
Structural changes in exchange-traded markets

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This article outlines the main recent structural changes in exchange-traded markets—mergers between equity and derivatives exchanges, new international links between exchanges, and changes in exchanges' ownership structure. It analyses the factors that have prompted these developments, and reviews the implications that the changes may have for market-users, other types of infrastructure and the authorities.

Introduction

The structure of exchange-traded markets continues to change. Three distinctive—and linked—trends are: mergers between equity and derivative exchanges within countries, new types of links between exchanges in different countries, and demutualisation. Links between exchanges are not new, and exchanges have been undertaking cross-listing links for a number of years. For example, the Chicago Mercantile Exchange (CME) and the Singapore International Financial Futures Exchange (SIMEX) have linked to cross-list the CME's eurodollar contract since 1984.⁽¹⁾ What makes the current trends particularly significant is the nature of the economic forces driving change, particularly those arising from technological development, and the implications for market-users, other types of infrastructure and the authorities. The Bank's interest in this arises from its purpose of maintaining the stability of the financial system, and the effectiveness of UK financial services.

The current changes in market structure are comparable in scope to the changes that have happened to regional equity markets within countries. These regional markets gradually consolidated as communications improved, leaving most business being done in one national exchange in most countries. For example, the UK regional stock exchanges consolidated as long ago as 1973. This article describes three of the more recent trends in market structure and analyses the key factors driving these changes. It focuses on supply-side factors, though demand-side factors, such as changes in the demand for instruments resulting from EMU, are clearly also important.

Structural changes

One clear trend is mergers between equity and derivatives markets within countries. Such mergers happened in Switzerland in 1993, in Germany in 1994, in the Netherlands, Finland, France and Austria in 1997, and in Sweden in 1998. In Denmark, the Copenhagen Stock Exchange (which also offered derivatives trading) merged

with the derivatives clearing-house (the FUTOB clearing centre) in 1997. In addition, merger plans have been announced between the Singapore Stock Exchange and SIMEX, between the Hong Kong Stock Exchange and the Hong Kong Futures Exchange, and between the Australian Stock Exchange and the Sydney Futures Exchange. Other stock exchanges, such as the US Philadelphia and Pacific exchanges, have for many years been including options trading in their business.

In parallel, there are new types of links between exchanges that list similar products. For example, Sweden's OM Stockholm/OMLX⁽²⁾ and Norway's Oslo Stock Exchange developed a shared trading-platform for equity derivative products in February 1997;⁽³⁾ and in September 1998, the German DTB and Swiss SOFFEX formed the EUREX common trading-platform for derivatives. The Stockholm and Copenhagen stock exchanges aim to achieve a joint trading-system for equities ('SAX 2000') from May 1999. The CME and the French derivatives exchanges, MATIF/MONEP, have a GLOBEX alliance, which allows members of each exchange access to products on these exchanges from NSC trading terminals. In February 1999, the Singaporean SIMEX signed an agreement to join this alliance.

Other exchanges, such as the Brussels, Luxembourg and Amsterdam stock exchanges, have cross-membership agreements, under which exchange members have access to products from each exchange. Another example of this is a link between the French derivatives exchanges, MATIF/MONEP, and the Spanish and Italian derivatives exchanges, MEFF and MIF, which has allowed MEFF members access to MATIF interest rate products from February 1999; MIF members are expected to gain access in May 1999. The London Stock Exchange (LSE) and the Deutsche Börse have also embarked on an alliance, the first stage of which began in January 1999, allowing each exchange's members access to both exchanges' electronic trading-platforms. The second stage of the alliance will

(1) Other contracts—including Tibor and Libor-based Euroyen futures, and Japanese Government Bond futures—are also available on this (mutual offset) link.

(2) OM Stockholm and OMLX are part of the same company, OM Gruppen, and operate as two exchanges linked through an electronic common trading-platform.

