



January 11, 2005

No. 47

economics

Digital economy and structural change



Alternative trading systems: a catalyst of change in securities trading

- Advances in information and communications technology (ICT) have altered securities trading in Europe. Trading increasingly takes place in a ubiquitous computer network. Trading floors and telephone networks are losing importance. Transactions are conducted via electronic trading platforms of stock exchanges and alternative trading systems (ATSS).
- Alternative trading systems create added value for investors. They reduce transaction costs and provide real-time execution as well as access to equity markets world-wide and innovative investment categories. In addition, investors can choose among customised market models.
- In the USA the success of ATSS is putting pressure on traditional market places to push ahead with automation. As yet, only 10% of equity trading on the NYSE and 30% of NASDAQ volume are handled by these markets' electronic trading platforms. The figures will rise to over 50% in the coming years. At the same time, consolidation among the ATSS is continuing and the number of big players will fall below the present five. Their trading system – the order-driven model – continues to gain ground and, with NASDAQ's SuperMontage and the NYSE's Direct+, is making inroads into traditional trading venues.
- In Europe, the stock exchanges have proved their ability to innovate. They offer investors the main advantages of ATSS such as real-time execution and low transaction costs. The only ATSS with prospects (and slim at that) are the crossing systems offering special block trade facilities. But their market share will not exceed 1-2%.
- New regulations now in the pipeline will influence how ATSS can position themselves in Europe and the USA in the future. Demands for competitive neutrality between stock exchanges and ATSS have been met in the European Union's Markets in Financial Instruments Directive, which stipulates "same regulation for same functions". The revision of the law on securities trading in the USA could lead to a severe shift in the competitive positions of stock exchanges and ATSS. The direction is not yet clear.
- While ATSS will at best hold niche positions in European equity trading, they have already captured up to 70% of individual segments of the bond market. If electronic trade in fixed-income products is to function efficiently, however, there must be a high degree of standardisation and sufficient liquidity.
- The future will see individual trading platforms being linked increasingly by means of standardised transmission protocols. This should resolve critics' fears that ATSS will lead to fragmentation of the market and of liquidity.

Author: Marion Mühlberger, +49 69 910-31815 (marion.muehlberger@db.com)



Editors

Antje Stobbe
+49 69 910-31847
antje.stobbe@db.com

Jürgen Schaaf
+49 69 910-46830
juergen.schaaf@db.com

Technical Assistant

Sabine Kaiser
+49 69 910-31831
sabine.kaiser@db.com

Deutsche Bank Research
Frankfurt am Main
Germany
Internet: www.dbresearch.com
E-mail: marketing.dbr@db.com
Fax: +49 69 910-31877

Managing Director
Norbert Walter

Alternative trading systems: a catalyst of change in securities trading

Advances in information and communications technology (ICT) have altered securities trading in Europe. They have reduced the need for personal contact on the trading floor or via telephone networks. **Trading** is no longer tied to a physical location but takes place in a **ubiquitous computer network**. In June 2004, 9% of the bond trading and 65% of the equity trading of European stock exchanges were executed entirely electronically.¹ The necessary transaction services are provided by the **electronic trading platforms of stock exchanges** (such as Xetra of Deutsche Börse AG, SETS of the London Stock Exchange (LSE) and NCS of Euronext Paris) and by **alternative trading systems (ATSs)**. The various types of electronic trading platforms differ, though, as regards the number of electronically assisted sub-processes they include (see box). Only computer-assisted floor trading systems do not fall into the category of electronic trading platforms. In computer-assisted trading systems, securities orders are merely shown in an electronic order book. In computerised trading systems, trades are also executed automatically, while computerised stock exchange systems include clearing and settlement as an integral part. In this report, the term automation is used to denote the increasing use of IT in trading systems.

ATSs face less strict rules than stock exchanges

Stock exchanges typically display the following characteristics:

- Trading is usually concentrated at a certain locality and within a certain time span.
- Investors who are not stock exchange members can only participate in the market through brokers.
- Trading is solely in standardised securities.

Both stock exchanges and ATSs bring security buyers and sellers together. The key distinction between them is that transactions via **ATSs** are based on **private-law contracts, not on stock exchange law**. In addition, stock exchanges have to meet stricter regulatory requirements. Off-exchange markets have neither admission procedures for securities nor a market supervisory authority.² The term “stock exchange” therefore has less to do with particular functions; it indicates, rather, a specific form of regulation.

Classification of ATSs by market microstructure

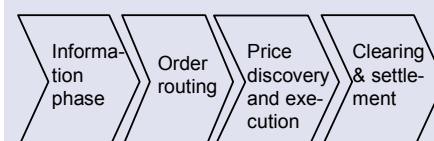
The theory of market microstructure examines how trading rules influence the results, and thus also the efficiency, of financial markets. It is the **specifics of the trading rules** that create the **market microstructure** of a trading forum or venue.³ Since systems operating in the financial market compete through their trading rules, the success – or lack of it – of an ATSs is closely linked with the system’s market microstructure. ATSs are therefore distinguished on the basis of their trading rules, i.e. their arrangements for price discovery and execution:

Alternative trading system (ATS):

An ATS is an entity which, without being regulated as an exchange, operates an automated system that brings together buying and selling interests – in the system and according to rules set by the system’s operator – in a way that forms, or results in, an irrevocable contract.

