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*The Changing Microstructure of European Equity Markets**

Marco Pagano

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The European Securities Markets: The Investment Services Directive and Beyond, edited by Guido Ferrarini, Kluwer Law International, 1998

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Abstract

In the last decade, the increased competition between European stock exchanges has reduced the cost of trading and increased the variety of trading mechanisms. The London Stock Exchange, which initiated the competition in 1986 by setting up the SEAQ-I market, attracted considerable trading volume in Continental equities in the late 1980s. Later, however, Continental exchanges recovered most of the trading volume from London upon restructuring their auction systems so as to offer very low trading costs, greater transparency and continuous trading via an automated order book. At the same time, the spreads quoted by SEAQ-I dealers increased considerably. Lately, potential competition by continuous auction systems is threatening even the market for British equities, and prompting the London Stock Exchange to replace its former SEAQ system with an automated order book. As in Continental Bourses, this automated auction system is expected to run in parallel with a dealership market for large trades. So trading systems appear to be converging towards a dualistic structure all over Europe. The paper documents these developments, and considers how the competition between European exchanges is likely to evolve and which opportunities and dangers the future may hold for them.

[*] This paper partly draws on material that I contributed to chapter 1 of the report "The European Equity Market", sponsored by the European Capital Markets Institute (ECMI) and published by the Royal Institute of International Affairs, London, 1996. An earlier version was circulated in March 1996 as Special Paper No. 83 of the LSE Financial Markets Group under the title "The Cost of Trading in European Equity Markets". I thank Didier Davydoff, Marianne Demarchi, Luca Filippa, Torsten Lüdecke, Martin Reck, Hartmut Schmidt and Stephen Wells for providing useful data, Giovanni Radicella and Gianluca Lobefalo for their helpful research assistance, and the Consiglio Nazionale delle Ricerche for partial financial support.

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1. Introduction

In the last decade, the microstructure of European equity markets has changed dramatically. Trading costs have been reduced and the variety of trading mechanisms has increased substantially. Most European "blue chip" stocks are now simultaneously traded in continuous auction (or "order-driven") systems and in dealer (or "quote-driven") markets, not to mention the hybrid systems that have emerged in some exchanges. The pressure on trading costs and the proliferation of alternative trading mechanisms are both due to an unprecedented wave of competition among European exchanges.

In this ongoing competitive struggle, the balance between the contenders' forces has shifted considerably. The London exchange, which started the competition with the inception of the SEAQ International (SEAQ-I) quote-driven trading system in 1986, was initially able to attract large trading volumes from Continental exchanges. In the late 1980s, London appeared on its way toward becoming the main marketplace for all the blue-chip European stocks. But in those same years, the main Continental exchanges underwent a radical restructuring of their trading mechanism and regulations, introducing continuous, electronic order-driven systems, liberalizing access to their membership, reducing transaction taxes, etc. This strategy allowed them to stage a formidable comeback in the early 1990s. The London dealers' share of trading volume in Continental stocks declined considerably. And even the London market for British stocks started facing the competitive pressure of order-driven trading systems, such as the London-based Tradepoint system, modeled on the Continental electronic auction markets, and EUROCAC, a new segment of the French Bourse specializing in British and other Continental stocks. As a result, after much controversy, the London Stock Exchange is currently replacing its quote-driven SEAQ system with an order-driven system similar to those used in Continental exchanges, while retaining its traditional dealer market for large trades. This underscores an impressive convergence among European exchanges towards a common dualistic structure, formed by an automated auction system specializing in small and medium-sized trades and a market-making segment devoted to large trades.

At the same time, new contenders are about to enter the arena. "Proprietary trading systems" (PTSs), *i.e.* trading systems managed by private brokers, may soon start to attract a portion of the order flow away from traditional membership exchanges. The competition – both among

traditional exchanges and between them and PTSs – is likely to be enhanced by the introduction of the new regulatory framework of the Investment Services Directive, which facilitates cross-border branching by the trading systems of regulated markets and remote trading by financial intermediaries.

In this paper I overview how the trading systems of the main European exchanges have changed in this turbulent decade, illustrating the initial move by the London Stock Exchange, the competitive response of the Continental exchanges, and the recent overhaul of the London trading system under the competitive threat of order-driven markets (section 2). I also assess how these changes in the exchanges' structure and operations affected their trading costs and competitive positions, and show that their mutual relationship is marked by interdependence as much as by competition (section 3). Finally, I discuss how the competition between European exchanges is likely to evolve, and which opportunities and dangers it may harbor in the near future (section 4).

2. The background: a decade of competitive reform

Until 1985, European equity markets still worked according to a blueprint laid out in the 19th century. Continental Europe featured call auction markets with open outcry dealing, where publicly licensed single-capacity[1] intermediaries conveyed the orders of their customers and were compensated via statutorily fixed commissions. In London, stock trading was managed by dealers, called "jobbers", who received the customers' orders via single-capacity brokers, and commissions were fixed by the members of the exchange. In all countries, the stock exchange was a closed membership organization, with high barriers to potential entrants. Each exchange operated in isolation from the others, well sheltered from competition by national regulations and especially by barriers to capital mobility and high costs of telecommunication.

These obstacles started to wither away in the mid-1980s. European integration lead to increasing capital mobility and technology made

[1] A single-capacity intermediary acts only as agent (on account of the clientele) or as principal (on own account). A dual-capacity intermediary acts in both roles.

telecommunications cheaper and more effective. At the same time, institutional investors stepped up their participation in international equity markets, and their hunger for international diversification lead to a rapid increase in cross-border trading.

2.1. Stage 1: London starts competing for foreign equity trading

The London Stock Exchange was the first in Europe to react to these new opportunities, albeit not without fierce resistance by many of its members. In 1986, it embarked on a series of reforms of its domestic equity market nicknamed "Big Bang". The reforms involved scrapping the old-fashioned distinction between jobbers and brokers, opening dealership to banks and other financial institutions, liberalizing commissions, and introducing a screen-based system, modeled on the US NASDAQ system and called SEAQ, where dual-capacity dealers could post their quotes. These changes were not limited to the market for British stocks: a similar screen-based system, named SEAQ International (or SEAQ-I), was created also for stocks listed in Continental European exchanges. For each foreign stock traded on SEAQ-I, a set of designated market-makers were charged to provide bid and ask quotes during the relevant "mandatory quote period" for trades of a minimum size, named "Normal Market Size" (NMS). To increase further the competitiveness of the London market, the stamp duty on British equity trades was halved, and no stamp duty was levied on trades involving foreign equities.

These reforms were very successful. They helped the City of London to capitalize on the traditional presence of a large number of international investors, especially US banks and investment funds, and to become the natural port of access to the equity markets of Continental Europe. The new trading system catered to the needs of these market participants better than the Continental exchanges. First, being available on the phone throughout the trading day, SEAQ-I market makers provided greater immediacy than the Continental call auction markets. Second, the SEAQ-I dealers provided a deep market, standing ready to trade very large blocks of stock. Third, the absence of taxes on foreign stock transactions added to the attractions of the London market.

A measure of the success of SEAQ-I in the late 1980s is provided by its increasing share of turnover in Continental European equities. The figures in Pagano and Röell (1991) and (1993a), reported in the upper panel of

Table 1, show that the ratio between SEAQ-I turnover in French, German and Spanish stocks and their domestic turnover rose between 1988 and 1989, and the same happened for Italian stocks between 1989 and 1990 (Italian stocks started trading on SEAQ-I only in 1989).[2] The lower panel of Table 1 reports the same measures for 1990-1991 and a larger set of countries, drawn from Worthington (1991).[3] For German and French stocks the turnover ratio approximately stabilized between 1990 and the first quarter of 1991, whereas it kept growing for Italian and Spanish stocks, and even more so for Dutch, Swiss and Swedish equities. The table also shows that, as of the beginning of 1991, London had managed to attract a relatively large share of overall trading in Continental European equities.