(3) There was a delay until June 1997 before members of the Oslo Stock Exchange gained access to Swedish products.

apply common rules and regulations, and the final stage (some time after 2000) will establish a single centralised trading-platform for around 300 of the largest European shares (by market capitalisation). It is possible that other exchanges will join the alliance in the longer run. Separately, the Swiss, French and Italian stock exchanges have also agreed to implement a cross-membership link, as the first stage in linking their existing electronic trading-systems. Though such cross-membership links are possible with open-outcry trading, electronic trading has clearly made them easier.

A third structural trend is the separation of exchange ownership from membership. So far, the stock exchanges in Stockholm, Helsinki, Copenhagen, Amsterdam, Milan and Australia have done this. Members of the London International Financial Futures and Options Exchange (LIFFE) voted in February this year to separate shares from trading permits and allow external shareholders; this was implemented in April. In addition, there are plans for the merged Singapore Stock Exchange and SIMEX company and for the merged Hong Kong Stock and Futures Exchange to have outside ownership. Some of these exchanges, such as those in Stockholm and Australia, have taken the further step of floating as a public company, and others, such as the Hong Kong exchange, have plans to do the same.

Factors driving these structural changes

(i) Technological advance

Technological improvement is a key factor influencing market structure. Advances in technology mean that most parts of the trading process can now be automated. For example, the LSE moved from a trading-floor to telephone quotes in 1986, to electronic and largely dematerialised⁽¹⁾ share-settlement in CREST in 1996, and to the electronic order-book SETS for its largest 100 plus stocks⁽²⁾ in 1997. LIFFE is switching from floor trading to its new electronic system, CONNECT, which was launched in November 1998 for equity options and introduced from April 1999 for futures contracts.⁽³⁾ Initiatives to introduce 'straight-through processing', under which a transaction will be automated from the initial input through to settlement, are well advanced in some markets. In a number of exchanges, trades are routed automatically to the settlement or clearing system.

(ii) Technology and scale economies

Electronic trading allows exchanges to increase in size and to benefit from potential scale economies. It widens access to markets (compared with floor trading), because it relaxes

the limit on the number of firms that can participate directly (subject to any credit or regulatory constraints), and reduces the need for geographical proximity to an exchange. Though telephone trading also widens market access, an electronic order-book has the added advantage of being able to provide constantly updated information on a wide range of bids and offers, allowing orders to be communicated instantly to all other market participants. Moreover, the 'reach' of exchanges can be extended further by use of public networks, which, for example, is how a number of brokers offer Internet broking services to retail investors. In the United States, Internet broking is estimated to account for about one quarter of all retail stock trades.⁽⁴⁾

Economies of scale can be gained from larger electronic networks by pooling exchange overheads such as marketing, product development and systems development. Malkamäki (1999)⁽⁵⁾ finds significant economies of scale in the trading function of exchanges (but not their listing function). Larger networks also allow cost savings to members from having to deal with fewer exchanges and comply with fewer sets of rules and regulations. There are reasons to believe that the scope for scale economies, and therefore the minimum efficient scale of exchanges,⁽⁶⁾ may have risen: the marginal costs of adding further participants to an electronic network may be lower than for an open-outcry network, partly owing to the increased ability of electronic markets to benefit from network externalities. Network externalities⁽⁷⁾ exist where the benefits to an individual participant increase with a greater number of participants in the system, because existing members benefit when new members join. In the case of an exchange, network externalities arise because new members give existing members additional trading opportunities, so making the market more liquid and reducing trading costs for all.

(iii) Technology and competition

Technology is also increasing the competition that exchanges face from other exchanges and from new entrants, such as broker-dealers offering trading to their clients on their own electronic networks. Competition between existing exchanges increases, because they can offer remote electronic trading and therefore compete for the business of firms in other countries, and because firms can switch from one trading-platform to another more easily. As a result, exchanges have acquired an increasing number of remote members; for example, EUREX, the German-Swiss derivatives exchange, had 148 remote members⁽⁸⁾ in January 1999, 65 of which were based in London. In the European Union, this cross-border access is facilitated by the Investment Services Directive (see below). In the United States, the Chicago Board of Trade (CBOT) adopted

(1) Without a share certificate or a paper stock-transfer form.