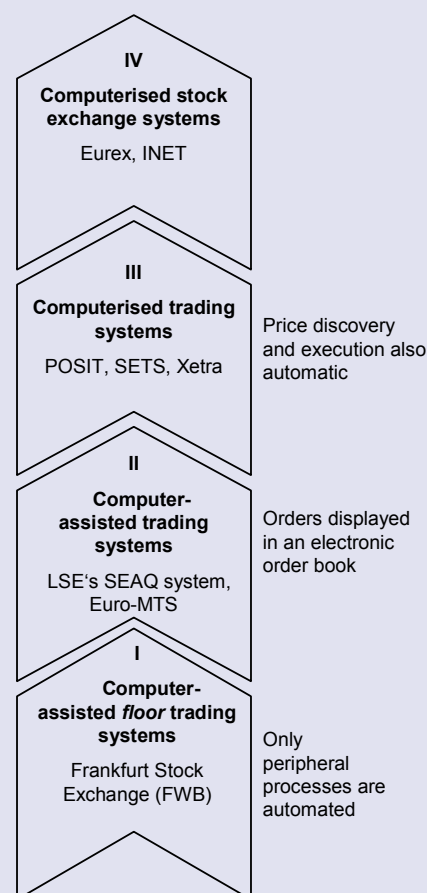
Source: FESCO/CESR (The Committee of European Securities Regulators), 2000

Process chain in securities trading



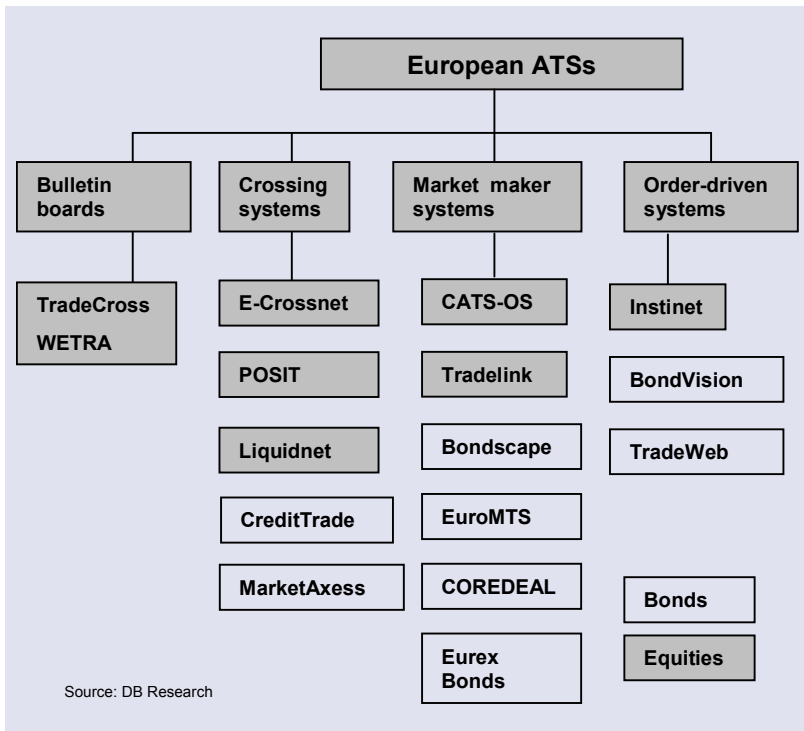
Source: DB Research

Automation of securities trading: evolutionary stages



Sources: Schenk, 1997; DB Research

¹ According to the Federation of European Stock Exchanges, www.fese.org.
² Under the German stock exchange act (section 59), though, institutions similar to a stock exchange are subject to supervision by the stock exchange watchdog.
³ Trading forum or venue refers to both stock exchanges and ATSs.



- **Bulletin boards** allow investors to publish their bids and conduct negotiations. They do not execute trades, however.
- **Crossing systems** do not discover prices themselves; instead, they import prices from other trading systems, e.g. from stock exchanges.
- In **quote-driven, market maker systems**, transactions are concluded between investors and market makers. The latter continuously quote binding bid and ask prices for certain securities. They thus guarantee that this paper can be traded immediately at any time.
- In **order-driven systems** the buy and sell orders of investors meet directly in an order book. The orders may be matched in a **call auction** or in **continuous trading**. In the first case, orders are batched together and executed at a single price at a preannounced time. In the second, compatible orders are executed immediately, mostly in a **central limit order book (CLOB)**.
- In **hit-and-take** execution, bid and ask quotes are collected and displayed to market participants. They respond, enter into negotiations, and conclude the trade within the system. Orders are not matched automatically.

The term “**electronic communications network**” (ECN), coined in the USA by the Securities and Exchange Commission (SEC), refers to order-driven systems.

ATs create added value through lower costs, ...

ATs **reduce explicit transaction costs**. The fees or commissions incurred for the use of either a stock-exchange trading system or the intermediation of banks and brokers are higher than the charges paid to ATs. The increased competition among trading systems and the elimination of intermediaries result in lower explicit transaction costs in ATs.