But these figures are to be treated with great caution. First, they are vitiated by severe *statistical* problems. Reported trading volume in a dealership market is not directly comparable with turnover in an auction market. A direct customer trade with a London exchange member generates a "cascade" of inter-dealer transactions, by which the dealer rebalances his inventories – an effect not present in an auction market when two customers' orders are crossed. In addition, trades effected in Continental Bourses by London-based dealers are often also reported in London.

Second, and more importantly, not all the London trading in non-UK stocks must be interpreted as trade *diverted* away from the respective domestic exchanges. In part, it reflects trades *created* by the availability of the SEAQ-I dealers. In the late 1980s many institutional investors, especially from the US, started to diversify into European stocks because they could trade them with London dealers in large blocks and with a high degree of immediacy, whereas they had refrained from doing so when the same stocks had to be traded clumsily in the unfamiliar, slow-paced and thin auction markets in the Continent.

At least for Italian and Belgian stocks, the available evidence actually indicates that the inception of trading on SEAQ-I did not reduce turnover in the domestic exchanges. Pagano and Röell (1991) and Impenna, Maggio

[2] Since SEAQ International and the German exchanges count both purchases and sales, in Table 1 their turnover figures are divided by two.

[3] The figures in the lower panel of the table are not directly comparable with those reported by Pagano and Röell (1991, 1993a), because after February 1990 the data on the turnover by members of the London stock exchange have become more complete and reliable.

and Panetta (1995) document that for several Italian stocks the inception of SEAQ-I trading increased trading volume on the Milan stock exchange.[4] Trade diversion appears to have been large and statistically significant only for few high-volume stocks. Pagano and Röell report that the inception of SEAQ-I trading had no effect on *overall* Milan turnover at conventional significance levels.[5] In a similar study of Belgian cross-listed stocks, Anderson and Tychon (1993) conclude that London trading on balance has stimulated greater trading in Brussels. These results are reasonable, considering that London dealers routinely use Continental exchanges to unload part of their excess positions, so that flurries of trading activity in London also raise trading in the corresponding Continental markets.

TABLE 1. TRADING OF CONTINENTAL EUROPEAN STOCKS EFFECTED BY MEMBERS OF THE LONDON STOCK EXCHANGE, AS PERCENTAGE OF STOCK TRADING ON 'HOME' COUNTRY EXCHANGE

Panel A (from Pagano and Röell, 1991)

Nationality of stock	1988	1989 (Jan.-June)	1989 (June-Dec.)
German	12.65	16.21	
French	13.72	25.08	
Italian		6.5	11.2
Spanish	0.53	6.15	

[4] Both studies estimate volume regressions in which the explanatory variables are a constant, the trading volume for the entire market, the average monthly return on the relevant stock and its estimated monthly volatility, and a dummy for the inception of SEAQ-I trading (or the actual volume of SEAQ-I trading since inception). Pagano and Röell (1991) employ monthly data over the 1982-1990 interval for 12 stocks. Impenna et al. (1995) employ monthly data for the 1985-1993 interval for 23 stocks.

[5] This statement has to be taken cautiously, because of several limitations of the data. The Italian turnover data omit the large off-exchange turnover that in Italy occurred at the time to which the data refer (1982-1990): off-exchange trading volume could have been diverted to London, and the data would not reveal it. In addition, the inception of trading on SEAQ-I may be unrepresentative, because several Italian stocks were unofficially traded in London before being assigned to a SEAQ-I market maker.

Panel B (from Worthington, 1991)

Nationality of stock	1990 Q1	1990 Q2	1990 Q3	1990 Q4	1991 Q1
German	12.5	12.2	11.3	12.8	10.3
French	26.9	26.8	25.3	26.3	29.5
Italian	23.1	18.1	19.1	27.1	24.7
Spanish	14.3	15.9	25.5	18.4	18.4
Dutch	38.3	49.8	63.0	54.2	52.9
Swiss	-- .-	29.2	25.5	33.5	35.5
Swedish	39.5	64.9	62.4	50.0	45.0

2.2. Stage 2: Continental exchanges respond to the challenge

The danger of losing business to London pushed Continental policy-makers to embark in a complete overhaul of their traditional systems: the challenge represented by SEAQ-I set in motion a competition between national exchanges and regulators which is still going on. The Paris Bourse has been the first one to respond to London's competitive threat, and its response has been very closely emulated by Madrid and Milan. The German and Dutch markets have also been substantially reorganized in the early 1990s, but along somewhat different lines.

2.2.1. Paris

The response of the French market turned on four key innovations, which were implemented sequentially: (*i*) the introduction of continuous screen-based trading; (*ii*) the replacement of publicly appointed brokers with corporate dual-capacity intermediaries; (*iii*) the liberalization of

commissions; (*iv*) the partial amendment of the principle that trade should be concentrated in one market.

Starting in July 1986, a continuous auction with automatic clearing replaced the old system of call auctions with open outcry dealing: trading in almost all the stocks was gradually transferred from the floor to a computerized facility where incoming orders are instantaneously executed against outstanding limit orders (CAC: *Cotation Assistée en Continu*). The call auction was retained only as an opening mechanism (orders placed before the opening are traded in an electronic call auction at 10:00 a.m.).

The hallmark of the CAC system is its extreme degree of transparency, in the sense that market participants have a very accurate picture of the limit orders already placed on the market and still awaiting execution (pre-trade transparency) and very timely information about the trades which have just been executed (post-trade transparency). The stock exchange member firms (*societés de bourse*) have access to the whole order book, including the codes identifying the member firms which have placed limit orders on the book. The only exception are "hidden orders", special limit orders which are only partly visible by other market participants: the undisclosed portion of these orders is called upon to fill incoming orders as soon as the visible portion is exhausted. Post-trade publication used to be immediate for all trades, and to include not only the price and the quantity of each trade, but also the codes of the member firms involved. But recently, on request by member firms, trade publication has been slowed down for trades involving member firms as principals[6]and the codes of the firms involved in the last trade are no longer published for the most active stocks.

The second step of the French reform was to end the monopoly of stock trading by the *agents de change*, who traded only on client account, replacing them in January 1988 with new corporate intermediaries, named *societés de bourse*, who operate as dual-capacity dealers. This opened stock exchange membership to banks and securities firms, provided they set up a separately capitalized subsidiary in the form of a *société de bourse*. The aim

[6] From September 1994, if one of the parties involved is a member firm, the delay before publication is 2 hours if the trade does not exceed 5 times the "normal block size", and 1 day above this threshold. The "normal block size" is determined by the Paris Bourse, and as a rule it is about 2.5 percent of the average trading volume over the previous 3 months. In any event, it cannot be less than 1 million Francs, and it is between 5 and 10 million Francs for the stocks of large companies.

was to induce more capitalized intermediaries to take position on the market by feeding limit orders on own account, and thus provide liquidity to other market participants. By the end of 1989, banks and securities firms, often foreign-based ones, bought stakes in about two-thirds of the *sociétés de bourse*.

The third step of the reform was to liberalize the members' commissions in July 1989, to increase the competitiveness of the French market. More recently, this was enhanced by fixing a 4,000 Francs ceiling to the stamp duty (July 1993) and exempting non-residents altogether (January 1994).

