C petition Between S k Exchanges: A rvey

So RAMOS
HEC sity of Lausanne, FAME and CEMAF/ISCTE

Res ber N° 77
Feb 3

FAME onal Center for Financial Asset Management and Engineering

INTERNATIONAL CENTER FOR
FINANCIAL ASSET MANAGEMENT AND ENGINEERING

RESEARCH PAPER SERIES

The International Center for Financial Asset Management and Engineering (FAME) is a private foundation created in 1996 at the initiative of 21 leading partners of the finance and technology community together with three Universities of the Lake Geneva Region (Universities of Geneva, University of Lausanne and the Graduate Institute of International Studies).

Fame is about *research*, *doctoral training*, and *executive education* with "interfacing" activities such as the FAME lectures, the Research Day/Annual Meeting, and the Research Paper Series.

The *FAME Research Paper Series* includes three types of contributions:

- First, it reports on the research carried out at FAME by students and research fellows.
- Second, it includes research work contributed by Swiss academics and practitioners interested in a wider dissemination of their ideas, in practitioners' circles in particular.
- Finally, prominent international contributions of particular interest to our constituency are included as well on a regular basis.

FAME will strive to promote the research work in finance carried out in the three partner Universities. These papers are distributed with a 'double' identification: the FAME logo and the logo of the corresponding partner institution. With this policy, we want to underline the vital lifeline existing between FAME and the Universities, while simultaneously fostering a wider recognition of the strength of the academic community supporting FAME and enriching the Lemanic region.

Each contribution is preceded by an Executive Summary of two to three pages explaining in non-technical terms the question asked, discussing its relevance and outlining the answer provided. We hope the series will be followed attentively by all academics and practitioners interested in the fields covered by our name.

I am delighted to serve as coordinator of the FAME Research Paper Series. Please contact me if you are interested in submitting a paper or for all suggestions concerning this matter.

Sincerely,

Prof. Martin Hoesli
University of Geneva, HEC
40 bd du Pont d'Arve
1211 Genève 4
Tel: +41 (022) 705 8122
Martin.Hoesli@hec.unige.ch

Competition Between Stock Exchanges: A Survey

Sofia B. Ramos

February 2003

Competition Between Stock Exchanges: A Survey

Sofia B. Ramos
HEC Lausanne, FAME and CEMAF/ISCTE

Current version: 1 February 2003[‡]

Abstract

This paper offers a systematized and updated view of competition between exchanges. It is divided in two parts: In the first part, we describe the recent reforms in stock exchanges and the main forces driving the development of competition. The second part surveys research done on stock exchanges.

JEL classification: G15, G29.

Keywords: Stock Exchanges, Reforms, ECNs, Mergers, Demutualization, Cross-Listing.

[‡] Financial support from the Fundacao para a Ciencia e Tecnologia, is gratefully acknowledged.
Address Correspondence should be send to : CEMAF/ISCTE, Av. Forcas Armadas 1649-026, Lisbon, Portugal
sofia.correiabritoramos@etu.unil.ch, sofia.ramos@iscte.pt

Executive Summary

Competition is an incentive to reform. The process of reforms in European exchanges, initiated in the mid-80s, stems from the rivalry of exchanges (Pagano and Roell, 1990). From early times, trading volume has been presumed to have a tendency to migrate to the most cost-efficient and liquid markets. More recently, the Euro has fostered a wave of consolidation and rationalization. There is also evidence that periods of increasing competition are associated with stock exchange mergers.

This paper aims to contribute to the literature offering a systematized and updated view of competition between exchanges. Although market evolution is closely followed by academics and the media, new developments have arisen at an accelerated pace in recent years, requiring an understanding of the intricate nature of competition. We thus provide a brief overview of recent events, having as background the theoretical framework of the core of competition.

This paper is divided in two parts: In the first part, we describe the recent reforms in stock exchanges and the main forces driving the development of competition. The second part surveys research done on stock exchanges.

The first part begins with a description of the origins of the recent shift in exchanges: liberalization of economies, changes in the architecture of markets, advances in communication, and the European Monetary Union and the Investment Service Directive. Then, we describe recent stock exchange reforms, emphasizing aspects such as electronic trading systems, cooperation, corporate governance issues and the creation of new markets, which we outline in the following paragraphs:

- Exchange architecture seems to be a competitive advantage, and has definitely been influenced by advances in communications and technology such as electronic trading systems.
- In a first phase, mergers in Europe were dominated by domestic rationalization; in a second phase, cross-border deals were sought, likely as a consequence of stronger integration of economies. In the United States, a critical obstacle to many deals or attempts at restructuring is the non-electronic nature of many US exchanges.
- A profound change is the transition from the traditional non-profit or cooperative system to alternative governance structures. Investors are distrustful of membership organizations, which are not believed to adopt all the optimal innovations.

- There is increased international competition between exchanges. Exchanges are striving to become international finance centers, where US markets seem to have the advantage, despite more demanding disclosure requirements. On the other hand, EU exchanges are focusing more on trading and not on attracting listing.
- The success of new markets for high-tech firms in Europe has yet to be proven.

The first section ends with a discussion of some of the issues determining the future of competition: the home equity bias, the Electronic Communication Networks (hereafter ECN), investor preferences and the concentration in industry.

- Home equity bias reduction is anticipated. Investors face fewer constraints and are expected to invest more in foreign markets, thus increasing cross-border trade. This gives an edge to exchanges, while endangering local monopolies, since exchanges lose their natural base of investors because the latter are free to seek more attractive markets.
- In a free market, the notion of competition is exemplified by the presence of new entrants who try to take advantage of market gaps. This stands in sharp contrast to the environment in Europe, where there is scope for protectionism.
- Market-driven fragmentation and the diversity of trading mechanisms are seen as desirable by academics, but clearly confront the interests of organized exchanges.
- European capital markets are expected to continue to grow because of demographic change, the establishment of pension funds, and the privatization of large state-owned companies (Dermine, 1999). Competition will be strengthened by the influence of institutional investors.
- In Europe, local markets are expected to continue to dominate despite the advantages of a single market. Two paradigms of solutions are proposed: a central European stock exchange versus a decentralized approach that aims to link national markets through a Europe-wide network.

In the second part, we assess several factors that determine the competition framework. In the new competitive framework, listing and trading are separate activities and there is evidence suggesting that physical location is no longer an indispensable factor. Both trends of consolidation and fragmentation seem to co-exist and will continue to do so. The concentration of trade is due to economies of scale and scope and positive network externalities. But competition acts as a disaggregative force, since investor preference differs, leading to segmentation. While greater concentration of trading in dominant market centers

can be foreseen (for instance, trade value on the NYSE represents 77% of the total value of US equity trading activity), fragmentation will be induced by the growth of competition, segmentation and the political intervention of authorities to protect domestic markets.

The theories that defend the advantages of trading on a single location advocate that consolidation creates externalities as well economies, which are self-reinforcing. Exchange mergers were a natural response to new markets conditions. In the US, in the past century, several mergers have occurred, and there is empirical evidence of their effectiveness in a competitive environment. In Europe, mergers were confined to within its borders. The US example is often used to forecast future competition. However, Europe is a diversified space where exchanges reflect historical and cultural differences, while the US is more homogeneous.

A main conclusion of this study is that reforms in exchanges, fostered by competition, lead to improvements in various domains such as trading systems and the decrease of transactions costs. Reforms will continue to be triggered by exogenous forces, since exchanges *per se* have little incentive to change the *status quo*.

Competition Between Stock Exchanges: A Survey

1 Recent Developments

1.1 Introduction

In the last two decades drastic changes have affected exchanges[1]. Exchanges are moving from an era of monopolies to a new era marked by competition. In this introduction, we try to identify the factors stimulating this shift. Market globalization and technological developments are causing this phenomenon to be felt worldwide, as the once traditional structures of monopolies are being destroyed. In Europe, such major elements as deregulation and economic and monetary convergence are also considered to be main reasons for the recent progress.