Implicit transaction costs:

- = Difference between actual buy or sell price and theoretical market price
- = Timing costs + market impact* + opportunity costs**
- * Large orders create a surplus on one side of the market and thus influence the price
- ** Costs if execution fails

Source: Gomber and Schweickert, 2002

ATSS also reduce implicit transaction costs. Timing costs and opportunity costs (see box on p. 3) are lessened appreciably by real-time settlement and greater certainty of execution. Contrary to expectations, though, ATSS have not reduced market impact. The competition among trading forums, although heightened by ATSS, is not always strong enough to entirely prevent agreements among the market makers in the individual forum; such agreements can lead to wider bid-ask spreads. This has been shown by studies on Island, an ATS, and NASDAQ in the USA.⁴ In quote-driven systems, especially, large bid-ask spreads reflect the costs incurred by market makers for holding liquidity in order to be in a position to diminish the price impact of large orders.

... greater trading opportunities ...

By providing extended trading hours, access to equity markets around the globe, and **innovative types of investment** such as financial instruments from the private equity segment, ATSS offer investors wider trading opportunities.

- **After-hours trading** can create added value for informed traders, who can profit from the significant, but not always efficient, price discovery during this period, when trading tends to be slack. They make only sporadic use of this opportunity, however. Large price fluctuations and information asymmetries in after-hours trading tend, though, to frighten off less well informed players, who include most private investors.⁵ While some ATSS are still offering longer trading hours, stock exchanges have cut their extended hours again.
- With the growth of index-related and pan-European products, institutional portfolios are increasingly structured on a sector basis, rather than by country as in the past.⁶ Investors therefore want ATSS to be admitted to several stock exchanges. Instinet, for example, is a member of 19 stock exchanges and offers **access to 40 equity markets worldwide**. In order to trade in Europe's fifty most liquid shares, a broker would otherwise have to be a member of 8 stock exchanges and be able to cope with the different regulations and different clearing and settlement systems.

... and customised services

For an investor selecting a trading system there are a number of important criteria. These include the method of execution, as well as the best price, speed and certainty of execution. ATSS draw on the advantages their specialisation gives them over conventional stock exchanges in order to provide investors with **customised market models**. Depending on the method of price discovery and execution an investor seeks, he or she can choose a crossing system, a quote-driven system, a hit-and-take system or a call-auction system. To let investors adapt the degree of transparency to the individual transaction, ATSS offer both open and anonymous limit order books. The former enable institutional investors to anticipate price movements triggered by block transactions.⁷ Anonymous limit order books reduce the market impact of block trades.

Average execution time (USA, August 2003)

- Stock exchange: > 20 seconds
- ECN: 2-3 seconds

Execution fee:

- ECN: 0.19 cents per share

Trading hours:

- CiticATS: 8:00 a.m. to 10:00 p.m.
- Tradelink: 8:00 a.m. to 11:00 p.m.
- Liquidnet: 2:00 a.m. to 6:00 p.m.

Trade in innovative asset categories almost 24/7, world-wide

ATSS increase investors' choice of market models

⁴ Biais, Bruno, Christophe Bisiere, and Chester Spatt (2003): Imperfect Competition in Financial Markets: Island vs. Nasdaq.

⁵ Barclay, Michael J., and Terence Hendershott (2003): Price Discovery and Trading After Hours, The Review of Financial Studies.

⁶ Davies, Ryan, Alfonso Dufour, and Brian Scott-Quinn (2003): Building a Competitive and Efficient European Financial Market.

⁷ These are large orders that temporarily create a surplus on one side of the market or the other.

Evidence resolves fears of fragmentation

Competition among trading venues can, theoretically, lead to centralised markets becoming fragmented, resulting in separate liquidity pools. Critics fear that inadequate matching of securities orders could then make **price discovery less reliable**. For if price discovery takes place in separate liquidity pools, then orders no longer potentially contribute to price building at other trading venues. This could lead to **wider bid-ask spreads, higher search costs**, and investors who did not have access to several trading platforms (and prices) would be placed at a disadvantage. However, empirical studies refute the theory that the concentration of order execution at stock exchanges increases market efficiency in Europe.⁸ Market efficiency is measured on the basis of effective average bid-ask spreads. Besides, **connectivity between different liquidity pools** prevents inefficient, derived pricing. Standardised protocols (such as FIX – Financial Information eXchange), sophisticated order routing systems (e.g. Lava in the USA), and appropriate regulatory requirements are essential in order to link up decentralised market venues and form a seamless market.

EU directive: same regulation for same functions

The regulatory framework has a major influence on the way ATSS can position themselves. In working to harmonise securities trading law, the European regulators decided there should be freedom of choice of place of execution. Under the Markets in Financial Instruments Directive (MiFID) of April 2004⁹, securities orders can be executed on any stock exchange or ATSS.¹⁰ This requires the **regulation of stock exchanges and ATSS to be aligned in certain areas** so that investors can rely on the same regulatory conditions and level of protection. While stock exchanges will be obliged to make bid and ask quotes public “on a reasonable commercial basis”, this means they will no longer have to do so free of charge. ATSS (called Multilateral Trading Facilities in the directive, where they are introduced as a new category for the first time) are subjected to stricter regulatory requirements than in the past. These include obligations regarding transparency – as a precaution against possible repercussions of fragmentation, not as a means of preventing fragmentation as such. The MiFID therefore recognises that direct regulatory intervention in market structures not only fails to produce any static efficiency gains – in the sense of narrower bid-ask spreads or greater liquidity – but actually gives rise to dynamic costs for the market as a whole by restricting choice for market participants, competition among trading systems, and scope for innovation. The framework legislation of the MiFID at least **meets the demands for competitive neutrality**.