(2) 135 stocks were traded on SETS on 14 April 1999. The SETS population includes the current FT-SE 100, ex-FT-SE 100 stocks, stocks for which there are LIFFE traded options, and UK stocks included in the Eurotop 100.

(3) CONNECT for Futures was launched in April for long gilt and five-year gilt futures. From May FT-SE 100, FT-SE 250, FT-SE Eurotop 100, Bund, BTP, JGB, Euroyen, five and ten-year LIFFE Euribor Financed Bonds, FT-SE Eurobloc 100, FT-SE Eurotop 300, MSCI Pan-Euro Index, MSCI Euro Index will be listed on CONNECT; the other short-term interest rate contracts will be added from August.

(4) Arthur Levitt, Chairman, Securities and Exchange Commission, 27 January 1999, statement concerning on-line trading.

(5) Malkamäki, M (1999), 'Are there economies of scale in stock exchange activities?', *Bank of Finland Discussion Paper*.

(6) The minimum efficient scale is the level of production at which average costs are minimised.

(7) Domowitz, I (1995), 'Electronic derivative exchanges: implicit mergers, network externalities, and standardisation', *The Quarterly Review of Economics and Finance*, Vol 5, No 32.

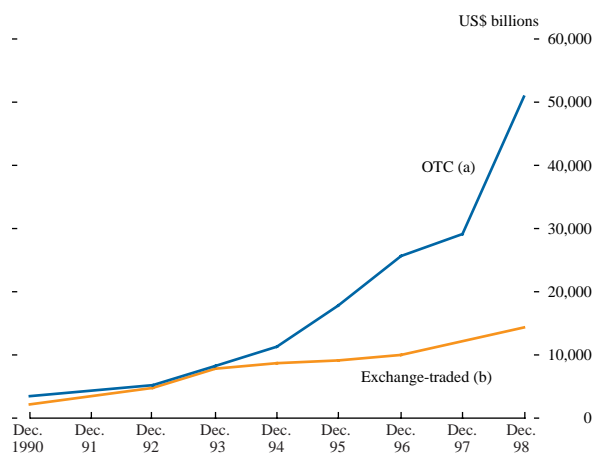
(8) This was calculated by subtracting the number of members based in Germany and Switzerland from the total number of 315 EUREX members.

daytime electronic trading of Treasury bond (T-bond) futures in September 1998, in parallel to floor trading of these contracts. This may have been motivated (at least partly) by the potential competition posed by Cantor Fitzgerald's trading-platform for T-bond futures.

National exchanges also face a potential increase in competition from new entrants, such as Alternative Trading Systems (ATSs). (See the box on US equity markets on page 205.) An important reason for this is that fixed costs to entry have fallen, because electronic trading systems have become cheaper to develop. New entrants may attempt to 'cream off' the more profitable segments of the market.⁽¹⁾

Over-the-counter (OTC) derivatives markets also offer an alternative to derivatives exchanges. In the past five years, the value of OTC derivative positions outstanding has increased more rapidly than the value of exchange-traded outstandings (see the chart below). Some traditional OTC markets (particularly for straightforward, unstructured products) are moving away from pure, decentralised bilateral trading to establishing some common market infrastructure, bringing them closer in some respects to exchanges. For example, the London Clearing House (LCH) is establishing Swapclear as a central counterparty clearing-house for OTC derivatives.⁽²⁾ In the foreign exchange market, much of the trading now occurs over the electronic platforms provided by Reuters or EBS. It may soon be more difficult to distinguish positions in on-exchange government bond futures from OTC government bond repos, with both traded electronically and settled through a clearing-house.

Value of OTC and exchange-traded outstanding contracts



Sources: BIS and ISDA.

- (a) This comprises data of around 100 ISDA members' outstanding interest rate swaps, currency swaps and interest rate options. The population fluctuates over time.
 (b) Exchange-traded outstandings for 1998 are based on June 1998 data; the BIS will publish the December 1998 data in June 1999.