While advances in communications have brought new opportunities, they also present a threat. Market geography has been modified in such a way as to potentially create an international base of investors through terminals in other countries. The flip side is that the traditional base of investors of an exchange has access to more opportunities than merely on the domestic market.

The progressive liberalization of European economies and waves of privatization have reanimated sleeping stock exchanges and established new ones. As this paper illustrates, the business of exchange was very dynamic in the last decade. Clayton, Jorgansen and Kavajecz (1999) report that sixty new financial exchanges have been created since 1990. They identify the likely factors they consider as having been critical for the establishment of these new exchanges: economic freedom in taxes, regulation and banking, and the existence of larger economies. In contrast, technology shocks that increase communication links reduce the likelihood of new exchanges being established. Yet, the study does not refer to the new wave of ECNs which, in the absence of regulatory barriers, render industry entry much easier than ever, since technological advances decrease the costs of setting up an exchange.

[1] While this work focuses mainly on stock exchanges, some of the issues debated here are common to other kinds of exchanges, as well. Also, the main emphasis is on European exchanges.

The wave of reforms, which started in the mid-80s, included access to stock exchange memberships, commissions, as well as changes in trading systems, such as information dissemination and settlement procedures.

In Europe, the single currency is expected to have more striking effects in the medium and long term. A single currency increases comparability between stock exchanges, causing more direct competition since the home currency effect, sometimes responsible for competitive advantage, disappears. Additionally, a currency changeover simplifies international transactions and increases market liquidity by eliminating conversion costs and exchange rate risk. This should, in turn, boost international investments and stimulate the overall level of economic activity (De Santis, Gerard, Hillion, 1999). Finally, the EMU encourages market integration by improving information flows and by readjusting traditional international asset allocation methods from a nation basis to a pan-European industry basis (Danthine, Giavazzi and von Thadden, 2000).

The next subsection provides more details on the change in exchanges, the most drastic of which took place in Europe.

1.2 Resume of Major Reforms

In the 80s, the London Stock Exchange (LSE) was the first European exchange to initiate a transformation, the effects of which are still of major influence in Europe today. The LSE opened dealership to competition by banks and other financial institutions, liberalized commission charges, introduced extensive use of computerized systems in price quoting and order placement procedures, and reduced the stamp duty, which implied a gain on competitiveness by a decrease in costs (Tonk and Webbs, 1989).

The London market for non-UK stocks, SEAQ International (SEAQ-I) started listing some major European companies already listed on national exchanges without their request. The purpose was to become a trade platform for continental exchanges. The upshot was an immediate increase of trade for London, "*more than 50 % of the volume of the French blue chips and one-third of the German ones were diverted to the London market*" (Benos and Crouhy, 1996, p.38), which caused other exchanges to react. Continental exchanges underwent a series of trading system and regulatory reforms. These reforms had common features such as introducing continuous electronic order-driven systems, liberalizing access to their membership, and reducing transaction fees [2].

[2] For a more detailed description of the changes in the 80's see Pagano (1998).

European integration is responsible for fostering another set of reforms. EU legislation aims to provide equal opportunities for its members. The Investment Service Directive (ISD), effective since January 1996, is the legislative centerpiece of the single market program for the securities domain. Market integration is encouraged since each recognized exchange is automatically accepted in other EU countries and offers remote access to intermediaries in other EU countries without imposing further regulatory burdens.

In addition, ISD promotes remote membership and price disclosure (on- or off-market trading). Member states that implement ISD can guarantee their investment firms freedom of establishment and freedom to provide services in other EU states. However, until recently, implementation of the ISD has been limited to a few states (Wymeersh, 1998).

Moreover, the influence of national interests is present: ISD Article 15.5 allows countries to prohibit the creation of new markets on their territory. The ISD also provides home country control in supervising financial institutions, using a "concentration principle" jointly with restrictions on non-regulated markets. This concentration principle entails a potential requirement that all trades should be executed on a "regulated" or a "organized" market. Recognition of a regulated market makes it possible for member states to preserve the monopolistic position of the existent market.

In short, a domestic market can still unilaterally limit the rights of a foreign "regulated market" by invoking Article 15.5 against the creation of a new market within its territory. Therefore, the ISD fostered competition in domestic countries through access of foreign intermediaries, whereas it reflects "political compromises which invariably allow a considerable degree of protectionism to persist" (Steil, 1996, p.137).

Recently, the emergence of ECNs contributed to a new round of reforms such as for corporate governance.

1.2.1 Electronic trading systems

One of the main exchange reforms was the computerization of trading. In 1977, Toronto was the first exchange to computerize its trade. Since then, a growing number of exchanges have opted for electronic trading, while floor trading is being progressively abandoned. The systems are fully computerized in the sense that the information system, order routing, queuing and execution systems are automated. Auctions markets are centralized systems and, as such, are more suitable for automation of trading than are dealer markets, which are set up as fragmented networks.

This trend is not specific to stock exchanges. Sarkar and Tozzi (1998) state that electronic trading systems were used in an attempt to boost trading volume for derivatives exchanges. They report that the number of (future and option) exchanges using electronic systems increased from eight in 1990, to forty in 1997.

The greatest advantage of electronic trading is its ability to promote cross-border trading. Exchanges can install local access points or direct computer connections, thus expanding their business. Moreover, recent estimates of exchange setup costs suggest that development on the trading floor is from two to forty times more expensive than in electronic marketplaces (Domowitz, 2001) and has lower fixed costs.

This innovation is not as frequently adopted in US exchanges, since, for the most part, the computer there has been used for order routing and information dissemination rather than for trade execution.

The introduction of computerized systems is an important instrument for competition because it decreases transaction costs[3] and thus increases liquidity. An analysis of international markets suggests that expected savings in total costs from automated execution technology are about 40 basis points (Domowitz, 2001).

Overall, in Europe, trade and execution systems are becoming very similar, with the notorious exception of London[4]. The trading systems seem to be aiming for more flexibility in order to please several types of clientele. Pagano (1998) states that European exchanges are converging towards a dualistic structure, or "hybrid," formed by an automated auction system specializing in small- and medium-sized trades and a market-making segment devoted to large trades.

---

[3] For a comparison of the advantages and disadvantages of systems, see Sarkar and Tozzi (1998). The authors compare costs of different trading systems: fixed costs (number of traders employed and their salaries) are higher for open outcry market, while a screen-based system requires less labor, skill and time. They also found that the costs of processing customer orders are also lower for electronic trading, as are overhead costs: Building, staffing, back-office costs tend to be higher for open-outcry methods. Also Domowitz, Glen, and Madhavan (2001) report that the widespread option of automated limit order book systems is a factor in reducing costs. Domowitz and Steil (1999) document a decrease in explicit costs for listed stock (60%) and in total costs for UK shares from trading on automated systems in the US relative to traditional trading systems.

[4] Exchanges in Anglo-Saxon countries generally have a market making system, while continental European exchanges, which first started using call auction, evolved to continuous auction markets, and now have an electronic auctions system.

1.2.2 Cooperation

The last decade was characterized by a great number of deals between exchanges, Cybo-Ottone, Di Noia and Murgia (2000) report around 100 deals between European exchanges.

Table 1: Type of Deals between European Exchanges

	Domestic		Cross-Border			
	Mergers	Others	Mixed integration	Mergers	Others	Total
96-97	9	2	6	1	8	26
97-99	11	1	29	2	20	63

source: adapted from Cybo-Ottone, Di Noia and Murgia (2000)

In Europe, the pace of contacts increased from 1997-99. This cooperation has taken the form of mergers, for example, which have been limited to two areas: between stock and derivatives exchanges in the same country[5] and between regional exchanges of the same country[6].

