingdom is the largest and most liquid European equity market. It is noteworthy, however, that the market with the second lowest mean spreads is the Netherlands, which is also the most transparent market, on average. Similarly, Germany has the highest mean bid–offer spreads and the lowest average transparency scores (by both measures) amongst the markets selected. Furthermore, the DAX 30 has the second most variable spreads and the most variable transparency index.

**Table 6. Bid–Offer Spreads  
(EUR cents)**

Market	Range		Mean	Std Deviation
	Low	High		
Netherlands AEX 25	1.42	3.75	2.30	0.62
Spain IBEX 35	0.94	6.97	2.71	1.65
France CAC 40	1.72	4.80	2.99	0.77
United Kingdom FTSE 100	0.91	1.66	1.17	0.24
Germany DAX 30	2.45	8.23	4.06	1.18

<sup>51</sup>That is, for any month  $t$ , the weighted average spread ( $S$ ) for index  $j$ , based on average market values ( $MV$ ) and average quoted spreads ( $s$ ) for each index constituent company  $i$ , is given by:

$$S_{j,t} = \sum_{\forall i} \left( \frac{MV_i}{\sum MV_i} \right) \times s_{i,t}.$$

Market values are measured in euros, and spreads are measured in euro cents for comparability across the sample.

Anecdotally, these facts may suggest that (1) high average transparency metrics are associated with low mean spreads and (2) less variable levels of transparency are associated with less variable spreads, and vice versa. These conjectures are substantiated in **Table 7**, which presents rank correlations for relevant pairs of the transparency and spread measures examined. The key observations are highlighted in bold. First, mean spreads are negatively correlated with mean transparency metrics. Excluding the United Kingdom, the correlation coefficients in the first column improve from  $-0.4$  to  $-1.0$  (perfect negative correlation) and from  $-0.3$  to  $-0.83$  for the respective pairs. Second, there is positive correlation between the variability of spreads and the variability of the transparency metrics, with coefficients of  $0.7$  and  $0.6$  for the respective pairs. These results support the view that on average, high levels of transparency correlate with low spreads, and also that stable levels of transparency correlate with stable spreads.

**Table 7. Rank Correlation Coefficients**

	Bid–Offer Spread	
	<i>Mean</i>	<i>Standard Deviation</i>
Transparency index: <i>mean</i>	<b><math>-0.4</math></b>	0.0
Lit-to-dark turnover ratio: <i>mean</i>	<b><math>-0.3</math></b>	$-0.2$
Transparency index: <i>standard deviation</i>	1.0	<b><math>0.7</math></b>
Lit-to-dark turnover ratio: <i>standard deviation</i>	0.1	<b><math>0.6</math></b>

*Notes:* The table provides the Spearman’s rank correlation coefficient for pairs of ranks relating to the variables described. For each variable, a rank of 1 is assigned to the highest value and 5 to the lowest value. The correlation coefficient ranges from  $-1$  to  $+1$ .

The other results are somewhat mixed. Whilst mean spreads are perfectly correlated with the standard deviation of the transparency index—such that high transparency index variability correlates with high mean spreads—the same relationship is weak when replacing transparency index variability with lit-to-dark turnover ratio variability. Similarly, the variability of spreads has no clear correlation with the mean level of transparency, with coefficients of  $0.0$  and  $-0.2$ , respectively.

### 5.2.2. Directional change

To examine further the nature and extent of any possible relation between transparency and bid–offer spreads, we next analyse the association between changes in transparency indices and changes in spreads. This analysis should offer greater insight into the nature of the relation between transparency and spreads; it enables one to establish directional change in these two variables and to examine whether such changes are consistent over time.

Based on the preceding analysis, we would expect changes in a given transparency index to be negatively associated with changes in spreads. That is, on average, we would expect increases in transparency to coincide with decreases in spreads, and vice versa. Intuitively, when trading shifts toward lit trading venues, one might expect spreads to narrow as visible market depth increases and investor confidence in the price discovery function strengthens. Conversely, when trading migrates to non-displayed off-exchange venues, publicly displayed liquidity is eroded and so spreads may widen. Furthermore, where the proportion of trading reported with a delay increases, thereby decreasing overall transparency, the real-time utility of post-trade information is diluted, which may have adverse effects on confidence being impounded in spreads.