Regulation National Market System: cards being reshuffled in the USA

In the USA there are plans for a revision of the law on securities trading. Regulation National Market System (NMS) proposed by the SEC could lead to a severe shift in the competitive positions of stock exchanges and ATSS in the USA. ATSS would benefit from the proposed opt-out choice for the trade-through rule (see below). Stock exchanges would benefit, on the other hand, if access fees for trading venues are capped

Danger of fragmentation smaller than feared

Markets in Financial Instruments Directive (MiFID)

- Successor to the Investment Services Directive of 1993
- Published in the Official Journal of the EU on April 20, 2004
- Framework legislation
- To be transposed into national law by 2006

Regulatory requirements for ATSS under MiFID

- Operational stability to be ensured through appropriate organisational arrangements and systems
- Authorised rules for trading (pricing)
- Transparent and non-discriminatory access to trading facilities
- Market supervision
- Pre- and post-trade transparency in respect of transactions in shares
- Financial stability to be ensured through sufficient initial capital and additional own funds
- No requirements regarding admission of the traded instruments

Regulation NMS proposed by SEC

- Published in Securities Exchange Act Release No. 34-49325 (February 26, 2004), 69 FR 11126 (March 9, 2004)
- Comment period extended to June 30, 2004
- Date of decision uncertain

⁸ London Economics (2002): European Financial Integration and Equity Markets.

⁹ Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments.

¹⁰ European Commission (2002): Proposal for a Directive of the European Parliament and of the Council on investment services and regulated markets, COM(2002) 625 final.

at fixed amounts and all market participants have to be allowed equal access to quotes. The final version of Regulation NMS will reflect the relative influence of the various market participants.

- According to the **trade-through rule**, orders must always be executed at the best price. Up to now this has mostly been offered by the NYSE. In future, the best price can be ignored at the explicit request of the customer. Also, automated systems such as ATSS can, within certain limits, exceed the prices of non-automated systems and thus execute more orders themselves. These regulatory changes reflect the fact that treating price alone as top priority may not always be optimal. Technological progress has highlighted other aspects of trading, e.g. speed of execution, which investors may now also see as criteria for best execution.
- Access fees have not been regulated up to now, but are to be capped in future. The **setting of maximum access fees** will mean that ATSS can no longer subsidise their discount prices for members out of fees for non-members. The securities prices quoted by ATSS will therefore be higher in order to compensate the fall in revenues due to lower access fees. This will reduce the competitive advantage of the ATSS.
- The rule on **equal access to quotes** takes account of the present market structure, in which a number of trading venues coexist. It will force many systems to open up, and sets higher standards for transparency, especially in internalisation systems and ATSS. This will counter the effects of fragmentation.

Stock exchanges and ATSS as winners and losers under Regulation NMS

Equity trading: ECNs push automation in the USA

As long as the stock exchanges in the USA felt no competition for trade in shares listed in the domestic market, they had little incentive – because of their ownership structure – to invest the large amounts needed to upgrade their IT infrastructure. The NYSE and the Chicago Board of Trade are owned by the traders who have acquired seats there. Since the automation of trading procedures increases transparency and depresses trading margins, the traders – as owners of the exchanges – found ways to prevent it for a long time. But when the ECNs¹¹ began to exploit weaknesses in the existing system and captured market share, especially in NASDAQ's territory (see chart), the pressure to automate increased.

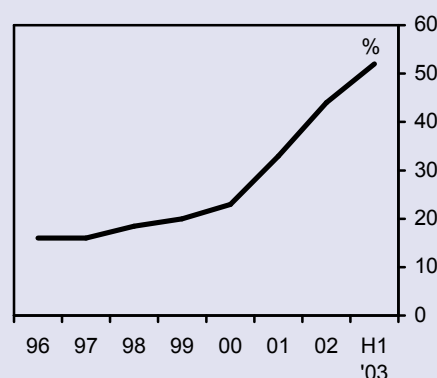
In August 2004 the NYSE announced plans to expand its electronic trading facility and evolve into a hybrid (combinations of order and quote-driven systems) market. This is in response to the needs of customers who would otherwise turn to other electronic markets. And the exchange is undoubtedly also seeking to qualify as a fast automated system under Regulation NMS. This would allow the NYSE to ignore the trade-through rule if its own price were not the best. At present, only 10% of the NYSE's trading volume is handled by **Direct+, its automatic order execution service**. The proportion should rise, though, depending on regulatory requirements and market developments.

The ECNs present a much greater threat to NASDAQ. In 2002 it launched SuperMontage to match the characteristics of ECNs, such as greater market depth, anonymity prior to the conclusion of the transaction, faster execution and order-routing algorithms, in order to

Conditions set by SEC for admission as ECN

- Continuous dissemination of information on prices
- Automatic matching of securities orders
- A limit order book or continuous auctions within the system

ECNs' share of trading volume of NASDAQ-listed shares



Source: Merrill Lynch, 2003

¹¹ Electronic Communications Network is the term coined by the SEC for specially regulated ATSS in the USA. The largest ATSS fall into the category of ECNs. They are the ones that are the focus of academic and regulatory attention.

become an “ECN killer”. So far, however, only 30% of NASDAQ’s volume is traded on this platform.

NASDAQ and ECNs pursuing acquisition strategies

NASDAQ is seeking to consolidate trade on its platform through automation and acquisitions. By taking over the second-largest ECN, Brut, for example, it is countering the fall in its trading volume. After turning in losses in 2003, NASDAQ posted its first small profits again in the first two quarters of 2004.