The fourth, and final, step was the gradual abandonment of the principle of concentration of orders on a single market, with the explicit aim of attracting to Paris the block trades which were executed by SEAQ-I dealers. In 1989, the practice of quoting prices outside the mechanism of the centralized auction was allowed, but only under very restrictive conditions. Initially, only selected member firms could carry out trades on own account (called *operations de contrepartie*) at prices different from those prevailing on the exchange, but had to report them within 5 minutes to the exchange. Moreover, if the trade had occurred at a price outside the *fourchette* (the spread between the best sell and buy limit orders outstanding), the member firm had to stand ready to buy or sell at that price so as to exhaust all the orders in the interval between that price and the *fourchette*. More recently, these rules have been relaxed in order to develop a "block trading facility" for the 50 most important stocks: all member firms can execute trades exceeding the "normal block size" at any price within the "weighted average spread" (*fourchette moyenne ponderée*), which is the interval between the buy and sell prices that would on average be obtained for a trade of "normal block size" (these prices are continuously computed by the CAC system). After the trade, they have no obligation to place any order on the main market, and even trade publication is not instantaneous, as explained above. The new block trading facility has been moderately successful, although it has not attracted the volume of trade that was hoped for by Bourse officials.

2.2.2. Madrid, Brussels and Milan

These three markets, formerly designed on the French model of an open outcry call auction, closely followed the French example also in responding to the competition by the London-based market-makers.

In 1989, the Bolsa de Valores in Madrid adopted an automated continuous trading system, replaced the *agentes de cambio* with *sociedades de bolsa* that can trade on own account and can be owned by domestic or foreign banks, insurance companies and securities firms. Commissions were deregulated, and a special facility for block trading was introduced. At the same time, similar steps were taken in Brussels. In 1989, the Brussels stock exchange introduced an automated auction system. In December 1990 a law replaced the Belgian *agents de change* with French-style *societés de bourse*, imposed a ceiling on stock transactions taxes, and allowed off-exchange trades, provided their prices do not deviate by more than 2.5 percent from the previous trade on the exchange.

In 1991 the Borsa Valori in Milan went through the same exercise. Italian stocks were gradually transferred from the open outcry call auction to an automated continuous auction, the *agenti di cambio* were replaced by *Società di Intermediazione Mobiliare* (SIM), commissions were liberalized and all trade was concentrated on the official exchange. The latter step was very innovative for the Italian equity market, which had previously been always characterized by a very large off-exchange trading volume, in some years estimated to be over 3 times as large as trading volume on the exchange.[7]

2.2.3. Germany

As elsewhere in Continental Europe, also in Germany equity trading has traditionally taken place via an auction mechanism, although with some distinctive features. First, trade has traditionally been segmented across the eight regional German stock exchange floors, of which Frankfurt is by far the most important. Second, in each of these exchanges orders are matched by a *Kursmakler*, an officially appointed auctioneer who can take positions on own account to avoid extreme price fluctuations. Third, German banks

[7] This extraordinary segmentation of the Italian equity market before 1991 was mainly due to the existence of statutorily fixed commissions on the exchange. To avoid paying the 0.7 percent commission to an *agente di cambio*, a bank receiving a client's order would trade with another bank off the exchange (so that it could retain a 0.35 percent commission) or, even better, cross the trade in-house (in which case it would appropriate the entire 0.7 percent commission from the two clients). The concentration rule was accepted by Italian banks because it was introduced together with the liberalization of commissions and the elimination of the *agenti di cambio*'s monopoly.

are the main players of the equity market, and they place their orders and those of their clients with the *Kursmakler* via their own floor traders (*Handlers*) or via dual-capacity brokers (*Freimaklers*). *Freimaklers* also serve private clients directly and provide some competition to the *Kursmakler*.

The fragmented nature of the market and its old-fashioned organization left it increasingly exposed to the pressure of competition from SEAQ-I. The response of the German banks involved the introduction of a continuous, screen-based trading system, called IBIS, in early 1991. Originally established by the banks, IBIS is now run by the Frankfurt Stock Exchange between 8.30 a.m. and 5 p.m.. Participants can input orders or one-way quotes and, whenever possible, orders are matched according to time and price priority rules. In addition, the Frankfurt stock exchange has created an electronic order routing system (named BOSS), specifically designed for small orders. At the same time, German stock exchanges were transformed into a joint-stock corporation (Deutsche Börse AG), whose main shareholders are the three top German banks – Deutsche Bank, Commerzbank and Dresdner Bank.[8]

In many ways, the German reforms were less radical than that of the other Continental exchanges. Rather than replacing the eight regional exchanges with a single automated system and scrapping floor trading altogether, the strategy was to set up a new automated facility running in parallel with the floor and catering mainly to banks and other institutional investors. This reflects less concern with the principle of concentration than in France. It also reflects the conviction that, if superior, IBIS will gradually steal trading volume away from the floor of the regional exchanges, as in fact is already happening. The likely end result of the process will be the gradual elimination of the regional exchanges, the disappearance of the monopolistic *Kursmaklers* and the transformation of the *Freimaklers* into independent brokers, probably allied with foreign financial institutions or brokers.

[8] The stakes are allocated as follows: 6 percent is owned by the Freimaklers, 5 percent by the Kursmaklers, 10 percent by the regional exchanges, and the rest by banks according to their importance in equity turnover.

2.2.4. Amsterdam

The Dutch equity market is particularly vulnerable to international competition, being highly dependent on about 25 international stocks of Dutch origin (representing 85 percent of Amsterdam volume) which are actively traded around the world. As a result, the Amsterdam exchange tried to respond to the cross-border competition from SEAQ-I and other markets by several innovations. As early as 1987, the Bourse supplemented its traditional trading system run by the competing single-capacity dealers (the *hoekmannen*) with the Amsterdam Interprofessional Market (AIM) – a block trading facility designed specifically for the needs of institutional investors and banks, who could trade directly for deals exceeding f. 1 million. But this liberalization of the wholesale segment of the market was not sufficient to prevent the loss of trading volume to other exchanges. As shown by the figures in Table 1, the competitive threat posed by the London Stock Exchange was particularly fierce.

To face this threat, in 1994 a more hybrid system was introduced. Small orders (below a normal market size defined for each stock) are channeled to a public limit order book cleared via a screen-based continuous auction system. The *hoekman* provides obligatory quotes in the limit order book for the normal market size, and receives a 0.08 percent commission if he trades on his book and a 0.016 percent commission if he does not, to give him an incentive to improve spreads in the order book and increase executions. Larger trades can be traded in a variety of ways: via direct deals, via in-house matching, via a quote-driven screen-based system (named ASSET) or via an automatic auction interdealer market (named AIDA). The basic idea of this complex architecture is to blend the most cost-effective and transparent system for small orders, *i.e.* a French-style automated auction system, with the widest possible choice of trading modes for large orders. It is hoped is that this eclectic approach will succeed in concentrating Dutch equity trading in Amsterdam, by offering the most appealing trading system to each type of potential customer.

2.3. Effects of the reforms of Continental exchanges

How effective has been the response of Continental exchanges to the competitive pressure of SEAQ-I? The effect of the reforms appears to have

come in two stages. Their immediate impact has been to offer a very competitive market for retail customers, but no increase in trading volume relative to SEAQ-I. But after a few years, a reversal of trading volume towards the Continental Bourses has taken place.