It should be noted that there are numerous factors affecting the level of, and changes in, bid–offer spreads.<sup>52</sup> As such, one would not expect a perfectly consistent month-on-month relationship between changes in transparency and changes in spreads. However, if such a relation does exist, we would expect negative co-movements to hold on average—that is, increases in transparency should coincide with decreases in spreads (and vice versa) in most months.

When considering the preceding analysis, it should be noted that the magnitude of the change in each variable is largely unimportant. It is not generally possible to directly compare numerical values between spreads and transparency indices because the latter are based on an ordinal ranking. Rather, it is the direction of movements that matters most.

<sup>52</sup>For this reason, it is difficult to establish causal relationships.

For each of the five markets sampled, the monthly percentage change in the transparency index as well as the monthly percentage change in weighted average spreads is plotted, as shown in **Figure 21** through **Figure 25**.<sup>53</sup>

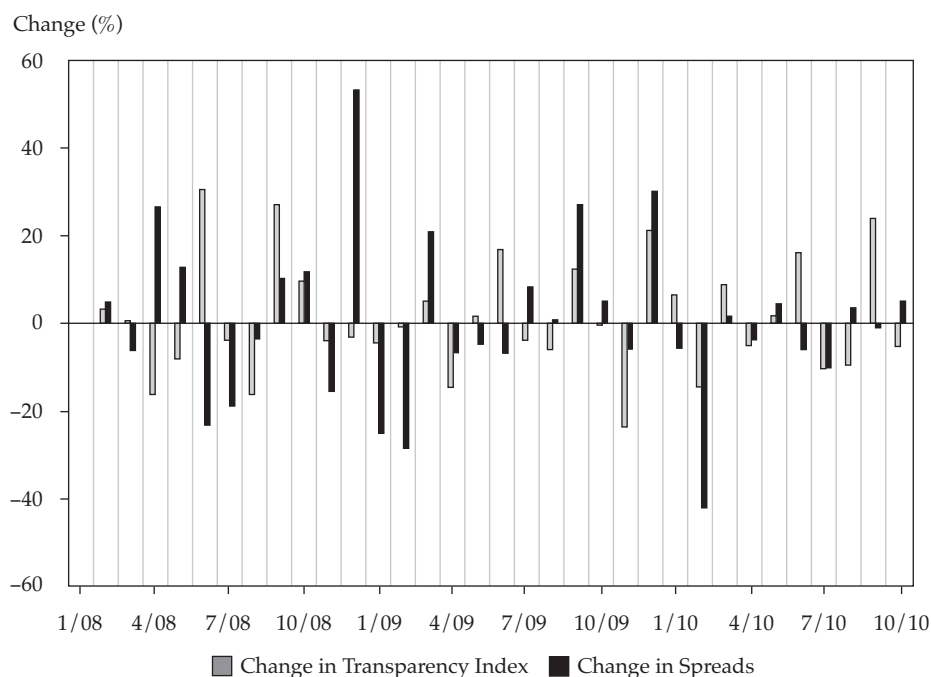
For the Netherlands, changes in spreads move in the opposite direction to changes in the transparency index in 15 out of the 33 months examined. As **Figure 21** illustrates, the months in which this relationship holds are in the first half of 2008, in the second and third quarters of 2009, and the final three months of the period.

The most conspicuous period for which spreads do not move in the opposite direction to the transparency index is the second half of 2008—a period of severe market turbulence—and into the first quarter of 2009. Excluding the second half of 2008, changes in spreads move in the opposite direction to changes in the transparency index in 52 percent of the months examined.

During the turbulent second half of 2008, spreads increased in September and October, even though the level of the transparency index also increased. This outcome may be explained by heightened concerns over counterparty risk around this time. Such concerns would have triggered a shift toward on-exchange execution (which effectively guarantees safety of clearing and settlement) and away from bilateral OTC execution, resulting in an increase in the transparency index. However, at the same time, systemic risk concerns are likely to have diminished investor confidence, resulting in an increase in spreads.

