Xetra BEST – Integration of Market Access Intermediaries' Requirements Into Market Design

PETER GOMBER AND KAI-OLIVER MAURER



INTRODUCTION¹

Operators of electronic markets constantly improve their systems in terms of market design, market infrastructure and the services provided for market participants. This is especially relevant for financial market infrastructure providers as they have to keep on track with and actively support participants' business models in a constantly changing and very innovative environment.

Against this background, in 2002 Deutsche Börse AG designed and introduced an innovative market model and trading functionality on Xetra, its electronic trading system. This new model, Xetra BEST, is providing a facility that reflects an increasing market trend in the securities industry — the provision of best execution and internal order execution services (internalization) by financial intermediaries, i.e. banks and brokers, to their customers, especially their retail clients.

Internalization facilities that specifically address retail customers are a product of the retail boom of the late 1990s, the increasing competition for retail order flow and the fact that the traditional separation between exchanges and their customers is getting blurred. Whereas intermediation in the traditional environment purely related to providing access to a market or acting in the market as a market maker or liquidity provider, this new trend aims at providing execution services directly at the customer interface or market access level thereby circumventing markets and exchanges.

The paper aims to illustrate the Xetra BEST market model, functionality and technical concept within this environment. The changing roles of intermediaries are explained to illustrate the background of this market innovation. From a conceptual point of view, the innovation refers to the integration of the requirements of market access intermediaries into an order book model. It aims at preserving a high level of market efficiency and at protecting the central price formation process. From a technical point of view, it refers to the integration of decentralized facilities of single intermediaries into a central market system.

The paper is structured as follows: the next section discusses traditional roles of intermediaries at the market level. This is followed by an analysis of new business models of intermediaries at the market access level. Based on this description of current market trends, the requirements are derived for a market model that tries to simultaneously reflect the needs of

Abstract

Innovative auction design has to consider both the outcome of market processes in terms of market quality and the business models of market participants. Recent competition for, and cost pressure in acquiring retail order flow has changed the role of market access intermediaries, i.e. banks or brokers, in European equity markets. They are attempting to extract a higher value out of the retail order flow especially by providing internal matching against their own trading books commonly referred to as internalization.

In this environment, Deutsche Börse designed an innovative equity trading market model fully integrated into its Xetra trading system. The paper presents this market model (Xetra BEST) based on an analysis of the changing role of market access intermediaries. It derives and validates design requirements for a model that aims at maintaining a high level of market efficiency while serving the needs of market access intermediaries in an internalization framework.

Keywords: market microstructure, intermediation, internalization, payment for order flow, Xetra BEST



Peter Gomber

(Peter.Gomber@deutsche-boerse.com) is Head of Market Development Cash Market, Deutsche Börse. Kai-Oliver Maurer

(Kai-Oliver.Maurer@deutscheboerse.com) is Senior Expert, Trading & Clearing Design, Deutsche Börse. market access intermediaries and the goal of maintaining highest market quality at the market level. The Xetra BEST model is then described and put into context within the Xetra system and market model. Beyond that, the model is checked against the requirements discussed in the previous section. The paper concludes with a summary and a brief outlook on regulatory developments in this domain.

INTERMEDIARIES AT THE MARKET LEVEL

Traditional market design as well as market microstructure theory are primarily focused on the role of intermediaries at the market level. Academic literature intensively discusses the relative advantages of the two fundamental market models of quote-driven markets on the one hand and order-driven markets on the other hand (for an overview on research topics in market microstructure theory see Madhavan (2000)).

A quote-driven market is organized according to the market maker principle, i.e. a defined number of market intermediaries are willing or committed to buy and sell specified sizes of financial instruments at prices determined by them (Demsetz 1968, Stoll 1998). In a market maker environment, intermediaries need profits to cover their costs for providing execution possibilities to other market participants (Silber 1984).

In an order-driven market, all participants provide buy and sell orders to a central facility called central limit order book (clob) (Madhavan 1992, Seppi 1997). Therefore, order-driven markets can be characterized as being disintermediated.

Both academics and practitioners agree that the choice between those two basic mechanisms significantly influences price formation processes (Pagano and Röell 1996) and that each mechanism realizes specific advantages concerning market efficiency and revenue distribution among participants.

