

Korhonen, Kari

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Securities market ATs concepts, their roles and related policy issues

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BANK OF FINLAND DISCUSSION PAPERS

24 • 2001

Kari Korhonen

Financial Markets Department

20.11.2001

Securities market ATSs Concepts, their roles and related policy issues

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Suomen Pankki
Bank of Finland
P.O. Box 160 FIN-00101 HELSINKI Finland
☎ + 358 9 1831
www.bof.fi

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Securities market ATSS

Concepts, their roles and related policy issues

Bank of Finland Discussion Papers 24/2001

Kari Korhonen
Financial Markets Department

Abstract

The aim of this paper is to clarify the concept of alternative trading systems (ATS) and to present an interpretation of their role in the securities markets. The discussion focuses on trading venues related to debt instruments and equities. Geographically, the American and European markets are the focus of interest. In brief, the primary aim of the paper is to demystify ATSS. Secondly, the paper analyses general policy issues raised by ATSS and concludes with an analysis of selected issues related to the Investment Services Directive.

The main sources available on the subject are reports published by market participant lead associations, regulators or international organisations. As in all fields of the 'new economy', the most up-to-date information sources are publications issued by operators themselves. Moreover, the use of news articles (often online publications) has been deemed appropriate in this context.

Key words: alternative trading system, ATS, ECN, exchange, equities market, bond market, oversight, supervision, systemic risk, investment services directive

Vaihtoehtoiset kaupankäyntijärjestelmät arvopaperimarkkinoilla: Toimintamallit, merkitys ja politiikkakysymyksiä

Suomen Pankin keskustelualoitteita 24/2001

Kari Korhonen
Rahoitusmarkkinaosasto

Tiivistelmä

Tämän selvityksen tarkoitus on selkiyttää käsitteen vaihtoehtoinen kaupankäyntijärjestelmä sisältöä ja esittää tulkinta tällaisten kauppapaikkojen asemasta arvopaperimarkkinoiden kehityksessä. Tarkastelu keskittyy joukkovelkakirja- ja osakemarkkinoihin. Maantieteellisesti erityisesti Eurooppa ja Yhdysvallat ovat mielenkiinnon kohteena. Toiseksi selvityksessä pyritään analysoimaan yleisiä vaihtoehtoisin kaupankäyntijärjestelmiin liittyviä politiikkakysymyksiä ja päädytään EU:n sijoituspalveludirektiivin analysointiin tällaisten kauppapaikkojen näkökulmasta.

Tärkeimmät aihetta koskevat lähteet ovat markkinaosapuolten, valvojien ja kansainvälisten järjestöjen julkaisemia selvityksiä, mutta kuten muutenkin ns. uuden talouden tapauksessa, on tässäkin selvityksessä jouduttu usein turvautumaan alan palveluntarjoajien omiin julkaisuihin (enimmäkseen verkkojulkaisuja), koska ne antavat ajantasaisimman tiedon.

Asiasanat: vaihtoehtoiset kaupankäyntijärjestelmät, ATS, ECN, pörssi, osakemarkkinat, joukkovelkakirjamarkkinat, valvonta, systeemiriski, sijoituspalveludirektiivi

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1 Introduction

Alternative trading systems (ATs) emerged in the securities markets in the context of rapid technological development and globalisation of investment practices. These two were further boosted by general deregulation of economies.

The ATS concept encompasses different trading venues offered mostly by investment firms with an aim to making trading easier and cheaper to clients and more profitable for the service providers. They tend to utilise the latest technologies such as network solutions and the Internet.

In many senses ATs have an image of technological development reflecting advances in network technology. They represent the latest forms of business-to-business commerce, and also business-to-consumer commerce. In the financial services industry, the latter obviously emphasises intermediaries' relations with investors as well as issuers' relations with investors.

Commercial use of online services started with advertising and distribution of information via so-called bulletin boards and evolved towards volume aggregation, online auction houses and real-time negotiation systems.¹ In the early stages the development of ATs went hand in hand with e-commerce in general. Nowadays several online marketplaces offer big advantages over traditional commerce as eg buyers can connect to many sellers without having to create separate point-to-point connections to each. Most modern e-commerce marketplaces for goods also support automated transactions and host workflow applications. Such systems allow immediate confirmation and accounting of transactions as well as use of the data in the client's in-house procurement system.² Many of these characteristics have been added to financial services applications. One might even add that during the last few years the sophistication of certain types of trading systems has accelerated remarkably and the financial services industry has moved to the forefront of the technological revolution. New technology has indeed widened the strategic options of financial institutions.

Deregulation, which has laid the ground for increasing competition among marketplaces and between broker-dealers and traditional market operators, should be understood as one of the background forces for the emergence of the phenomena analysed in this paper. Authorities in some countries such as the United States and the United Kingdom feel that this competition will stimulate innovation and encourage markets to offer better features and services to their members and subscribers, and at lower costs. Earlier financial markets were considered as either over the counter (OTC) markets or exchanges, but following the emergence of

¹ For a more ample description of e-commerce strategies see eg Raisch (2001), chapter 5; Also Lucking-Reiley – Spulber (2001) provide a good account of business-to-business e-commerce.

² See eg Dalton (1999) for a more detailed description.

alternative trading systems new types of market places have been formed between the two poles.³

New investment strategies and political will have generated immense pressure for national markets to integrate. But integration requires systems that can ease the work of issuers and investors. OECD refers to globalisation of markets as reduction of market segmentation. It predicts that in the long run it is the ATSS in particular that will deliver such market despite the fact that they have usually started out as niche players, as can be seen below.⁴

Other related trends worth mentioning include venture capital, which was boosted by an abundance of finance in the late 1990s and the 'Internet hype'. Several investment banks and risk capital financiers invested in ATSS, which led to a flood of such systems at the turn of the century. When the Bond Market Association (TBMA) – a US-based association that represents the interests of securities firms and banks that underwrite trade and sell debt securities - first did a survey on ATSS active in the bond markets in 1997 it found 11 such systems. When it renewed the survey again in November 2000, the count had already reached 68. For the equities markets the number is much larger. This reflects a real boom period in the markets.⁵

Central bankers participating in the G-10 Committee on Global Financial System (CGFS) defined electronic trading systems as facilities that provide some or all of the following services:

- electronic order routing (delivery of orders from user to executing system),
- automated trade execution (transformation of orders into trades) and
- electronic dissemination of pre-trade (bid/offer quotes and depth) and post-trade information (transaction price and volume data).

By a narrow definition such systems are limited to facilities that automate all aspects of the trading process, including trade execution. Not all of such systems can however be included under the term ATS, which is what the following section seeks to clarify.

Chapter 2 focuses on defining the ATS concept and different system types. In section 3 the focus is on the impact of such systems on both credit markets – mainly bond markets – and stock markets. Finally in section 4 an attempt is made to identify current and future issues of interest to public authorities.

³ Steinherr (1998) writes about the inconveniences of an OTC market: 'OTC market has no location (contractual parties can be anywhere in the world), and therefore no address; it has no defined membership and therefore no rules; it has no defined products for trade and no boundaries...;It is therefore difficult to ...obtain meaningful statistics; and difficult to regulate either by market participants or by external regulators.'

⁴ OECD (2001).

⁵ Lin- Geng - Whinston (2001) claimed that the prime reason for the proliferation is that it is profitable to operate an electronic market especially for bond instruments.

2 ATSS – what are they?

The definition of an ATS is not straightforward. Different terminology is used in different contexts and the same term is often capable of bearing different interpretations. Some of the terms used to describe such systems include distribution platform, trading service, trading platform or system, trade execution engine, electronic or online marketplace, Electronic Communication Network (ECN), and of course there are dozens others.

One of the problems with the above terms is that they do not necessarily speak for the alternative nature of such systems. European securities market regulators gave the following definition of ATS:⁶

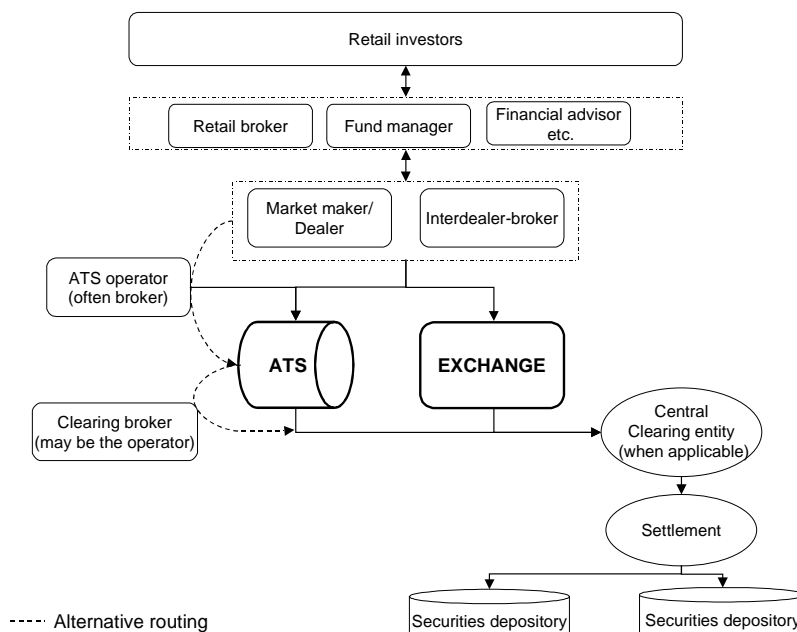
'An ATS is an entity which, without being regulated as an exchange, operates an automated system that brings together buying and selling interests - in the system and according to rules set by the system's operator - in a way that forms, or results in, an irrevocable contract.'

The point made is that similar systems may be used by regulated and specially licensed entities such as stock exchanges that can be considered as infrastructure of the financial market. However, from the perspective of regulators such markets have a different status. In fact, ATSS are often - though not always - operated by broker-dealers or similar intermediaries. Some systems are maintained eg by special IT service companies.⁷

⁶ FESCO (2000), p. 4-5; Also the United States SEC has used a similar definition as a basis for its regulation.

⁷ In the last couple of years some systems have however been set up in close association with an established marketplace. This will be further discussed under section 3.

Figure 1. Relative position of a typical ATS in the secondary equities market trade process



Another nuance worth noting in this definition is that such systems are essentially trading systems. Therefore the fact that the use of an ATS results in a binding contract is crucial. As a consequence, a system that provides only routing of orders from one participant - whether a professional intermediary or an investor - to another (or to a marketplace), and does not execute trades, should not be considered as an ATSs.

On the other hand, whether a system generates a price of its own for all securities traded or uses reference prices from other markets, eg exchanges, is less relevant for ATS status.⁸

With the above in mind, a rough categorisation into two types can be established:

- **Transaction systems** allow buyers' and sellers' interests to meet via the matching of bids and offers to form actual trades. These systems tend to focus on the business of professional market participants eg brokerages and market makers.
- **Distribution systems** allow professional market participants to concentrate their client volumes in such systems and use them as a distribution and marketing channels.

⁸ Nonetheless, how prices are obtained affects the way such systems are structured.

Between these special combinations of functions, one can make distinctions based on the target clientele and the business plan of the system.⁹

In attempting to further deepen such a definition, a negative description may be useful for understanding the full scope of the terminology. In Canada for example a marketplace cannot meet the proposed definition of ATS if it:

- provides a listing function;
- sets a guaranteed minimum order size for securities traded, for the purpose of ensuring liquidity via intermediaries such as market makers
- sets market regulations, and/or
- disciplines its participants eg by levying fines.

In the following sections I will attempt to describe the main ATS types by using two classifications, one issued by the Forum of European Securities Commissions (FESCO), an association of European securities regulators¹⁰, and the other by the Bond Market Association (TBMA). These will be further clarified by interpretations taken from publications of Banque de France and the US Securities and Exchange Commission (SEC). In brief, the aim of this section is to demystify ATSs.

2.1 Classification of Bond Market Association

The TBMA classification¹¹ makes a distinction between five types of trading systems: auction systems, cross-matching systems, interdealer systems, multi-dealer systems and single-dealer systems. This classification has been adapted to systems operating in the credit markets.

⁹ This categorisation is a simplification of that given in Fouquet – Haas (2001).

¹⁰ FESCO was transformed to the Committee of European Securities Regulators (CESR) in September 2001. The CESR is currently in the process of revising the ATS definition and producing forthcoming standards.

¹¹ See the Bond Market Association (2000).

Table 1. Relative position of a typical ATS in the secondary equities market trade process

Distribution of System types according to TBMA Survey					
TYPE	1997	1998	1999	2000	2001
Auction	1	3	10	14	14
Cross-matching	2	6	8	22	21
Interdealer	1	0	5	11	16
Multi-dealer	0	4	3	8	11
Single-dealer	7	12	13	18	17
Other	0	2	1	0	0
Total	11	27	40	73	79

Over the five-year period during which the TBMA has conducted the survey, it has witnessed a rapid proliferation of systems. The number of cross-matching systems has exploded. It should however be noted that not all systems can be put nicely in a single category, for which reason the total shown in Table 1 exceeds the actual number of systems. It should also be noted that in 2001 a process of system consolidation has started.¹²

2.1.1 Auction systems

Auction systems enable participants to conduct electronic auctions of securities offerings. Via such a system, a seller typically posts the details of a security being offered for sale with the specific terms of the auction¹³. Buyers submit bids for the offered securities, which go to the bidder submitting the highest price/lowest yield bid. For this reason an auction is defined as a competitive sale. In some cases, the identities of the bidders and the amounts of the bids are kept anonymous. In others, identities and/or bid amounts are viewable by all participants. Some auction systems are tailored to new issues in the primary market, in which case the issuer is the seller. Others focus on auctions of secondary market offerings by investors or by brokers used by them.

Some systems provide for reverse auctions. In such an auction a buyer can post its requirements for one or several potential sellers (or issuers) to respond.

¹² Currently the TBMA does not cover systems that focus primarily on retail investors; a summary of the May 2001 survey is provided in The Bond Market Association (2001).

¹³ that is, whether the auction is single-price or multiple-price, the time the auction is open, whether partial orders will be filled etc.

2.1.2 Cross-matching systems

Cross-matching systems generally bring dealers and institutional investors together in electronic trading networks that provide real-time or periodic cross-matching. Customers are able to enter anonymous buy and sell orders with multiple counterparties, and these are automatically executed when counter-orders are entered at the same price or when the posted prices are “hit,” or “lifted.” In some cases, customers are able to initiate negotiation sessions to establish the terms of trades. Some systems of this type allow users to execute complex portfolio strategies that incorporate multiple orders in different securities.