To check the robustness of these results, changes in bid–offer spreads were also compared against changes in the lit-to-dark turnover ratio. Using this transparency metric yields similar results: opposite movements occur in 16 out of the 33 months, and excluding the second half of 2008, in 56 percent of the months examined. On balance, there is only weak evidence from the Dutch market regarding the relationship between changes in transparency and changes in spreads.

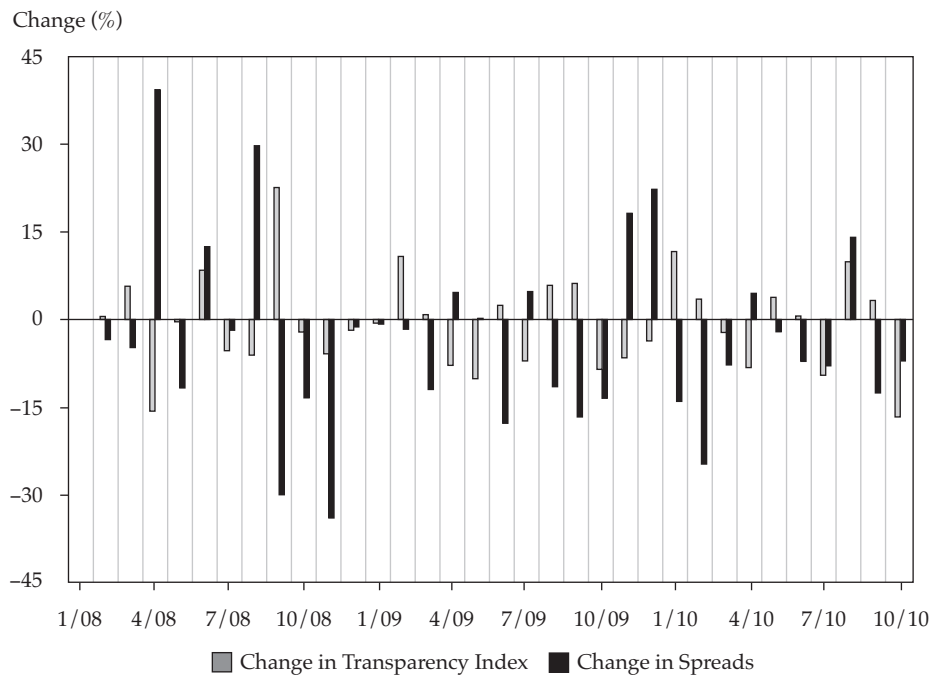
**Figure 21. Monthly Percentage Change: Transparency Index and Weighted Average Bid–Offer Spread—Netherlands AEX 25, January 2008–October 2010**



*Sources:* CFA Institute calculations based on bid–offer spread data from FactSet and trade data from Thomson Reuters Equity Market Share Reporter.

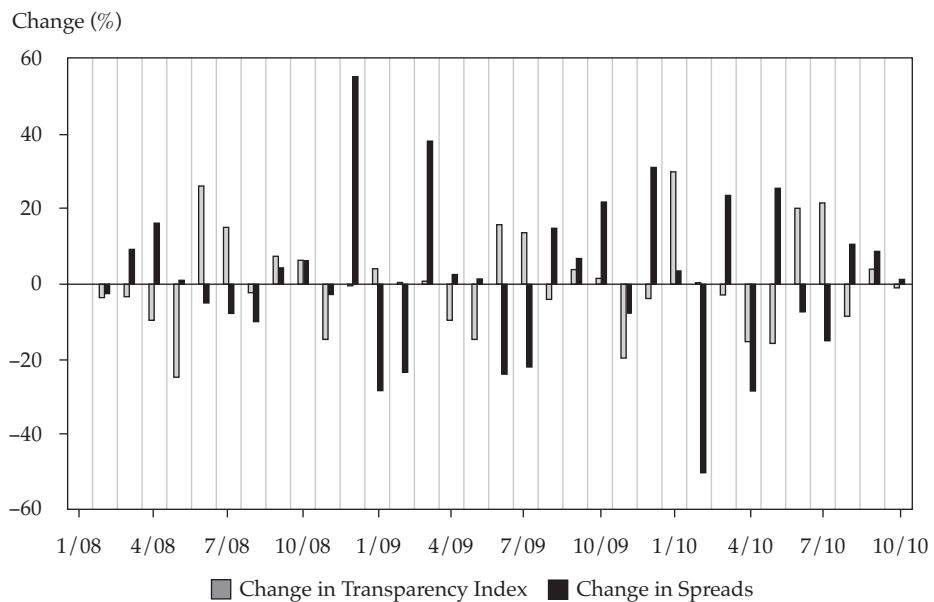
<sup>53</sup>A caveat of this analysis is that the percentage change in the transparency index is subject to error if there are errors in the underlying trade data. For example, reported instances of double-counting and missed trades in OTC trade data may affect the month-on-month change in the transparency index—particularly where OTC trades constitute a relatively high proportion of the transparency index in one month compared with the prior or subsequent months.