Whereas markets in the US (e.g. Nasdaq) and in the UK (e.g. SEAQ) were traditionally based on quotedriven models, continental European markets are typically based on order-driven concepts (e.g. Deutsche Börse's Xetra order book system (Braue and Hille 1997)). To cover a wide range of securities and to apply the advantages of both fundamental models, a lot of markets developed hybrid mechanisms integrating direct market participant interaction (order books) and liquidity provision by dedicated market participants (market making). The latest examples for hybrid models are the implementation of SuperMontage by Nasdaq in 2002 (Nasdaq 2002) and the introduction of SETS mm by the London Stock Exchange on 3 November 2003 (London Stock Exchange 2003).²

Irrespective of this dogmatic discussion, literature and practice agree that overall market quality depends on the interaction among the participants within the electronic or floor-based market infrastructure. Often, the market access question is faded out and access intermediaries like brokers are modelled as being neutral at the market level. Nevertheless, a wide range of literature focuses on the ability of access intermediaries to derive information out of their customer order flow (Forster and George 1992). In the following, the specific role of market access intermediaries is discussed against the background of the internalization and preferencing debate. By challenging the neutrality assumption, the debate is a manifestation of the increasing importance of market access intermediaries for both practical and theoretical market design.

INTERMEDIARIES AT THE MARKET ACCESS LEVEL

Market access intermediaries provide access to specific markets or execution venues for specific customer groups who are either not fulfilling the criteria for direct access or who abstain deliberately from direct access for economic reasons. While some intermediaries focus on access provision only, other intermediaries bundle access provision with additional (financial) services to achieve economies of scope (Biais and Davydoff 2002). In the case of institutional customers, service bundling in the form of research, counterparty search and risk capital provision by the intermediary has a long tradition. Retail investors often receive banking or insurance services in general and advisory services together with the provision of execution services.

Automation in equity markets was expected to significantly enhance the individual investor's ability to directly access markets. Direct access was associated with increased transparency, improved responsiveness and lower transaction fees. The result would have been a reduced importance of access intermediaries.

While these benefits have been delivered to some extent, they were not mirrored by a widespread disintermediation of retail brokers. Rather, the massive increase in retail order flows during the late 1990s and the accompanying advent of online brokerage led to another form of automation and electronification: a seamless, virtual, direct access based on a fully electronic interface between the broker and the individual investor on the one hand and the broker and the market on the other hand. It significantly improved the availability of real-time market information to individual investors. The speed of order routing reduced the delay in forwarding orders to the respective market nearly to zero. Nevertheless, the vast majority of individual investors still rely on the services of the retail broker in its function to provide market connectivity and to ensure sufficient funds (in the case of a buyer) or the necessary securities (in the case of a seller).

This trend was accompanied by a substantial pressure on brokers' margins because of fierce competition and increasing costs for the acquisition of additional flows (Clemons and Hitt 2000). Therefore, brokers have been trying to tap into additional revenues. One potential revenue source exists in the value inherent in the individual investors' order flow. This value exists, for example, due to the informational advantage of the broker receiving the order flow over the rest of the market (Ip 2000) or the information on the investor's reservation price as expressed by the limit of the individual order (or by the absence of such a limit in the case of market orders).

The broker has two principle ways to realize at least part of this value:

- 1. He may direct the flow to preferred dealers based on special arrangements that will offer pecuniary or nonpecuniary inducements in exchange for the flow, e.g. in the form of explicit payments or lower execution costs (payment for order flow); or
- 2. he may execute the order himself by also acting in a dealer capacity (internalization of order flow).

In both cases, the order is not forwarded to the central market place. It is executed through a proprietary venue. As the broker's decision on the execution destination is not necessarily based on current market conditions or the price quoted by a dealer, payment for order flow or internalization is often associated with a conflict of interest and raises the question of whether the broker is fulfilling his agency obligations (see Harris 2003).

The broker's ability to influence the specific execution venue of a given order depends on the regulatory and legal environment. In regimes with compulsory execution (concentration rule) on a central market place (exchange), the broker is not able to withhold the order from that market. The other extreme is the absence of any regulation affecting the handling of customer orders leaving full discretion to the intermediary.