We can distinguish between horizontal and vertical mergers. Horizontal mergers try to explore economies of scale and scope.[7] Vertical integration arises because listing, trading, clearing, settlement and central custody are different parts of the same chain of value. An example of vertical integration between the exchanges, clearing house and depository was achieved in the Deutsche Börse (DB), Amsterdam Exchanges and Brussels Exchange.

---

[5] E.g. Bruxxel and Belfor (1997), Copen SE and Cop Fut (1997), Helsinki SE and SOM (1997).

[6] E.g. Madrid and regional exchanges (1991), Milan and regional exchanges (1991), Zurich and regional exchanges (1991).

[7] Two examples follow, one between exchanges and the other, between clearing houses:

"*Members of American Stock Exchange (AMEX) voted in favor of a merger with the National Association of Securities Dealers (NASD). One of the interesting points of this business is that NASDAQ is an all electronic market and AMEX is an open-cry-specialist driven auction market. The plan is that NASDAQ and AMEX will remain separately operating entities, and it will exist an effort in technology upgrading AMEX's equity floor. The main goal of this cooperation is to chase NYSE, the premier market of the USA*"-Source: Wall Street&Technology, Vol. 16, No.9.

"*The London Clearing House and Clearnet SA, the clearing subsidiary of Paris Bourse, announced plans for the creation of a consolidated European clearing house. The new entity will use a single set of clearing and netting systems, based on Clearing 21, a technology adapted from the Paris Bourse and from The Chicago Mercantile Exchange's original software. According to its backers, the merged entity will be the largest central counterpart in Europe for capital, energy and commodity markets, cash and derivatives, traded on regular exchanges and/or on the OTC market*"-BIS, April 2000.

Cross-border contacts led to a great number of announcements, but a low level of implementation (Cybo-Ottone, Di Noia, Murgia, 2000). Many deals were ambiguous arrangements frequently in the form of an implicit merger[8]: "*an agreement between two exchanges such that the securities listed in one exchange are listed by the other and remote access is offered to the traders of each exchange, with reciprocity and without further requirements*" (Di Noia, 2001).

An example of a successful merger of derivatives exchanges is EUREX (both Swiss exchange and DB have 50% of EUREX). As it is stated "*the outstanding performance is mainly due to the efficiency of electronic trading, combined with low transaction costs and a significant increase in membership across Europe and United States*"[9].

Another relevant example is the announcement of the LSE and DB alliance in July 1998. In May 2000, DB and the LSE announced a merger of their operations. The new entity, called iX (International eXchange), which should be detained in 50% by each entity, would pool the exchanges[10] business in equity and derivative instruments, with Xetra, the DB's electronic trading system, becoming the trading platform.

We would like to emphasize the importance of electronic systems and other communication devices in enabling connection between geographically distant markets. Indeed, the differences in integration usually lie in the type of access to the trading platform: a single access to a common platform; common access to different platforms; or remote membership.

The ultimate goal in the "race" for cooperation is survival, since destructive competition is avoided. Technological and regulatory developments allow trading to be carried out anywhere and to be offered by anyone (see 1.3.2 Private Markets). Mergers and other forms of integration seem to be a solution for members to maintain their presence in the market. Additionally, mergers offer advantages as economies of scale, a barrier to potential entrants, preparing for the effects of future liberalization. Also, major users prefer connecting to a single system rather than to many different ones. Intermediaries do not want to pay

---

[8] The term is accredited to Domowitz (1995b) which applied to derivative exchanges: "*consist of a set of derivative products, offered by at least two existing exchanges and sharing a common membership for the purpose of trading via direct access to the market*". In the table see in the category of mixed integration.

[9] Brochure from website.

[10] "*the goal of the alliance is to deliver a low-cost, efficient and accessible market infrastructure to enable issuers, investors and market participants to take full advantage of the opportunities arising from the development of a pan-European capital market*". The Banker, August 1998. This deal was later aborted.

memberships to various European stock exchanges or want to have a dozen different terminals for trading and settlement of trading. While the monopoly situation was quite comfortable for exchanges, it was no longer sustainable. The pressure for deals is evident through the great number of announcements. The agreements take different forms, whereby mergers seem to represent a strong trend in competition. However, mergers are only implemented within borders, suggesting difficulties in bypassing country and regulatory factors.

1.2.3 Changes in Corporate Governance

The discussion on alternative systems of corporate governance of stock exchanges is extremely controversial. Traditionally, exchanges have been seen either as public entities, like continental European exchanges, or as formally private structures, deeply regulated by public rules like the Anglo-Saxon exchanges. In all cases, they were closed-membership organizations with high barriers to entry.

More recently, some European exchanges have undergone a process of public supervision to demutualization, i.e., they have become for-profit corporations. Other countries have followed the Anglo-Saxon model: in the US, markets have historically been private entities and member-owned exchanges.

New paradigms have emerged like the Scandinavian[11] and Australian view of exchange as an investor-owned firm. In the Stockholm Stock Exchange, issuers have 50% of shares, while the Australian Stock Exchange, Amsterdam, and Tradepoint are listed companies for which private investors may own capital. Some of exchanges even list their own shares like the Australia Stock Exchange. For instance, this change opened the way for a hostile bid of OM, the Swedish exchange company, for the LSE, which due to the demutualization in March 2000 is now subject to Britain's takeover rules.

Supporters of demutualization see it as a trigger for the restructuring of stock exchanges. The passage to market-oriented organizations seems to respond better to stiff competition. For instance, exchange boards often refuse automation of trading as it is seen as having major implications on the profitability of brokerage and dealer firms, commonly exchange members.

[11] Exchanges privatization/demutualization: Stockholm SE (93), Helsinki SE (95), Copenhagen SE (96), Amsterdam Exchanges (96), Borsa Italiana (1997), Australian SE (98), Iceland SE (99), SIMEX (99), Athens SE (99), Stock Exchange of Singapure (99), Hong Kong SE (2000), Toronto SE (2000), LSE (2000) from Domowitz and Steil, 1999.

Following this trend, US exchanges[12] also plan on becoming for-profit companies and even self-list. The main justification is the belief that a private legal structure should be allowed to respond more rapidly to the new environment[13].

The effects of demutualization and privatization seem to be a promising area resulting in new and interesting progress.

1.2.4 Cross-listing outside domestic markets

One major trend that has been intensified over the last few years is the "invitation" of foreign companies to list on domestic markets, which has brought profits for both parts. Exchanges benefit from listing fees and trading volume, and corporations expand their base of investors and strengthen their public image.

This can also be seen as a result of some large exchanges adopting a strategy of assuming the role of international financial centers. For instance, in 1995, NYSE had 252 non-US companies listed from 40 countries against 406 in 1999. Cochrane, Shapiro and Tobin (1995) identify two causes for this: firms are looking for equity as a source of finance, more so now than in the past, and US investors are more receptive to invest in foreign equity. The US market had benefited from these two trends, acting as an intermediary between the increasing demand and supply. Participation of foreign issues in the US market could be higher if it were not for the obstacle of the US regulatory requirement whereby non-US companies have to reconcile their home financial accounting documents to US-Generally Accepted Accounting Principles (GAAP). In the authors view, US stock exchanges might be losing business because of their demanding disclosure requirements, leading some companies to look elsewhere for listing.

Pagano, Roell and Zechner (1999) studied the geographic pattern of foreign listing from 1986-1997. They concluded that while European companies are more outward oriented, European stock exchanges are not, bringing about a great loss for the exchanges from 1991 to 1997. European companies have gone abroad, particularly to US exchanges, while US companies have reduced cross-listing. The decline of foreign listings on European exchanges appears to be part of a more general decline in exchanges ability to attract new listings. Most of them have not attracted many new domestic listings. The opposite is true of US exchanges,

---

[12] like the NYSE, a two-hundred year old institution, is planning to issue capital (The Wall Street Journal, 29 July 1999).