2.1.3 Dealer systems

Dealer systems allow dealers to execute transactions electronically with other market participants. The TBMA categorises such systems into three different groups based on a rough segmentation into interdealer markets and dealer-to-customer markets:

Interdealer systems allow dealers to execute transactions electronically with other dealers through fully anonymous services of brokers’ brokers. A number of interdealer brokers have introduced electronic transaction systems that allow dealers to execute transactions anonymously in securities through proprietary networks. These type of systems are increasingly adopting central counterparty (CCP) clearing in order to extend the anonymity¹⁴ to the settlement process.

Multi-dealer systems provide customers with consolidated orders from two or more broker-dealers and enable customers to handle multiple simultaneous quotes. However, multi-dealer systems often inform customers only of the best bid or ask price for a given security among all the prices posted by participating dealers. The dealers generally act as principals in these transactions.

Single-dealer systems allow investors to execute transactions directly with a specific dealer (principal) of choice. As such a system only provides a bilateral relationship between investor and broker-dealer, access is limited to information or other facilities offered by this single service provider.

Single-dealer systems provide the dealer with a facility to internalise the volumes.¹⁵ In theory, the danger of such systems is that there is little incentive for the dealer to compete by narrowing its spreads because it would not attract much

¹⁴ Anonymity can be defined as non-disclosure of identities of counterparties. It can take place both pre- or post-trade.

¹⁵ Internalising volumes means that a broker-dealer creates a limited internal market based on its clients’ interests.

additional order flow. However, this tendency can be countered by effective regulation.

Dealers offer access through a combination of third-party providers, proprietary networks and the Internet, although in recent years there has been a pronounced shift toward Internet access. The latter applies especially to systems, the clientele of which is mainly composed of retail investors.

2.2 Classification of FESCO

FESCO's¹⁶ approach emphasises the functionalities of the different types of systems. One of the key functions is price setting or price formation.

2.2.1 Active bulletin boards

These systems simply display invitations to make offers to the system operator. Communication takes place typically from one service provider to many potential (normally pre-registered) clients. The system informs as to whether submitted offers have been accepted or not. FESCO does not offer further elaboration on these systems. It is crucial that the system also establish rules or operate a trading facility by which subscribers can agree to the terms of their trades.¹⁷ Another controversial aspect of the definitions becomes clear when certain active bulletin boards are compared to certain reverse auction systems.

2.2.2 Order-driven automated trade matching systems

In order-driven systems prices follow orders. FESCO distinguishes between continuous matching and **auction-type matching**. The latter enables acceptance of limit orders¹⁸, which are stored in a batch during the opening period of the auction. Later, an algorithm calculates the single price that maximises the number of executable orders or securities or total trade value.

¹⁶ This classification was set out in FESCO's response to the EU Commission on ATS regulation, (see FESCO 2000).

¹⁷ It is questionable whether systems that simply instruct suitable counterparties to contact each other, should be considered trading systems, ie ATSs.

¹⁸ A limit order is an order to buy (sell) a specified quantity up to a maximum (minimum) price (cf market order, which is to be executed at the best price obtainable at the time of the placement of the order).

Under continuous matching order-driven systems accept limit orders or market orders in a more or less public order book. These orders are automatically matched in time and price priority without interruption. Some systems automatically notify both parties of a potential trade and open an anonymous negotiation session between buyer and seller, which enables them to agree on amount etc and thus finalise the trade. The contents of the order book for an order-driven system may or may not be public information.

The architecture of a fully automated system is often complex, and the differences between the various systems can be quite subtle. The trading process of a typical order-driven market place is illustrated in figure A of the Appendix 1.

2.2.3 Quote-driven systems

Quote-driven systems display quotations of dealers and provide automatic execution based on the quotations. These systems are based on the idea that orders follow prices and, in the purest form, do not enable price negotiation. Clients can either accept quotes published by dealers and trade on them or wait for more convenient interest from the side of the dealer or dealers (if several dealers were involved in price formation in the same system). In dealer markets, investors buy at a dealer's ask price and sell at a dealer's bid price.

Prices can result either from multilateral interaction between broker-dealers' competing quotes at a central location or they can be formed predominantly in bilateral/private negotiation.

2.2.4 Crossing systems

Crossing systems accept market orders for securities, which are then periodically executed in a batch run at a reference price from another market, eg from the primary market (where the security is listed). ATSS using this method normally publish timetables for crossing runs, and subscribers can then submit orders to specified crossing runs. Orders are entered without a specified price, and subscribers agree to trade at prices based on the primary market, eg at the mid-point of the bid-ask spread at the time of order matching or at the primary market's opening/closing price. Therefore it is often said that such systems play no part in *price discovery*, which is why they are also known simply as price-taking systems or passive or derivative pricing systems.

2.3 Special case of ECNs

Neither of the above classifications takes special notice of the most frequently quoted systems, Electronic Communication Networks (ECNs). These generally fall between some of the above definitions, usually being defined as trading systems that automatically distribute participants' orders to third parties and permit full or partial execution of those orders. Hence most of them could be categorised as order-driven automated trade matching systems. Based on further analysis of existing systems, one can maintain that such systems are solely order-driven, ie none of the participants undertake to guarantee prices, hence liquidity, for the securities traded in the particular market.¹⁹

ECNs typically provide a transparent public order book. However, the degree of publicity may vary; in some systems only the top of the book is visible to participants, while on others subscribers may be able to see the full depth of the market by price levels. In most modern systems the evolution of the order book can be followed in real-time, eg via Internet.

Their main vantage in comparison to other marketplaces is effective price formation, for which reason passive pricing systems would not qualify for the ECN category. Despite this, several ECNs have a special feature which enables participants to submit orders the full size of which is not disclosed in the order book. Such orders are often called reserve, or hide-in-the-book, orders.²⁰

In terms of price formation ECNs can be divided into two main categories. Some ECNs act principally as destination-only markets, ie they aim at matching trades internally (emphasising speed of execution), while others use high-speed communications technology to scan the full market for the best prices (emphasising aggregation of liquidity from different markets).

ECNs were originally set up in the United States as niche markets for exchange or OTC market makers. They mainly focused on after-hours trading and trading in unlisted shares. There is still at least one ECN that is active only in after-hours markets.

Finally, it should be noted that ECNs, by and large, limit their direct participants, ie subscribers, to professional financial intermediaries through which investors can submit their orders to ECNs. Such intermediaries initially did not dis-

¹⁹ Unlike in the regulated United States markets, on ECNs market makers are not paid to make two-way markets but actually use ECNs mostly to cover unwanted short or long positions, either because they can do this anonymously or in order to profit from quick execution.

²⁰ Several forms of reserve orders exist. Interests can be entered as a) completely hidden at a specified price, b) partially hidden with only a portion of the order disclosed at the same price (investor can specify the quantity to be displayed), or c) partially hidden with a portion of the order exposed at a different price. In some cases only a counterparty with a counter-order that matches the parameters of the reserve order would discover its existence.

close to all clients where their orders were submitted for execution. Nowadays, at least in the United States (where most ECNs are located), intermediaries must now fully inform their clients and, to make matters simple, most online brokers customarily offer their clients the option of specifying the types of markets to which their orders can be channelled.

Some systems have, however, started to accept orders directly from institutional investors but require that each investor be sponsored by a professional intermediary. In practice, this entails that a broker-dealer takes the responsibility for trades executed in the name of any investor that it sponsors. Other ECNs, such as MarketXT and Island, also try to attract more sophisticated retail investors - mainly day-traders.

Like other ATSS, ECNs are incorporated in for-profit companies. Their operators collect charges from subscribers, usually based on number and value of orders. Access fees are consistent with the pure agency business model of ECNs. They charge a separate commission to one or both sides of a trade within their system, but do not trade as principals with customer order flow and therefore do not profit from the spread between the bid and offer, or from position trading.

3 Implications of ATs on securities markets

The role of ATs has changed a great deal over time and markets. Here, below, an attempt is made to analyse them in different market contexts.

ATs have had tremendous success and impact on functioning of securities markets in the United States but have generally had less success in Europe. FESCO nonetheless identified 27 multilateral systems operating in the EEA which fulfil its ATs definition. The operators of most ATs are authorised in the United Kingdom (16 ATs) and in Germany (6 ATs), with one being authorised in each of France, Ireland, Belgium and the Netherlands. The remaining eleven jurisdictions, including Finland, have not yet licensed or authorised the operation of any trading system falling within the definition of ATs.²¹ However, it is well-known that eg the main Finnish shares can be traded through American ECN services or via POSIT Europe, and that Finnish government benchmark bonds are traded eg on EuroMTS.²² Several Finnish brokers offer platforms for both equities and debt instruments, which in some aspects resemble single-dealer platforms but which have been classified as order-routing systems by the regulator.²³

ATs have certain effects on the securities markets, the most apparent of which seems to be the pressure to reduce the cost of search and execution. To present evidence on their impact on liquidity and prices or spreads is more challenging due to differing market characteristics. The latter will be discussed separately for credit and equities markets. What can be said in respect of both markets is that the introduction of ATs has increased the **efficiency of the markets for large volume investors and market makers**.

In addition, they have brought **add-on services** like research and analytical data to the reach of all potential market participants. Technical tools have been developed hand in hand with the spread of quantitative trading methods used mainly by institutional investors. Increasing use of technical platforms is partly due to their capability of limiting certain 'trader risks' quite easily, eg via limits on maximum amounts against 'fat finger' errors and controls against illicit use of the system can be included. Furthermore, ATs have clearly **increased competition** in the markets, but defining who they compete with depends mostly on the business plan: some of them compete with exchanges, others with inter-dealer brokers

²¹ FESCO (2000).

²² It would seem quite likely that the future primary dealer market for most Finnish government bonds will be in one of the MTS systems.

²³ Probably the best known are the EQ online and EvliNet brokerage platforms. The Swedish NeoNet brokerage house has announced recently that it would start offering the services of BRUT to its clients. Quite recently also Finnish brokers have started to add links to foreign exchanges on their retail customer platforms; see eg Koskinen (2001).

or for securities houses' underwriting business. Finally, a feature yet to be fully expanded is the exploitation of **straight-through processing**.

3.1 Credit markets

Credit markets like bond markets have been presented as a prime example of the OTC market, where trading was traditionally based on telephone communications between a small number of broker-dealers and inter-dealer brokers. However, it is now felt that telephone has too many shortcomings to enable development of an efficient market. Secondary market activity tends to be driven by large institutional investors, who do not trade directly between each other.

Because in most countries there have not been any central marketplaces for fixed income instruments, such markets have generally been described as fragmented markets.²⁴ At the early stages of the networking era, banks used technology to market their own issues (or issues underwritten by them) through single-dealer systems. These types of platforms did not fulfil customer needs as they did not enable simultaneous comparison of competitive dealer quotes or assessment of liquidity distribution. Thus these systems maintained the division of markets into dealer markets and dealer-to-customer relationships.

More sophisticated ATSs such as cross-matching systems have the ability to provide the market with centralised order books as an alternative to exchange environments. In practice, the number of cross-matching systems has increased most rapidly since 1997. On the other hand, if multi-dealer systems, as described above, become more popular than single-dealer systems, customers will have wider market access and better price information, although the segmentation into inter-dealer markets and dealer-to-customer markets will continue to exist.

According to TBMA survey, in 2000 – 2001, the number of multi-dealer systems in particular increased, whereas the number of cross-matching systems stagnated. One of the most lucrative features provided by the former systems is competitive bidding. Growth in the establishment of new ATSs occurred in the markets for mortgage-backed, agency and municipal securities. TBMA found that it is on those markets that electronic trading can best enhance liquidity and reduce transaction costs. It also suggested that the Treasury bond market had reached a saturation point in terms of the number of electronic trading systems.²⁵

²⁴ Admittedly, in some countries the exchanges had a special market section for debt securities trading, but this is fairly unusual.

²⁵ The Bond Market Association (2001). However, as can be seen in table 1, also the number of interdealer systems increased.

Some of the main advantages of different ATSs as regards credit markets can be described as follows:

First, ATSs provide **liquidity improvements** in several ways.

- by concentrating volumes in heterogeneous securities such as mortgage-backed securities and other asset-backed securities, ATSs facilitate creation of niche markets.
- by improving traders' ability to apply spread-pricing methods based on benchmark issues, ATSs facilitate creation of liquidity for less frequently traded issues.
- they can interlink to and from different markets, which facilitates market-making activity;²⁶ eg some ATSs enable more highly automated coverage of cash market positions in derivatives markets.
- new types of orders that allow the building of portfolio strategies that can be executed instantaneously enable dealers/investors to save liquidity compared to conventional trading; at least one cross matching system, namely Bond Connect, offers combined value trading; the core of combined value trading is an order format, which enables users to express interrelationships among multiple securities in a single order; although price levels and maximum quantities to be bought or sold are specified for individual securities, execution is based on the total value of an order; liquidity is enhanced because orders submitted are aggregated until regularly scheduled daily auction times; and the matching engine uses the entire set of orders to allocate trades and determine a single auction price for each security; after each session, auction prices and volume are available to all participants, bringing transparency to the markets; customers of other systems such as BondNet and LIMITrader are able to enter indications of interest, subject to specific parameters and criteria, which, when met, trigger an automatic notification process that places the parties into direct negotiation in an anonymous interaction.
- because increasingly sophisticated ATS function on the basis of public operating rules, certain types of matching algorithms or fully open order books, they provide credit markets with enhanced transparency; It can be assumed that if investors feel more comfortable trading under such circumstances they are likely to do more frequent trading and hence raise the level of liquidity.
- an ATS may allow new investors to access a trading system with minimal IT investment, especially if the platform is built on Internet; hence, ATSs may broaden the active investor base, which will again increase liquidity.

²⁶ Hence at market-maker level niche markets become less isolated than prior to networking.

- on the other hand, if transparency is pushed too far, the incentives for anyone to act as a market maker may disappear and as a result liquidity may evaporate; new order types - discussed above and under section 2.3 - may help save their profession.

Other ATSs aim at **facilitating market-making or institutionalising market-making** in the inter-dealer markets. Participants in such systems often commit to making two-way markets for substantial amounts in a subset of bonds 'listed' on the system but at the same time may act as price-takers in other issues traded in the same system. From the European viewpoint, probably one of the most frequently mentioned systems in this context is EuroMTS, which is an electronic benchmark bond trading platform with national sister markets eg in Belgium, France and the Netherlands²⁷. Several trading systems feed trade details real-time to position and risk management systems. These can also be connected to automated internal order generators, thus eliminating the need for traders to key in bids or offers.