At the extreme of existing European regulatory positions are, for example, the UK, where the broker has to fulfil a best execution duty without specific order handling rules, and the Italian market, where a concentration rule requires all executions to be performed on recognized exchanges. In the US, the Securities and Exchange Commission in 1997 adopted a different approach and introduced so called Order Handling Rules (Rules 11Ac1-1, 11Ac1-4) which aim at defining proper ways of handling customer orders.

German law that represents the background for the market model presented in this paper has a default rule which assumes execution at an exchange as the default venue but leaves the ultimate decision to the investor (see §22 Börsengesetz 2002). It allows the broker to influence the customer's decision by establishing different execution costs or by offering additional services.³ These services may provide important benefits from the customer's perspective such as immediacy of execution or a guarantee of no partial executions.⁴ At the same time the broker is able to position himself as a provider of a

superior execution quality (best execution) from a marketing point of view.

Thus, the main aims for market access intermediaries to execute order flow away from the central marketplace are the following:

- to achieve process optimizations and cost savings in internal order execution based on economies of scale;
- to increase profits by avoiding exchange fees;
- to earn the spread component of marketable orders (i.e. market orders or limit orders that can be executed immediately at present market conditions);
- to gain a first mover advantage in a framework where internalization can be expected to further foster the sell side concentration process; or
- to position themselves as providers of superior customer services ('best execution').

Against this background, the trend towards internalization and payment for order flow has actually increased the importance of access intermediaries. This is quite contrary to the expected development towards direct access.

Practical market design has to develop models that reflect this trend while avoiding the negative effects potentially associated with internalization and payment for order flow.

INTEGRATION OF MARKET REQUIREMENTS AND MARKET ACCESS INTERMEDIARIES BUSINESS MODELS INTO MARKET DESIGN

On the basis of the trends mentioned before, academic literature and practitioners are intensively discussing the impact of internalization on market structure (Levin 2003). The major arguments in favour of internalization centre around the benefits of competition on the one hand and choice for investors on the other hand. Competition will require established marketplaces, especially the incumbent exchanges, to innovate and to provide competitive pricing for their market participants and ultimately for the investor (Davies et al. 2003). The provision of internal matching systems enhances investors' choice (Levin 2003) as it provides additional execution options and tailor-made trading facilities that are not provided by exchanges. Examples are after-hours trading or immediate execution against quotes on request. Competition, openness and a level playing field among all institutions providing execution business enables the market for markets to work and to achieve competitive outcomes, to the benefit of investors.

Opponents of internalization systems argue that internalization may have a significant negative impact on *market efficiency, transparency* and the *price formation process* (Biais and Davydoff 2002). Decentralized order execution may induce significant risks to overall *market* *efficiency* as internal execution withdraws order flow from a public, commonly accessible liquidity pool increasing the risk of fragmentation. Isolated liquidity pools reduce *transparency* by withholding limit order information from the public and thereby allowing intermediaries to extract information out of customers' order flow and to achieve superior market information. As there is no predefined and transparent order execution algorithm, internal order execution leaves discretion to the intermediary. Internalization reduces the incentive to provide limit orders to the central market place and may negatively impact public activity in equity trading.

Limit orders are the key source of liquidity in order driven markets. The public *price formation process* in order-driven markets crucially depends on the information that limit orders bring to price discovery. Liquidity has significant positive externalities as posted orders attract additional liquidity from the other side of the market. Therefore, whenever limit orders that can not be executed immediately are withheld, there is a major negative liquidity effect with the result of rising implicit transaction costs (Biais and Davydoff 2002). In this respect, the *market for price formation* relies on transparency and access to all bids and offers in the market.

Internalization is based on the concept of fragmentation. This fragmentation is manifold. It not only refers to the establishing of additional execution venues for a given order flow but also to the fragmentation of order flow itself. The intermediary is usually not required to provide open and equal market access to his execution venue. He usually restricts the execution venue to specific investors or participants and is selective in the execution of orders given the availability of a central market place as a fallback venue. This allows the implementation of strategies that are either pre-selecting specific customers (e.g. assumed uninformed order flow) or specific low-risk stocks or a combination of both. Fragmentation also exists from a system and information provision perspective as the respective execution venues are operated on proprietary infrastructures. It is therefore difficult, not to say impossible, to trace the route of an order or to guarantee an effective market surveillance because, for example, a consistent time-stamp is missing.