In the first stage, markets appeared to specialize according to trade size. As we shall see in section 3.1, there is solid and consistent evidence that the automated auctions of Continental exchanges had a comparative advantage in the retail segment of the market. But initially the Continental exchanges did not recover market share relative to SEAQ-I. On the contrary, Pagano and Röell (1993a) find that, at least initially, the switch to the computerized auction was associated with a fall in the trading volume of the Paris Bourse: as stocks were moved to the new system, their turnover fell by about 20 percent relative to the market as a whole. Urrutia (1990) finds the same result for the Madrid stock exchange. Murgia (1993) and Impenna, Maggio and Panetta (1995) find the opposite for Milan, but their result may reflect the concomitant introduction of the obligation to concentrate trade on the official exchange, rather than the switch to continuous trading. A possible explanation for the initial fall in volume in Paris and Madrid is the initial lack of experience with the new trading system. But another reasonable explanation is that the new automated systems of Continental Bourses was helping SEAQ-I market makers to make a more liquid market in London, exploiting the greater transparency and faster dissemination of information of the continuous auction.

More recently, however, trading volume has been flowing back to the Continental Bourses. The order book on these exchanges has become so thick and liquid that the London broker-dealers increasingly use them to "work" block trades, by transforming them into a trickle of small orders and executing them gradually in the continuous auction. Typically, this happens when the dealer's final customer does not require immediate execution or when the dealer has provided immediate execution of a block order and wants to rebalance his inventories. As the trading activity of the London dealers in Continental exchanges increased, it tended to further enhance the liquidity of these markets.

This reversal in the fraction of trade performed by SEAQ-I dealers is increasingly recognized by the leading UK market makers. For example, Natwest securities recently announced that "it will conduct far more of its business on continental bourses than on London's SEAQ International system", and its management motivated this choice as dictated by "the

growing sophistication and transparency of local dealing systems in Europe" and by their "greater efficiency in both cost and execution".[9]

This conclusion is partly supported also by the turnover statistics for Italy and Germany, though not by those for France. Figures 1, 2 and 3 show the SEAQ-I turnover in Italian, German and French stocks as a percentage of home market turnover in the same stocks.[10] As explained in Section 2.1, these statistics must be interpreted with great caution. Their actual levels are not meaningful because of double-reporting of trades: a large number of trades executed in the home market are reported also in London, and in some cases only in London. In addition, these figures are not comparable across countries, because different exchanges compute turnover statistics according to different conventions. Despite these problems, the Italian data in Figure 1 show a very clear and intriguing time-series pattern: a remarkable rise in the proportion of London trading between 1989 and 1991, and a decline following the introduction of continuous electronic trading in Italy in 1991. The German data in Figure 2 tell a roughly similar story: London's proportion of German equity trading exhibit a mild downward trend since late 1990, which coincides with the introduction of continuous electronic trading (IBIS) in Germany in early 1991.

[9] *Financial Times*, 26 October, 1995.

[10] SEAQ-I turnover data are from the London Stock Exchange. For Italian and French stocks, the SEAQ-I volume has been divided by 2 to compensate for the "double-counting" in London (each buy and sell order executed in London is counted as a separate trade in the published statistics). This is unnecessary for the German volume, which is double-counted in the home market as well as in London.

German data for 1990 were provided by Dr. Torsten Lüdecke of the Universität Karlsruhe, and for 1991-95 by Martin Reck of Deutsche Börse AG. The German turnover figures refer to trading on all the German exchanges. Italian data were supplied by Luca Filippa of the Consiglio di Borsa. French data were provided by Marianne Demarchi of the SBF-Bourse de Paris. They include all trades carried out through the central CAC trading system, and block trades acrried out under the Paris block trading rules. Since 1992, they also include after-hours trades done off the central market. To account for the distortionary effect induced by the initial public offerings (IPOs) of BNP in October 1993 and Elf Aquitaine in February 1994, the Paris data for these stocks on their respective IPO dates were replaced with the average daily volume of the relevant month (excluding the IPO days). For the SEAQ-I data, we replaced the turnover figure for February 1994 with the average of January and March 1994. We could not follow the same procedure for BNP, as no SEAQ-I data are avilable before October 1993. We therefore replaced the turnover figure for October 1993 with the monthly average between October 1993 and March 1995.

Figure 1
Trading of Italian stocks reported by SEAQ-I dealers as percentage of trading volume in Milan

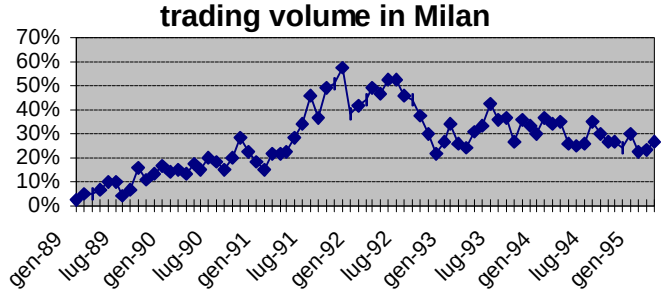


Figure 2
Trading of German DAX stocks reported by SEAQ-I dealers as percentage of trading volume in Germany

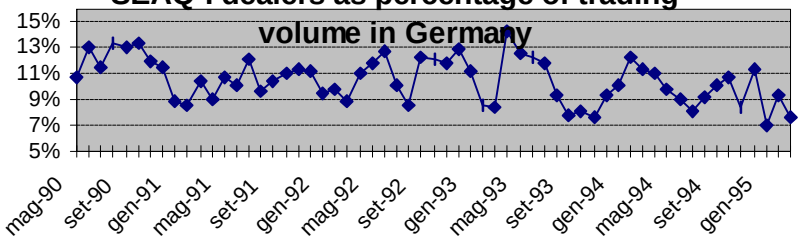
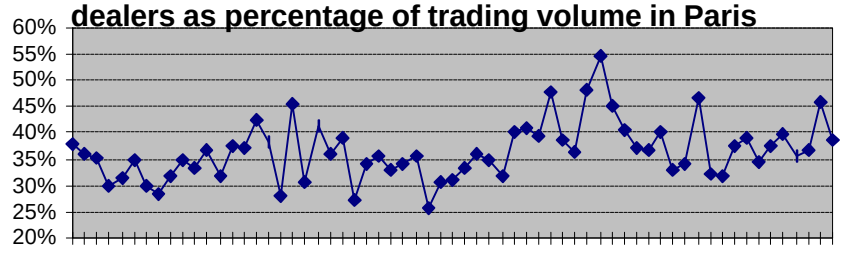


Figure 3
Trading of French stocks reported by SEAQ-I dealers as percentage of trading volume in Paris



The French data in Figure 3, instead, are inconsistent with the view of a general decline of London trading. However, this reflects much more the unreliability of the official volume statistics than the true underlying story. There is a rough market consensus that London's proportion of total French stock trading has declined from about 25-30 percent in 1990-91 to about 5-15 percent today. This latter estimate is also consistent with a very careful study by Jacquillat and Gresse (1995), which produced an estimate of 8.35 percent for 1993. French stock trades executed (as opposed to simply reported) through the London Stock Exchange are now primarily large block and program trades, which require the immediacy offered by a dealer market.

This reversal in the trend increase of the trades executed in London has been determined by three concomitant factors. The first is the increase in the liquidity, immediacy and transparency of the Continental markets, credited to the introduction of the continuous, computerized auction and the associated changes in market design and regulation.

The second reason is the declining willingness of London dealers to commit substantial capital to market making in Continental stocks, especially after the substantial losses deriving from such dealing in the early 1990s. This decreasing commitment of SEAQ-I market makers has translated into wider quoted bid-ask spreads, and thus to an increase in the trading costs in London relative to Continental auction markets, as we shall see in section 3.1.