Fouquet and Haas (2001) found that the number of market makers has not increased since the introduction of ATSs. Instead, mainly due to the capital requirements, the business is rapidly concentrating in the hands of a small number of players. Another important factor promoting concentration is the critical need for an adequate volume of customer trade flow in order to get maximum information and satisfactory profitability in a market where margins have constantly narrowed.²⁸

Another feature promoting both liquidity and facilitating market-makers' positions in the fixed income markets is anonymous trading, which in some cases extends even to the settlement stage. The **anonymity** provided by most matching and inter-dealer marketplaces relieves participants of worry about revealing their full interests and thus about deterioration of their market. Hence on such systems market makers can 'frame' their quotes, eg improve bids when carrying short positions or wishing to accumulate, with less risk of being identified as a buyer (or seller). On MTS markets participants are notified of their counterparties only after trade execution, where as with the COREDEAL trading platform - promoted by the International Securities Market Association (ISMA) - and with BrokerTec, anonymity reaches even to the settlement stage, thanks to the use of CCP services.

Other systems put accent on increased transparency of order books and the global nature of their market connections, as eg Instinet ECN's electronic fixed income broker service for professional market participants. Such systems truly

²⁷ In addition, MTS markets are run as regulated markets in Italy and Portugal (see FESCO 2000).

²⁸ One may thus conclude that it is the smaller market making firms in particular that have been unable to find a niche market, either in terms of clientele or instruments, that have suffered and may continue to be the ones whose role will diminish.

improve integration of national financial markets. For example, Instinet is connected to some 40 separate markets, albeit not all of them are necessarily available to all subscribers.

Use of ATS may help investors **reduce trading costs**, for instance by reducing the time required for searching for a counterparty. Cross-matching systems in particular can boast of **speed of execution**, but even multi-dealer systems enhance execution of investor's interests compared with single-dealer platforms or traditional telephone trading.

Finally, introduction of ATSs has generated longer trading hours to the markets. However, no ATS is currently providing a truly 24-hour market.

It would be difficult to claim that ATSs have been adequately described if no reference were made to the fact that the usual technology allows use of some degree of **Straight-through-Processing** (STP). It is very important as means of increasing back office processing capacity and reducing eg staff related costs. STP also allows a higher degree outsourcing. For example, MTS platforms include functionalities for automatic creation and transmission of settlement instructions to relevant securities depositories.

Moreover, STP, as used with certain ATSs, facilitates functioning of central counterparty clearing, which further enhances anonymity and liquidity. Central counterparty clearing also has the capacity to reduce the capital requirements of market makers and brokers. In US bond markets, OTC trades are first confirmed in a centralised trade comparison process, before they are accepted to clearing by a CCP. Following the increase of trading on ATSs, daily batch comparison became outdated and the Government Securities Clearing Corporation (GSCC), the US bond market's central counterparty, launched a real-time service in spring 2001. Instinet - which acts as a riskless principal in such government bond transactions - has even further pushed the clearing corporation to accept its trades as locked-in (ie 'confirmed') trades and clear them in real-time (data is normally submitted by both counterparties of a trade). This would eliminate the cost of trade comparison. Real-time clearing would cut capital usage even further. Despite the fact that CCP clearing is becoming increasingly frequent on credit market ATSs, in some systems counterparties are required to negotiate credit risk lines.

The use of STP has not yet been maximised, but several operators of credit market ATSs have only lately realised that offering only trading functionalities is not enough for survival in a competitive market. In order to gain more market share they have started to invest more in back office links.²⁹ New developments will have to cater for improved handling of securities transfers as well as links to modern payment systems.

²⁹ Kite (2000).

Primary market auctions

Secondary markets have been in the spotlight in the above discussions, but additional benefits of ATSs can be found in primary market functions, namely in respect of auction systems.

The CGFS analyses auction systems as follows. Traditionally the auctioning or issuance of securities involves the issuer, the intermediaries and the final investors, who can all benefit from **cost savings** from the adoption of electronic trading, eg from the possible introduction of straight-through processing. Technological development has facilitated the transmission of information between these entities and enhances the **real-time knowledge** of the book-building process.

Furthermore, auction systems may widen investors' access to the primary markets (ie potentially **widening the investor base**). Previously underwriters focused on large institutional investors, whereas the scalability of electronic systems now gives borrowers access to smaller institutional and retail investors. So far, however, electronic issuance has been used mainly in parallel with traditional methods and its use has had a limited impact on the existing issuance mechanisms.

A primary market auction system has the capacity to reduce the number of intermediaries and hence may enable **better prices for final investors**. For example, well-recognised institutions such as state or local governments may directly constitute a 'community' of investors that is invited to bid for short or long-term debt issues. Many government issuers in developed countries now have systems in place that enable investors to place competitive or non-competitive bids.³⁰ Normally access to such platforms are limited to broker-dealers assigned as primary dealers who handle the resale of the issues to final investors. Some issuers, however, provide a facility even for retail investors to bid through Internet auction facilities, even for fairly small amounts.³¹

The extent to which this can happen in practice depends on whether issuers need intermediaries for purposes other than mere market access. Such additional services may involve underwriting (guaranteeing placement) and market making in secondary markets.

³⁰ Eg Belgium, Finland, Iceland, the Netherlands, Portugal, South Africa and the United Kingdom (via the Bank of England) use the Bloomberg Bond Auction System to issue bonds and bills according to Bloomberg. See The Dutch State Treasury...(2001).

³¹ Through its Treasury Direct service, the US Treasury accepts bids from retail investors in regular auctions for T-bills or bonds but provides also for continuous issuance of savings bonds.

Secondary market auctions

Auction systems can nevertheless be used also in the secondary markets and can therefore also serve registered dealers in intermediating competitive sales of their clients' positions. On the other hand, a state or local government treasurer may eg call for bids from institutional investors or dealers in order to buy back part of an issue. Auction systems would thus seem to have the potential to provide market participants with more versatile tools.

What lies ahead for credit market ATs?

During 2000 bond trading volumes remained quite subdued. The question is can such specialised entities as alternative trading systems supporting only certain credit instruments survive or is it possible that they will suffer the same fate as the independent online banks? There are, however, important differences in the ownership structure in comparison to the online banks referred to above. With the exception of single-dealer systems, most ATs are owned by a group of the largest broker-dealers or investment banks while a smaller number of them, eg EuroMOT, are owned by stock exchange operators.³² Therefore, from the outset the situation is different as ATs already have links to the existing service providers which need not create a customer base. But the reality is that the markets are becoming overcrowded with different systems.

As a consequence, the current trend in the bond market ATs is toward **consolidation**. The driving force is the need to allow participants to rationalise their IT costs by combining the best features of separate ATs under a smaller number of full-service systems. For example, Market Axess has acquired Trading Edge's internet-based multi-dealer system (Bondlink) in order to offer both anonymous and disclosed trading relationships to its participants. On the other hand, an increasing number of ATs supports standard communication methods based eg on FIX, which should allow participants to avoid heavy investments needed for each additional trading system. However, this could mean that most investors do not have, or are not willing to invest in, trading applications.³³

³² Interdealer systems constitute a special case, since it is typical that some members are also shareholders of the operating company.

³³ This reasoning would seem to apply to the merger of BondClick, multidealer-system for institutional investors, and to BondVision platform developed by the operator of MTS markets, which allows institutional dealers to receive quotes simultaneously from several MTS market makers. The advantage of this initiative seems to be that it reduces to some extent the inconveniences of separation of dealer and client markets while maintaining the necessary credit risk controls.

Also the separate MTS markets, which all run on the same technical platform, seem to feel a pressure to merge their operations.³⁴ Another reason behind this trend may be that the market makers with equity stakes require higher returns on their investments as a compensation for shrinking margins and hence insist on even leaner cost structures from system operators. The same issue will be discussed in more length under equities market systems.

Despite clear advantages related to disintermediation offered by multi-dealer ATs, Caplen claims that electronic trading has improved the power position of the leading interdealer brokers in globalizing wholesale markets. Among the derivatives markets, there may be interest in joining forces with, or even buying, exchanges, in order to broaden the range of services to retail clients.³⁵ Similar projects may also arise vis-à-vis credit products.

3.2 Stock markets

Unfortunately, no surveys of TBMA type have been published regarding ATs operating in the equities market. The evolution of US stock markets has been rather different from that of the European marketplaces, which is why they will be discussed separately below. The European equities markets are more distinctively based on matching of investor offers than on market making by intermediaries.

3.2.1 US stock markets

3.2.1.1 Structure and functioning of the US markets

Let us first use the McAndrews - Stepnadis (2000) description of the main established US equities markets to outline the market environment in which ATs and especially ECNs have managed to thrive in the late 1990s. Equities are traded actively both in exchanges and on the over the counter market (OTC). The major markets are the New York Stock Exchange (NYSE) and the Nasdaq³⁶. Both Nasdaq and the large exchanges have been, until just recently, mutual organisations.

Trading on the NYSE is structured around so-called specialists who maintain auction markets. For each stock, one specialist has an exclusive status as the

³⁴ Even Coredeal has announced that it would adopt the MTS model (Kentouris 2001).

³⁵ Caplen (2001). However, it appears that part of the lure of the most modern inter-dealer brokers is that they can combine electronic systems with voice broking.

³⁶ Nasdaq stands for National Association for Securities Dealers Automated Quotation System.

agent who matches buy and sell orders and maintains an order book in which investor orders are placed via brokers. At the same time, the specialist acts as a dealer who makes a market for the particular security, ie trades from his/her own inventory, and thus creates liquidity when the normal order flow is insufficient. Hence investor orders are executed manually by the specialist, either against his order book or against his own price (position).³⁷

The Nasdaq, which was created in 1971 to automate trading in OTC securities, is not an exchange but an information system provider for trading between dealers registered in the National Association of Securities Dealers (NASD), which sets the code of conduct and acts as a supervisory body. Brokers can route orders to NASD dealers via telephone or through one of the numerous order routing systems. As on NYSE, the order books maintained by dealers are not fully disclosed to all participants. However, the main difference to NYSE is that for each Nasdaq share there is a large number of dealers committing their capital and making prices. Nasdaq provides the dealers with execution and negotiation systems.³⁸

Earlier dealers were not compelled to align their quotations with the best customer orders in the order book, but in 1997 the Securities and Exchange Commission, the market supervisor, forced them to show the effect of such orders in their quotations or arrange for immediate execution. As a result, Nasdaq is now both quote-driven and order-driven, and has evolved so as to incorporate features of what is sometimes referred to as a 'hybrid' market.

In addition to its proprietary trading and execution systems Nasdaq has announced that it is planning to run a parallel electronic auction market facility. The facility, designed by Primex, will support sophisticated orders that facilitate execution and price improvement. The auctions are scheduled to be run continuously.³⁹

Some academicians consider the emergence of ECNs and innovations in network technology as fundamental changes in the organisational structure of the whole industry.⁴⁰ Traditionally in the US stock markets a retail broker would forward an investor's order to an exchange floor specialist for execution against its position. Nowadays by routing the order to an ECN or by executing it on its internal market the broker avoids the costs and time-loss linked to these middlemen. Electronic brokerage actually predates retail investors' access to the Internet. In the mid 1980s, a number of broker-dealers offered customers software and direct dial-up access, which permitted them to submit orders via personal computer. In

³⁷ More ample descriptions of roles of different NYSE participants can be found eg in Sofianos – Werner (1997) or Market Structure Report (2000). Trading process of a typical open out-cry marketplace is illustrated in figure B of the Appendix 1.

³⁸ Trading process of a typical dealer marketplace is illustrated in figure C of the Appendix 1.

³⁹ The Primex service was initially scheduled to start in September 2001.

⁴⁰ See eg Lin – Geng – Whinston (2001).

the early 1990s, several broker-dealers gave customers the capacity to enter orders through private computer networks. Broker-dealers introduced the first systems that allowed their customers to submit orders through the Internet in 1995.⁴¹

Already in the mid 1970s the US Congress adopted a policy of promoting technology-based linkages between different securities markets in an attempt to prevent *fragmentation of liquidity* and the ensuing effects on competition in the markets. As a result, a number of market-wide transaction and quote reporting systems were set up by registered exchanges and the NASD. Nowadays there are at least five separate technical solutions that link trading, quotation and reporting for all registered exchanges and the NASD forming what is called the National Market. One of the most important developments in the US markets is constituted by the opening of Nasdaq order routing systems to other exchanges and partially even to ECNs. This even permits dissemination of orders on listed securities on Nasdaq operated systems and consequently promotes integration of a number of regional exchanges with the wider national market.⁴² However, it appears - at least according to claims by ECNs - that these systems require updating so as to enable further improvement of market efficiency.

3.2.1.2 Values promoted by ATs in the equities markets

The first ECN, the Instinet, was set up already in 1970s but the actual golden age started in 1996 or 1997 when systems such as Island ECN and Archipelago were established.

For-profit focus

Alternative trading systems were at first typically proprietary and thus used by the operators to improve cost-effectiveness and raise profits.

As can be seen in the figure in Appendix 2 - despite the fact that the data reflect the situation as at September 2000 and hence are not up-to-date - ECNs tend to be owned by large broker-dealers and investment banks. Since September 2000 at least Instinet has been listed and Island's principle owner apparently has similar plans.

⁴¹ See SEC (1999).

⁴² As long as different markets are accessible on-line, so that search engines can seek out the best prices in any marketplace, then the overall force of the ECNs and the routing systems will be to consolidate the liquidity. In effect the network will become the market (Barber and Odean 2001).

The traditional exchanges are organised around a complex culture and hierarchical committee structures.⁴³ This contrasts sharply with the management of the newer ATSS, whose shareholders gain high returns via eg rapid regional expansion of business and demand rapid-fire business decisions.

The point is that gradually when ECNs began to account for roughly a quarter - according to some estimates as much as 37%⁴⁴ - of the share turnover on Nasdaq, the US exchanges began to sense the need to demutualise. NASD acquired the American Exchange (AMEX), the second largest US exchange, in June 1998. The board of directors of Nasdaq has announced that it plans to become a publicly traded company 'possible some time 2002'. Thus it is fair to say that ATSS have for their part had an impact on the ownership and functioning of established exchanges in the United States.

However, the motives of global trading firms as owners of ATSS have been questioned. Already in late 1999 Merrill Lynch owned stakes in five alternative trading systems; Morgan Stanley Dean Witter had invested in four, and Goldman Sachs in six. It has been claimed that investments made by such leading Wall Street firms, have been defensive, ie aimed at preventing their rivals from gaining control of the equity markets.⁴⁵

Liquidity

Another main thrust of the ATSS is improved liquidity in the products for which they organise trading facilities. By creating niche markets, they can indeed offer improved liquidity to a certain category of market players. However, by definition a niche market is a liquidity pocket unless proper links to or from it have been established.