The problems resulting from internalization are not taken into account by the individual retail investor as he is better off in the short term by being executed at a price better than (or at least as good as) execution on the central market. Beyond that, he might be incentivized by lower execution fees. In this respect, the market structure faces a coordination failure problem. In the short term, it is individually rational for retail investors to use internalization/best price offerings. In the long run, however, this behaviour is collectively irrational because of the negative effects on overall market quality and thereby on execution and price quality for the retail investor. In this environment, market design faces the challenge of providing a market model that serves two goals: on the one hand to minimize adverse effects on market quality, to sustain a high level of market efficiency and to protect the price discovery process; on the other hand to enable market access intermediaries to realize value out of the order flow in order to be compensated for their costs of acquiring retail order flow. Such a market model needs:

- 1. to offer attractive economic terms in order to compete with proprietary solutions (*cost effectiveness*);
- to allow smaller market access intermediaries to provide best execution to their customers without the necessity to execute those orders internally themselves (*openness*);
- to apply non-discretionary trade execution and order handling rules based on a predefined execution algorithm (*non-discretionary rules*);
- 4. to maintain the incentive for market participants to provide (limit) orders to the central market place by assuring strict price-time-priority (*incentive compatibility*);
- to ensure a high level of market transparency by displaying all orders that are contributing to the central price formation process (*limit order display*);
- 6. to assure best execution to the retail clients based on a clear and comprehensible mechanism (*best execution*); and
- 7. to provide consistent and integrated surveillance covering both the order book and the internalization facility (*consistent surveillance*).

Rather than deciding between an internalization and a centralization regime, practical market design consequently has to look into ways of integrating both trends, aiming to satisfy the above mentioned requirements.

In order to adopt the trend towards internalization and to minimize the negative effects on market efficiency and price formation, Deutsche Börse decided to offer an innovative market model. The design is based on the principles of seamless integration of the traditional Xetra order book with the new functionalities, which were branded 'Xetra BEST'.

APPLYING NEW ROLES IN ELECTRONIC AUCTION MARKET DESIGN – THE XETRA BEST MARKET MODEL

The Xetra trading system

Xetra is the electronic trading system of Deutsche Börse AG for cash market trading in equities and a variety of other instruments including exchange traded funds, bonds and warrants. It was introduced in November 1997 in order to create a transparent and efficient way of automated trading at the Frankfurt Stock Exchange, one of the main European equity markets. Xetra currently offers two fundamental forms of trading: continuous trading and auction trading.⁵ Both trading *forms* can be combined to establish different trading *models*. The commanding trading model is continuous trading with opening and closing auctions.⁶

Orders that are not immediately executable upon their entry into the system form the order book. They are executed according to price-time-priority. The inside market is defined through best bid (buy order(s) with the highest bid price) and best ask (sell order(s) with the lowest ask price).

In continuous trading, incoming orders are checked against the existing order book for immediate execution. An order is immediately executable if it is either unlimited (market order) or, in the case of a limit order, its limit is equal to or lower than the current best bid (for a sell order) or is equal to or higher than the current best ask (for a buy order). Any unfilled part of the order is sorted into the order book according to price-priority as it is the case for orders that are not immediately executable.⁷ During continuous trading the order book is open. All traders can see the aggregate volume of orders and the number of orders at each price limit.

Auction trading allows the pooling of liquidity at given points in time. This can be of advantage at the open or close of a security, for calculating reference prices or for less liquid securities. An auction starts with the existing order book and accepts all incoming orders for a predetermined period of time (the call).⁸ The order book is partially closed during auctions, i.e. Xetra distributes either best bid and best ask (order book is uncrossed) or an indicative auction price (order book is crossed).⁹ Price determination at the end of the call phase follows the principle of most executable volume (highest executable volume and lowest surplus).