**Figure 22. Monthly Percentage Change: Transparency Index and Weighted Average Spread—Spain IBEX 35, January 2008–October 2010**



Sources: CFA Institute calculations based on bid–offer spread data from FactSet and trade data from Thomson Reuters Equity Market Share Reporter.

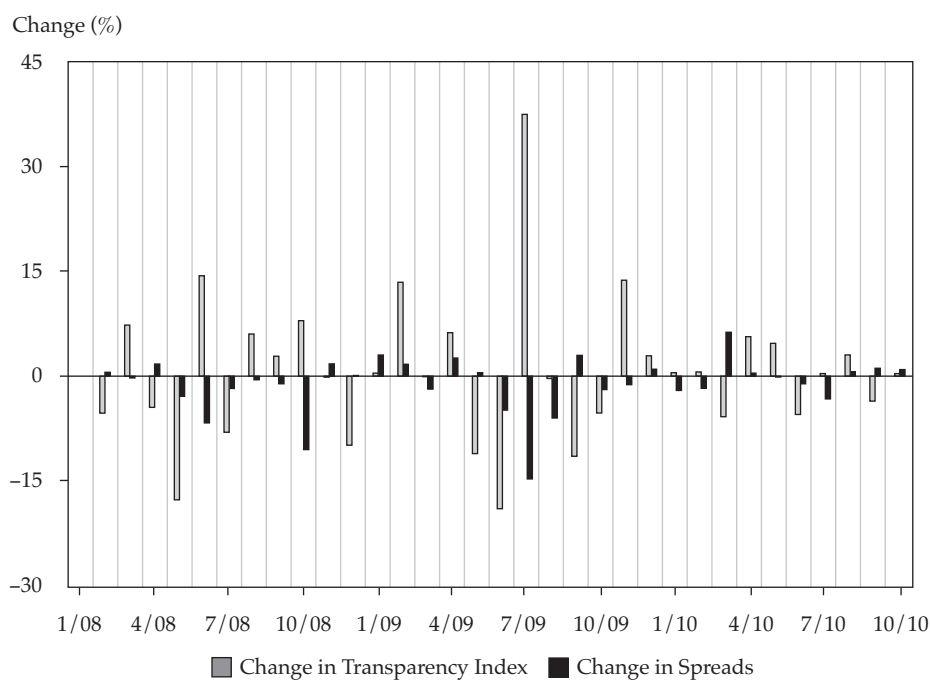
**Figure 23. Monthly Percentage Change: Transparency Index and Weighted Average Spread—France CAC 40, January 2008–October 2010**



Sources: CFA Institute calculations based on bid–offer spread data from FactSet and trade data from Thomson Reuters Equity Market Share Reporter.