The ECNs are also having to adopt new strategies. While they have put pressure on the conventional stock exchanges, they are also under considerable pressure themselves. The number of ECNs registered with the SEC fell from 9 in December 1999 to 5 in July 2004. The **consolidation** (see diagram on p. 8) has been partly due to the general decrease in trading volume in the wake of the market crash and the resultant fall in turnover of the ECNs. In addition, declining transaction costs on the traditional exchanges have led to stiffer competition. For example, Instinet, after its takeover of Island in summer 2002, did not return to the black until the first two quarters of 2004.

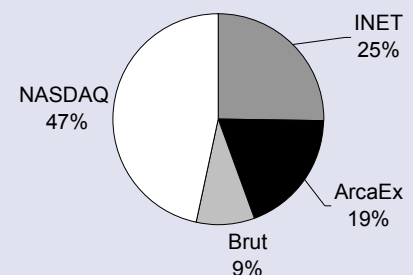
The introduction of a cap on access fees under Regulation NMS would broadly mean that earnings can only be raised by increasing trading volumes. This will lead to further consolidation. But ECNs will not disappear even if their numbers dwindle further. Already, INET (market share 25.5%), Brut (8.7%) and ArcaEx (19.2%; regulated as a stock exchange) have together captured more than half of the market in NASDAQ-listed stocks (see chart). Regulation NMS makes it attractive for **ECNs** to register as a stock exchange by **teaming up with a regional exchange**. This opens up new revenue sources such as listing, transaction and market data fees. The alliance of Archipelago with the Pacific Exchange to launch ArcaEx is a prime example. There is talk that INET will take over the National Stock Exchange (NSX).

The stakes held by large market players such as Merrill Lynch, Reuters, Morgan Stanley and Goldman Sachs in a number of ECNs can be seen as giving the former protection against changing market structures. The almost completed restructuring of securities trading could thus mean the end of some more ECNs. Efficiency has been raised at the old trading venues and the operators are increasingly looking to internalisation as a means of increasing their own earnings directly. ECN platforms are declining in importance, but the ECN trading model – i.e. **order-driven systems** such as Direct+ and SuperMontage – is continuing to make inroads into all markets. **Hybrid models** will ultimately **remain as the predominant form**.

Decline in market volume ...

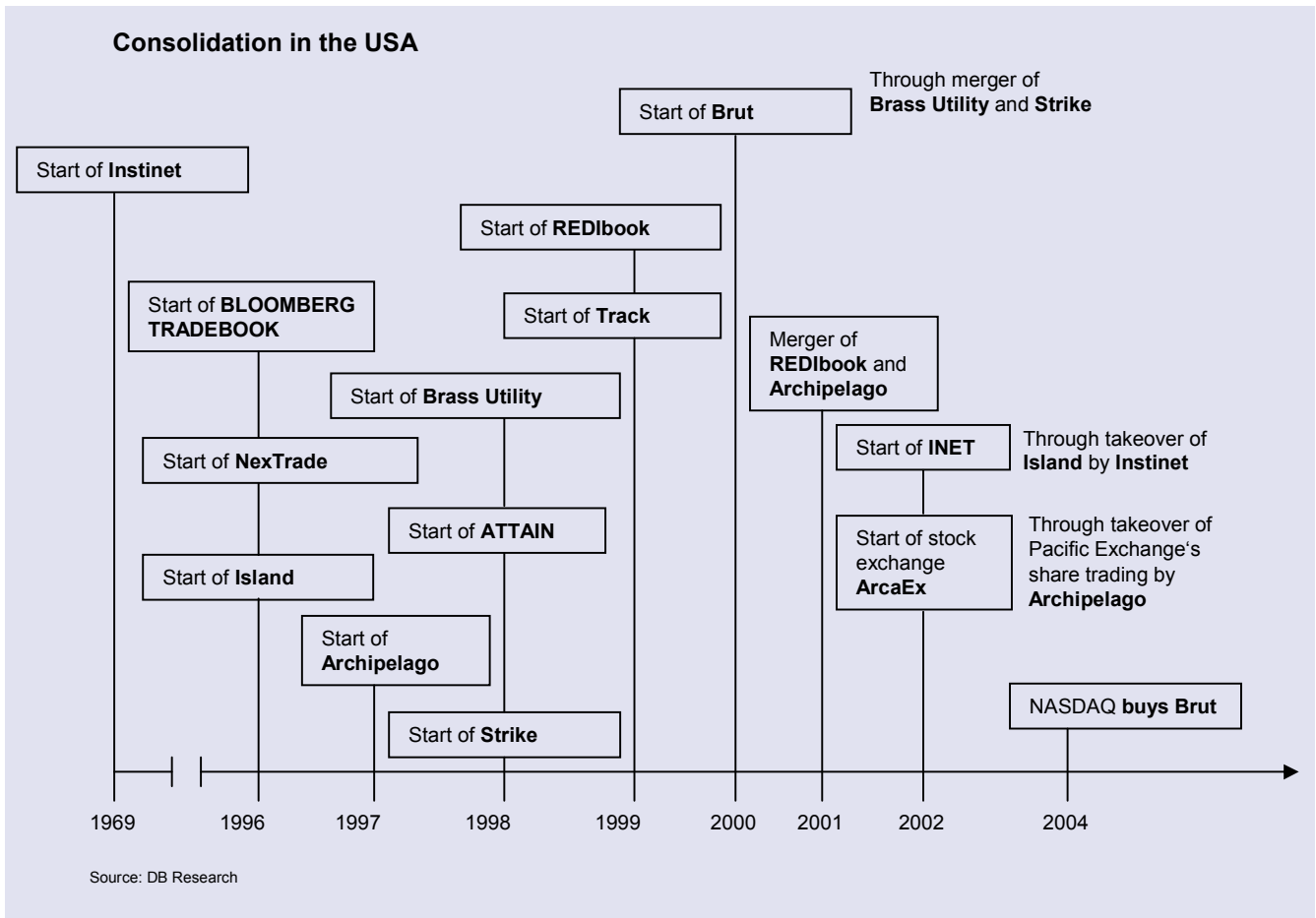
... and regulatory plans make life difficult for ECNs ...