Iceberg orders are designed to facilitate the placing of block orders. Although they enter the order book with their entire volume, only part of the volume (the peak) is actually visible for the market. Once the peak of the order has been executed and a hidden volume is still available, a new peak automatically enters the order book. Auction trading considers the entire volume of iceberg orders.

Volatility interruptions are special auctions that interrupt continuous trading or initiate an extension of the call phase in a standard auction to avoid adverse price movements. These adverse price movements are defined as potential matching prices that lie outside predefined price-ranges from the last traded price.

The Xetra BEST model

Within the Xetra trading system, Xetra BEST establishes an additional, hybrid market model integrating marketmaking components and the central limit order book. It introduces two new roles on Xetra:

- 1. members with a special set-up (Best Executors) are provided with preferential access to order flow based on specific premises; and
- 2. members (Order Flow Providers) are able to direct order flow to Best Executors using the Xetra network (preferencing) based on defined requirements.

Best Executors and Order Flow Providers are established as new roles within the Xetra market model and trading system. A pure Order Flow Provider performs the broker function of an access intermediary. He is acting in an agency capacity only.

By actually executing the flow in a principal capacity, the Best Executor performs the dealer role. He may simultaneously be recognized as Order Flow Provider. In this case he is (also) executing his own clients' orders and is acting in a dual capacity. Both functions and their combination therefore cover the existing roles in the market under any internalization regime.

Orders are eligible for Xetra BEST if they have been entered in an agency capacity by an authorized Order Flow Provider and meet defined maximum size restrictions. They have to be particularly targeted at Xetra BEST, which is configurable by the access intermediary. Otherwise they enter the Xetra order book like any other order. Orders eligible for Xetra BEST have to contain an additional flag specifying the Best Executor that is designated to execute the order.

The execution of Xetra BEST orders against the Best Executor is based on their potential execution price in the order book at the time of order entry. This price is defined as a volume weighted average (VWA) of the Xetra order book. Table 1 shows an exemplary order book situation during continuous trading. In that order book situation, the VWA for a market buy order with a size of 220 is:

 $[(170 \times 54.39) + (50 \times 54.41)]/220 = 54.3945.$

The second factor influencing the execution price of a Xetra BEST order are the Xetra BEST quotes entered by the respective Best Executor in a principal capacity. In order to obtain preferential access to order flow directed towards them, Best Executors have to place relative quotes with Xetra BEST. These quotes are not visible for

Table 1. Volume weighted average

Bid Quantity	Limit	Limit	Ask Quantity	
60	54.35	54.39	170	
180	54.32	54.41	50	
140	54.31	54.46	320	
540	54.30	54.49	920	

the market and specify the amount of price improvement a Best Executor is willing to provide in a given instrument. The specified price improvement has to be greater than zero. A Xetra BEST quote only affects orders that are subsequently entered into the system.

The reference for the relative quotes and therefore for the price improvement is the potential VWA. In the Xetra order book a buy order of size 220 would receive a VWA of 54.3945 given the order book situation in Table 1. Assuming that the respective Best Executor is willing to provide price improvement of 0.01 the actual execution price in Xetra BEST is 54.38 as the calculated VWA is rounded to two decimal places and price improved by 0.01. The trade information is immediately disseminated to the market.

The system processes both Xetra BEST orders and standard Xetra orders strictly according to their time of arrival in the Xetra system. Thus, the VWA of the potential order book execution does not change during the processing or execution of a Xetra BEST order.

In the example considered so far, the execution is straightforward. If the Xetra BEST execution price would potentially execute orders in the order book, the mechanism has to be adopted. For illustration purposes assume that the order book situation in Table 1 now faces an incoming Xetra BEST market buy order with a size of 500. The VWA of a potential order book execution for this order is:

$[(170 \times 54.39) + (50 \times 54.41) + (280 \times 54.46)]/500 = 54.4312.$

On the basis of a price improvement of 0.01 (and rounding) the actual execution price for the Xetra BEST order would be 54.42. Execution at this price would put the sell orders in the order book at 54.39 and at 54.41 at a disadvantage because they offer an even better price. With a print of 54.42 they would have received an entire execution if the order was executed within the book.