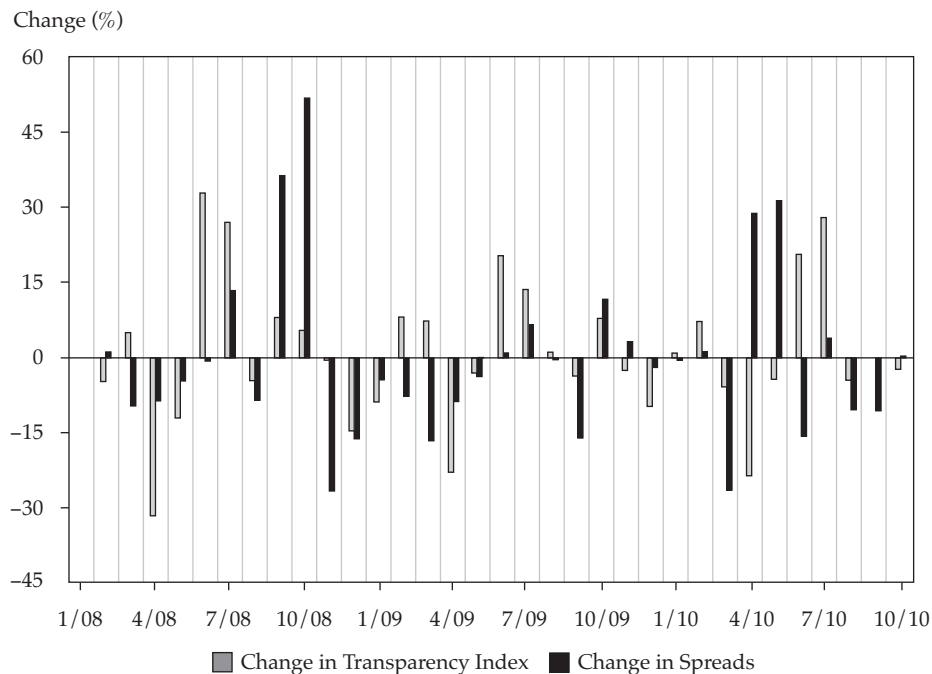


**Figure 24. Monthly Percentage Change: Transparency Index and Weighted Average Spread—United Kingdom FTSE 100, January 2008–October 2010**



Sources: CFA Institute calculations based on bid–offer spread data from FactSet and trade data from Thomson Reuters Equity Market Share Reporter.

**Figure 25. Monthly Percentage Change: Transparency Index and Weighted Average Spread—Germany DAX 30, January 2008–October 2010**



Sources: CFA Institute calculations based on bid–offer spread data from FactSet and trade data from Thomson Reuters Equity Market Share Reporter.

Figure 22 illustrates that for IBEX 35 stocks, decreases in the transparency index broadly correlate with increases in spreads, and vice versa. Out of the 33 months examined, changes in spreads move in the opposite direction to changes in the transparency index in 21 months. The periods when this relationship is least apparent are the fourth quarter of 2008 and January 2009, when the transparency index changed little month on month (as per Figure 18, the index remains relatively high around a value of 5.7), whilst spreads are more volatile.

For comparability with the AEX 25, if the turbulent second half of 2008 is stripped out, changes in spreads move oppositely to changes in the transparency index in more than two-thirds (70 percent) of the months in the review period. Based on the lit-to-dark turnover ratio, changes in spreads move in the opposite direction to changes in the transparency metric in 22 out of the 33 months in the period and excluding the second half of 2008, in 74 percent of the months examined.

Similar to the results obtained for Spain, Figure 23 shows that for CAC 40 stocks, changes in the transparency index and changes in bid-offer spreads generally move in opposite directions to one another. This pattern is evident in 21 months out of the 33 months examined. This relationship is accentuated if the movements in the fourth quarter of 2008 are stripped out. During this turbulent period, analogous to the Netherlands, spreads increased in September and October, even though the level of the transparency index also increased. As noted previously, this outcome may be explained by heightened concerns over counterparty risk around this time. By December, however, the relationship is largely re-established, such that increases in transparency are mainly associated with decreases in spreads (and vice versa).

Overall, if we strip out the fourth quarter of 2008, the relationship between the transparency index and spreads holds in exactly two-thirds of the months in the review period. The same result is obtained by excluding the broader period of the second half of 2008. Similar results are obtained based on the lit-to-dark turnover ratio. Opposite movements occur in 18 out of the 33 months reviewed, and in 63 percent of months excluding the second half of 2008.