[13] In contrast, the futures market is not following this trend, a rejection justified by the absence of competition (Lee, 1998).

where both domestic and foreign listings have increased over the sample period. According to the authors, trading costs is the indicator which appears to have the closest correlation with normalized net change of cross-listings.

Table 2: Number of Companies with Listed Shares (source:FIBV and Steil (1996))

	1999		1998		1994	
Market	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Amsterdam	233	154	255	146	317	215
Athens	262	0	229	0	165	0
Brussels	146	122	146	122	155	141
Copenhagen	233	9	242	12	243	10
Dublin/Irish exchange	84	19	79	21	56	9
Deutshe Bourse/Germany	617	234	452	210	423	227
Helsinki	147	3	129	2	65	0
Lisbon	125	0	135	0	83	0
London	1826	448	1957	466	1747	462
Luxembourg	51	226	53	223	55	217
Madrid	718	9	479	5	375	4
Paris	968	176	914	183	459	195
Stockholm	277	23	258	18	106	8
Vienna	97	17	96	32	94	41
Total	5784	1440	5424	1440	4343	1529
NYSE	2614	406	2278	392	1689	216
NASDAQ	4400	429	4627	441	4577	325
Tokyo	1892	43	1838	52	1651	110

Also, Table 2 shows that, from 1994-1999, European exchanges increased the number of listed domestic companies, while the number of listed foreign companies decreased. However, this trend is not homogeneous within countries. Since 1994, the domestic segment grew more than 50% in the Athens, Dublin, and German exchanges, and in Helsinki, Lisbon, Madrid, Paris, and Stockholm, while both domestic and foreign listing decreased in the others. In the foreign listing, only Dublin and Stockholm doubled their number of listings. In the US, the presence of foreign firms increased in both markets. However, while there was a higher concentration of domestic firms on NYSE, the majority of the foreign firms listed were European (65%)(FIBV News Letter July).

1.2.5 Exploring new markets

There are two main ways to achieve growth: one is through acquisition of another company, and the other is by developing new products, markets and processes. As already pointed out, the way of acquisition is already being used, but exchanges have not excluded the latter way, creating markets, for instance, for companies with great potential growth.

Table 3: Total Number of Listed Companies (source:FIBV)

Market		1999	1998
Amsterdam	Euro-NM Amsterdam	13	13
Athens	Parallel market	70	51
Brussels	Euro NM Belgium	8	13
Dublin	Developing Companies	5	4
Germany	Neuer market	201	62
Helsinki	I list and NM list	48	41
London	AIM	347	312
Paris	Nouveau Marche	111	81
Stockholm	OTC list and O-list	204	171

In contrast with US markets, European capital markets do not normally supply capital to new firms. Now, some steps have been taken to invert that trend through the constitution of some new markets. The French 'Nouveau Marche', created in 1996 by the Paris Exchange to attract high-growth companies, is a dual structure with an electronic limit order book and one or two daily call auctions operate side by side. Other examples of market places for small or start-up companies are the London's Alternative Investment Market (AIM) created in 1996, the Frankfurt Neuer Market, created in 1997, and Euro N.M. Belgium, created in 1996.

Table 4: Market Capitalization of Firms (000.000 USD), (source:FIBV)

Market		1999	1998
Amsterdam	Euro-NM Amsterdam	1141	1277
Athens	Parallel market	20317	3489
Brussels	Euro NM Belgium	160	71
Dublin	Developing Companies	142	80
Germany	Neuer market	74572	46636
Helsinki	I list and NM list	2734	3415
London	AIM	21706	7383
Paris	Nouveau Marche	15261	4900
Stockholm	OTC list and O-list	73183	43315

These markets have been created in line with economic and political goals and aim to finance high-tech and economy enterprises, which are believed to be instrumental in creating economic growth, technological innovation and jobs. Historically, in Europe, small- and medium-sized firms have always frowned upon raising funds from stock markets, because they have secondary status, therefore their stock market is seen as a minor market. The launch of this market renovates hopes based more on an alternative market view.

Given the recent creation of these markets, it is too soon to make solid conclusions. The table shows that the number of companies in this market has grown substantially in Athens, Germany, London, Paris and Stockholm, while market capitalization has grown across the

board, except in Helsinki. Some explain that this diverse growth in some markets is due to the addition of more small firms, while others attribute it to an increase in capital.

Overall, the German market seems very successful: "*The Neuer Market for high-tech companies halted the flow of European listings to America's NASDAQ*" (The Economist, 2 September 2000).

1.3 Challenges

1.3.1 Home equity bias

Despite an increasing accessibility to international markets, empirical evidence reports the existence of home bias in equity portfolios: stock market investors maintain a puzzling preference for home assets.

This was initially explained in terms of barriers to international investment, such as government restrictions on foreign and domestic capital flows, taxes, tariffs and fees. However, empirical evidence has not provided a clear support of those hypotheses[14]. Dissatisfaction with institutional explanations has led some authors to consider explanations based on investor behavior. French and Poterba (1991) suggest that investors may simply be relatively more optimistic about their domestic markets. Strong and Xu (2002) found evidence that fund managers are comparatively biased in their outlooks towards their domestic market.

The more consensual explanation relies on local informational advantages. Gehrig (1993) states that, until the early 1990s, the home bias could be explained by informational problems that domestic investors faced when valuing foreign securities. This view is supported by the work of Tesar and Werner (1995), and Hau (2001), who explicitly introduce variables such as geographical distance and language barriers into asset pricing models in order to proxy informational frictions. Hau (2001) states that linguistic and cultural barriers, rather than geographic distance per se, is key to the informational advantage identified in the data. Local proximity is positively correlated with intra-day profits, indicating local informational advantages.

The problem could be bypassed by cross-listing. As discussed above, the strength of home equity bias lies in behavioral components and on informational factors, like linguistic and cultural barriers. Thus, if exchanges notice that investors are more prone to investing in the

domestic listing, a good solution is to expand this set of opportunities. Furthermore, if firm visibility increases, as reported by Baker, Nofsinger and Weaver (1998), capturing the attention of analysts, then the informational barriers are broken, and the bias is expected to decrease.

Overall, a decrease in home bias is expected because pension funds will trade more actively, communications will be improved by computerization advances (Biais, 1999), and information costs of European cross-border investment will be reduced by the EMU (Danthine, Giavazzi and von Thadden (2000)). Despite the bias reduction, geographic factors will continue to matter, and domestic markets will always be the major ones (Breuer, 1995).

1.3.2 Private Markets

The growth of Electronic Communication Networks[15] (ECN), alternative systems for negotiating stocks, is a main source of competition for exchanges. An ECN is a communication network designed to match orders[16], competing with stock exchanges by providing an alternative trading structure and with market makers by offering lower transaction costs.

A key feature of ECNs is the matching service: electronically matching buyers and sellers. This eliminates the need for a human broker dealer, thus lowering transaction costs. ECNs also offer after-hour trading capacities.

Some see them as merely responding to pressure for after-hour trading[17], worldwide network extension and cost competition, since ECN competition is based on lower spreads but greater volume.

ECNs have US roots[18] and since 1997 the Securities Exchange Commission (SEC) has given ECNs a special statute. The first ECNs have been designed as proprietary systems, i.e.,

---

[14] Tesar and Werner (1995) state that transaction costs cannot explain the equity home bias. Cooper and Kaplanis (1994) explain the motive as hedging domestic inflation, but that implies levels of investor risk aversion below those conventionally assumed.

[15] E.g. Strike, ReDIbook, Brut, Archipelago, Island, Tradebook, NextTrade, Attain.

[16] A striking example: Island intends to execute transactions at an extremely low cost, without the traditional role of intermediaries and dealers. Island represents orders in NASDAQ Stock Markets, and is registered as an ECN with the Securities and Exchanges Commission. On an average day, Island trades over 190 million shares, approximately 12% of the transactions of NASDAQ. In the first quarter of 2000, growth was 135% over the first quarter of the previous year.