The third motivation is a change in the attitudes by the final customers – the so-called "buy side" of the market. Final customers, especially institutional investors, are becoming acutely aware of the cost of immediacy, a development documented by Economides and Schwartz (1994) for the US and by Schwartz and Steil (1996) for Europe. More specifically, they appear to be learning that the cost of immediacy is so high that it is generally worth the wait: the price offered (or required) by a dealer to take a very large position at once is often considerably less favorable than the "average price" that the same dealer will offer (or require) if he is allowed to "work" the order gradually in the continuous auction. This realization is at least partly due to the very transparency of the trading system in Continental stock markets: institutional investors can now *observe*

the prices at which their trades can execute in the continuous auction, and thus how much they sacrifice by requiring immediacy from a dealer.

These three concomitant factors – the greater liquidity of the Continental auctions, the decreasing commitment of market-making capital by London dealers, and the diminished taste for immediacy by institutional investors – have drained trading volume away from the London market, which appears to retain only a "hard core" of block trading, arising from customers who demand immediate execution of their trades, and therefore cannot dispense of the services of a dealer.

2.4. Stage 3: London market makers come under pressure

By the mid-1990s, the competitive position of London equity dealers has reversed. While a decade ago they were challenging the auction markets of the Continental exchanges, now they must defend themselves from the competitive threat created by auction markets, *even in the market for UK equities*. This challenge comes both from a new exchange set up in London, named Tradepoint, and from the brand-new EUROCAC system created by the Paris Bourse to trade non-French equities.

Tradepoint, which started operating in London in September 1995, replicates the basic electronic auction trading mechanism used by virtually all continental exchanges. It has been set up by former executives of the London Stock Exchange who tried unsuccessfully to introduce a continuous auction mechanism into that market. An innovative feature of Tradepoint is that it allows institutional investors to trade directly, bypassing the intermediation of broker-dealers. Initially it offered continuous trading for the largest 400 UK stocks, and in March 1996 it expanded its market to more than 900 shares. Less liquid stocks are traded in a call auction.

EUROCAC, launched in January 1996, is instead the first instance of a Continental auction market trying to attract cross-border trading in foreign equities. It is a segment of the Paris Bourse, which uses the same infrastructure and trading technology as the CAC market to market professionals wishing to trade non-French equities. It can be accessed through any Paris Bourse member firm, and initially it will deal with British, Dutch, Italian, Spanish, Swedish and Swiss blue chip stocks. Its ultimate objective is to trade the components of all major European indices, *i.e.* around 500 stocks. Though basically a continuous auction system, it

also features a market-making element: for each stock, at least one market maker will ensure permanent bid and ask price display for a minimum value of FF 1 million. EUROCAC trades are not subject to stamp duty, and its fee structure is designed to provide an incentive to traders inputting limit orders and a penalty to those inputting market orders, to maximize the liquidity of the market.

While both Tradepoint and EUROCAC still have to prove their ability to compete effectively with pre-existing exchanges, their potential competition is already worrying London Stock Exchange officials. The Exchange is replacing its current trading system, SEAQ, with an updated system, called Sequence VI, with order-matching capabilities. Whether such a mechanism should be actually available for trading has been a hotly debated issue between the board of the Exchange and the main market-makers (the controversy has even led to the abrupt dismissal of the Stock Exchange chief executive, Mr Michael Lawrence, in January 1996). The main London market makers have fiercely resisted the introduction of an order-driven trading mechanism, fearing that it will reduce their profitability and eventually force them out of business. The collapse of the SEAQ-I dealer market in Continental equities indicates that their fears may be well-founded. But if indeed an order driven mechanism can effectively compete with the London market makers, this will happen even if the London Stock Exchange were not to offer an order-matching system (Tradepoint and EUROCAC are there precisely for this reason).

Eventually, after much controversy, in mid-1996 the majority of the London Stock Exchange members convinced themselves of the need to replace the SEAQ quote-driven system with an order-driven mechanism. The proposed rules of the new system (SETS, an acronym for Stock Exchange Electronic Service), recently detailed by the London Stock Exchange (1996a), are very similar to those of the automated auctions of Continental Bourses.

Market making is envisaged to survive only for large trades. As in Continental Europe, the complex issue is how to allow market making for these trades without too much damage for the liquidity and transparency of the auction. The general principle is that trades occurring outside the order book will have an “interaction obligation” with the limit order book if it occurs at the same price as an order present in the order book: to prevent a violation of the time priority principle, the off-market trade can be carried out only if the outstanding orders which qualify for “interaction” at the time of the trade are also filled. However, some important exceptions are

envisaged to this "interaction obligation". The main exception refers to large orders subject to delayed publication (currently trades over six times the NMS). Other exceptions concern orders placed at times in which the automated order book is not active, trades priced inside the order book touch, certain proprietary trades of market makers, etc. (London Stock Exchange, 1996b).

This dramatic change in the design of the UK Stock Exchange development underscores an impressive degree of convergence between equity trading mechanisms all over Europe. Just like the Bourses in the Continent did earlier on, London is now developing a dual market structure, with an order-driven main market and a block trading segment managed by market makers. And, just as in the Bourses, a crucial and sensitive issue is how to coordinate these two different mechanisms.

3. The current picture: transaction costs in the competing markets

3.1. Liquidity and immediacy

As noted above, one of the main reasons of the successful "counterattack" mounted by Continental exchanges on the London dealer market has to do with their comparatively low transaction costs offered by their trading systems. This confirms one of the most consistent empirical findings about the relative efficiency of trading systems, *i.e.* that auction markets offer considerably lower transaction costs, even though – unlike dealer markets – they cannot provide instantaneous execution for very large orders at a firm price. In other words, auction markets offer cheap execution but provide immediacy only for relatively small orders: traders wishing instantaneous execution of large orders can obtain it only on a dealer market.

One can use several methods to compare the liquidity of a dealer and an auction market. The simplest one involves comparing the difference between the lowest ask and the highest bid quoted by the competing dealers (in London, the so-called *market touch*) with the difference between the best buy and sell limit orders outstanding in the auction market (in Paris, the so-called *fourchette*). One problem with the use of the *fourchette* as a measure of the liquidity of a continuous auction market is that it applies to smaller trades than the *market touch*: the two best limit orders in an auction market

are typically much smaller than those for which dealers commit to quote firm prices (the "Normal Market Size", or NMS). But this problem can be overcome by measuring the hypothetical average price that can be obtained in the auction for a given order size, using data from the limit order book. In particular, this average price can be computed for the order size for which dealers post firm quotes. Upon computing this price for buy and sell orders, one obtains the average market spread (*fourchette moyenne ponderée*) – a measure of the auction's trading costs directly comparable with the market touch.

These measures of trading costs have been computed in a variety of studies. Their results, summarized in Table 2, show that SEAQ-I quotes are wider than domestic auction spreads in France (Pagano and Röell, 1990 and 1993a), in Belgium (Anderson and Tychon 1993), Italy (Impenna, Maggio and Panetta, 1995), and Germany (Schmidt and Iversen, 1992, Davis, 1993 and Brown, 1994).

When these quoted spreads are used as a measure of trading costs, the competitive gap between Continental auction markets and SEAQ-I appears to have gradually widened over time. While the *fourchette* has changed little over time, the spread quoted by the SEAQ-I market makers has roughly doubled in the early 1990s, as shown by Table 3.