It has been noted in Figure 20 and Table 6 that bid-offer spreads are generally lower and much more stable in the United Kingdom than in other markets. Based on their lower variability, one might expect month-on-month changes in spreads to be less closely associated with month-on-month changes in transparency. As Figure 24 illustrates, however, changes in spreads do move in opposite directions to changes in the transparency index in most months. Specifically, this pattern occurs in 19 months—less than in Spain and France—but still a slight majority of months in the review period (58 percent). However, unexpectedly, this ratio falls to 52 percent when the second half of 2008 is excluded. Although transparency increased in September and October of 2008—consistent with other markets and reflective of a migration of trading toward exchanges at this time—it seems that, in the case of the United Kingdom, the depth and resiliency of the equity market was such that spreads narrowed in these months, even though in other markets, spreads rose. As such, by excluding the second half of 2008, the overall relationship is weakened. The months in which the relationship is weakest are in the first quarter of 2009, when changes in each variable moved in the same direction. However, in two of these months—January and March—the change in the transparency index is only negligible (0.55 percent and -0.02 percent, respectively), meaning that the extent of positive co-movement is also negligible in these months.

Stronger results are obtained using the lit-to-dark turnover ratio. Based on this transparency metric, opposite movements occur in 20 out of the 33 months reviewed, and in 56 percent of months excluding the second half of 2008. Overall, the relationship holds for the United Kingdom, although it is less pronounced than in Spain and France.

Figure 25 illustrates that for DAX 30 stocks, there is no evidence of negative correlation between changes in the transparency index and changes in bid-offer spreads. Out of the 33 months in the period, changes in spreads move in the opposite direction to changes in the transparency index in 12 months—fewer than half of the months sampled. Excluding the second half of 2008 (in which positive co-movements exist in every month), opposite movements exist in 44 percent of the months reviewed. Similar results are obtained using the lit-to-dark turnover ratio. Opposite movements occur in 13 out of the 33 months reviewed, and in 48 percent of months excluding the second half of 2008.

One possible explanation for this unexpected outcome is that, in the case of Germany, the quality and reliability of price formation may be adversely affected by the high average proportion of dark trading in that market. Examination of the components of the transparency index for Germany shows that the total market share of dark trading for DAX 30 stocks exceeds 50 percent on average (off-exchange OTC trades account for 49 percent of this total). Such relatively high proportions may dislocate the expected relationship between changes in transparency and changes in spreads.

Alternatively, the results for the German market may simply be attributable to poor data. Indeed, the relatively low proportion of on-exchange trading in the German market casts doubts over the reliability of the transparency index for that market, given that such a high weighting (i.e., 50 percent on average) is assigned to trade types that are not subject to exchange oversight. On this basis, the dislocation in the relationship between changes in transparency metrics and changes in spreads may simply be a function of the data rather than reflective of a structural relationship. Either way, the data studied are insufficiently granular to adequately explain the results for the German market, or to draw further conclusions.

The results from Figures 21 through 25 are summarised in **Table 8**. In Spain, France, the United Kingdom, and the Netherlands (excluding the second half of 2008), changes in bid–offer spreads move in opposite directions to changes in transparency metrics in the majority of months (highlighted in bold). The opposite is true for DAX 30 stocks.

**Table 8. Proportion of Months with Opposite Changes between Transparency Metrics and Bid–Offer Spreads**

Market	Based on Transparency Index		Based on Lit-to-Dark Turnover Ratio	
	Full Sample	Excluding H2 2008	Full Sample	Excluding H2 2008
Netherlands AEX 25	45%	<b>52%</b>	48%	<b>56%</b>
Spain IBEX 35	<b>64</b>	<b>70</b>	<b>67</b>	<b>74</b>
France CAC 40	<b>64</b>	<b>70</b>	<b>55</b>	<b>63</b>
United Kingdom FTSE 100	<b>58</b>	<b>52</b>	<b>61</b>	<b>56</b>
Germany DAX 30	36	44	39	48

### 5.3. Academic Literature

The literature related to market transparency is numerous. This section provides an overview of some of the key academic studies in this field.

Chordia, Roll, and Subrahmanyam (2000) examined various liquidity measures based on a sample of NYSE listed stocks. They found, among others, that dollar volume has a negative influence on bid–offer spreads and a positive influence on depth—whilst volatility has a positive effect on spreads and a negative effect on depth. That is, higher on-exchange volume and lower volatility result in narrower spreads and greater depth. Because on-exchange volumes translate into higher transparency scores, these results are broadly consistent with the findings in Section 5.2.1—namely, on average, high levels of transparency correlate with low spreads; and also stable levels of transparency correlate with stable spreads.