In order to preserve price-time-priority also between Xetra and Xetra BEST and to guarantee execution of order book orders with a better limit, Xetra automatically generates a 'clean-up print' in a principal capacity of the Best Executor by matching the order book orders at 54.39 and 54.41, respectively. The affected order book orders consequently achieve the same execution they would have received had the Xetra BEST buy order entered the order book.

As Xetra supports the usage of iceberg orders, the visible order book may not represent the entire market depth or full order sizes. The hidden size of any iceberg order presents an opportunity for a better execution than can be inferred from the visible order book. Consequently, Xetra BEST takes these hidden sizes into account when calculating the VWA.

Consider the order book situation in Table 2: The VWA for a market buy order of size 1,000 seems to be:

Table 2. Execution with iceberg orders

Bid Quantity	Limit	Limit	Ask Quantity
600 5 200 5 200 5	54.35 54.34	54.41 54.45 54.46	200 300 (hidden size: 1,200) 1 500

 $[(200 \times 54.41) + (300 \times 54.45) + (500 \times 54.46)]/1,000 = 54.447.$

Assuming again a willingness to provide a price improvement of 0.01 the actual execution price would be 54.44 after rounding. This is exactly the situation an external dealer would face in a fragmented internalization regime.

If the sell order of 300 at 54.45 is actually the peak of an iceberg order with a hidden size of 1,200 and therefore an overall volume of 1,500, the client at 54.44 does not receive an actual price improvement of at least 0.01 because the correct VWA is

$[(200 \times 54.41) + (800 \times 54.45)]/1,000 = 54.442.$

Since Xetra BEST considers icebergs, the client will receive an execution price of 54.43 given the same price improvement.¹⁰

The discussion so far has focused on examples involving Xetra BEST market orders. It is also possible to enter limit orders into Xetra BEST. Two different types of limit orders can be distinguished: marketable or nonmarketable limit orders. The limit of the former category allows immediate execution because it will meet the potential Xetra BEST execution price. For this category of orders, the treatment is identical to that for market orders. Immediate execution of limit orders belonging to the latter category, however, would violate the limit of the order if in the case of a sell (buy) order the potential Xetra BEST execution price is lower (higher) than the limit. These orders are immediately forwarded to the Xetra order book where the order will be sorted into the book according to price-priority, i.e. the order does not have any disadvantages compared to the case where it has been immediately entered into the book.

Other cases where orders originally targeted at Xetra BEST are forwarded to the order book include order arrival during an auction (including volatility interruptions), a missing Xetra BEST quote, a situation where the price improvement would cross or lock the order book or initiate a volatility interruption or the lack of a VWA for a corresponding size.

Review of derived requirements

Earlier, the specific requirements were defined for a market model taking into account the changing role of

market access intermediaries while securing an efficient price discovery process. Xetra BEST establishes an innovative hybrid market model. It integrates market making components and the central limit order book without compromising order book consistency, price-timepriority or immediacy of order execution. As an integral part of the Xetra trading system, it is able to concentrate flows on a single platform. Moreover, since it provides an open solution, Xetra BEST is able to realize economies of scale allowing it to compete with proprietary solutions on economic terms. Thus, it satisfies the requirements of (1)cost effectiveness and (2) openness: Best Executors and Order Flow Providers are able to utilize both the Xetra trading system itself as well as the Xetra network already connecting over 300 participants across Europe based on a well-defined, standardized interface for best execution and preferencing functionalities. Integrating the entire functionality of order book trading and Xetra BEST into a single trading system allows the establishment of a single, linear execution schedule and a consistent price-time-priority across both execution venues.

Order handling follows a consistent procedure since the pre-requisites for a Xetra BEST order are well defined: an immediately executable order entered by a recognized Order Flow Provider in an agency capacity and not violating the maximum order size restriction. Orders can be specifically targeted at any of the two execution venues, the order book or Xetra BEST. Xetra BEST orders not immediately executable in this venue are instantly forwarded to the central limit order book rather than rejected (e.g. returned to the Order Flow Provider) or held up for later execution in Xetra BEST. The forwarding does not take place at the cost of the particular order's time priority. Thus, (3) nondiscretionary rules are established satisfying a further important requirement defined above.