(iv) Effects of competition

Increased competition puts greater pressure on exchanges to maximise their trading volumes, reduce overhead costs, and

therefore achieve economies of scale, as well as update their technology and offer an attractive overall 'package' to users. One reason for merger of stock and derivatives exchanges within countries is likely to be the potential for cost reductions via changes in business organisation, such as shared product development and legal departments. These exchanges may want to merge in order to strengthen their competitive position in the face of increased cross-border competition, and to put themselves in a better bargaining position in the event of subsequent international consolidation. Technology also widens the potential gains from merger. Although most existing merged equity and derivatives markets currently retain separate electronic markets, it may be possible to integrate them in the future.

A number of these mergers between stock and derivatives exchanges have been accompanied (or preceded) by demutualisation of the exchange. Again, technology and increased competition are important factors. In times of more dynamic markets, when quick responses are required, co-operative ownership can have disadvantages: consensual decision-making across members and the need for the support of the majority of members may in some cases have prevented exchanges from being sufficiently flexible to respond quickly to technological and market changes. Co-operative decision-making also becomes less desirable as the exchange members become more diverse, which could happen, for example, as exchanges widen their membership through remote trading. In addition, competition reduces the disadvantages of outside ownership. With more competition between exchanges, there is less scope for outside owners to exploit their power by charging excessively high fees to members.⁽³⁾

(v) Cross-border investment and EMU

Greater global cross-border investment flows may result in demand for further consolidation of existing exchanges from investors who find it easier to trade on a reduced number of exchanges. EMU is likely to have a significant impact on investment flows between euro-area countries. By removing currency risk, it is likely to result in pressure for market integration both from investors and from companies seeking access to a wider pool of capital. EMU has a direct impact on derivative exchanges, as contracts based on interest rates form a significant part of total exchange volumes. A single euro interest rate makes government bond contracts closer substitutes and short-term interest rate contracts almost identical.

(vi) Globalisation and consolidation of main market participants

In the past decade, there has been a global consolidation of the main intermediaries in the world's capital markets. Since these firms are the major users and, in some cases, owners of the market infrastructure (exchanges,

(1) Domowitz and Steil (forthcoming, 1999), 'Automation, trading costs and the structure of the trading services industry', *Brookings-Wharton Papers on Financial Services*.
 (2) Hills, Parkinson, Rule and Young (1999), 'Central counterparty clearing-houses and financial stability', *Financial Stability Review*, Issue 6.
 (3) See Hart and Moore (1996), 'The governance of exchanges: members' co-operatives versus outside ownership', for the original (and fuller) discussion of the relative efficiency of outside versus co-operative ownership of exchanges.

US equity markets⁽¹⁾

The stock exchanges in the United States vary markedly in character. They can be broadly categorised as the national exchanges—the New York Stock Exchange and the (merged) American Stock Exchange and Nasdaq Stock Market—and the five regional exchanges. There are also many Alternative Trading Systems (ATSs), which offer additional means of trading. Though these have existed in some form for several decades, they have recently begun to make a huge impact on stock trading, and they are likely significantly to affect the environment in which stocks are traded in the future.

Background

Although overlapping markets, mergers and the effects of technology mean that there is no single delineation between the business of each, key features of the mainstream exchanges are as follows.

- New York Stock Exchange (NYSE): the largest stock exchange, covering major national and international companies.
- American Stock Exchange (AMEX): similar stock categories to the NYSE, though a smaller exchange. Trades some derivative securities, in addition to equities. Merged with Nasdaq in November 1998; since then, both have operated as separate subsidiaries under the management of the Nasdaq-Amex Market Group, ie there has been no integration of trading-systems.
- National Association of Securities Dealers Automated Quotations system (Nasdaq): known particularly for its coverage of high-growth companies, especially the technology sector, though its listings cover a wide range of the US economy. Comprises two separate markets—the Nasdaq National Market for the largest and most actively traded securities, and the Nasdaq SmallCap Market for emerging-growth companies.⁽²⁾
- The regional stock exchanges—the Boston, Chicago, Cincinnati, Pacific (with floors in Los Angeles and San Francisco) and Philadelphia exchanges. These trade mainly equities, many issues being dual-listed with the national exchanges; options trading is an additional major business of the Pacific and Philadelphia exchanges.