[17] As of 2 June 2000, DB extended trading hours until 8 p.m. as a reaction to the competition of PTS (Proprietary Trading Systems), Source: FIBV Focus News Letter July.

systems with software and hardware belonging to the operator. New competitors have chosen open interface providing only additional privately owned software.

Although they represent a threat, their strength in the market is still limited. JP Morgan/McKinsey Company (2002) estimate that European ECNs have gained only 1% of European Markets versus 37% of NASDAQ in US. Benhamou and Serval (2000) emphasize the importance of the critical mass in the exchange business. For them, ECNs are still fragile. In fact, few Internet exchanges have endured; only private exchanges sponsored by private companies.

In this market share dispute, it is enlightening to analyze how ECNs presence in the market is evolving. First, some exchanges are trying to acquire some of the ECN in an attempt to modernize their structure. Second, some ECNs are moving towards regular exchange, having applied to the SEC for an exchange status which was approved in 2001 (ATS rules). Third, some are becoming more like brokerage firms such as Instinet of Reuters, member of 17 exchanges.

The presence of ECNs is obviously not peaceful. Market participants defend that normal exchanges like NYSE and NASDAQ have mechanisms that provide liquidity and buffering, mainly through the presence of specialists and market makers, which are absent from ECNs. Other critics also cite opacity in after-hour trading, lack of fraud control and "price piracy."

One of the strongest impacts of ECNs is fragmentation, which merits criticism for its effect on market liquidity and price formation. The free-riding of information weakens the exchanges where price is discovered and weakens the validity of market price. Piracy has led exchanges not to reveal the equilibrium price with accuracy, hurting the transparency in financial markets. On the other hand, some state that fragmentation is a natural phenomenon of free markets, given the different specificities of clients (Blume, 2002). Forced consolidation of order flow prevents competition between market centers that offer different trading systems. By this reasoning, Schwartz (1995) defends that order flow fragmentation must be allowed. The benefits of consolidation[19] can be obtained in a fragmented market

---

[18] with the exception of Tradepoint, a London exchange, which began to offer trading services in UK equities in September 1995. Also, in November 2000, OM, the Swedish exchange group, launched JIWAY, a cross-border trading system for retail brokers with Morgan Stanley Dean Witter. (Source: The Economist, 2 September 2000).

[19] Even if off-exchange dealing is allowed in most countries, exchanges usually try to impose consolidation. For instance, Paris imposed that all trades must be channeled through the exchange; NYSE Rule 390, preventing NYSE member firms from acting as market makers in NYSE-listed stocks in other exchanges, was confronted

when information freely flows between market segments and when all traders do not have to trade in only one segment. Besides, competition fostered by fragmentation has benefits like lower costs and innovation. The question is open "*fragmentation deriving from market architecture is desirable; fragmentation deriving from free-riding on price discovery is not*" (Steil, 1996, p.61).

1.3.3 Changes in the Demand for Equities

In the past years, the demand for equities has displayed some changes. Globally there has been a growing demand for securities, where "*the most rapidly growing class of participants is the institutional investors* " (Steil, 1996, p.59). This is due to a change in demographics, which will have two major implications: financial resources traditionally raised by banks in the form of deposits will have to be replaced by life insurance reserves and/or pension funds. Also, pension funds are sophisticated investors likely to invest domestically and internationally in the capital markets.

Demand for foreign equity is expected to increase due to the decrease in restrictions to cross-borders investments, to the single currency, the emergence of European pension funds, the reduction of informational and agency costs, the computerization and interconnection of trading centers. In a first phase, EU investment in securities can be concentrated in countries adopting the single currency. However, European investors will also diversify outside EU borders, since European equity markets will be more correlated, offering lower diversification benefits. That will force European investors to look more at non-EU markets in order to diversify. "*One can therefore anticipate an enormous growth in the size of capital markets in Europe and in cross-border trading*" (Dermine, 1999).

The segment of institutional investors will continue to grow: They are already the largest segment, representing 70-80% of NYSE daily average volume traded, and their influence is expected to increase due to the restructuring of social security systems. However, this group of investors is more demanding and, by virtue of their large share in the market, they often negotiate brokerage commissions. Institutional investors will thus likely continue press for cutting trading costs. They are also more demanding in terms of disclosure of information, since they are actively involved in monitoring. However, most European countries fail this

---

with SEC Rule 19c-3 that prohibits exchanges from restricting secondary market trading for shares listed on an exchange after April 26, 1979.

level of requirements except for London (Onado, 1998). The increasing influence of institutional investors will probably result in great corporate disclosure in Europe.

The retailed segment is less active, as European countries are accused of not having an "equity culture." However, investing in equities has become more popular due to the wave of privatization. From the above discussion, we can anticipate more direct investment of this segment in equity markets and more indirect investment through funds offering professional asset management.

Table 5 shows that while stock market economies have grown in all countries, continental European exchanges are still lagging behind Anglo-Saxon countries. Hence, European markets are expected to grow significantly in the coming years.

We believe that market capitalization will continue to grow in all exchanges, large or small. However, some difficulties can arise. As equity demand starts to decrease, competition is expected to be fiercer. Meanwhile, the viability of major and small exchanges seems not to be jeopardized.

Table 5: Market Capitalization/GDP (%) (Source: Pagano (1993), Steil (1996), Dermine and Hillion (1999), FIBV)

	1998	1996	1994	1987
Luxembourg	218.2	180.66	208.47	-
United Kingdom	171	145.7	112.72	87
Netherlands	158.7	103.3	68.1	35.4
USA	148.6	116.6	75.8	49.2
Sweeden	123.1	96.5	61.14	41.8
Finland	121.6	52.6	43.38	19.6
Belgium	97.7	48.4	37.09	26.4
Spain	72.3	36.6	32.26	21.7
France	67.8	37.4	34.2	17.1
Ireland	67.4	53.5	37.87	-
Greece	66.4	21.8	18.45	8.5
Denmark	56.8	42.3	31.89	17.5
Germany	50.9	29.9	23.3	17
Italy	48.33	24.1	17.73	14
Austria	16.8	14.9	14.74	-

1.3.4 A Single exchange for Europe versus the future of small markets

There is an ongoing debate on the possible convergence for a single exchange, particularly within EU borders. However most authors do not consider this as very plausible (Steil, 1996). In the same way, the future of small exchanges does not seem to be in danger for the moment

(Cybo-Ottone, Di Noia, Murgia, 2000). A standard comparison is with telephone services, a very similar business to that of exchanges: a worldwide telephone company is not observed.

The fact that Continental stock exchanges have the same basic trading system is seen as a duplication and waste of resources (Steil, 1996). However, for Europe to have a single exchange would present several problems: cross-border mergers have political implications, involving critical issues like nationalism and regionalism. This explains why mergers have strictly been within borders to date. It is possible that when governance structures extend to public traded companies, shareholders expect different attitudes that might not be in accordance with nationalism, regionalism and other kinds of political intervention.

The vested interests of sell-side participants are another barrier; trade is carried out by dealers, who are also members of exchanges and tend to protect their own business. There are technological barriers, as trading systems are different and not compatible. In most cases, a merger implies a new system and a new investment, and scrapping past ones.

Therefore, while we can expect more cooperation among European stock exchanges, this cooperation will be based on alliances. This may be wise because of the heterogeneity of Europe in terms of language, culture and legislation. Moreover, past attempts at achieving a pan-European market have not been successful, as the high drop in the number of deals proves.

A niche of mainly small- and medium-sized firms for local trading can support the continuity of small markets. A possible equilibrium is concentration of trading of a set of securities in one exchange and concentration of trading of another set of securities in another exchange (Pagano, 1989b). That is viable if share ownership tends to be concentrated in one market.