A criticism that can be leveled at these comparisons is that *quoted* spreads tend to overestimate trading costs in dealer markets, where trades often take place within the market makers' quote, especially for medium and large transactions.[11] But more recent studies are immune from this criticism, since they use actual transaction prices to compute the average *realized* spread (or *effective* spread), as opposed to the quoted spread. They confirm that London is not cheaper than the Continental Bourses. De Jong, Nijman and Röell (1993) conclude that the Paris Bourse offers lower transaction costs than SEAQ-I for all trade sizes. This reflects the inclusion of crossed trades, *i.e.* trades matched outside the CAC system, but priced within the

[11] For the London stock exchange, this is documented by the figures reported in the *Stock Exchange Quarterly* (April-June 1992, and October-December 1993). Reiss and Werner (1994) show that the most common form of competition among market makers is not done by undercutting each others' quotes, but by giving discounts to customers over the phone, especially for intermediate trade sizes. Röell (1992) reports similar results also for SEAQ-I, where the difference between realized transaction prices at which dealers sell and buy French stocks is about half the quoted bid-ask spread for the "normal market size".

fourchette. Comparing the realized spread, trading costs (excluding taxes and commissions) are lower in Paris even at trade sizes of twice normal market size. Similar results are obtained for Belgian cross-listed stocks by Degryse (1995), who computes both the quoted and the effective spread in the Bruxelles continuous auction market and SEAQ-I, and finds that under both measures the Brussels market offers lower trading costs than the London market, for all trade sizes. Finally, for cross-listed German stocks Brown (1994) finds that SEAQ-I provides transaction prices comparable with those provided by IBIS for trades executed with market-makers.[12]

[12] One could suggest that even these comparisons are unfair because they do not allow for the home-country informational advantage: if information reaches the domestic exchange before the foreign dealers, thedomestic bid-ask spread may be tighter than the foreign one for reasons unrelated to the intrinsic functioning of the two markets. But the home-country informational lead is not sufficient to explain these differences, as shown by Booth, Iversen, Sarkar, Schmidt and Young (1994) in a study of a matched sample of American stocks traded on NASDAQ and German stocks traded on IBIS.

TABLE 2. SEAQ-I MARKET TOUCH AND HOME MARKET FOURCHETTE FOR DUALLY TRADED STOCKS, AVERAGE PERCENTAGE VALUES

Nationality of stocks and time period	SEAQ-I quoted spread	Home market *fourchette*	*Fourchette moyenne ponderée* at NMS	Study
French, 1989	1.52	0.41	0.5	Pagano and Röell (1990, 1993)[13]
Belgian, 1992	1.9	0.4	0.6	Anderson and Tychon (1993)[14]
Italian, 1992	1.69	0.41		Impenna, Maggio and Panetta (1995)[15]
German, 1991	1.25	0.76 (IBIS)		Schmidt and Iversen (1992)[16]

[13] Pagano and Röell (1990, 1993a) use two weeks of perfectly time-matched data from SEAQ-I and from the Paris Bourse recorded in July 1989 for 16 cross-listed French stocks. Their *fourchette moyenne ponderée* is computed for order sizes ranging from half to twice the SEAQ "normal market size".

[14] Andersen and Tychon (1993) analyze a group of 12 cross-listed Belgian common stocks, accounting for more than half the total Brussels volume in 1992.

[15] Impenna, Maggio and Panetta (1995) analyze all Italian shares cross-listed in 1992.

[16] Schmidt and Iversen (1992) report comparative spreads on IBIS and SEAQ-I over the first and second quarters of 1991. Beside the average *quoted* spreads reported in this table, they also compute the SEAQ-I *effective* spread for 6 stocks and find that it is on average 0.64 percent (the effective spread is defined below in the text). Davis (1993), using June-November 1993 data, shows that a large proportion of SEAQ-I trades occurs at prices within 0.5 percent of the quote mid-point. Brown (1994) performs a detailed analysis of data between October 1991 and March 1992. He confirms that IBIS offers a narrower spread than SEAQ-I if one considers quoted spreads.

TABLE 3. SEAQ-I AVERAGE MARKET TOUCH FOR DUALLY TRADED STOCKS, PERCENTAGE VALUES[1]

French stocks	July 1989	1993	1994 Q1 and Q2
	1.52	2.66	3.37

Italian stocks	Oct.-Nov. 1990	1992 Q1 and Q2	1992 Q3 and Q4	1993
	1.70	1.69	2.53	3.50

[1] **Sources:** Pagano and Röell (1991, 1993), Impenna, Maggio and Panetta (1995) and Quality of Market Review (Summer 1994).

In conclusion, the weight of the evidence suggests that, for all the trade sizes for which we have data from both types of markets, Continental auction markets are more liquid than (or at worst as liquid as) the London dealer market. This leaves us with the question of why the London dealers get any trade at all in Continental equities.

There are three possible answers to this question. First, we cannot compare the *depth* of these two types of markets at the very high end of the scale, since we have no data for the very large orders carried out by London dealers markets: these orders may occasionally exceed the size of the entire limit order book of the corresponding auction market.

Second, the bid-ask spread is only a part of the total cost of trading equities, the rest being accounted by commissions and transaction taxes. The larger bid-ask spread required by London dealers is often compensated by their lower commissions, since many large London deals are done on a "net" basis, with commissions included in the price.

Thirdly, our data fail to capture the time dimension of liquidity: a dealer market can offer greater *immediacy* than a continuous auction, *i.e.* faster execution at preset prices. Immediacy may be important to some customers not only because of their impatience, but because they need *insurance against execution risk, i.e.* the danger of adverse price changes while the

order is filled.[17] It is also important to informed traders, who fear that the information prompting their orders may become public before these are carried out.

3.2. Competition and interdependence

Continental auction markets and SEAQ-I dealers compete for order flow, but at the same time are interdependent. SEAQ-I market makers set their quotes exploiting the real-time price and order flow information disseminated by the auction markets' screens, and use those markets to unwind their excess positions. But also the Continental auction markets benefit from the additional liquidity that London dealers often provide by placing orders in their limit order book. This mixture of interdependence and competition between the two markets is witnessed by at least two pieces of evidence: the effect of trading activity on the Continental Bourses on the SEAQ-I spread, and the continuous arbitrage between these trading systems.

3.2.1. Impact of the Continental Bourses' trading on SEAQ-I spreads

Pagano and Röell (1990, 1993a) report that the London market touch for cross-listed French stocks falls from 3 percent to 1.5 percent when the Paris Bourse opens at 9.00 a.m. (UK time), stays approximately constant at that level until the Bourse closes at 4.00 p.m. and then goes back up to almost 3 percent. This 100 percent increase in the spread by far exceeds the corresponding increase for British stocks in the London market.[18] A similar pattern also emerges for German stocks between both IBIS and SEAQ-I on one side and the Frankfurt Bourse on the other: just prior to the opening of

[17] Pagano and Röell (1993b) provide a model where agents who are more averse to execution risk may prefer the implicit insurance offered by a dealer to the lower expected trading costs of the auction market.

[18] Using evidence reported by Lee (1989), one can estimate by how much the market touch for British stocks rises outside the "mandatory quote period"(from 9.00 a.m. to 5 p.m.): in the early morning and in the evening the average touch is 14.3 percent higher for the most heavily traded stocks (at the time called "Alpha" stocks), and between 9.9 percent and 8.2 percent for less heavily traded stocks ("Beta" and "Gamma", respectively).

the Bourse at 9:30, spreads in both IBIS and SEAQ-I widen and both markets become less deep (Brown, 1994).[19]

There are two possible interpretations of these intradaily swings of the market touch for cross-listed stocks, and they are not mutually exclusive. The first one is that when they are open, Continental exchanges exert a competitive discipline on London market makers who post prices for the same stocks. This "discipline" hypothesis is consistent with most of the evidence on the effects of inter-market competition in the United States. The second explanation relies on the presence of informed traders. When Continental exchanges are open, London market makers rely on their prices as a guide to set their quotes. Being less exposed to traders with superior information, they tighten their spreads.