Trading-systems

The US national exchanges exemplify two generic types of stock-market systems. The NYSE and AMEX both have a trading floor and are order-driven (or ‘auction’) markets, meaning that prices are established from the incoming buy and sell orders. Buyers and sellers are matched by ‘specialist’ traders, whose role is to ensure orderly markets in their particular stocks (though this matching can be performed by computer—see below). Nasdaq, by contrast, primarily conducts business by a market-maker (or ‘dealer’) system, where market-makers compete for investors’ orders by quoting

prices at which they will buy or sell. Nasdaq has no physical floor; its trading is conducted electronically via its own terminals, or by telephone.

The rapid advances in computing capacity combined with steeply falling costs have driven the development of ATSs. These operate on the same basic principles as traditional exchanges, but deliver in a different manner. ATSs now handle more than 20% of the orders in securities listed on Nasdaq.

Alternative trading systems⁽³⁾

ATSs are functionally similar to exchanges, competing with many of their services. (There is no clear definition to differentiate an ATS from an exchange—their facilities overlap, which is one reason why they have raised considerable regulatory issues.)⁽⁴⁾ ATSs are systems that provide facilities to bring together buyers and sellers, with particular criteria for how the trades should be executed. In practice, they operate electronically (no floor) and have tended to operate parallel to existing exchanges, often as members or facilities of an existing exchange.

The main attractions of ATSs are the possibility of lower transaction costs and often greater anonymity, which increases the possibility of trading without adverse market impact. Depending on the system, there can be a range of other facilities, including wider access to the market, the means to specify more complex preferences (eg about price/quantity/urgency) and the possibility of direct trades by crossing orders within the system.

Operation of ATSs

Central to an ATS is its ‘order-execution algorithm’—a set of rules to determine which of the competing orders should be executed first and how. Price is usually the first criterion, with priority going to the highest bids and lowest offers. Secondary criteria could include the time that the order was submitted, the size of the order (eg orders placed first having precedence, or larger orders executing before smaller orders), and numerous other factors, including those required to comply with market rules (such the ranking of retail trades relative to those from institutions).

Though these are the broad principles of ATSs, their particular characteristics vary markedly, as does their complexity. Some operate as continuous electronic auctions, in effect replacing specialist traders such as those in the NYSE and AMEX (eg Instinet). Others operate as a single-price periodic call auction, with bids and offers entered into the system ahead of a cut-off time, after which the system calculates an equilibrium price (eg Posit, AZX). Other systems add additional features; for example, Optimark allows the specification of a complex preference profile of prices and quantities. Systems also vary in the extent to which they either offer mechanisms for independent price discovery or are passive, making explicit reference to prices on other markets.

(1) This box was prepared by Helen Allen of the Bank’s Market Infrastructure Division.

(2) The other routes for listings for small companies are the OTC (over-the-counter) market, either via its OTC Bulletin Board (the electronic quote service operated by Nasdaq) or the ‘Pink Sheets’, a daily publication of the National Quotation Bureau.

(3) There is a growing literature on the subject. See, for example, Lee (OUP, 1998), ‘What is an exchange?’ and Domowitz and Steil (forthcoming, 1999), ‘Automation, trading costs and the structure of the trading services industry’, *Brookings-Wharton Papers on Financial Services*. Other terms that are variously used to refer to such systems are Proprietary Trading Systems (PTSs), Electronic Communications Networks (ECNs) and broker-dealer trading systems.

(4) The US Securities and Exchange Commission modernised its rules governing exchanges in December 1998, broadly allowing ATSs the choice of whether to register as an exchange or as a broker-dealer, and adjusting the approach according to the ATS’s significance in the market. The rules are intended to level the regulatory playing-fields, integrating the ATSs into the regulatory framework, and to plug regulatory gaps that had emerged.

clearing-houses, settlement systems, messaging systems, information systems) in each country, their interests have a strong influence on market structure. These firms may prefer to use their own balance sheets to offer some types of products to their customers, rather than a central exchange. So the major firms are often in effect in competition with infrastructure providers, for example when offering in-house trading or custody services to their clients. But they also want to trade with each other in order to manage their own risk and inventory and to take proprietary positions. For this purpose, they want low-cost trading and settlement mechanisms that minimise their exposure to counterparty risk and the impact on their balance sheets. To the extent that there are economies of scale in trading, firms are likely to encourage consolidation to minimise costs. Set against this, the major firms may be reluctant to allow the dominance of a single supplier. For example, Electronic Broking System was set up by a number of the major banks to offer an alternative system for foreign exchange trading.