Trading volume of NASDAQ-listed shares (May 2004)



Source: Securities Industry News

... but their trading model continues to gain ground



Order-driven systems: stock exchanges are Europe's ECNs

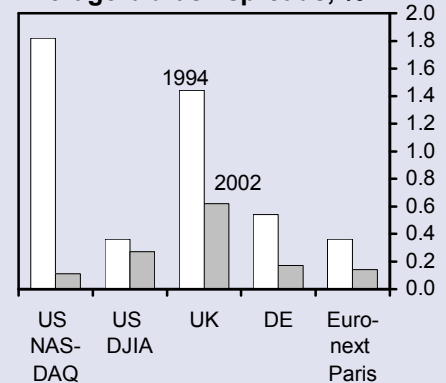
In Europe, the stock exchanges have proved their ability to innovate. They themselves offer investors the main features of ECNs. Between 1992 (Germany) and 1999 (Norway and Austria) the European stock exchanges installed **central limit order book (CLOB)** systems. Since then, investors have profited from markedly lower spreads (see chart). The market microstructure of the European exchanges is thus similar to that of the successful order-driven ECNs in the USA. In competition between two similar trading systems, the established, liquid system generally has by far the brighter prospects, which means that **order-driven ATs in Europe have little potential for success**.

The **European exchanges continue to innovate**. By introducing special block trade facilities and hybrid trading systems that combine call auctions with continuous trading, for example, they are seeking to satisfy the needs of investors even better.

Market maker systems: not needed in Europe

Market maker mechanisms or similar systems such as Jiway, Knight or NASDAQ Europe were unable to gain a real foothold in Europe because they **did not succeed in attracting enough liquidity**. Even though the systems were technologically very advanced and some charged just low settlement costs for international transactions, they failed because of the reticence of the market makers. The attempts of regional stock exchanges to score points by specialising as quote-driven systems also met with little success. Quotrix (for orders of private investors) of Germany's Düsseldorf stock exchange is struggling to attract sufficient liquidity. MAX-ONE of the Munich stock exchange, on

Average bid-ask spreads, %



Stock exchange	Trading system	Type
Deutsche Börse	Xetra & floor trading	CLOB & call market
Euronext Paris	NCS	CLOB
London Stock Exchange	SETS	CLOB
Swiss Stock Exchange	SWX	CLOB
NYSE	Floor trading	Call market
NASDAQ	Montage	Quote display

Source: Birinyi Associates, 2002

the other hand, seems to have found its niche. In the case of illiquid securities, **market maker systems are often precursors of order-driven systems**. The fact that there are already efficient order-driven systems in Europe indicates that there is little need for market maker systems there.

Crossing systems: slim chances

Despite the stock exchanges' efforts to cover the market for block trades, the European crossing ATs are scoring here. One weakness of CLOBs is their inability to handle **large block trades**. Market maker systems are often more revealing of information on upcoming transactions. Crossing systems, by contrast, are so designed that they reduce the market impact of large orders. They are the ideal forum when participants are more interested in low-cost, anonymous execution of a transaction than in the certainty and speed of execution. Price-importing reference market systems such as Xetra XXL of Deutsche Börse (a trading platform for large equity orders) try to cover the potential market of **crossing systems**. The LSE (with the crossing functionality of SEAQ) and Borsa Italiana have opted to diversify their services with crossing systems for block orders of institutional investors. As yet, it is only banks that trade on stock exchange platforms; institutional investors prefer the direct route through **crossing ATs**. A few success stories show that such systems can attract sizeable volumes. E-Crossnet can boast 50% annual volume growth; POSIT and Liquidnet are also expanding steadily, albeit at a low level. Depending on the chosen scenario, crossing market share in 2007 will come to between 2% and 6% in the United Kingdom and 0.3% to 1% in continental Europe.¹² However, the generally high liquidity and efficiency of European stock exchanges leave crossing systems, too, **little room for development**.

So the prospects for ATs are not rosy, at least not in the European equity market. Even though the number of multilateral trading facilities identified by the Committee of European Securities Regulators rose from 29 in 2000 to 48 in 2004, their percentage market share is only in single digits. They will at best be able to occupy niches.

Future of internalisation in Europe is uncertain

The stock exchanges are still the predominant trading platform for equities in Europe. The importance of ATs in the changing world of equity trading could be further diluted by another mechanism, internalisation.