In a fragmented internalization regime, usually a set of order handling rules is established at the regulatory level. In these cases it is quite burdensome if not impossible to monitor whether market participants actually observe the rules. Xetra BEST defines the rules at the market model level and their satisfaction is technically guaranteed.

Non-discretionary order handling rules are the prerequisite for also meeting the requirement of (4) incentive compatibility. Incentive compatibility requires that limit orders placed in the central limit order book are not put at a disadvantage through Xetra BEST. Execution in Xetra BEST is based on the order book's VWA and requires an actual, positive price improvement by the Best Executor. The concept of clean-up prints guarantees execution of limit orders in the order book if the potential Xetra BEST execution price in the case of buy orders (sell orders) is lower (higher) than these orders' limits. Those limit orders receive exactly the same execution as in the case where the respective Xetra BEST order had entered the order book. As all non-executed orders are immediately forwarded to the book the requirement of (5) *limit order display* is satisfied. Xetra BEST avoids the lack of transparency resulting from a fragmented market by immediately publishing all transactions in Xetra BEST, by using a single information source and by applying the same principles of transparency which are valid for the limit order book.

The requirement of (6) best execution is met through the concept of relative quotes in combination with the VWA as reference price. The Best Executor either enters a relative quote that offers a price improvement greater than zero or the order receives an execution in the order book. Calculation of the reference price also takes into account the entire size of iceberg orders, for example, which otherwise impairs the dealers execution proposition in a fragmented internalization regime.

Also implicitly underlying the concept of best execution is the idea of investor protection and absence of price manipulation. The quote entered or amended by the Best Executor only affects subsequently arriving Xetra BEST orders. In addition, it has to be entered in a principal capacity that has to be strictly separated from the agency capacity. This provides a better protection for investors than could be achieved in a fragmented internalization regime where the determination of the reference price as well as the synchronization of order execution and reference price determination suffer from the inherent drawbacks of that approach.

In a fragmented environment, the lack of a consistent, linear execution schedule further complicates an independent surveillance of the market. Xetra BEST is able to offer real-time surveillance of both execution venues in parallel and to deliver a consistent database for ex-post monitoring and analysis. Thus, the model also satisfies the requirement of (7) consistent surveillance.

SUMMARY

The paper discusses the trade off between decentralized order execution and market efficiency against the background of specific industry trends with a focus on the requirements of market access intermediaries. Whereas traditional literature discusses the relative advantages of decentralized versus centralized order execution, this paper derives requirements for an integration of both fundamental approaches and transforms those requirements into a market model.

This innovative market model aims at minimizing potential negative effects and problems occurring in fragmented internalization regimes. This is achieved by concentrating order flows on a single trading system and by establishing a system-wide price-time-priority across execution venues. The solution addresses the problem at the market level, i.e. the level of price formation. Its ultimate success depends on the ability to compete with proprietary execution platforms on economic terms by providing market access intermediaries with a costeffective alternative through realization of economies of scale. Xetra BEST was launched in August 2002 and since then has been used by market participants that base their business model on providing best execution within a reliable high-performance system.

Promoters of fragmentation usually stress the necessity of competition among execution venues in order to bring about evolution in market models and technology. This competition, however, is affected by a multitude of externalities (Harris 2003). Therefore, a deliberate level of regulation is deemed to be necessary in order to ensure a level playing field among competing execution venues.

Current regulatory efforts, especially the introduction of the new Investment Services Directive¹¹ (EU Commission 2002), are trying to balance the competitive advantages within the market for markets and the positive externalities in the markets for price formation. The ultimate goal is to maintain a high level of market efficiency and investor protection while achieving the necessary level playing field in the competition among markets. It is scheduled for implementation into national law in mid 2006. The outcome of this regulatory process will shape the markets for years to come.

Future research will focus on the effects of the presented market structure on business models thereby evaluating its contribution to balance the requirements of market access intermediaries and market efficiency.