Being an alternative to the exchanges implies that during system outages of exchanges, ECNs in particular can act as back-ups in providing liquidity. This should apply especially to the blue chips and most actively traded technology stocks. Reportedly, for example, Instinet, a member of Stockholms Börsen, recovered a good deal of institutional trading volume on Ericsson shares during a short technical incident. In theory, an ECN could maintain the market as long as the trades can be cleared and settled without problems. However, should such an inci-

⁴³ Especially in Europe, the bourses generally prefer to deliver turnkey solutions for equity investing, by providing the full chain of trading, clearing and settlement services.

⁴⁴ In September 1999 the ECNs had roughly 29% of the dollar volume (Building better stock market... 2000). According to Nasdaq's market data service, the share of the six top ECNs was already some 35,6% of total Nasdaq dollar volume in July 2001.

⁴⁵ Carroll - Lux - Schack (2000).

dent concern a central securities depository, on which trades are settled and shares are held for safekeeping, even their stock trading operations would fairly soon have to come to a halt.

Efficiency of price formation

Huang and Stoll, for example, pointed out in 1996 that spreads on Nasdaq trading were too large in comparison to those on the NYSE. However, they concluded that the market was likely to self-correct such anomalies through competition.⁴⁶ The predicted competition soon emerged in the form of ECNs, on whose order books spreads could be reduced as dealers sought to deal between bid and offer prices of the established markets. ECNs were also first to adopt decimalised price conventions, which further enabled a further reduction in spreads.

As ECNs are compelled to route their best orders for any security to Nasdaq, they have a tendency to improve the prices of Nasdaq market makers.⁴⁷ However, some controversy arose regarding the fact that ECNs can charge for execution of their orders outside their own market.

There is some controversy also about the role of ECNs in improving price discovery, given that not all of them actively seek best prices from the market at-large but limit the process to internal interaction. This is true eg of Island.

Cost effectiveness

One of the main reasons why an investor would use an ATS is to cut costs. Automation by technology allows ATSs to function with a very limited staffing. Outsourcing is also frequently used in order to keep the costs down.

ECNs became the driving force in changing the US market structure. the influence of technology can be seen in the differences in growth rates between the US marketplaces that invested early in trading technology and those that were slower to realise its importance. According to Marc Lackritz, President of the US Securities Industry Association, the Chicago Exchange, which was one of the early birds in adopting electronic trading, experienced a surge of 616% in average

⁴⁶ See Huang – Stoll (1996).

⁴⁷ Biais – Bisière – Spatt (2001) provided evidence that Island effectively had tighter spreads than regular Nasdaq quotes before decimalisation was introduced. However, they also concluded that trading on Island did not necessarily increase broker-dealers' per share profits, despite the increase in order flow. Barber and Odean (2001) have similarly argued that the increased trading activity on ECNs has not even improved day-traders' profits.

daily trading volumes over the period 1995 to July 2000, while Nasdaq's volume rose by 319% and NYSE by 196%.

ECNs have clearly forced established exchanges to adopt new technologies and gradually change their trading models. Even NYSE admits in the Market Structure Report that its trading model could be re-engineered, which is why over the last couple of years it has launched several projects. These initiatives aim eg at:

- offering institutional investors closer or more direct access to market makers and more transparency in their order books
- allowing member-sponsored investors to enter orders within a predefined credit line directly to the exchange's systems
- allowing for automatic execution of matching limit orders up to a maximum size.

Cost effectiveness for investors is often expressed in terms of cost of execution of portfolio strategies; the investor can control these costs by avoiding illiquid securities and illiquid markets. If it all boils down to liquidity, the only means for cutting costs in the long run is developing better trading venues, ie marketplaces.

Flexible trading

ATSS have enabled creation and use of new types of orders. The benefit of reserve orders, especially to institutional investors who trade in large blocks was already discussed above in the context of credit market systems⁴⁸. An order type that closely resembles it is the 'discretionary order', for which eg a buyer specifies not only the displayed bid price but also maximum price it is prepared to pay for a certain quantity of securities. Other types of orders that help investors are eg orders that are valid until they are executed or cancelled (good-till-cancelled orders) or all-or-none orders, which are to be executed in their entirety or not at all. Availability of such orders has expanded even to the Nasdaq systems. Some ECNs identify orders that can be forwarded to other markets (so-called directed orders) and orders that are valid only for a specified time.

As stated earlier, ECNs have had an impact on the length of the trading day for US equities. As they improved the access of overseas investors to the US markets, they appear to have been pushing for wider trading hours for listed and unlisted markets. However, because the technology used by ECNs has evolved faster than that of traditional securities firms, systems that are still largely based on night time processing flow are subject to practical limits as regards trading hours. Also

⁴⁸ At least Instinet, Island and Tradebook support reserve orders.

the infrastructure creates its constraints: The speed of ECN technology likewise surpasses that of the national market links, which apparently gives ECNs' own systems a clear advantage in routing and executing orders. Similarly clearing and settlement of securities trades tends to require lengthy processing times under the technology currently utilised by the infrastructure, therefore limiting the trading hours.

Crossing systems facilitate the trading of large blocks, as they usually are somewhat less transparent than continuous trading and hence protect the participants. Given that buyer and seller meet simultaneously with their full interests, the market impact of executed trades is smaller.

Such intermittent trading models may suit many market participants far better than continuous trading. They help asset managers in tracking indices and adjusting portfolios exactly at market opening or closing prices, essentially in a single batch run. This is based on the general practice whereby asset values are computed using closing prices. Therefore from the standpoint of execution of a specific portfolio strategy, a crossing system gives the fund manager greater immediacy than does a marketplace that accepts only simple limit orders or market orders in a single stock.⁴⁹

Another advantage of crossing systems is that they free the investor from tying its resources to costly minute market monitoring. There is evidence that crossing systems are busiest just after the close of the normal trading day. Thus one can argue that a continuous market is not necessarily the most convenient for all investors.

Auction systems can also provide the equities market with new trading facilities. Auction systems do not necessarily have to be restricted to outright sale of equity instruments. In May 2000, for example, a US custodian bank arranged an open auction in which dealers submitted bids to borrow shares using an auction site white-labelled by Grant Street Group.

3.2.1.3 Co-operation or merger between established markets and ATSs?

As noted above, some ATSs work in very close co-operation with regulated marketplaces. Before it opted to team up with Primex, Nasdaq had planned to use a similar auction trading system provided by Optimark, which was in fact recognised eg by the SEC as an ATS. However, because the Optimark system apparently was unable to cater to the needs of ECN technologies and because of the fee structure, the project was abandoned. Despite the renovation plans of the tradi-

⁴⁹ See Economides – Schwartz (1995a) or Economides – Schwartz (1995b).

tional exchanges, the largest ECNs have until now continued to gain customers, and play a role in the equities trading.

Rather than talking about all ATSS, the question is more pertinent to ECNs, which have not been called virtual exchanges without reason. Two of them, namely Archipelago and Island, consider themselves as direct competitor markets to traditional exchanges. These two have even sought to convert themselves to exchanges. For example, in 2000 Archipelago ECN joined up with the Pacific Exchange (PCX), a regional exchange in San Francisco, in order to create a new stock trading facility at the PCX, replacing its old stock trading floor with Archipelago's modern technology.⁵⁰ Its aim is to offer an alternative for trading NYSE, AMEX and Nasdaq shares on a single market. Archipelago assumes it will gain increased credibility being a self-regulating entity vs remaining supervised by a self-regulating organisation, ie the NASD. By becoming self-regulating organisations (SROs), such ECNs would become competitors of the NASD.

Other ECNs see themselves as agency brokers and are more comfortable being members of the NASD and supervised as broker-dealers by the SEC. Instinet, for example, sees itself as complementing the exchanges. Also BRUT's concept supports more traditional broker-investor relationships. There have nevertheless been indications on some ECNs directly challenging even online brokers as they begin to move toward the retail market.⁵¹

In any case, it is safe to assert that ATS operators provide competition to those securities markets firms that have not yet started to offer electronic services. More specifically, some primary market auction systems provide competition to underwriters whose business, like that of market makers and ECNs, is generally felt to entail important economies of scale.

3.2.2 European stock markets

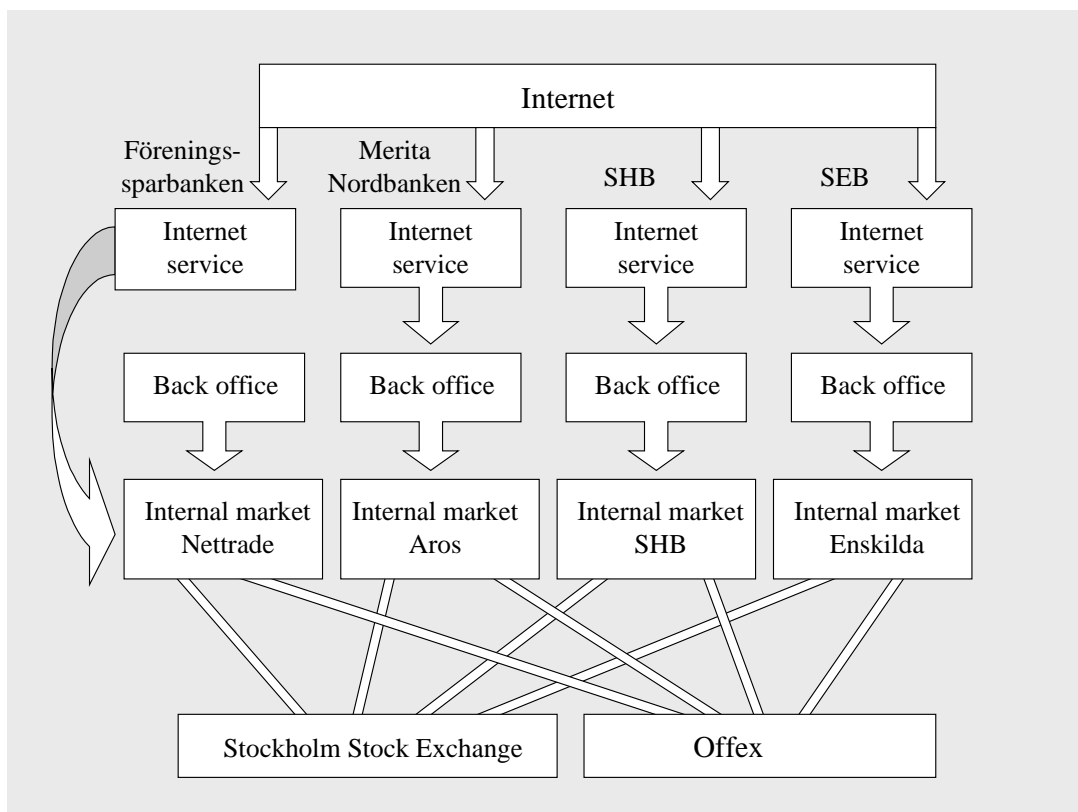
On the European continent, ATSS and especially ECNs have had less of an impact on technological developments, as exchanges have been technically much more advanced than the US exchanges in general. However, the threat of ECNs has most likely pushed established exchanges to extend trading hours to include evening sessions.

⁵⁰ The new section of PCX is called Archipelago Exchange. For more details see eg Chapman (2001).

⁵¹ Electronic communication Networks... (2000); This applies eg to MarketXT and other ECNs that focus on day traders.

However, several ATS business plans have been published in the last few years. Despite the fact that the year 2000 OFFEX plan⁵² floated by Swedish banks and brokers does not seem to be realising⁵³, it is worthwhile describing the plan, as it illustrates well how an ATS could benefit intermediaries. The crossing system plan allows consolidation of banks' distribution networks and has the capacity to cut execution costs to the extent that trades are concluded outside the exchange, since brokers could match internal interests. It would also eliminate investor dependence on official exchange trading hours.

Figure 2. Swedish Offex plan as a competitor to the Stockholm stock exchange and distribution channel for banks and brokers



Source: Bage

⁵² Bage (2000).

⁵³ Stockholms Börsen defended its role by cutting execution costs and trimming its opening hours. In addition, after-hours trading has not been as popular in Europe as it has been in the United States.

The plan evolved further into the establishment of VPX Matching AB, which launched a matching service for after-hours trading available to the clients of the same banks. All limit orders that have not been executed on the Stockholms Börsen during the day are automatically transferred to the VPX matching since mid October 2001. Clients can also trade on VPX during weekends via their banks' Internet services.⁵⁴

The opportunities related to ECNs have raised the question of whether the future European market should be based on a combination of ECNs around a traditional exchange or would a network of traditional exchanges suffice. But the restructuring of the markets has not yet evolved enough to provide a clear picture of the underlying tendency.

In Europe there are no significant local ECNs concentrating on secondary market equities trading. Instead trading is dominated by the exchanges. The role of these ATs is more clearly limited to equities market order collection. They tend to be either systems of local brokers linked with a small number of European and US exchanges or brokerage systems of the same global (inter-dealer) brokerage houses that operate in the United States. On the other hand, US-based ECNs have started to trade in stocks listed on European exchanges. The most obvious examples are Instinet, POSIT Europe and Bloomberg Tradebook, which offer their services to institutional investors and broker-dealers. As to private investors, it is more difficult to estimate the market size despite the fact that equity investing has been on the rise. Some evidence on this is provided by the increasing number of securities depository accounts in Europe.

A number of auction systems aimed at the primary market have been set up during the last couple of years. Nonetheless, their volumes have not been extraordinary in Europe, most likely due to the fact that the majority of them missed the technology IPO-boom. The fact that most regulators nowadays permit arrangement of share issuance via Internet, without alternative subscription means, opens the door to change in issuance practices once the markets regain their ability to attract investors.

In its report to the EU Commission FESCO used Tradecross, a German alternative auction market, as a practical example of such systems. Tradecross in targeting retail investors offers an Internet platform for arrangement of premarket share issues for small and medium sized companies. In Finland, several banks and brokers have since 1998 enabled retail investors to subscribe to IPOs via Internet.

⁵⁴ Swedish Off-Hours Exchange... (2001).

With whom would ATSS compete in Europe?

On the one hand, ATSS would be a threat to smaller electronic exchanges that must carry the cost of heavier regulation. Their competitive position is often difficult even vs established exchanges that are planning to consolidate in diverse forms. For example, Tradepoint, an electronic exchange operating in the United Kingdom, did not manage to survive alone but was forced to form Virt-X with the Swiss Exchange (SWX). However, there is more to the story; Tradepoint was in fact about to cooperate with some US ECNs.