One definition of **internalisation** is the **gathering of clients' buy and sell orders** and their in-house electronic **execution on the basis of the bank's own business**. Only the remaining orders are passed on to a trading platform for execution. Banks and their clients save the costs of stock exchange execution. In Europe to date there are **very few internalisation systems in operation**. Uncertainty as to how the EU's Markets in Financial Instruments Directive will be transposed into national law is causing potential operators to hold back. Overall, only the most liquid stocks will be tradable in these systems. How successful "neutral" internalisation platforms such as Deutsche Börse's Xetra BEST will be, remains to be seen.

Crossing systems are designed for block trades, but market share remains low

Internalisation platforms making little progress for regulatory and strategic reasons

¹² Merrill Lynch (2003): Alternative Trading Systems.

Off-exchange bond trading: great potential for automation ...

While stock exchanges continue to dominate equity trading, off-exchange channels are the leaders in bond trading. In Europe 95% of bond trading takes place outside the stock exchanges. The remaining 5% is transacted on an exchange, mostly at the express wish of the customer. The potential for automation therefore lies with bond trading platforms, and has already been partially utilised.

In 2003, there were 31 electronic trading systems for fixed-income papers in Europe. The volume of electronic trading is rising. But consolidation is also taking place in this sector (see chart). The quote-driven EuroMTS system, set up in 1999, demonstrates that, in Europe, too, ATs can grow to become the dominant trading platforms for certain segments. With a market share of more than 70%, the whole MTS group is by far the most important service provider in the spot market for euro-denominated government bonds. In Europe, probably about 75% of orders but only around 50% of volume is executed electronically at present. Large orders in particular are still traded mainly by telephone. The market impact that large orders have on quote-driven electronic platforms is the reason for the **continuing preeminence of the telephone as trading channel**. The development in the USA has been largely similar to that in Europe.

... with clear limits

There are limits to automation in bond trading. If **electronic trade in a paper** is to function efficiently there must be a **high degree of standardisation** and **sufficient liquidity**. The automation of procedures will come to a halt at the point where it ceases to be profitable. Trade in corporate bonds and some derivatives is an example. These types of paper are less standardised and liquid than government bonds. Despite the fact that agent-based electronic trading systems provide the technology to enable investors to combine and configure individual market features themselves, over-the-counter (OTC) trading¹³ will, for various reasons, remain the prime channel for trade in non-standardised bonds in the near future. The existence of accepted trader practices, established networks and a desire for intransparency play an important role.

The automation of bond trading affects dealers' revenue sources, and thus influences their business models. Whereas, in the past, bid-ask spreads were the main source of income, commission-based models are becoming increasingly attractive as spreads narrow because of the greater degree of transparency.

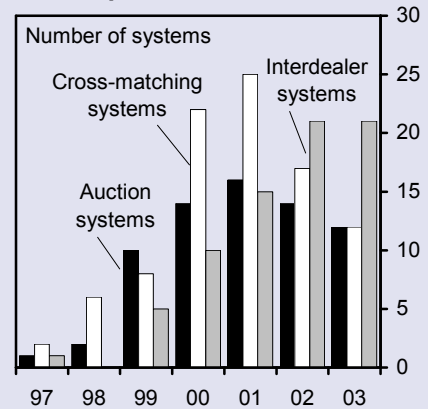
Quite generally, though, players face a dilemma. On the one hand, investment in automation holds promise of first-mover advantages in competition in certain products. On the other hand, automation leads to tighter margins, and the risk of increasing cannibalisation of the traditional business model. The extent to which **automation of trade in standardised and liquid bonds** will continue will depend partly on **how market players assess this trade-off**.

Connectivity between platforms lessens effects of fragmentation

The growing use of information technology in securities trading is altering the structure of the industry. The distinction between market

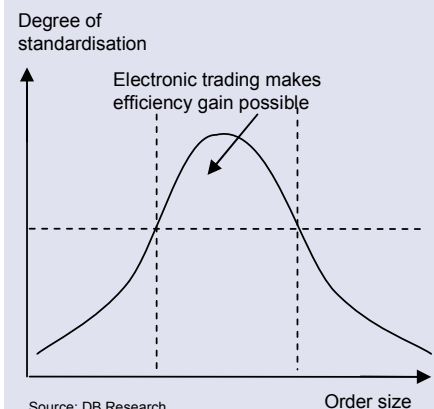
¹³ Here, this refers to all transactions concluded off-exchange in bilateral direct or telephone trading.

Electronic bond trading systems in Europe and the USA



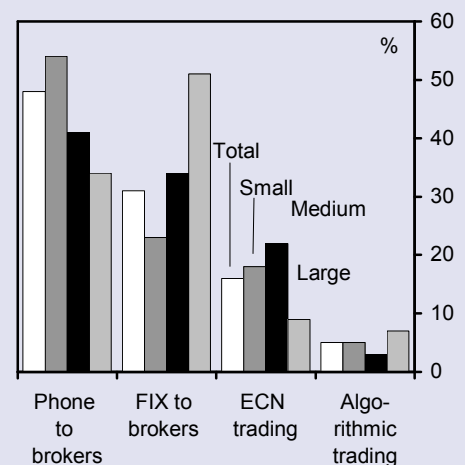
Source: The Bond Market Association, 2003

Potential efficiency gains through electronic trading



Source: DB Research

Order allocation of institutional investors



Source: The Tabb Group, 2004

venues and market participants is becoming blurred. ECNs in the USA and crossing systems in Europe are market venues for institutional investors and brokers. But they are also market players, as they transmit orders that they cannot execute within their own order book to traditional markets (see chart). There are thus very **close-knit connections among market players**.