Notes

- 1. The views expressed in this paper are those of the authors and do not necessarily reflect the views of Deutsche Börse AG, any of its subsidiaries, or anyone else.
- 2. Further examples are the Designated Sponsor in the Xetra trading system or the Animateur at the Paris Stock Exchange.
- 3. It is important to keep in mind that the differential in execution costs might result from an increase in commissions for an execution on the central market place rather than from a decrease in commissions for an execution off that market place.
- 4. The problem of partial executions at the central market place resulting from the matching algorithm used by the trading system mainly exists because brokers tend to charge each partial execution with the full commission scale, whereas e.g. Deutsche Börse does not charge trading fees based on partial executions.
- 5. For a detailed description of the current market model including all peculiarities see Deutsche Börse (2002).
- One or more intraday auctions establish additional reference prices. Less liquid securities are traded in one auction only.

- Certain specific matching rules have been established to take into account unusual situations (e.g. an order book with market orders on one side of the order book). These rules are given in Deutsche Börse (2002).
- 8. In order to prevent price manipulations Xetra adds a random component to the length of the call.
- 9. Further information that may be distributed includes imbalance information, i.e. existence and size of any surplus.
- 10. The sell limit order at 54.41 will be executed through a clean-up print as explained above.
- 11. The process currently (March 2004) approaches its finalization with the second reading in the European Parliament after proposals were provided by the Parliament as well as the Council of Finance Ministers.

References

- Biais, B. and Davydoff, D. (2002) 'Internalization, Investor Protection and Market Quality', Working paper, European Savings Institute (OEE), Paris.
- Börsengesetz (2002) Bundesgesetzblatt I 2002, 2010.
- Braue, C. and Hille, L. (1997) 'Xetra Elektronisches Handelssystem am Finanzplatz Deutschland', *Die Bank* 3: 140–5.
- Clemons, E. K. and Hitt, L. M. (2000) 'The Internet and the Future of Financial Services: Transparency, Differential Pricing and Disintermediation', Working paper, Wharton Financial Institutions Center.
- Davies, R., Dufour A. and Scott-Quinn, B. (2003) 'Building a Competitive and Efficient European Financial Market', ECMI Short paper, European Capital Markets Institute, Madrid.
- Demsetz, H. (1968) 'The Cost of Transacting', *Quarterly Journal of Economics* 82: 33–53.
- Deutsche Börse (2002) *Xetra Market Model Stock Trading Release 7.0*, Frankfurt am Main: Deutsche Börse AG.
- EU Commission (2002) 'Proposal for a Directive of the European Parliament and the Council on Investment Services and Regulated Markets', Brussels: European Commission.
- Forster, M. and George, T. (1992) 'Anonymity in Securities Markets', *Journal of Financial Intermediation* 2: 168–206.
- Harris, L. (2003) *Trading and Exchanges*, Oxford: Oxford University Press.
- Ip, G. (2000) 'Role as Big Nasdaq Market Maker Helps Knight Trimark's Portfolio', *The Wall Street Journal*, 3 March.
- Levin, M. (2003) 'Competition, Fragementation and Transparency', CEPS Task Force Report no. 46, Brussels: Centre for European Policy Studies.
- London Stock Exchange (2003) 'SETS mm Evolution for Success', online at: http:// www.londonstockexchange.com/cmsattach/2328.pdf [accessed 24 October 2003].
- Madhavan, A. (1992) 'Trading Mechanisms in Securities Markets', *Journal of Finance* 47: 607–41.

- Madhavan, A. (2000) 'Market Microstructure: A Survey', Journal of Financial Markets 3: 205–58.
- Nasdaq (2002) 'The Next Generation Market Platform from Nasdaq', online at: http://www.nasdaq.com/about/ SuperMontageBrochure.pdf [accessed 30 November 2002].
- Pagano, M. and Röell, A. (1996) 'Transparency and Liquidity: A Comparison of Auction and Dealer Markets with Informed Trading', *Journal of Finance* 51: 579–612.
- Seppi, D. (1997) 'Liquidity Provision with Limit Orders and a Strategic Specialist', *Review of Financial Studies* 10: 103–50.
- Silber, W. L. (1984) 'Marketmaker Behaviour in an Auction Market: An Analysis of Scalpers in Futures Markets', *Journal of Finance* 39: 613–36.
- Stoll, H. R. (1998) 'Reconsidering the Affirmative Obligation of Market Makers', *Financial Analysts Journal* 54/5: 72–82.