Madhavan, Porter, and Weaver (2005) examined the effect of the Toronto Stock Exchange’s decision to publicly display its limit order book for both its electronic and its traditional floor market in 1990—a unique change in the exchange’s transparency regime. They found that the increase in transparency reduced liquidity; in particular, execution costs and volatility increased after the limit order book was publicly displayed. The authors found no evidence that spreads of cross-listed stocks widened in other markets, nor did they find any significant order-flow migration from one exchange to another. However, on balance, the study is not supportive of greater transparency.

In contrast, Hendershott and Jones (2005) found that less transparency has negative effects on market quality. They reviewed the event in 2002 when the Island electronic communications network stopped displaying its limit order book in the three most active exchange-traded funds (ETFs). As a result of this reduction in pre-trade transparency, ETF prices adjusted more slowly and substantial price discovery migrated from the ETF market to the futures market. Moreover, Island's bid-offer spreads increased, while spreads fell in other markets. However, the increase in spreads on Island more than offset the reduction in trading costs in other markets, such that overall trading costs increased. In short, this study shows that a reduction in transparency worsens overall price discovery and market quality.

More recently, Weaver (2010) examined off-exchange reporting and market quality, focussing on the U.S. equity markets and the prevalence of dark pool and internalised trades. The study examined the market share of trading volume reported through a trade reporting facility (an off-exchange reporting venue) and found strong evidence that off-exchange reporting is associated with a reduction in market quality. In particular, the study found that stocks with higher levels of off-exchange reporting have wider bid-offer spreads (quoted, effective, and realised). Weaver also found that that increased off-exchange reporting is associated with greater price impact per trade and higher volatility. In short, the study concluded that increased off-exchange reporting is associated with a degradation of market quality for all market segments in the United States. These results are consistent with the view that less market transparency has a negative effect on market quality.

Buti, Rindi, and Werner (2010) examined the impact of dark pool activity on market quality, based on regressions of the proportion of dark pool trading on quoted bid-offer spreads for U.S. stocks. Using different model specifications, they concluded that, broadly, dark pool trading does not have any detrimental effect on market quality. However, based only on the quadratic specification of their regression model, they found that, beyond a market share of approximately 8 percent, a higher amount of dark pool activity is associated with higher spreads.

Overall, the academic literature on the relationship between transparency measures and market quality is somewhat mixed, highlighting the difficulty of obtaining conclusive evidence from empirical analysis. But on balance, the literature reviewed here is marginally supportive of greater transparency.

#### **5.4. Summary**

First, the empirical analysis suggests (1) high average transparency scores broadly correlate with low average bid-offer spreads and (2) stable levels of transparency correlate with stable spreads.

Second, the analysis indicates that changes in market transparency are negatively associated with changes in bid-offer spreads in most months, such that spreads typically narrow when transparency metrics increase. As per Table 8, evidence supports this assertion in four out of the five markets examined.

Third, a review of the academic literature is broadly consistent with these findings. Although somewhat mixed, the literature reviewed is balanced in favour of greater transparency.

In aggregate, we conclude that greater transparency is beneficial for investors.

## 6. Conclusions and Policy Considerations

On balance, the preceding analysis suggests that transparency is good for markets. Accordingly, policy measures should support greater transparency and greater consistency in the application of transparency rules within the regulatory framework.

Two broad policy measures support these goals. First—regarding market structure—limit expansion of dark trading and encourage execution of marketable order flow on transparent organised trading venues. Second—regarding the regulatory framework—level the playing field between trading venues so that venues engaging in similar types and sizes of business are subject to the same rules.

Whilst evidence indicates that bid–offer spreads typically narrow when transparency indices increase, it should also be remembered that a plethora of factors affect spreads, one of which is competition. The proliferation of new trading venues since the implementation of MiFID has brought many benefits to investors, offering greater choice over where to trade and fostering competition, which has had a positive impact on spreads. Within this environment, off-exchange execution (internalisation, crossing networks, and other forms of OTC transactions) serves an important role, enabling investors to obtain efficient executions for non-standard types of business. Therefore, it would be inappropriate to eliminate OTC trading or prohibit certain types of OTC structures, or to impose undue regulation. Equally, it would be undesirable to return to a more monopolistic market structure.