A related finding is reported by Impenna, Maggio and Panetta (1995), who compare the SEAQ-I bid-ask spread on Italian cross-listed stocks traded via the continuous auction in Milan with the spreads of the stocks still traded via the call auction. In 1992, as the stocks of the first group made the transition to continuous electronic trading, their average bid-ask spread on SEAQ-I declined 35 basis points below that of the second group of stocks. So the effect of home-country trading on the SEAQ-I spread appears to be specifically linked to the fact that trading occurs via the continuous automated auction. This is not surprising if one considers that, in contrast with the pre-existing auction system, the automated auction features instant dissemination of price and order flow data, and allows very rapid order placement.

These empirical findings suggest that, at least after the introduction of the electronic continuous auction, the trading activity of the Continental Bourses has been beneficial also for the users of the London SEAQ-I market, making it more liquid than it would have been otherwise.

[19] A similar result was also found for Italian cross-listed stocks in 1990, before the transition of the Milan stock exchange to a continuous automated auction, but the increase of the London spread after the Milan close was considerably smaller. Pagano and Röell (1991) report that the average market touch on Italian stocks in London started at 1.75 percent at 10:30 a.m., decreased to 1.53 percent at 12:00, then climbed to 1.62 percent at 1:30 p.m. and finally reached its highest value after the Milan close, being 1.86 percent, at 3:00 p.m. (at the time the Milan stock exchange closed at 2:00 p.m. on a normal trading day). Similar figures are found also by Panetta (1991). The fact that the effect is much weaker than for the French cross-listed stocks may be due to the fact that in 1990 the Milan stock exchange was not yet an automated exchange, and thus did not provide the same type of real-time information on prices and order flow as the Paris Bourse.

3.2.2. Continuous arbitrage and cross-border trading

The ease of access of the screen-based systems of SEAQ-I and of Continental auctions allows arbitrageurs to keep the two types of markets strictly in line with each other. Pagano and Röell (1993a) find that SEAQ-I and the Paris Bourse are perfectly arbitraged: in a sample of 380 perfectly time-matched observations for 16 different stocks taken in July 1989, they do not find a single unexploited arbitrage opportunity. It is remarkable that before the transition to automated trading arbitrage was less than perfect for Italian stocks: Pagano and Röell (1991) and Panetta (1991) find that some transaction prices struck in Milan in the "durante" session (the bilateral trading session before or after the call auction) fell outside the contemporaneous best bid and ask quotes of SEAQ-I dealers. This is partly because these trades were generally small and not very visible to the generality of market professionals.

Thus, the visibility and fast dissemination of price data typical of the continuous auction has increased the integration between the London market and the Continental exchanges. This integration has been favored also by the fact that the main SEAQ-I market makers include major banks from the Continent, who are members of the respective domestic exchanges (such as Paribas for France, IMI for Italy, Deutsche Bank for Germany) and have simultaneous access to SEAQ-I and home exchange screens.

But these markets are not linked only by arbitrageurs. As already mentioned, Continental auction markets are used by the London market makers to close their excess positions.[20] Moreover, as mentioned in section 2.3, dealers increasingly operate on the auction markets of the Continent without taking the orders of their clients on their books but rather by working the order gradually into the continuous auction at a price very close to the bounds of the *fourchette* or even within the *fourchette*.[21]

In the Paris Bourse some large intermediaries reportedly execute in this fashion over 75 percent of their block trades in French stocks. Their strategy

[20] In fact, Pagano and Röell (1991) find that, even though most of the time the Milan prices appear to lead those in London, in some instances the reverse occurs. This may reflect the price impact of large orders imbalances that London market makers unload in Milan.

[21] In the Paris Bourse, member firms can execute pre-arranged trades at a price within the fourchette via a procedure known as *application*.

often involves placing a sequence of limit orders which equal or improve the best market quotes, rather than market orders. In their detailed analysis of the order flow and of the limit order book in Paris, Biais, Hillion and Spatt (1995) document that "a large fraction of the order placements improves upon the best bid or ask quote" (p. 1657) and that these aggressive limit orders appear to be motivated by the need to gain priority, especially if the market is deep or the spread is wide. In contrast, under the Bourse's rules, if one places a market order, any excess that cannot be executed at the best price on the opposite side of the limit order book is converted into a limit order at best quote.[22] So the architecture of the trading system implies that a dealer who wants to trade a block in the continuous auction quickly must "provide liquidity" to the opposite side of the market by placing limit orders, rather than "consume liquidity" by placing a single large market order. This trading activity of the dealers tends to contribute to the liquidity of the continuous auction. In this sense, the auction and the dealer market are truly interdependent.

4. Likely future developments

So far we have seen that the microstructure of European equity markets has changed beyond recognition in the past decade. But the near future also promises to be laden with change and turmoil. A host of factors will increase even further the competition between trading systems both across and within national boundaries: the regulatory changes brought forth by the ISD, the emergence of proprietary trading systems, the pressure by institutional investors to narrow broking margins, and the European monetary union (if it happens) will all tend to increase the competition between trading systems, and may eventually lead to the disappearance of some of them via a process of concentration. The longer-term structure of European equity markets will be affected by three main developments: on the demand side, the transition to a funded social security system, which

[22] In other words, a single large market order cannot execute in one shot against many limit orders on the opposite side of the market. So, paradoxically, an impatient trader is forced to place a sequence of limit orders *within* the fourchette, whereas a patient one may accept to place a market order, have part of it converted automatically into a limit order *at* the best bid or ask quote and wait until the latter executes.

will greatly increase the weight of institutional investors in equity markets; on the supply side, the completion of the ongoing privatization of European state-owned enterprises and the possible development of an active market for younger, high-growth companies comparable to that existing in the US.

4.1. Further increase in competition between exchanges

In the last decade cross-border competition from SEAQ-I has been the engine of change in European stock markets. In the future, also the automated auction systems of Continental countries are likely to start competing with each other, via cross-border branching of their network of terminals. The birth of the EUROCAC trading platform in Paris is a first symptom of this development. Several factors are going to stimulate this incipient new wave of competition among exchanges.

4.1.1. Causes ...

First, the novel regulatory framework of the EU **Investment Services Directive** (ISD), effective since January 1996, facilitates both cross-border access for investment firms and cross-border branching by the electronic networks of the European exchanges. The French and German Bourses have already started to exploit this opportunity, establishing direct electronic connections to investors in London and in other major European financial centers. In the near future in each major European city financial intermediaries are likely to have direct access to screens from CAC, IBIS, SEAQ International, from the Madrid and Milan Bourses, *etc.* Initially these terminals will be essentially vehicles to facilitate access to the various domestic exchanges from abroad. But gradually, as more and more stocks become cross-listed, one may find the same stock being traded simultaneously on several competing networks.

In addition to increasing cross-border competition, one can expect sharper competition even *within* national boundaries owing to the growing importance of **proprietary trading systems** (PTSs). These are trading networks set up by brokers in competition with official exchanges, and can take several different forms. In some instances, they do not contribute to price discovery, and are simply facilities to cross orders at a reference price drawn from an official exchange (such as the Arizona Stock Exchange in the

US, which matches orders at the NYSE closing prices after the floor's closing time). In other cases, they allow traders to post anonymous bids and offers and negotiate electronically: the leading example here is INSTINET, already present in the US and the UK and currently branching into Continental Europe. Some PTSs even provide an independent price discovery mechanism.

A third factor which will promote competition is the increasing **pressure to cut trading costs from institutional investors**. Within the financial services industry, power is gradually shifting away from stock brokers and traders in favor of institutional investors, reflecting the latter's increasing weight in the order flow. Institutional investors are increasingly conscious of the toll that trading costs (commissions and bid-ask spreads) take on their performance (Schwartz and Steil, 1996) and are therefore willing to "shop around" different trading systems to achieve the cheapest execution of their orders. In fact, the largest institutional investors are already capable of executing their orders directly on electronic auction markets, and are starting to gain direct access to the marketplace by using intermediaries as a mere electronic "gateways" to place their orders. This process of disintermediation is likely to continue, and competition between intermediaries will tend to be replaced by competition between trading systems in the wholesale segment.