Also behavioral factors should not be underestimated. Home equity bias can persist from the part of investors and exchange members can show a strong attachment to their domestic products due to informational advantages on national firms. Dermine (1999) identifies sources of competitive advantage of domestic intermediaries: customer relationship, better assessment of credit risk that provides control of underwriting, and secondary trading. Since brokers have a tendency to act in their domestic countries, they consequently also draw investors.

Political factors may be a significant contributor to exchange survival. Governments are still enjoying some freedom in setting economic policy, like fiscal policy, which may give incentives to trade in local exchanges.

The existence of single market involves the harmonization of several national legislation systems in areas such as investor protection, national tax regulation and treatment of

investment income. The Committee of Wise Men (2000) proposes reforms towards a future, more homogeneous regulatory environment in EU securities markets in order to achieve market integration. However, the progress to promote market integration is slow. In December 2002, the European Commission issued a proposal to upgrade the ISD "*after an intensive two-year consultation process*" (European Commission Press Release IP/02/1785). Therefore, several hindrances remain, keeping stock exchanges from reaching common standards in the area of regulation a key area for integration.

2 A Theoretical Assessment on the Nature of Competition Between Exchanges

In most countries, the history of exchanges can be briefly described as a monopoly enhanced by regulation. Now that barriers to competition are being removed, it is necessary to have a better understanding of the forces involved in consolidation versus fragmentation and of the critical factors that investors and firms look for.

A stock exchange can be defined as an entity that provides a centralized forum for stock trade (Macey and Kanda, 1990). Additionally, it facilitates information production and dissemination, and rivalrous competition among market professionals. The goal of the structure is to maximize the satisfaction of actual and potential participants by minimizing transaction costs, establishing market prices that accurately reflect the underlying equilibrium prices, and reducing the uncertainty that traders face in market interactions.

Stock exchanges had long been seen as philanthropic institutions organized to act in the public interest. This view has drastically changed with the appearance of private markets and the demutualization of most of the exchanges; currently exchanges are faced more as market-oriented firms. Listing firms and trading securities were the traditional business areas, but many exchanges have developed new business areas like outsourcing technology[20]. Listing seems to be the main difference in the kind of services offered by "organized exchanges" and the new entrants, since electronic exchanges are essentially markets for trading. Exchanges used to be easily identifiable. However, today, technological improvements have facilitated the creation of new types of markets, ironically known under the acronym "MONSTERs" (a

[20] Another type of cooperation is the stipulation of long-term contracts mainly for supply of technology. The rapid rate of development has increased the frequency of technology agreements in which exchanges purchase technology from other exchanges. Some exchanges have achieved a degree of leadership in technological development, like OM.

Market-Oriented New System for Terrifying Exchanges and Regulators) (Lee, 1998), like the ECNs which present themselves as alternative trading structures, competing directly with market makers.

2.1 Agglomeration versus fragmentation

An interesting feature of the stock exchange industry is that contrary forces seem to co-exist. On the one hand, markets tend to segment, but on the other hand, strong agglomerating forces cause them to consolidate.

2.1.1 Agglomerating Forces

Economies are the most important factor driving competition. Exchanges attempt to exploit scope and scale economies by matching more investors and firms. The higher the trading volume, the smaller the average operating costs of exchanges and bid-ask spreads. An example of the exploitation of economies of scope can been seen through the mergers between derivative and spot markets.

Malkamaki (1999) studied the existence of economies of scale in stock exchanges. According to the study, trading clearly entails economies of scale. The functions related to the listing procedure and to other activities involving company-specific information have less returns to scale, except for the larger stock exchanges. Hasam and Malkamaki (2000) conclude that exchanges in North America and Europe report substantially larger economies of scale than those in the Asia-Pacific regions.

The presence of economies of scale is a well-known argument used to discourage entrants. However, with the advances in technology, the cost- advantage of large exchanges is losing importance, since smaller markets can also offer smaller transaction fees, as is patent in ECNs.

Exchanges can be considered as networks in which the greater number of customers, the higher the utility is for all participants (Economides 1993, 1995). Based on that reasoning, exchanges benefit from positive network externalities. Businesses characterized by networks effects start with very low value, but grow exponentially after reaching a critical mass (Arthur, 1989 and Hagel III-Armstrong, 1997). Consequently, networks are self-reinforcing by nature (Economides, 1993). A financial network, like any other network, needs to reach a critical mass to experience positive externalities. Pagano (1993) emphasizes critical mass as the reason for the disparity in the level development of stock exchanges: countries with an

equal level of economic development still have stock exchanges with varying degrees of development.

Liquidity is the main externality that appears on a financial network. However, consumers prefer larger markets, where they are more likely to find their preferred item (Gehrig, 2000). In addition, a greater number of investors means more accurate price information, which, in turn, attracts more investors.

Due to the network nature of business, in the absence of friction, volume tends to consolidate in one marketplace, in both space and time. The spatial network externality is matched by a similar temporal network externality: there is incitement for traders to send their orders to a trading system all at the same time, thereby increasing the likelihood that these orders will be executed.

Pagano (1993) refers to another market externality: When an entrepreneur floats his company's shares on the stock market, he opens up new risk-sharing opportunities for other investors, helping them to diversify their equity portfolios.

Although the literature has strongly emphasized the agglomerating forces, empirical evidence, still scarce in this area, provides only modest support of them: economies of scale may be relevant only for mergers of large-scale entities (Malkamaki,1999), and the overall opinion is that network effects are important only after reaching a critical mass (Cybo-Ottone, Di Noia, Murgia, 2000).

2.1.2 Why localized markets persist?

The above arguments might lead one to think that trade would converge to one large market, but "competition acts as a degglomerative force" (Gehrig, 1998). Fragmentation arises because of the heterogeneity of investors or the complexity of information.

There is an ongoing debate about whether to have a single central market or several localized markets. A large market that provides greater variety is attractive for investors. So, what are the advantages of having several localized markets? The answer is related with segmentation. It is difficult to have a trading system that satisfies all the requirements of the trading orders. Hence, exchanges try to segment according to elements related to investors, such as their preferences for speedy execution and anonymity. A striking example is the ECNs, which try to take advantage of gaps in "regulated markets." ECNs have even tried to segment and differentiate between themselves.

Other justifications are offered for the persistence of different marketplaces: First, handling complex information may require face-to-face contacts and hence motivate the

existence of multiple market places for securities. Moreover, information collection takes a lot of time and money. Investors and intermediaries may prefer to concentrate in small and familiar markets, where it is easy to manage information. It may thus be optimal to keep company- specific information and related functions close to the source of original information[21], i.e., in the local exchange (Malkamaki, 1999). In addition, differences in language and culture also reduce the quality of communication if trading activities are centralized. Local proximity is connected with informational advantages, which translates into profit differences (Hau, 2001).

Secondly, the intervention of national authorities serves political goals and is meant to strengthen domestic markets. For instance, despite the monetary integration in Europe, domestic economic goals are still prevalent and determine economic policy, an influent determinant of trading. Gehrig (1998) highlights the importance of fiscal policy, which remains a domestic instrument.

Lastly, currently, markets in Europe are regulated at the national level and are guided by a certain minimum standard amount established by EU directives. The existence of several jurisdictions and the difficulty in harmonizing national legislation make it difficult to have only one stock exchange.

2.2 Competition for order flow

Competition takes place on many grounds "*such as the provision of immediacy, price discovery, low price volatility, liquidity, transparency and transaction cost*" (Ferrarrini, 1998). Factors like reputation and quality have also contributed to making many regulators and/or exchanges reform their governance structure, trading systems and surveillance rules (Di Noia, 1998). We attempt to identify what investors and firms look for in deciding whether to trade or list. These factors are extremely important, since they define the attributes that exchanges can exploit to attract volume.