ATSS also clearly provide competition for regulated markets eg the largest exchanges. However, these exchanges have been forward looking in offering different trading methods. In recent years electronic call auctions have been incorporated in a number of marketplaces, most notably the ParisBourse and Deutsche Börse. These electronic calls are not being used as stand-alone systems, but have been combined with continuous trading to create hybrid markets. The reason is that, when it comes to handling participants' orders, one size does not fit all. With a hybrid trading system, an investor can more easily select among alternative trading venues depending on the size of the order, the liquidity of the stock being traded and the investor's own reason for trading.⁵⁵

⁵⁵ Building Better Stock Market... (2000).

4 Current and future concerns and policy issues

In this section an attempt is made to identify issues and concerns for public policy as regards further development of electronic securities trading, mainly through ATSS. Most of these matters could be topics of further studies in this field. The list of concerns presented here, which can hardly be exhaustive, includes both of micro and macro nature. As a result, they call for the attention of market supervisory and licensing authorities as well as overseers.

I will first discuss some general policy questions for the most part presenting reasons why authorities should pay attention to securities market ATSS before discussing some more specific issues raised in the context of the EU Commission's initiative to update the Investment Services Directive (93/22/EEC)⁵⁶.

4.1 General interests of public authorities

General motivation of public authorities to address ATSS may be identified as financial stability, efficiency, a level-playing field and investor protection. Stability will be treated below mainly in terms of ATSS's **impact on systemic risk**. The other aspects will be touched on in connection with both general issues and the ISD proposal.

Systemic risk

There has been an increased recognition of the systemic significance of disintermediation to the health of the financial system. Innovation and structural changes of the financial services industry have resulted in dramatic improvements in the efficiency of the financial system, but the periods of rapid change and increased complexity can themselves at times attribute to systemic risk.⁵⁷

It is the increasing volumes of US ECNs, as illustrated below, that underscore the importance of these systems. Volume statistics provided by Nasdaq show quite clearly that at least Island and Instinet are starting to gain such a large portion of Nasdaq trading volumes as to give them systemic importance.

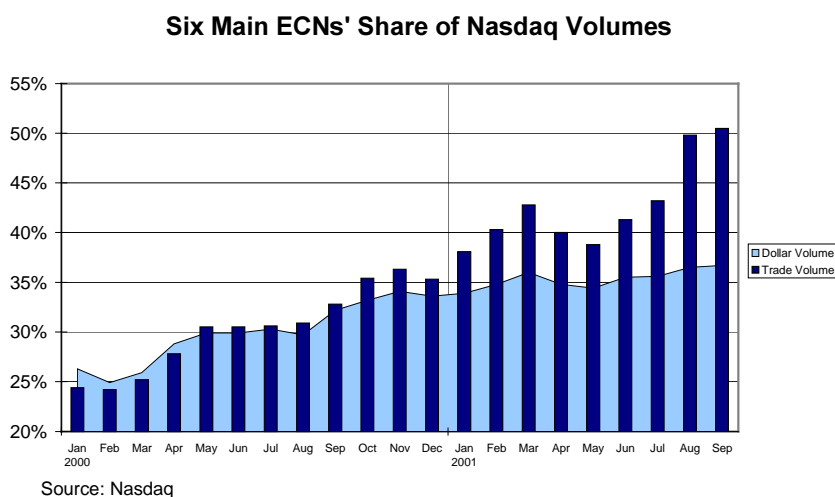
⁵⁶ European Commission (2001).

⁵⁷ See for instance Crockett – Cohen (2001).

- In terms of numbers of trades concluded Island accounted for roughly 21.2% of Nasdaq trades in September 2001. At the same time, Instinet accounted for 13.4% of trades. RediBook was third largest with 6.6%.
- In dollar terms, the importance of the two dominant ones is reversed, with Instinet accounting for 14.3% and Island 10.3%. These two still account for roughly a quarter of the dollar volume on Nasdaq.
- Measured by share volume the two largest ECNs together account for just over 20% of the total.

Summing up the trade volumes of Archipelago, BRUT, Bloomberg Tradebook, Instinet, Island and Redibook gives a total of 50.5% of Nasdaq trades in September 2001, while their share of dollar volumes peaked at 36.7% of the total (see figure 3).

Figure 3. ECNs' portion of Nasdaq volumes



In a similar manner volumes for bond market systems can be quite significant despite the fact that they generally process a smaller number of transactions. For example, trade volumes of Tradeweb approached USD 4 trillion for the first quarter of 2001.⁵⁸ Also the average size of a single transaction has been increasing. It was even reported that, based on customer requests, Tradeweb had increased the maximum size for trade inquires from 1 billion dollars to USD 9,999,999,000. Transactions of this magnitude entail significant risk.

Given the volumes involved it is in the interests of the authorities that transactions be performed according to their terms. Hence authorities' interests include

⁵⁸ While Island, the second largest stock market ECN, generated a volume of some USD 891 trillion, data for Instinet are not readily available.

eg estimating whether specifically erected CCP structures have sufficient financial resources.

Obviously the focus here is on the *technical reliability and legal robustness* of these systems and services, as these aspects are likely to have a direct impact on public confidence in the systems and on the functioning of the financial markets as a whole:

- Legal risks generally arise from the fact that the business of such operations is still relatively novel and may carry a good deal of legal uncertainty due to lack of a suitable or precise legal framework. Given that their concepts often are innovative, they tend to test the boundaries of regulation and law. Such risks may also derive from the cross-border nature of the business.
- The fact that nearly all key banking institutions have equity stakes in and/or operate such systems entails potential reputational risks for them.
- Innovations involve high set up costs, and when the number of systems is too high it is difficult to achieve the required profitability. There appears to be some evidence that certain banks actually have suffered from excessive investments made in electronic trading and brokerage systems.
- Other issues of interest include risks related to automated functions, eg mitigation of consequences of a broker activating automatic client order execution without purpose, or risks related to pressure to open closed circuit systems to a wider community, eg retail investors.

Another perspective on the stability of the financial system is provided by the fact that some ECNs and on-line brokers enable so-called day-traders to trade directly via Internet. Barber and Odean (2001) argue that the Internet bolsters the overconfidence of these investors, who then trade more actively and more speculatively than they otherwise would. This increases the volatility in the markets.

Moreover, the trend toward systems for trading instruments from several geographic markets raises the possibility that larger ATSS could become vehicles for transmitting instability, albeit the risk of crisis is reduced because such ATSS often enable trade in assets issued in OECD countries only. At least one recent study⁵⁹ indicates that the contagion effects related to financial integration, at least between G-5 countries, seem to arise less frequently and be less severe than between the emerging market economies. However, the risk of simultaneous crashes is considerable higher in equities markets than in credit markets. Involvement of financial institutions in a wider range of markets requires increasingly more robust clearing and settlement solutions in order to contain diverse day-to-day exposures and to limit propagation of eventual shocks.

⁵⁹ Hartmann – Straetmans – De Vries (2000).

Demand for more convergent regulation

From a conceptual standpoint, by bringing together buy and sell orders in a single platform and executing those into trades in a non-discretionary way, broker-dealer-owned ATSs fulfil the same function as exchanges. This raises the question of a level playing field. As claimed eg by Britton⁶⁰, one can make a case for convergence of regulation and supervision of ATSs and recognised exchanges. But forcing ATSs to become self-regulating organisations (SROs) may not be advisable for the public good, as a reluctant disciplinary authority may not be sufficiently active.

Moreover, any further fragmentation in this aspect is unlikely to increase market efficiency. As a result, capital market supervisors may have to develop new approaches and roles within their organisations at least as regards ATSs that potentially have stronger impacts on market stability and investor confidence.

However, determining which operators should be subject to regulation has not yet been accomplished eg in Europe. In some countries there has been a tendency to require that all relevant marketplaces be registered as regulated markets, one reason for this being that it strengthens the powers of public authorities vis-à-vis the systems. Applying this principle would also mean that ATSs operating in those countries would have to seek regulatory approval.

ATSs have undoubtedly contributed to increased innovation in the securities markets; the question is whether the regulatory and supervisory authorities now act too hastily and suffocate that activity via overly complex and/or multi-layered rules. Authorities should take a close look at keeping the cost of regulation moderate in order not to create a new barrier for entry into the market and should keep in mind that if the regulatory regime is excessively strict there is a risk that traders will revert to less centralised trading, at least in the case of the bond markets.

On the other hand, it should be noted that competition may have multifaceted implications in the long run. Following a gradual demutualisation of exchanges, the ownership and membership of these exchanges is likely to start to resemble that of ATSs and, at some point, profit motive is likely to have a similar effect on self-regulatory and disciplinary functions of the exchanges as well. The danger is that major exchanges may eventually renounce their recognition status and elect to be regulated as ATSs. For the moment, however, there seems to be pressure on ATSs - at least in the case of ECNs – to seek recognition as SRO, as can be seen in connection with Archipelago, Island and NexTrade.

⁶⁰ Britton (2001): raises the question of the cost of self-regulation imposed on established marketplaces and the artificial nature of the division of service providers into exchanges and broker-dealers.

Possible effect of prudential standards?

The current capital adequacy requirements set up by the Basel Accord of 1988 are not considered to be very risk sensitive. The Basel Committee on Banking Supervision and the EU Commission are working in parallel on an updated version of the accord. The EU Capital Adequacy Directive also applies to investment firms so that to the extent that ATs function as investment firms they are subject to these prudential standards. The new capital accord should provide incentives for prudent system design and elaborate systems.

It is difficult to estimate how ATs will be affected by the revision, since the final version of the accord is not ready yet. However, it would appear that the key issue for such operators is the treatment of operational risk (mainly technical and legal issues)⁶¹. Traditionally, operational risks have not been factored into capital requirements at all.

The current intention is to base the measurement of operational risk solely on accounting data (mostly net interest margin and net fees) over an extended period of time, which is anticipated to even out any seasonal variations that may exist in the companies' operations. The approach treats all investment service firms collectively and assumes that fees, in terms of their size, reflect the risks that the services provided carry. This may not automatically be true in highly competitive markets, though.

There are also more sophisticated qualitative methods, eg a scorecard methodology, which can be applied if the firm has adequate capacity in terms of risk management skill, systems and policies. These types of methods could suit either very large institutions or firms whose business is concentrated on one service, system or process. Some ATs could fall into the latter category.

4.2 Selected issues applied to investment services directive upgrade

Regulatory and supervisory questions are particularly important in European efforts to create a single market for financial services in general, but especially for capital markets. The discussion will have to focus on the Commission's definition of the scope of the ISD as well as certain issues related to the two cornerstones, namely investor protection and market access.

⁶¹ Operational risk is defined: 'the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events'. See Basel Committee on Banking Supervision (2001).

Scope

The Commission's proposal for the new ISD seeks to extend regulation to a new level by re-defining marketplaces. It introduces the **concept of organised markets**, which covers both officially regulated entities and market places that, strictly speaking, are less formal than SROs but do provide for matching of multiple interests. Regulated markets then become a subset of organised markets that fulfil a specific set of – yet to be defined - conditions. The above definition excludes order routing systems, bulletin boards and broker-run matching systems, and automated single-dealer systems. It also excludes crossing systems, as their prices do not 'reflect the interaction of supply and demand on the system'.

What makes matters more obscure is that the Commission similarly declares that it will preserve the differences between market places and order-matching brokers, which continue to be treated as investment firms:

- On the one hand, the Commission states that ISD rules would apply to all *marketplaces* for trading in issues that have been admitted for trading in any other regulated market⁶². This would imply that eg ATs in which listed equities are traded would become subject to the same principles, which would also apply to other instruments once they are traded in a system authorised as a regulated market. In practice this also means that government bonds would be included because some MTS markets for instance currently operate as regulated markets.
- On the other hand, the Commission acknowledges that brokers have always been doing internal trades and it does not seek to ban this practice. The Commission would thus *authorises ATs to be run on the basis of an investment firm licence*. It appears that the Commission does not intend to set a threshold level for internalisation as a criterion for ATs being required to become regulated markets. A very high internalisation percentage could be used to signal that an AT effectively has become a market of its own.

Finally, the Commission has laid down a definition of alternative markets, that deal in instruments or issues that cannot be traded on a regulated market; this would cover eg privately issued securities or securities of issuers that do not provide a sufficient level of disclosure. There are a number of securities market ATs that could fall into this category unless they can operate under a investment firm licence.

⁶² By a corollary to the principle that once an instrument is admitted to trading on a regulated market it would no longer be eligible for trading on markets which are not authorised as "EU regulated markets". See further European Commission (2001).

Even though the Commission has aimed at resolving the treatment of ATSS in the revised ISD, it is questionable whether their status becomes self-evident on the basis of the proposed text. It is for example difficult to see how these stipulations would interact with the lower level regulation outlined as FESCO standards for ATSS.⁶³

More segmented investor protection as goal

Regulatory and supervisory questions are made more cumbersome by the fact that this regulation should cover both professional service providers and investors, whether professional or retail.

The ISD upgrade, as the Commission calls it, will have to distinguish between the two types of investors in order to cater to streamlined supervision of professional trading platforms – Ideally they could be supervised by the system provider's home country only. At least following should be noted:

- Home country control should not entail that the relevant authorities in host countries would not be able to receive statistics on the investment and trading patterns of the participants that are established in these countries or on stocks or debt instruments issued by companies similarly established. The public good demands such co-operation.
- The question of protection of consumer or retail investor interests is more complex. How far should such protection reach? It at least appears evident that the valid court of litigation should be that of the retail investor in case of a conflict that could not be resolved on a bilateral basis.⁶⁴ Forcing the service provider to make all retail contracts in the language of the client may limit the availability of such services to the very largest countries thus only putting some investors in a worse position than others.
- A related issue is that of marketplace integrity. It may now be difficult for participants to evaluate the risks involved in the use of an ATS and its resources. It may be necessary in future to require every ATS operator to file a disclosure statement similar to the IOSCO framework for securities depositories.

On account of these complexities, the definition of regulatory/supervisory responsibilities and general interest objectives has to be done in a painstaking manner. Given that ATS services cross national borders, resolving these issues may require

⁶³ Namely those outlined in FESCO (2001), which are being revised by the CESR.

⁶⁴ The general rule in commercial contracts being freedom to choose the applicable law.

establishment of new supervisory systems and work procedures. Some of the tasks may have to be delegated to a supra-national body, which should be closely linked with local authorities.

New regulatory initiatives should also aim at ensuring that no auxiliary restrictions in practice prohibit cross-border use of such ATS services by retail investors. Such restrictions may include de facto forcing retail investors to maintain their securities depository accounts in their home country or any restrictions in access of ATSS to cost-effective local settlement systems.