All this may be compounded by the effects of the **European monetary union**, if and when this will happen (this outcome is still highly uncertain at the time of writing). A single currency will eliminate exchange rate risk for European investors and thus encourage them to hold more diversified equity portfolios. The effect will be a great increase in cross-border trading. As a result, to keep and increase their trading volume, national exchanges will have to count less on the captive pool of domestic investors and more on their ability to attract the more mobile foreign investors, competing with alternative trading systems for the same stocks.

4.1.2. ... and effects of increased competition

The proliferation of trading systems will offer investors greater **variety in the modes of execution** of their orders, and will exert **competitive pressure on trading costs**. The wider choice will certainly be beneficial for investors. Auction markets will offer very cheap execution to investors who want to trade small amounts as well as to large traders who are willing

to wait for their order to be executed gradually. Direct access by institutional investors to the limit order book of electronic markets may become widespread. Dealer markets will be increasingly confined to providing immediate execution to block traders who need protection against execution risk, for instance because they need to close an arbitrage or to carry out program trading.

The lower trading costs deriving from greater competition among trading systems will also benefit issuing companies, since the implied reduction in trading costs will be reflected into a higher issue price for equities, hence in a reduced cost of equity capital for public companies. This may also induce more companies to go public, thus helping equity markets in Continental Europe to overcome its main historical weakness, *i.e.* the paucity of young and entrepreneurial companies which turn to public equity markets to finance investment and growth (in stark contrast with the US and UK experience).

These beneficial effects from competition between markets unfortunately cannot be had without bearing the associated **costs deriving from their increasing fragmentation**. One might hope that this tradeoff would vanish if arbitrage keeps prices in line across the various market segments. Arbitrage can indeed reduce the losses from fragmentation of the order flow, but it cannot completely eliminate them, unless there is complete transparency in all the market fragments. This can readily seen if one considers the example of the French cross-listed stocks. Although the prices of the Paris Bourse and the quotes posted by SEAQ-I market markers are perfectly arbitraged, it is still true that the market-makers' quotes in London seldom reflect the true transaction prices that can be obtained from them, and that the orders placed in London are not visible to the generality of investors in Paris. As a result, the Bourse is not as transparent as it would be if all trades were concentrated there and, according to most models, also the liquidity of the Bourse will be lower than under complete consolidation of the order flow (see, for instance, Pagano and Röell (1996) and Madhavan (1995)).

Another cost to be expected from the increasing segmentation of the European equity market is the greater difficulty in detecting and policing insider trading and fraudulent practices. To a certain extent, this problem may be counteracted by setting up a coordinated monitoring scheme and a consolidated trade reporting tape across all the markets involved. But the costs of such coordinated surveillance scheme are going to be considerable,

and they are to be weighed against the benefits associated with the increased competition between markets.

However, at least in some cases, fragmentation may be only a transitional phase, followed by eventual agglomeration of the trading flow in other marketplaces: **some exchanges may not survive** this new wave of competition. While the larger exchanges based in major financial centers are certain to survive, smaller exchanges are at greater risk of losing trading business to larger ones. A defensive strategy that smaller exchanges may enact to counter this risk is to merge their dealing systems with other exchanges. For instance, in June 1997 the Copenhagen and the Stockholm stock exchanges have announced plans to create an integrated equities trading market, which "could mark the first step towards the creation of a pan-Nordic share market, embracing Oslo and Helsinki."[23]

To acquire the flexibility needed in the coming fight for survival, most European exchanges have embarked into a process of **transformation into joint stock corporations**. The idea is that a private legal structure should allow them to respond more rapidly to the changing demands of investors at home and abroad. Whether this will actually be the case will largely depend on the ownership structure and control of the exchanges: depending on the balance of power between domestic and foreign intermediaries, institutional investors and issuers in the share ownership structure, national exchanges will pursue different policies in competing with other markets. For instance, an exchange tightly controlled by a cartel of domestic intermediaries will be more tempted to delay or hinder the provision of remote access to foreign investors, or more generally will hesitate before changing its trading system in ways which may harm local intermediaries, as shown by the London Stock Exchange's reluctance to allow order-driven trading.

4.2. Long-run forces shaping European equity markets

In the longer run, three main factors are likely to reshape the microstructure of European equity markets. The transition from unfunded social security systems to **funded pension plans** will greatly increase the

[23] *Financial Times*, 12 June 1997 (pp. 1 and 15).

demand for equities and the prominence of institutional investors in Continental Europe, where private pension funds currently are still marginal (with the exception of the Netherlands). The design of trading mechanisms in equity markets will therefore increasingly tend to accommodate the trading needs of these investors.

At the same time, the **massive privatization** plans currently being carried out in most European countries will expand the supply of equities in the segment of large, "blue chip" companies, especially in the utilities sector. Since the shares of large corporations tend to be the most actively traded ones, the turnover rate and the overall liquidity of European equity markets will increase.

The supply of equity capital to European markets may increase further owing to an increased flow of **initial public offerings by young European companies**. Currently, companies tend not to list on stock markets to finance investment and growth in the early stage of their life, unlike their US counterparts: the average age of firms going public in Continental Europe is 40 years (Rydqvist and Högholm, 1996), while in the US the corresponding figure is 6.7 years for venture-backed firms and 11 years for non-venture-backed firms (Gompers, 1992). The reasons why young European companies have such a smaller propensity to go public are still imperfectly understood: it is unclear to what extent this reflects their ability to find other, more efficient channels to finance their investments or rather their inability to access public equity markets – and, if so, which are the obstacles obstructing their access to the stock market. In a recent article, *The Economist* has argued that the main obstacles may be Europe's institutional investors aversion to invest equity in start-up firms and the lack of a liquid stock market dedicated to small firms.[24] If so, the design of a suitable market microstructure may help to induce young and dynamic companies to go public, as shown by initiatives recently undertaken in various European countries.

The French "Noveau Marché" is the most promising of these initiatives in Continental Europe: created in April 1996, it attracted 23 companies in its first year of life, and plans to add 25 more by the end of 1997. It has a hybrid trading system: the electronic limit order book is supplemented by the intervention of an "animateur", a market-making intermediary paid by

[24] *The Economist*, 25 January 1997, pp. 15-16 and 20.

the issuer to supply liquidity and continuity to the market. Currently the Noveau Marché is still much smaller than London's Alternative Investment Market, which in 1996 had 283 listed companies. But recently Paris has launched a coordinated effort with three other exchanges to create a single Continental market for young companies: Frankfurt (Neuer Markt), Brussels (Euro.NM Bruxelles) and Amsterdam (Nmax) are about to create, together with the Noveau Marché, a four-market, fully integrated trading system for young companies based in Brussels and called Euro.NM.

A similar attempt to foster a pan-European trading system for young companies is being made by the new EASDAQ market, also based in Brussels and designed very closely after the NASDAQ quote-driven trading system in the US. EASDAQ is funded by a group of European banks, securities firms and venture capitalists, as well as by NASDAQ itself, and hopes to attract particularly high-tech, dynamic young European companies. To this purpose, its management is trying to persuade European companies currently listed on NASDAQ to seek a dual listing on the new exchange.

It is still too early to say if initiatives such as the Euro.NM or the EASDAQ project will contribute to increase significantly the flow of initial public offerings by young and dynamic European companies. If they succeed, they will have helped to remove a crucial bottleneck in the development of European equity markets.

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