However, given the noted benefits of greater transparency, the primacy of transparent order book markets should be supported and on-exchange (RM or MTF) execution should be encouraged. It would be detrimental for investors if the market share of dark trading—which is predominantly OTC—were to increase. Dark trading in Europe over the period studied averaged 46.4 percent. At the very least, consideration should be given as to whether this represents an appropriate level. Prima facie, a figure significantly in excess of 50 percent would likely undermine investor confidence in market prices and could damage price discovery.

Furthermore, to ensure that transparent venues and order types can compete on fair and even terms, the regulatory framework should provide for consistency in transparency requirements amongst venues engaging in similar types and sizes of business.

To support these transparency goals, we recommend the following key policy considerations:

### 1. Market structure: encourage more trading on transparent organised trading venues.

- a. *Prevent orders up to standard market sizes from being executed outside of MiFID organised trading venues (RMs, MTFs, and SIs).* OTC business is acceptable for ad hoc, large, or non-standard transactions. However, there is little economic rationale for standard marketable order flow to be executed through OTC channels. Such a measure would also mitigate regulatory arbitrage between organised trading venues and OTC activity.
- b. *Maintain the existing large-in-scale pre-trade transparency waiver thresholds.* A reduction of the large-in-scale thresholds could have adverse unintended consequences on market transparency. The fall in average order and transaction sizes since the implementation of MiFID has increased the gap between large order sizes and average order sizes. A lowering of these thresholds, however, would necessarily result in a greater proportion of dark transactions—which already account for between approximately 40 percent and 50 percent of all transactions.

### 2. Regulatory framework: level the playing field so that venues conducting similar types of business, and orders of similar types and sizes, are subject to the same rules.

- a. *Require broker crossing networks that facilitate multilateral order execution, and that engage in a similar size of business as MTFs, to register as MTFs and be bound by the same regulatory framework that applies to MTFs.* This recommendation would ensure that all marketplaces are subject to the same market-oriented rules. It would also uphold the proportion of trading being transacted through organised trading venues and mitigate regulatory arbitrage amongst venues.

- b. *Establish a minimum size threshold for dark reference price systems (dark pool MTFs) that provide for executions at prices inside the quoted spread on the stock's reference market. Average transaction sizes on such systems are broadly equivalent to those on transparent order book markets. A minimum size threshold is necessary to provide consistency in the application of transparency rules for similarly sized orders. This recommendation upholds the principle that only large or non-standard orders should be exempt from pre-trade transparency requirements. Such a threshold would also help uphold the proportion of trading on transparent venues (Consideration 1).*
- c. *Require residual orders ('stubs') that fall below the large-in-scale thresholds to be pre-trade transparent. This recommendation is appropriate to ensure fair treatment with other similarly sized orders.*

Other considerations relevant to improving market transparency include:

### 3. Improve the quality and utility of post-trade data.

- a. *Shorten the permissible trade reporting delays under the MiFID deferred publication framework, as recommended by CESR.<sup>54</sup> The current maximum permissible time delay of three days undermines the timeliness and usefulness of post-trade data. In general, exceptions to real-time trade publication should not extend beyond the current trading day (or the start of the next trading day). Trades published with a delay should also be identified as such in trade reports.*
- b. *Implement CESR's recommendations to introduce Approved Publication Arrangements<sup>55</sup> to improve the accuracy, consistency, and reliability of post-trade data. MiFID should require trade data to be published in a standardised format, utilising consistent symbology, with appropriate quality-control procedures to ensure data quality. Such measures are necessary to facilitate the consolidation of post-trade data.*
- c. *Implement a consolidated tape. Investors need access to a complete and clear picture of market prices and trading interest to facilitate the investment decision-making process and to assist the accomplishment and measurement of best execution. Accordingly, MiFID should mandate the requirement for a consolidated tape. Authorities should task industry to develop a consolidated tape according to clear standards and time frames that meet the needs of investors.*

Implementation of these considerations will strengthen the functioning and integrity of equity markets and promote fair competition between trading venues. Moreover, by improving the transparency of equity markets, investors' interests will be best served.

<sup>54</sup>See CESR's *Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (July 2010).

<sup>55</sup>See CESR's *Technical Advice to the European Commission in the Context of the MiFID Review: Equity Markets* (July 2010).

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