Some key criteria for authorisation

It is planned that the ISD will only list the core principles for authorisation of trading systems and that the financial market supervisors⁶⁵ will have to define the exact criteria in lower level regulation. Supervisors should pay attention eg to the following matters when authorising new systems:

- Is information security sufficient in view of the need to mitigating the risk of unauthorised users accessing the system and obtaining or altering vital customer related information? What are the risks of cyber-crime eg in the form of vulnerability to hacking or virus attacks?⁶⁶
- Is system performance, measured by the time between customer request and system response, scaled to the potential number of users? Is contingency planning in order?
- One should also assess whether excessive flexibility could bring new risks.

Ownership

US authorities have expressed their concern about overly concentrated ownership of dominant market institutions. The question has been raised especially in the context of ECNs' exchange statute applications. According to Datek, Island ECN's exchange status has been held up by the government's concerns about its concentrated ownership, among other things. Datek held 85% of Island's shares

⁶⁵ The CESR will advise and give guidance to the European Securities Committee (ESC), which is entrusted with the proper regulatory powers.

⁶⁶ According to the Fraud Advisory Panel (2000), established by the Institute of Chartered Accountants in England and Wales, cyber-crime may eg aim at manipulating asset prices, collecting confidential information on clients (eg financial information) or on the company itself (eg regarding business solutions or even regulatory compliance). Other forms may include impersonation and document forgery.

up until December 2000 when its holdings were reduced to less than 10% following a financing deal in which a group of private equity investment firms became the majority owners.

In a similar manner the ISD authorises the regulators to control the suitability of shareholders of investment firms. Authorities are however unlikely to start dictating who can own brokerage services such as ATs as long as they are properly managed, which in fact is one of the conditions for taking up the business under the directive. The article mainly suggests giving the authorities the right to limit any potential conflict of interest due to shareholders' personal interests.

Problems related to clearing and settlement

The impact of such trading systems will also have to be analysed in terms of clearing and settlement. According to the ISD upgrade, any regulated market must negotiate arrangements that will result in speedy, efficient and final settlement of transactions (proposed article 30). Also investment firms must ensure execution and settlement of transactions undertaken by them. Similarly the ISD upgrade aims at giving all market participants the freedom to choose where trades are cleared and settled. This applies to locations pre-selected by the operator of the marketplace; the Commission recognises the cost of building increasingly numerous facilities. It should also keep in mind that this increases the complexity of the clearing and settlement infrastructure, and entails that any sustained disruption in these services would potentially have broader economic impacts than currently.⁶⁷

With regard to clearing and settlement, the ISD upgrade is aimed primarily at removing all obstacles to membership in clearing and settlement institutions. In order to resolve more complex issues in this field, the Commission is planning to issue a separate communication. It may want to reflect the following points in either initiative:

- Until now the roles of established settlement systems have stayed essentially the same, despite the 'revolutionary' impact of the ATs on trading functions and brokers. On the one hand, this may entail certain shortcomings in efficiency of the financial systems as a whole. Apart from increased use of STP, it seems that only the call for an enhanced anonymity is new. From the standpoint of market supervision, anonymity may lead to deterioration of disclosure of trading patterns and risk-taking, if only existing reporting systems are used.

⁶⁷ Crockett – Cohen (2001) already highlights the current risks compared to those prior to market liberalisation.

- Another interesting question is whether ATSS can improve the timeliness of trade settlement. The answer may be that via STP they have good opportunities to do so, unless their settlement arrangements become too complicated due to connections with numerous markets with different operational procedures. Construction of multiple interfaces is always costly. To avoid the piling up of such costs, a CSD should ideally provide one clearing and settlement system that can handle all types of securities.
- But unless settlement services are cost-efficient there may arise pressure to effect the settlement of securities trades outside the established service providers, ie CSDs and the banking systems. Efficiency is also tied to a security aspect, which in the settlement leg of the transactions is normally ensured by exchange of obligations in central bank money. What action should authorities take in order to allow continued use of central bank money as a risk mitigation method?

Access to market information

Growth of institutional trading has drawn all the attention in recent years but will retail investors have the opportunity to obtain **adequate information** in order to protect and further their interests? Levelling the playing field in this respect could be one of the key targets of public authorities.

Authorities may wish to verify that publication of consolidated statistics on volumes of key ATSS of each market sector is arranged properly; In the United States, ECNs are considered as ‘spokes in the Nasdaq wheel’, whereby their volumes are counted as part of the Nasdaq volume. With this type of reporting, the general public can find out only the percentage market shares of each system. However, some of the systems have chosen to disclose their daily volumes. It is not clear whether the data is always made available in a comparable form.

The ISD proposal provides that internal trades be reported immediately to a market that is associated with the issuer, in order to integrate these trades into the price discovery mechanism. However, it does not compel any ATS operator to disseminate real-time market prices.

Finding best prices?

Depending on the market structure, there may be a need for best execution rules⁶⁸ and construction of market linkages. In the European context, ECNs entail the danger of fragmenting the stock markets as in the United States but only in the sense that they might reduce the liquidity of the underlying markets if most institutional trading were to move on such systems leaving eg stock exchanges with essentially retail volumes. Currently it seems that they would provide a boost to integration of the market from the viewpoint of institutional investors in any case.

In the longer run, market participants and authorities will have to determine whether Europe needs public order routing networks between diverse exchanges or other regulated markets and some main ATs in order to further enhance integration. At the national level, such links already exist eg between Spanish regional exchanges. On the other hand, the development of private networks may resolve the problem. In any case it should be recognised that the meaning of ‘best price’ is changing.

In fact the EU Commission quite rightly aims at increasing the transparency of order execution: The proposed new article 15 of the ISD would impose disclosure of routing practices of retail investor orders. Also article 17 aims at providing authorities with ex post means to verify best execution by imposing effective audit trails and reporting of executed trades to the relevant home country authority. However, its motivation here is investor protection rather than market efficiency. The Commission is also worried about the effect of ATs on general price discovery. It thus aims at enforcing the rule that trades concluded outside the market, eg matched on ATs, are to be reported without delay to a relevant regulated market.

⁶⁸ The United Kingdom, for example. The FSA has recognised the difficulty of interpreting current rules within a market structure in which securities trade simultaneously on several marketplaces. At present, brokers need to check that trades are made at the best price available on the market that they choose to execute an order, but there is no obligation to search for the best price of the entire market for the security.

5 Conclusions

In this paper I have attempted to describe different types of alternative trading systems using two sets of classifications, which hopefully has clarified the terminology in use. Short descriptions of selected ATSS have been provided in Appendix 3 so that the reader can get some more practical examples.

I have also attempted to analyse the impacts of varying business models on the credit market as well as on equities markets. It is important to distinguish between the different market segments. ATSS have been characterised as vehicles of innovation and integration in the OTC bond markets, where they have markedly enhanced liquidity. In the equities markets, their impact is more debatable, as concerns have been expressed on the tendency of destination-only ECNs to create liquidity pockets, although the depth of such liquidity pockets may have become notable. In this sense action already taken by the US authorities has integrated ATSS more extensively to the broader markets, which has improved order execution and price discovery. Furthermore, alternative trading systems have enhanced competition in securities markets and now allow more direct access by investors to the trading places. Some ATSS have even become so extensively used that, measured by the volumes handled, they have become markets in their own right. It could be argued that a small number of such ATSS have even gained systemic importance. Last but not least, they are crucial promoters of Straight-through-Processing, which increases efficiency and has the capacity to provide a safer and faster clearing and settlement process for securities.

ATSS have become an integral part of market structures, which has lately been recognised even by international initiatives to understand their impacts. Recent regulatory initiatives launched by the public authorities at least in Europe have however been influenced by the EU Parliament's tendency to safeguard consumer or retail investor protection, which obviously is a tremendously important matter but may not be sufficient to promote the swift integration of European markets. Addressing market issues from a purely functional standpoint, another current tendency entails the danger that leading authorities could miss some of the less obvious features of ATSS, which could be harnessed for the purpose of developing a more efficient and integrated securities market. Therefore it is in the interest of market overseers, supervisors and other authorities to understand the underlying issues regarding the use and operation of ATSS.

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Appendix 1. Order flow in different market models

Figure A. Order-driven market

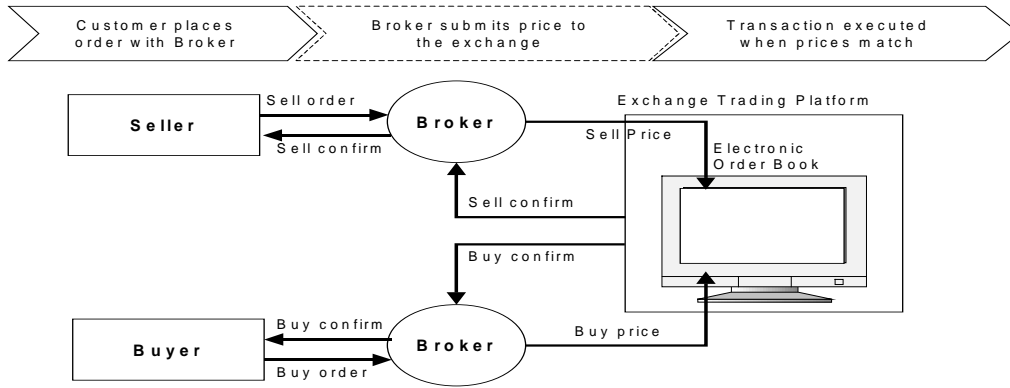


Figure B. Open out-cry model

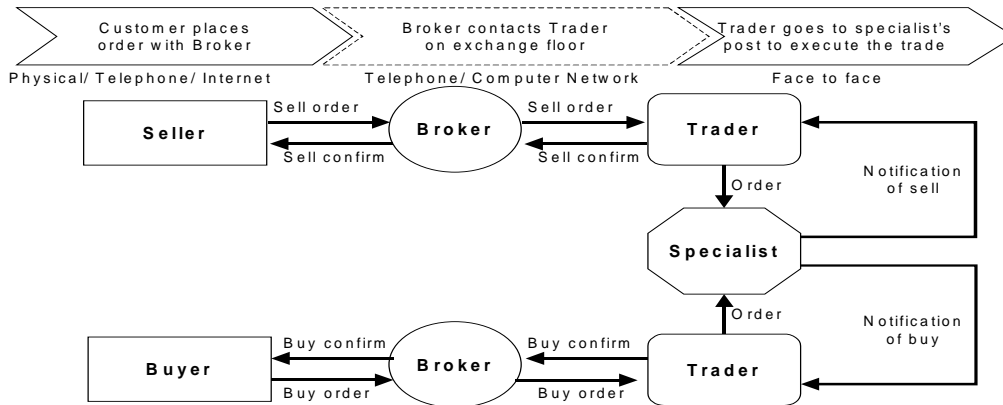
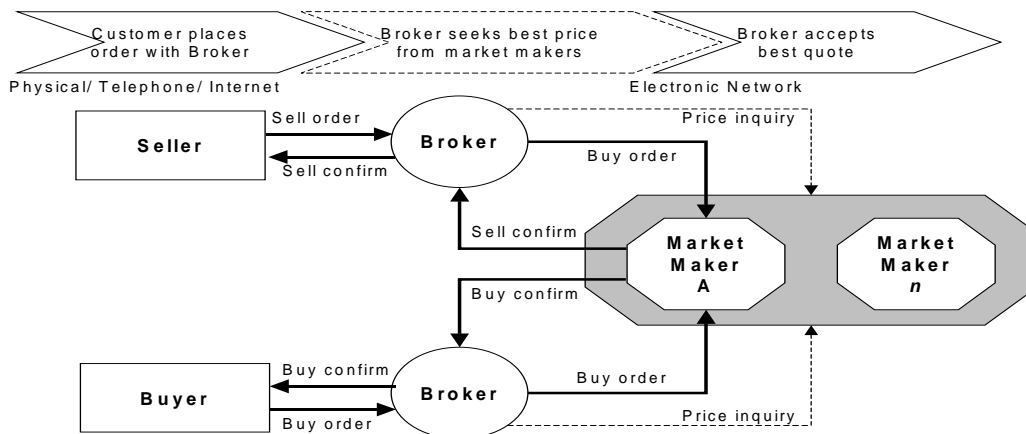
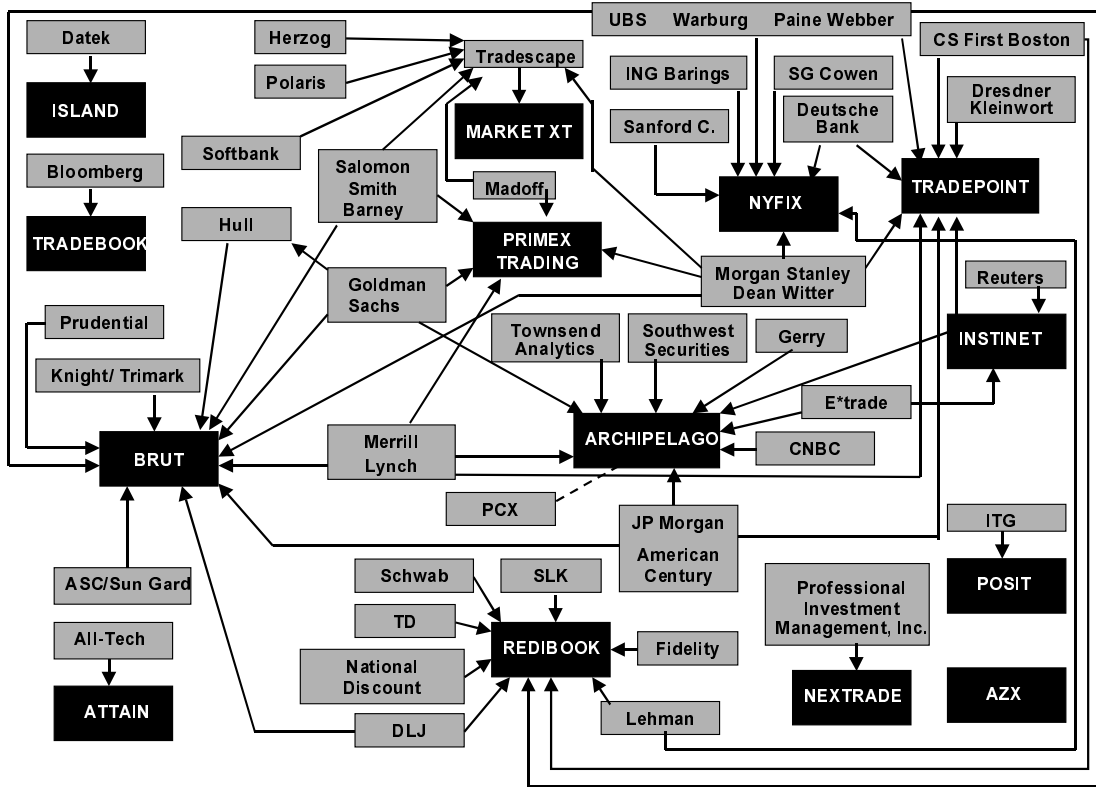


Figure C. Dealer model



Source: Electronic Communication Networks and Global Financial Markets

Appendix 2. Main ownership links of selected US equities market ATs



Derived from presentation of Marc Lackritz September 2000

Appendix 3. Description of selected ATSS

In order to facilitate the understanding of ATSS, a short description of selected systems that are frequently noted in the press are given below. The information comes from secondary sources and/or web sites of the companies, so that care should be exercised in making use of the information. The fact that a system is described hereunder is not intended as an endorsement of it.