Implications

There are conflicting pressures on the role of financial intermediaries in this new market structure. Further capital market integration seems likely to add to the market power of the large global intermediaries, which are better placed than local firms to offer cross-border services. However, new technology has the potential to reduce the cost of trading directly on the market in small size, and to reduce the market impact of trading directly in large size. Electronic systems, such as those based on the Internet, could also allow end-investors to trade and settle with each other directly through a central market. At one extreme, it is possible to envisage a 'retail capital market'.⁽¹⁾

These changes in exchange-traded markets are also likely to have implications for other types of infrastructure. For example, common trading-platforms for derivatives directly affect derivatives clearing, particularly since clearing-houses are often under the same ownership as the exchange. The EUREX common trading-platform mentioned above also has common clearing, and there is a cross-clearing link for the OM-Oslo Stock Exchange trading-platform. Other alliances, such as the GLOBEX alliance, intend to establish co-operation on clearing. Common clearing can offer other benefits, through margin offsets, operational efficiency and better surveillance of members' overall positions.

Common trading-platforms for equities are likely to affect securities settlement infrastructure. If there are fewer trading-platforms, investors are likely to demand a similar consolidation of settlement infrastructure. In the United States, there is already a single settlement system, the Depository Trust Company (DTC). But in Europe, there are

separate securities settlement systems in each country. There are various ways in which this settlement infrastructure could evolve, including the creation of a common settlement infrastructure through multilateral links (such as the model that has been developed by the European Central Securities Depositories Association), or consolidation, to leave one or more settlement hubs.

There may be another implication for the organisation of clearing and settlement of securities and derivatives. With increasing competition between exchanges, some exchanges may see their ability to offer settlement as part of their competitive edge. On the other hand, market-users may prefer to have clearing and settlement provided by entities separate from exchanges, to minimise costly duplication, given the fixed costs of settlement. In this model, clearing and settlement might occur in utilities open to various exchanges and the OTC market. This already happens in some countries; for example, in the United Kingdom, the LCH clears for four exchanges, and plans to clear repos and OTC swaps; CREST settles trades on the LSE and the Irish Stock Exchange. In the United States, the DTC settles trades on all the major US stock exchanges.

These changes should bring benefits to market-users in the form of a better service, more liquid markets or lower costs. There is also likely to be more choice. For example, London firms might trade bonds on an Italian platform, hedge them using a EUREX futures contract, settle the trade through Euroclear in Belgium, and make the associated payments through a pan-European system. Market-users will no doubt want to ensure that consolidation does not occur to the extent that it reduces the competition and innovation that has been driving change.

The structural changes also have implications for the authorities. The regulatory framework needs to encompass advances in cross-border businesses, and to allow competition between all types of exchanges without an erosion in standards. An example is the US Securities and Exchange Commission's adoption of a new regulatory framework for ATSS. In the European Union, the 1996 Investment Services Directive (ISD) provides a legal framework in which EU exchanges can compete for business throughout the European Union: exchanges recognised in one Member State can gain access to other Member States, for example by establishing remote trading terminals. Each exchange is regulated by the home country, and the ISD requires only minimum harmonised standards. The creation of the Forum of European Securities Commissions in December 1997 also provides scope for coordination between Europe's securities commissions. However, further progress towards consolidation of exchanges and other market infrastructure within Europe and beyond may well require more coordination between regulators.⁽²⁾

(1) See Financial Services Foresight Panel (1999), '2010: W(h)ither Financial Services?'

(2) Howard Davies, Chairman, Financial Services Authority, 'Euro-regulation', European Financial Forum Lecture, 8 April 1999.