Many **brokers** in the USA are working proactively to overcome fragmentation through **innovative business models**. They have become fee-based providers of execution services, offering innovative vehicles. Direct market access technology, for example, aggregates multiple execution venues and provides smart order routing to find the venue offering best execution. Algorithmic trading gives the ability to align block trades with specific trading strategies. The slump in commission income at Instinet reflects the price war that such innovations have triggered between ECNs and brokers (see chart).

Information technology thus facilitates the coexistence of centralised trading models (SETS and order-driven ATs) and decentralised models (market maker ATs and OTC trading). It increases connectivity among market participants and real-time information on prices and transactions. Trades are decentralised, but pricing is centralised. This reduces the risk of market fragmentation and makes it possible for separate markets to **connect indirectly** via standardised securities trading protocols such as FIX. For optimal execution of trades in certain securities, a variety of execution venues and channels is needed. IT creates the ideal link between them at a small number of points.

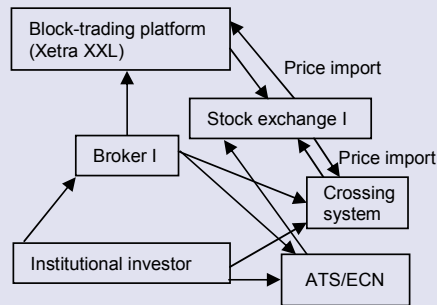
Clearing & settlement: key to further change in Europe

The overhaul of **inefficient clearing and settlement structures** will trigger a **further wave of IT developments in securities trading**. This wave will relate to the implementation of international communication and data format standards and the concomitant increase in connectivity among market participants. ATs will not participate in this, however. As in the fourth evolutionary stage of automation in securities trading (see diagram on p. 2), trading platforms will integrate clearing and settlement into their electronic system through backward integration along the value chain. As the regulatory protection still enjoyed by stock exchanges in Europe erodes, exchanges that incorporate the entire value chain in their business model will increasingly cover their costs out of revenues from clearing and settlement (custody business especially), and not so much from trading. The new pricing model of Deutsche Börse and its subsidiary Clearstream from 2005 is already a first step in this direction. Such cross-subsidisation of trading fees is likely to have an even more severe effect on the income of all venues that are purely trading platforms. This applies particularly to **ATs**, which exclude clearing and settlement from their market model owing to the high fixed costs (Instinet is an exception).

ATs active in different segments

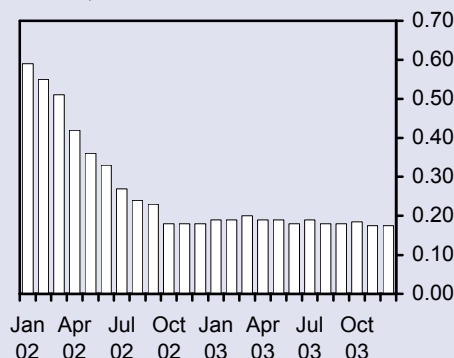
Securities trading is increasingly taking place in ubiquitous computer networks, with transactions being conducted via the electronic trading platforms of stock exchanges or alternative trading systems. In the USA, ATs were able to become established in equities trading because the traditional trading venues were originally not very automated. But consolidation among ATs is intensifying. Their progress is being hampered by declines in market trading volumes, regulatory plans and the increasing automation of the NYSE and NASDAQ. In Europe, the innovativeness of the stock exchanges in

Order flow in equity trading



Source: DB Research

Instinet: net commissions per share, US cents



Source: Instinet, 2004

Major providers of clearing & settlement for ATs:

- Clearnet
- Euro-Clear
- London Clearing House
- Clearstream
- Crest

both technology and trading models prevented ATs (with the exception of electronic bond trading platforms) from capturing more than niches. Clearing and settlement will be key to further changes in securities trading in Europe.

Author: Marion Mühlberger, +49 69 910-31815
(marion.muehlberger@db.com)

© 2005. Publisher: Deutsche Bank AG, DB Research, D-60262 Frankfurt am Main, Federal Republic of Germany, editor and publisher, all rights reserved. When quoting please cite "Deutsche Bank Research".

The information contained in this publication is derived from carefully selected public sources we believe are reasonable. We do not guarantee its accuracy or completeness, and nothing in this report shall be construed to be a representation of such a guarantee. Any opinions expressed reflect the current judgement of the author, and do not necessarily reflect the opinion of Deutsche Bank AG or any of its subsidiaries and affiliates. The opinions presented are subject to change without notice. Neither Deutsche Bank AG nor its subsidiaries/affiliates accept any responsibility for liabilities arising from use of this document or its contents. Deutsche Banc Alex Brown Inc. has accepted responsibility for the distribution of this report in the United States under applicable requirements. Deutsche Bank AG London being regulated by the Securities and Futures Authority for the content of its investment banking business in the United Kingdom, and being a member of the London Stock Exchange, has, as designated, accepted responsibility for the distribution of this report in the United Kingdom under applicable requirements. Deutsche Bank AG, Sydney branch, has accepted responsibility for the distribution of this report in Australia under applicable requirements.

Printed by: HST Offsetdruck Schadt & Tetzlaff GbR, Dieburg