Credit Markets

BondNet

BondNet, which operates under the Bond Division of the Bank of New York, provides an **order-driven**, multi-currency exchange **platform** for trading fixed-income securities. Real-time executable markets are available to all or a selected group of participants. The system is an interactive, real-time order-matching system that allows users to electronically bid for, and offer, US Treasury bills, notes, bonds, when-issued securities, Eurobonds, US federal agency debentures and corporate debt securities. The system is available through the Internet and through a proprietary data network.

All orders are anonymous and can be entered using a variety of user-selected criteria. Unrestricted orders are live and firm and are subject to immediate execution. Participants can provide indications of interest that are subject to negotiation through a private and anonymous messaging system. Orders may also be placed that are subject to a range of conditions and criteria, including spread-to-benchmark, all-or-none, lots of or minimum of. The system provides access to analytical software, as well as to historic and descriptive bond data. BondNet supports business information flows at all stages of fixed-income trading.

Orders may be placed and executed on a price, yield or spread basis and may specify a rich set of trading conditions. Markets may be viewed in full depth. Alternatively, the best bid and offer in many securities can be seen at once in a BondNet Monitor “spreadsheet” display. All orders at all prices in a single security may be seen and executed against. Multiple orders in a security may be “swept” in a single transaction. Securities can be searched for and sorted by their characteristics, and whether markets exist at the desired price and size. Searches can be sent to other participants as an ‘offer wanted.’

BondNet has NASD approval to operate as a broker-dealer and as an ATS. It also commercialises the platform.

www.bondnet.com

BrokerTec Global, LLC

BrokerTec, **interdealer system**, is targeted at major players in the wholesale market. It provides them with an anonymous brokerage system for US Treasury bills, notes, bonds and strips and some agency benchmark issues as well as some European government bonds. The service has been expanded in June 2001 to deliverable and non-deliverable basis trading and standardised repurchase agreements. It uses CCP services of both London Clearing House and Clearnet for European bonds and GSCC for US bonds but some issues like Spanish government bonds are cleared and settled on a bilateral basis. It is also scheduled to start trading in non-government issues like Pfandbriefe issues on the same platform. Issues have to have a minimum size of EUR 2 billion.

Access to the order book is available to dealers who are members of clearing houses via BTEC's web interface or via a dealer's own proprietary application. Trades are fed in real time to customer's back office for processing and use in risk management systems. For bilateral settlement the system automatically sends instructions to the appropriate custodians and depositories. The product facilitates participants' collateral management by allowing them to electronically allocate collateral to so-called General Collateral Repo trades. BrokerTec is a non-clearing member at Eurex and Matif. Internal market data will eventually become available to market participants.

BrokerTec Global, which is held privately by a consortium of the largest global banks, started its commercial operations in June 2000. Operating hours vary according to the time zones of the underlying markets. For example European bonds are traded from 6.45 am to 17.00 pm GMT. The system is based on OM Technology trading system.

www.btec.com

COREDEAL Limited

Open since May 2000, COREDEAL is a screen-based, **order-driven** exchange, designed and developed by the International Securities Market Association (ISMA). Debt securities traded on the exchange are predominantly investment-grade corporate issues (bonds rated BBB-/Baa3 or higher at the time of writing), denominated in a variety of currencies, including the euro (government issues). Trades executed on COREDEAL clear against its central counterparty TradeGO (service provided by Euroclear), whose trade guarantee arrangements reduce failed payment incidents and provide full anonymity.

COREDEAL provides for straight-through processing by automatically sending notification of executed trades to TRAX, the electronic post-trade matching service, which generates and sends settlement instructions to approved

settlement systems. It provides its members with unrestricted access to real-time information such as best bid and offer price, yield, order size and depth of market. A straight bond order may be entered as a price, yield or spread over a benchmark security. For spread trades, COREDEAL presents the option to execute an opposite trade in the benchmark security. COREDEAL's functionality also allows users to engage in an anonymous negotiation in which they can fix the trade's price and/or quantity. It disseminates the price and size of trades, as they occur, via a scrolling ticker display.

Membership in the exchange is open to members of ISMA's council of reporting dealers (CRD). COREDEAL Limited had announced earlier that it would develop CORETRADE — an additional module to the system allowing ISMA's wider membership to execute trades with CRD members on-screen.

COREDEAL was mainly owned by ISMA with 11 major banks and securities houses but, due to problems of attracting sufficient volumes, the ISMA has agreed to link up in a strategic alliance with MTS in October 2001. MTS becomes a shareholder of COREDEAL, which will adopt the former's infrastructure and be re-branded as Coredeal MTS.

Cpmarket.com

Prescient Markets (a NASD member through Prescient Securities LLC) operates cpmarket.com, an **auction system** that allows issuers and investors to execute real-time commercial paper transactions. Prescient Markets has established multi-year relationships with over 20 active direct issuers. The system is accessible via the Internet and the BRIDGE Telerate Network, and enables the investors to negotiate, close transactions and communicate directly with issuers online. The system also provides real time market data and financial news. BRIDGE is a strategic partner of Prescient Markets and provides Web hosting, optional network services and continuous customer support. With an initial focus on commercial paper, Prescient plans to offer additional tools via cpmarket.com in the near future and to launch other fixed-income products in the United States, Europe and Asia. The service was launched in June 2000.

www.cpmarket.com

eSpeed

eSpeed, an **inter-dealer system**, allows participants to execute transactions in a range of financial instruments. They can execute individual transactions and trading strategies simultaneously in multiple products and multiple markets. The system supports transactions in US Treasury, other G7 government bonds, Euro-

bonds, corporate bonds, agency securities, UK gilts, emerging-markets securities, and US, European and other re-purchase agreements and US municipal securities. The system, which has been used internally by Cantor Fitzgerald Securities since January 1996, was made available to customers of Cantor in March 1999.

Transactions are processed using interactive matching, a proprietary rules-based trading method that executes the orders of multiple market participants one against the other. eSpeed incorporates a customisable range of compliance and credit risk management components that monitor trading activity to ensure that credit limits are not exceeded and evaluate positions and risk exposure across products and credit limits.

The system is available 24 hours a day via a proprietary global network distribution system. The firm, which is listed on Nasdaq, also operates Cantor Exchange, a US Treasury futures exchange marketplace and some white labelled systems.

www.espeed.com

EuroMOT

Since 1994, Borsa Italiana has operated MOT, an electronic bond and government securities **multi-dealer system**. Recently EuroMOT was introduced for the trading of Eurobonds, foreign bonds, and asset-backed securities.

EuroMOT is a screen-based system that accommodates trades in round lots. The system is available to investors as well as dealers. Trading is conducted in two stages. The first stage is the open auction, which allows as many bids and offers as possible to be matched at a single price. The second stage is continuous trading, during which trades are made by matching opposing bids and offers available on the market.

Orders are executed with an automatic matching procedure according to price and time priority. Trading may be conducted by dealers who have signed a membership agreement for markets regulated and managed by Borsa Italiana. In addition, certain authorised intermediaries act as specialists, whose ongoing task is to provide bid and offer prices in a given set of securities. The system provides for automated settlement using daily matching and rectification methods.

During trading hours, prices and quantities of the best bids and offers are available publicly in real-time, as are the quantities being bought and sold at the best prices. The price of the most recent trade, time of trade and quantity traded are also available.

EuroMTS Limited

EuroMTS, **inter-dealer system**, began operations in 1999 as a pan-European electronic trading system for euro-denominated benchmark government bonds. In May of 2000, EuroCreditMTS, a division of EuroMTS, began trading non-government bonds. Initially, EuroCreditMTS will cover German Pfandbriefe and French obligations foncières. The repo trading facility is available for both special and general collateral repo based on Italian, German and French government bonds, and other European markets are expected to be available shortly. EuroMTS is owned by more than 20 international banks and securities dealers. Participants in the system commit to make two-way markets for substantial sizes in a subset of bonds listed on the system.

A market maker may show both the quantity bid/asked as well as the maximum quantity he is willing to trade. Trading is anonymous, and participants are notified of trade counterparties only after trade execution. The system provides straight-through processing capabilities, which include automatic creation and transmission of settlement instructions to the relevant depositories.

EuroMTS uses the technology of the Telematico system, which is an electronic fixed-income trading platform managed by MTS S.p.A. Italy. The system architecture utilises a centralised market management system that allows users to access the system from a peripheral client server environment. For each product, quotes are aggregated in a book according to price and side of market. Orders are automatically matched by price and time received. Following the Coredeal's decision to adopt the MTS's infrastructure, the group has de facto become the focus of the consolidation of the European credit market.

EuroMTS has national sister systems operating on the same platform in Belgium, France, Germany, Italy, the Netherlands and Portugal; EuroMTS and MTS S.p.a intend to merge. MTS S.p.A. has also developed an Internet-based multi-dealer system called BondVision, which merged with BondClick in May 2001, in order to provide a trading platform to institutional investors.

www.euromts-ltd.com

Grant Street

Grant Street Securities used to be called MuniAuction until recently. It is an **Internet auction** house specialising in forward auctions (sales) of new bond issues for state treasuries, municipalities and government sponsored enterprises or agencies. The system also supports reverse auctions (solicitations) of money market instruments (including jumbo CDs, repurchase agreements, guaranteed investment contracts and Treasuries) for municipal treasurers.

Grant Street does not require that trades between institutional investors using its website involve a broker-dealer, unless required by the issuer or seller. The firm offers clearance and settlement services solely for the purpose of facilitating trades between institutional investors or parties who wish to remain anonymous. The system only conducts discrete auctions (ie at scheduled times and of limited duration), not continuous auctions (ie exchange format).

In addition to hosting auctions, it provides customised auction software for debt issuers and institutional investors, often on a “private label” site. The system is available to institutional investors and broker-dealers. Private-labelled web sites are supported by training, technical troubleshooting and administrative services from MuniAuction personnel. Such services include for example State of Ohio (www.BidOhio.com); Federal Home Loan Banks (www.fhlbauction.com) and Freddie Mac (www.freddiemacauction.com);

www.grantstreet.com

Instinet

Instinet Fixed Income introduced in spring of 2000, originally **interdealer system**, is a global electronic broker service that facilitates secondary market trading in US Treasury and Euro sovereign debt securities. This service allows professional market participants, in both the United States and Europe, to execute their securities transactions. Instinet Fixed Income combines the attributes of its global technology platform with professional broker support. The Instinet service provides a transparent broking system that allows clients to see the entire live order book for a given security. Trading is anonymous at all times, with Instinet Clearing Services acting in all transactions as a riskless principal.

The system is provided to its clients through Instinet’s proprietary network. Clients can access the service through an Instinet-provided interface or through an API. Commissions associated with using the system are based on a sliding scale dependent on total monthly transaction volume. Instinet Fixed Income is available to about 100 clients (August 2001) during New York and London trading hours but plans to expand to Japan. Instinet Holding is majority owned by Reuters Plc with some 13% of shares being traded in Nasdaq.

www.instinet.com

LIMITrader Securities, Inc.

LIMITrader Securities operates a real-time electronic trading system for the corporate debt market, and plans to launch a new-issue distribution system later this year. The secondary market trading system allows customers to electronically

negotiate and execute transactions in all types of corporate debt: high-yield debt, straight debt, convertible debt and medium-term notes. LIMITrader became operational in the third quarter of 1999, and is available to dealers and institutional investors. Customers access the system via the Internet.

LIMITrader allows customers to post and view current bids and offers, anonymously execute transactions and negotiate with other users. Customers are able to enter orders that are subject to specific parameters and criteria that, when met, will trigger an automatic notification process that will place the parties into direct negotiation in an anonymous interaction.

The new-issue component of the system allows corporate issuers to offer their programmes directly to investors and qualified broker-dealers, with electronic delivery of all relevant company offering documents, including prospectuses and pricing supplements. Investors are also able to submit anonymous inquiries to provide an indication of demand for a particular issuer's securities.

LIMITrader Securities acts as a riskless principal and clears its trades via Bear Stearns Securities Corp. All fees associated with secondary trading are on a mark up/mark down basis. The system is currently available for trading Monday through Friday from 8:00 am to 5:00 pm Eastern Standard Time;

www.limitrader.com

Market Axess

Market Axess, an Internet-based **multi-dealer trading platform** for credit market instruments, with disclosed trading, merged in January 2001 with Trading Edge, a provider of anonymous trading in fixed income markets via its BondLink service. The new Market Axess provides institutional investors with facilities for primary and secondary trading in investment grade corporate, high yield bonds as well as emerging market, municipal and convertible bonds. The platform, which also includes research reports from global market makers and financial news regarding the issuers whose securities are available for trading, is currently available solely via the Internet.

Under the disclosed trading facility, clients can submit trade inquiries to one or multiple dealers requesting a firm prices, which are delivered simultaneously to the client using a proprietary auction process. Both clients and dealers maintain their identities and dealing and settlement relationships but can only see the identities specific to the transactions they engage in.

Under the anonymous facility (ex-BondLink) users are able to see orders, as they are entered into the system, as well as price and quantity information for all trades as they occur. The system automatically matches orders on a strict price/time priority basis.

Market Axess is majority owned by global investment banks with the participation of venture capital firms. It uses separate clearing brokers, depending on

the product, and acts as a nominal counterparty assuming the risk of failure of either counterparty.

www.marketaxess.com

TradeWeb LLC

TradeWeb, is an online **multi-dealer system** that began operations in January 1998, and allows institutional customers to buy and sell US Treasury and federal agency securities electronically with multiple primary dealers. TradeWeb gives customers access real-time trading, price information and research for United States Treasury bills, notes, bonds, STRIPS and agency securities. The company has also opened a European operation, which will support trading in the largest, most liquid Euro-denominated sovereign debt securities.

Currently, the network includes offerings from some 15 of the largest market makers in US Treasuries. Users of the system are restricted to institutional customers of the primary dealer participants. TradeWeb is available via the Internet and on BRIDGE Telerate private network.