Transaction costs indicate the explicit costs that are paid in brokerage commissions and taxes for carrying out a transaction, plus the implicit costs of the time required for its settlement (Pagano and Roell, 1990). Because investors look for markets with smaller transaction costs, transaction costs are also associated with higher liquidity. Transaction costs

[21] Gaspar and Glaeser (1996) model cities as a mean of reducing the fixed-cost involved in face-to face interactions. Since complex information and instructions can easily be misunderstood, face-to-face communication is required.

are also said to have a negative impact on price discovery and volatility (Steil, 1996), thus, the importance of improving the efficiency of market structures.

As a rule of thumb, higher **liquidity** increases the utility of market participants. Liquidity can be viewed in two dimensions: immediacy, the market's ability to provide immediate execution for an incoming market order; and market depth, the ability to execute market orders without entailing significant changes in the market price. Traders would want to trade in the same market as all other traders, and where they would find the best terms for their trades (with minimum effort and time). Liquidity is inversely related with the level of costs, as mentioned above, and positively related with accessibility.

Price discovery is the process by which a market attempts to find transaction prices that are in reasonable alignment with theoretical equilibrium. Investors prefer markets that have a greater flow of information, thus, where price risk is smaller.

Access to markets is also a crucial factor. Advances in technology and the trend of market deregulation make exchanges within reach for a greater number of investors. Computerized systems have the merit of enabling border-crossing and shortening distances.

Investors also look for **operational efficiency**; they are concerned about how well and at what cost a market structure facilitates transactions by bringing buyers and sellers together. For example, they want to know how quickly a customer's orders are queued for execution. It is also important for all market participants to operate under similar conditions, where no one has a persistent advantage over another. Hence, transparency[22]is also fundamental for investor protection and market integrity.

But investors have different preferences, Schwartz (1995) has the opinion that it is not possible to achieve at the same time "*transparency, liquidity and immediacy*", thus there is scope for segmentation.

The decision variables of firms do not differ from those of investors: the costs for firms are **listing fees**, and they also look for liquid markets to trade, with more investors and intermediaries, where they can cheaply raise capital, and build their reputation.

Listing can be unbundled into several components (Macey and Kanda, 1990). When exchanges provide listing, they are also providing other valuable services: liquidity,

[22] Transparency can enhance the efficiency of securities markets. Ex-ante transparency ensures that trades are routed to the best available quotes in the market, which minimizes transaction costs. Ex-post transparency ensures that the information content of trades is impounded in the following quotes and transaction prices, which enhances the information efficiency of the market (Biais, 1999).

monitoring of exchange trading and a signaling function to inform investors that the issuing companies' stocks are of high quality.

Firms select markets that are more likely to provide liquidity for their shares. Moreover, the concept of liquidity is closely linked to the concept of market efficiency. More liquid markets are generally more efficient.

Regulation is also taken into account in the trading decision. Coffee (2001) defends that strong legal standards tend to attract listing rather than repel. He supports his idea with evidence that exchanges with strong protection for minority shareholders have received comparatively listing.

2.3 Mergers

"*Mergers and acquisitions are a response to new technologies or market conditions which require a strategic change in a company's direction or use of resources*" (Michael C. Jensen in Ross, Westerfield, Jaffe, 1988).

The belief that technological shocks cause merger waves is based on the evidence of a positive relationship between mergers and innovations. But mergers also occur when managers believe that the target company can be acquired at less than its true value, or when managers believe that two enterprises will be worth more if merged than if operated as two separate entities.

The reasons for mergers in exchanges are closely related to the factors that are the core of competition. In theory, a merger happens if there are sources of synergy to promote revenue enhancement (like reputation effects, market power), cost reductions (like economies of scale, economies of vertical integration, complementary resources) or elimination of inefficient management.

Economies of scale are the natural goal of horizontal mergers. These economies come from sharing central services such as office management, optimizing the use of a fixed-cost network, and sharing common facilities. They can consequently cut costs and enhance service levels. Malkamaki (1999) was the first to address the relevance of the size of economies of scale in stock exchanges. Results show that economies of scale in stock exchanges are an increasing function of size, thus mergers between large exchanges save more costs.

Complementary resources also create value. The potentialities of mergers will be enhanced if they merge markets with different features, i.e., one with a wider scope and another with better technology (Cybo-Ottone, Di Noia, Murgia, 2000). Based on that

reasoning, the merger between LSE and Frankfurt would be interesting, since Frankfurt has more trading technology and LSE has the advantage on listing. Also, Pirrong (1999b) supports the idea that when assets of exchanges become closer substitutes, consolidation reduces fixed costs without substantially increasing competition between members of the previously separated exchanges.

The existence of mergers with a complete union of both entities, have been limited to two areas: between stock and derivatives exchanges in the same country and between regional exchanges of the same country. Advances in technology have also created implicit mergers: an agreement between two or more exchanges to provide reciprocal access for all their brokers under a compatible platform, and possibly, to cross-list stocks on both networks. In this kind of merger, entities can opt for a common trading platform, or a different trading platform, while offering remote membership. They consequently merge their activities without merging as entities, thereby avoiding possible "political" implications.

Arnold, Hersh, Mulherin and Netter (1998) study the causes and effects of competition for order flow by US regional exchanges[23] focusing in a specific method of competition: mergers. The authors report that, in 1940, there were 18 regional stock exchanges registered in SEC, whereas there were only seven in 1980. The main question addressed is whether mergers proved to be an effective means of competition. The conclusions were that mergers were successful in attracting market share, at least by comparison with the regional exchanges that did not merge. This was also supported by the narrowing of the bid-ask spreads of merging exchanges.

There is scarce empirical evidence of the effects of the recent wave of mergers in Europe. A few studies substantiate that domestic integration lead to a decrease in costs in DB, and an increase in revenue (but no decrease in costs) in Amsterdam Exchanges (Cybo-Ottone, Di Noia, Murgia, 2000). However, liquidity improvement was reduced for the merger between Stockholm and Copenhagen stock exchanges (Carey (1999)).

[23] Research has historically pointed out that the regional exchanges shifted from their traditional role of trading local securities and began to serve as auxiliary markets for New York Stock Exchange. This was due to a reduction in communications in costs in the 1920s and 30s, and to changes in securities regulation, following the great crash.

2.4 Models of Competition Between Exchanges

Models of competition between stock exchanges follow previous work in industrial organizations. In general, these models predict agglomeration, since they focus on economies of scale, transportation costs, and liquidity. Early work states that trading of a particular security tends to cluster in a single location (Stigler (1961, 1964)). Doede (1967) and Demsetz (1968) elaborate on the economies of scale present in securities markets. Davis (1990) discusses the future of financial centers in the light of the optimal location theory of the firm and the oligopoly theory. The author argues that economies of scale in financial services may lead to the emergence of a single global center in Europe, with smaller centers in each country. Other theories predict that trading occurs in a single market due to liquidity effects (Telser and Higinbotham, 1977, Telser 1981, Pagano, 1989a and Glosten, 1994).

Only recently, the more complex nature of exchanges, like the effect of members in competition, or the view of exchanges as firms, has been analyzed. Pirrong (1999b) demonstrates that when exchanges are not perfect substitutes, they may adopt inefficient rules that benefit members at the expense of customers and third parties. The argument is that many stock exchanges are owned or controlled by financial intermediaries who are also the major buyers of the exchanges services. Di Noia (1998a) investigates the existence of "perverse" effects of having these "dual capacity" individuals.

We group the models according to the two outcomes: consolidation or segmentation.

Consolidation

Listing concentrates on a single exchange, in the absence of information frictions (Gehrig, Stahl, and Vives, 1996). If there are barriers to information, firms prefer to list on more than one exchange, since investors have more precise information on the domestic exchange.

According to network externality literature, only one exchange survives, when considering incompatible structures (no kind of cooperation) (Di Noia, 2001). Note that compatibility is a broad notion in this approach, it includes implicit mergers or remote access. Contrary to a real merger, implicit mergers keep some price competition alive. The results are good incentive for exchanges to achieve full compatibility, since more than one exchange can survive and specialize.