TradeWeb's transaction protocol is similar to the way business is done over the phone between dealers and their customers. It allows customers to simultaneously solicit multiple dealer participants to provide bids and offers for a specific security in which they have an interest. Customers will see bids and offers only from the dealers that they elect to send their inquiry to and may automatically execute a transaction at the displayed price within "the on-the-wire period" (approximately 3–5 seconds). The customer can then hit or lift the subject price, at which point the dealer has 10 seconds to accept the original price or, if the market has moved, counter with a new price and a new "on-the-wire period." If the dealer fails to respond during the 10-second period, the trade negotiation will time-out and the customer may execute a transaction with another dealer.

Transactions can be executed for as little as the minimum denomination of a particular security, or up to several hundred million dollars (face amount). The system also provides access to a suite of analytical products, as well as trade history and real-time pricing information. TradeWeb has a customer base of nearly 600 buy-side institutions and transacts an average of over USD 7 billion per day, according to the November 2000 TBMA survey. Recent press reports reveal that the daily average participant volumes exceed USD 20 billion in 3,000 to 4,000 trades broken into some 20,000 tickets. There is a monthly user fee of USD 100, and there are no commissions or fees associated with executing transactions. The system is available Monday through Friday 8:00 am to 5:00 pm Eastern Standard Time;

www.tradeweb.com

Equities Markets

Archipelago

Archipelago was launched as an out-bound routing ECN in January 1997. The system aims at finding the best price available internally and externally by routing the order directly to the markets offering the best price and order/execution ratio (preferencing based on per cent fill history). It links for example to other ECNs like Instinet, Island, REDIBook and Bloomberg Tradebook.

As an ECN, it was used mainly by large institutions, hedge funds, online brokers, market makers, order entry firms, professional upstairs traders totalling more that 200 firms.

Archipelago was authorised by the SEC to become Archipelago Exchange operating in connection with the Pacific Exchange in San Francisco; Operations started in July 2000. As an exchange, the service is mainly based on direct access services offered to retail investors and creation of a hybrid market that combines contracted market makers and an open limit order book.

Technology needed by users: Users can use Townsend's RealTick software to access the Archipelago ECN, which provides point and click single order entry and basket execution capabilities along with multiple order types. They can also use FIX-compliant proprietary software.

Archipelago is owned by major investment banks, securities houses, CNBC and Instinet.

www.tradearca.com

Attain

Attain ECN, which was launched in February 1998, is an order matching system owned by All-Tech Direct, a member of NASD. Used by about 50 market makers and All-Tech Direct's active-trader customers (who trade on their own account), it is one of the smallest US ECNs accounting for only a fraction of Nasdaq share volumes. It features a customisable trading platform, through which clients can get direct access to analytical services and Attain's outbound routing service. Attain offers trading in AMEX, Nasdaq and NYSE shares as well as exchange-traded options. Its hours of operation are 8.30 am to 6.30 pm EST.

www.attain.com

BRUT ECN LLC

Brass Utility (BRUT), an ECN owned by SunGardDataSystems and 26 Wall Street firms including investment banks and market makers, offers an anonymous trade match service for broker-dealers and institutional investors sponsored by them. Once sponsored into BRUT, investors negotiate commission rates with brokers whom they want to pay and choose a broker to sponsor each individual trade. Investors can then enter their orders directly without passing through a broker via a proprietary communications network. Commissions generated through BRUT are monthly directed to broker-dealers net of BRUT's fees. Brokers are informed only of commissions generated and the number of shares trades but not the identity of shares or whether they were bought or sold by the investor. BRUT achieved a trade volume record December 2000 when on-daily-average over 100 million shares were traded.

BRUT acts as a clearing broker for all trades effected. It was formed by merger in February 2000 between BRUT (which had been in the market since February 1998) and Strike ECN (active since November 1998).

www.ebrut.com

E-Crossnet

E-Crossnet is an automated **crossing system** operating in the United Kingdom since March 2000. It concentrates on trading in European equities (14 markets) and provides anonymity.

It has six daily crossing runs. Orders, which can carry constraints such as price, minimum fill, ticket size etc, can be entered either via Bloomberg workstations or via a FIX compliant API. In addition to entering orders for a specific cross, participants can submit orders as good-for-day or good-excluding-close. The residuals will automatically be resubmitted to all subsequent cross times if relevant. All concluded trades are reported to the underlying exchange and the settlement of trades takes place as if they were brokered by Merrill Lynch.

E-Crossnet is wholly-owned by participants, which are institutional investors.

www.ecrossnet.com

EO

EO is operated by EO plc, which is regulated by The Securities and Futures Authority, provides retail investors with an access to private placements of unquoted companies. It has partnerships with Noble & Company and UBS Warburg

the latter being a minority shareholder. EO operates in the United Kingdom, Italy and Sweden.

www.eo.net

Instinet

Instinet ECN, which founded in 1969 and acquired by Reuters in 1987, runs an agency broker service for equities. Instinet owes its success to its global strategy. It is currently the largest global agency brokerage firm, with membership in 18 exchanges and trading in 40 markets. It provides an intelligent sweep facility, which allows routed orders to interact with the Instinet book en route to the destination exchange. Instinet's system shows the top five buy and sell quotations for each security traded. In April 2001, the company was listed on Nasdaq but Reuters remains the majority owner.

Users: Institutional fund managers, plan sponsors, brokers, dealers and exchange specialists in the United States and internationally. In addition, Instinet first expanded the retail market after-hours trading through its agreement with E-Trade and has begun to focus on establishing relationships with other online retail brokers. All after-hours trading (4 pm to 6.30 pm) on E-Trade is conducted via Instinet.

In early 2000 it had nearly 18,400 US users and about 3,000 international users. Instinet had revenues of USD 1.03 billion in the first nine months of 2000, up from USD 709.4 million in the year-earlier period, according to the SEC filing.

www.instinet.com

Island ECN

Island ECN, previously owned principally Datek (a privately held online broker), offers trading in Nasdaq and NYSE stocks. Each time an order is received, the Island system is scanned to determine if a match can be found. If a matching counter order is found, executions occurs immediately, otherwise the order is displayed in its real-time limit order book, viewable on the Internet, until a match is found or the order is cancelled. Matching takes place with strict time and price priority. The system's top orders are represented in the Nasdaq National Best Bid/Offer display but Island does not seek for better prices from other ECNs; several other ECNs send their orders to Island.

The company grew out of a day-trading system called the Watcher, which allowed day traders to gain access to the Nasdaq SelectNet system. In doing so, however, Island realised that, with sufficient volume, they could match the orders prior to routing to SelectNet. When the SEC began enforcing the Order Handling

Rule of 1997, Island was launched to absorb all the unwanted Nasdaq limit orders from various market makers. At first, Island targeted mainly retail order flow from online brokers and day traders. Island is usually ranked number two in terms of volume, although Island says it is the largest and fastest-growing ECN. Currently majority stakes in Island are held by a group of three private investor firms lead by Bait Capital. Datek's ownership has fallen to some 10%.

www.island.com

MarketXT

MarketXT is an ECN specialising in off-hours trading in NYSE and Nasdaq stocks. It was specifically designed for retail investors. Its direct access service accepts limit orders, reserve orders and dynamic orders that can be routed outwards. MarketXT's core is its order routing technology, which continuously scans multiple markets be they NYSE, Nasdaq, regional exchanges or other ECNs and ATSS in search of the best price for each individual security (outbound routing). Trading is anonymous and the order book can be seen on the Internet. Opening hours of the system are 7.30 am to 8.00 pm ETS.

Market XT is owned by Tradescape.com which has major investments from SOFTBANK and large investment banks. It can be reached via third-party networks and the Internet. Broker-dealers can either clear trades with the NSCC directly or via a correspondent clearing broker.

www.marketxt.com

NexTrade ECN

NexTrade ECN, which was launched in Florida in November 1998, provides a 24-hour order matching service for broker-dealers. It has some 50 subscriber. Orders not matched internally go into a matching algorithm that looks at prices from other ECNs (apparently Attain, Island and Instinet) and market makers that are connected to Selectnet or to which NexTrade connects directly. Less than 5% of the orders are matched internally.

In addition to Nasdaq and listed securities, it handles options trades. NexTrade Holdings, which owns the technology for NexTrade ECN, has sold its technology to other trading systems, such as Matchbook FX, an Internet-based ECN for spot foreign exchange trading. The technology can handle 16,000 messages per second. The users must download the software platform from the Internet to submit orders. The service is also available to Asian and European subscribers.

NexTrade filed to become a stock exchange in 1999 with the aim of increasing the credibility of the holding as a provider of exchange technology, but the SEC has not yet processed the application.

www.nextrade.org

Optimark, Inc

Optimark, which provided its subscribers with a rule-based **periodic call market** for listed US stocks, was launched in January 1999 but run into trouble in 2000. The system allowed broker-dealers to automatically make markets in multiple issues with simple pegging to national market and to accommodate complex trading strategies, but it was specifically designed to enable institutional investors to trade anonymously in large blocks of stocks.

Outside the United States, the Optimark system was used by the Osaka Securities Exchange in Japan, but on 5 June 2001 the Exchange announced a suspension of trading at the Optimark Market. Optimark had also discontinued operation of the equities trading systems as facilities of the Pacific Exchange and Nasdaq in late 2000, and has been struggling to survive, according to the Securities Industry News.

Optimark is privately held with such investors as Softbank, Dow Jones, Merrill Lynch and Goldman Sachs etc. It should be considered as a facility of exchange or other market.

www.optimark.com

POSIT

The POSIT **crossing system**, owned by Investment Technology Group Inc., matches orders of institutional buyers and sellers anonymously at a price derived from the stock's primary market. Matching takes place at the mid-point of the bid/offer spread. The system provides advanced tools for executing complex automated transactions, eg users have an option to specify sophisticated criteria they would like to satisfy, such as stock or portfolio characteristics. Such enhancements facilitate eg management of index funds. Portfolios can be imported directly from spreadsheets into the ITG Platform.

Matching orders are automatically executed. Immediately after each match, clients receive electronic reports showing match results for their orders. Clients then decide whether to keep unmatched orders in the system for future matches or to execute them by other means, eg to have them routed to a market maker. The service covers both Nasdaq and NYSE stocks.

The match times are 9.40, 10.00 and 10.30, 11.00, 12.00, 1.00, 2.00 and 3.00 Eastern Standard Time. Crosses are, in fact, run at a randomly selected point within a short window around the announced time and orders are executed to the extent matches are found. POSIT market is a form of call market, ie a single price auction. POSIT started operations in October 1987.

POSIT Europe operates from the United Kingdom with some 120 institutional members.

www.itcinc.com/tools.html

Primex

The Primex Trading System is designed as an electronic **auction market** system for the trading of Nasdaq and exchange-listed securities. It is designed to replicate many characteristics of auction market trading conducted on a physical exchange floor but is completely automated within an open platform. It is scheduled to launch its trading platform, licensed to Nasdaq, in September 2001, which will replace an earlier Optimark facility used by Nasdaq.

Broker-dealers and market makers can anonymously place firm priced orders or preference indications, which are triggered by certain degrees of price improvement in comparison with prevailing market bid or offer. Concluded transactions are executed and reported via Nasdaq. Broker-dealers can also sponsor their clients for direct access to Primex auctions.

Primex is owned by major Wall Street broker-dealers.

www.primextrading.com

REDIBook

Redibook, which is owned mainly by large US brokerage houses, is the third largest **ECN**. It started operations in November 1997 as an anonymous extended trading hours market. It currently handles trades from 7.30 am to 9 pm ETS. REDIBook has focused on listed stocks but launched trading in certain Exchange Listed Funds in August 2001 in order to gain higher volumes.

It supports market orders, limit orders, inside quote orders, limit sweep orders (the system simultaneously bids all the market makers up to and including the limit price) and immediate-or-cancel orders for both NYSE and Nasdaq stocks.

<http://www.redibook.com/>

Tradebook

Bloomberg Tradebook, an ECN owned by Bloomberg LP, was launched in December 1996 to provide order matching and intelligent order routing. It is a continuous order-driven market on which trading is anonymous. The system aggregates and consolidates multiple sources of liquidity including ECNs like Instinet, Island, Archipelago and RediBook, market makers and ATSS such as ITG's Posit system. About 55% of orders are matched internally (participant trading with another participant) and 45% externally. Tradebook is used by institutional asset managers and broker-dealers, a total of over 500 firms. Its hours of operation are from 7.30 am to 6.30 pm EST.

Technology needed by users: Bloomberg Terminal, FIX protocol computer-to-computer interface or via Bloomberg's Internet application

Tradebook and the Philadelphia Stock Exchange, which is mostly retail volume driven, have implemented a trading link that allows Tradebook customers to have their orders represented on the Consolidated Quote System and provides the Philadelphia exchange with additional order flow. Tradebook also gives access to listed stocks in at least the following countries: Australia (Australian Stock Exchange), and Canada (Toronto Stock Exchange), Denmark, Finland, France, Germany (Xetra), Japan, Spain, Sweden and the United Kingdom (SETS).

Tradecross

TradeCross operates an online private placement platform in Germany, through which companies that are too small to go public can issue shares directly to retail investors. It also provides a secondary market trading capability in issued shares. Issue prospectuses must be submitted to German authorities. The service provider charges a percentage of the capital raised as its fee. Customers have to have a bank account and a securities account in Germany.

www.tradecross.de

Appendix 4. List of abbreviations

AMEX	American Exchange
API	Application Protocol Interface
ATS	Alternative Trading System
BIS	Bank for International Settlements
CCP	Central counterparty
CESR	Committee of European Securities Regulators
CGFS	G-10 Committee on Global Financial System
CSD	Central Securities Depository
EEA	European Economic Area
ECN	Electronic Communication Network
ESC	European Securities Committee
FESCO	Forum of European Securities Commissions
FIX	Financial Information eXchange protocol
GSCC	Government Securities Clearing Corporation
IPO	Initial Public Offering
ISD	Investment Services Directive
ISMA	International Securities Market Association
MTS	Refers to MTS S.p.A. corporation or marketplaces operated by it. Originally stands for 'Mercato dei Titoli di Stato'.
NASD	National Association of Securities Dealers
Nasdaq	National Association for Securities Dealers Automated Quotation System
NYSE	New York Stock Exchange
OTC	over the counter market
OECD	Organisation for Economic Co-operation and Development
PCX	Pacific Exchange
SEC	Securities and Exchange Commission
SRO	Self-Regulating Organisation
STP	Straight-Through Processing
TBMA	the Bond Market Association (also TBA)

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