Pirrong (1999a) focuses on economies of scope and the organization of financial exchanges markets. According to the author, the creation of a single exchange with multiple membership classes with restricted trading rights has lower fixed costs than multiple single-product exchanges due to economies of scope.

Gehrig (1998) suggest a framework for modeling competition between market places that endogenously differentiates the interests of firms within a market place from the interests of outside firms. The model presents competition in two dimensions: one dimension can be interpreted as geographic distance; the other dimension is a product characteristic. Agglomeration economies arise endogenously due to savings in transportation costs for consumers. The author argues that the wave of deregulation in financial markets may be understood as an equilibrium reaction to a significant decline in transportation costs.

Fragmentation

Foucault and Parlour (1999) model two profit-maximizing exchanges competing for IPO listing. Exchanges compete through a choice of listing policy, trading technology, listing fees or a combination of these. When firms decide where to list, they pay attention to trading costs. An important feature of this model is that firms' listing choices and listing requirements are endogenous. The main conclusion is that when exchanges with different trading costs, listing requirements and listing fees compete, they can co-exist. In fact, competition induces exchanges to differentiate themselves, through a choice of trading system or listing requirements. Also, entrepreneurs with different characteristics choose to list on different exchanges.

Gehrig (2000) argues that geographical dispersion of financial activity exists because financial markets are not frictionless. The author divides the factors underlying the development of financial markets into centripetal and centrifugal groups. Centrifugal forces arise from market access costs and localization of information, while centripetal forces are economies of scale, informational spillovers, market liquidity and thick market externalities. The author argues that centrifugal forces should be particularly relevant in markets for assets priced on the basis of complex local information, like stocks and derivatives.

Focus on fees

Shy and Tarkka (2001) build a model where exchanges set different fees for different brokers. Demand is exogenous, and they give special emphasis on access fees. The conclusion is that exchanges would benefit from the alliances, whereas brokers would lose from the alliances. Notably, mutual stock exchange agreements on access fees do not seem to be as detrimental as in other industries.

Ramos and von Thadden (2002) analyze international competition between stock exchanges. They endogenize stock exchange transaction costs and analyze the impact of stock market integration. They find that transaction costs are likely to decrease as a result of stock market integration in a set characterized by home bias. They also conclude that transaction

costs emerging from the competition between a developed and an emerging stock market are higher than between two developed markets. Moreover, the results also imply that the decrease of transaction costs in European markets will be limited due to the expansion of pension funds as well as "an equity culture" at an early stage.

Others

Others studies analyze competition from different angles: Angel and Aggarwal (1997) study the competition between NYSE and NASDAQ. Huddart, Hughes and Brunnermeier (1998) present a model in which exchanges competing for trading volume engage in a "race to the top" regarding disclosure requirements.

3 Conclusions

A first glance at the recent developments reveals that the increase of competition has been beneficial for investors and firms. Competition between exchanges has led to improvements in market architecture and efforts to trim down costs. Specifically, in Europe, structural reforms have contributed to increasing the role and efficiency of securities markets.

Nevertheless, competition is still blocked by institutional rigidities and the vested interests of various sell-side participants. In Europe, the transition to a free competitive environment is slow and faces strong intervention from public authorities: the ISD has increased the involvement of public authorities to the detriment of regulation by the markets themselves (Wymeersch, 1998).

A key issue is the relationship between regulation and competition. Some state that the more the competition, the smaller the need for regulation (Steil (1996)). Competition makes regulation unnecessary because exchanges have incentives to adopt efficient rules and practices without external prodding. Others defend that there are strong reasons to believe a priori that direct competition between exchanges will be limited, if it exists at all (Pirrong, 1999b). Moreover, although technological advances and the end of legal monopolies facilitate industry entry, the industry cannot be correctly classified as being contestable due to network effects and the control of authorities. We believe that there are natural limitations to competition in this industry, and regulation is necessary to provide a counterbalance. The true benefits of a pan-European market for the future are unclear. It is particularly difficult to foresee how much internal competition of exchanges would result. From a public policy point of view, it is important to make sure that competition is not diminished by the introduction of compatibility standards and the coordination produced by cooperation deals. For some "*a*

pan-European market will be the worst solution for users. The best solution would be a contestable market where the entry for new suppliers was easy" (Wells, 1998).

References

Angel, J. and R. Aggarwal, 1997, Optimal Listing Policy: Why Microsoft and Intel do not list on the NYSE, mimeo, Georgetown University;

Arnold, Tom, Philip Hersh, J. Harold Mulherin and Jeffrey Netter, 1998, Merging Markets, Journal of Finance 54, 1083-1107.

Arthur, W. B., 1989, Competing Technologies, Increasing Returns, and Lock-in by Historical Events, The Economic Journal, 99, March 116-131.

Baker, H., John Nofsinger and Daniel Weaver, 1998, International Cross-listing and Visibility on NYSE Listing, NYSE Working Paper 99-01.

Benhamou, E. and Thomas Serval, 2000, On the Competition between ECN's, Stock Markets and Market Makers, LSE, Financial Markets Group Discussion Paper.

Benos, Alexander and Michael Crouhy, 1996, Changes in the Structure and Dynamics of European Securities Markets, Financial Analysts Journal, May/June 37-50.

Biais, Bruno, 1999, European Stock Markets and European Unification, in European Markets with a Single Currency, edited by Jean Dermine and Pierre Hillion, Oxford, University Press.

BIS Quarterly Review August 2000, International Banking and Financial Markets Developments.

Blume, Marshall E., 2002, The Structure of the US Market, Wharton Working Paper 02-16.

Breuer, Rolf-E, 1995, Tomorrow's Equity Markets: Problems and Opportunities, in Global Equity Markets: Technological, Competitive, and Regulatory Exchanges, Robert Schwartz (Ed.), Irwin.

Carey, A., 1999, Stock Exchange Consolidation: Who are the winners? City University Business School London, MSc Finance Final Project.

Clayton, M., Bjorn Jorgansen and Kenneth Kavajecz, 1999, On the Formation and Structure of International Exchanges, Wharton Working Paper 99-22.

Cochrane, James L., James E. Shapiro and Jean Tobin, 1995, Foreign Equities and US Investors: Breaking Down the Barriers Separating Demand and Supply, Working Paper NYSE.

Coffee Jr., Jonh C., 2001, The Coming Competition among Securities Markets: What Strategies will Dominate? Working Paper No 192, Columbia University School of Law.

Cooper, Ian and Evi Kaplanis, 1994, Home Bias in Equity Portfolios, Inflation Hedging and International Capital Market Equilibrium, Review of Financial Studies 7, 45-60.

Cybo-Ottone, A., Carmine Di Noia and Maurizio Murgia, 2000, The Consolidation of Securities Exchange, Brooking-Wharton Papers on Financial Services.

Danthine, Jean Pierre, Francesco Giavazzi and Ernst-Ludwig von Thadden, 2000, European Financial Markets after EMU: A First Assessment, CEPR 2413.

Davis, E.P., 1990, International Financial Centers- An Industrial Analysis, Bank of England, no 51.

De Santis, Giorgio, Bruno Gerard and Pierre Hillion, 1999, The Single European Currency and World Equity Markets, in European Markets with a Single Currency, edited by Jean Dermine and Pierre Hillion, Oxford, University Press.

Demset, Harold, 1968, The Cost of Transacting, Quarterly Journal of Economics 82, 33-53.

Dermine, Jean and Pierre Hillion (Ed.), 1999, European Markets with a Single Currency, Oxford, University Press.

Dermine, Jean, 1999, European Capital Markets: Does the Euro matter ?, in European Markets with a Single Currency, edited by Jean Dermine and Pierre Hillion, Oxford, University Press.

Di Noia, Carmine, 1998, Costumer-Controlled Firms, The case of stock exchanges, Wharton R. White Center for Financial Research, Working Paper 2.

Di Noia, Carmine, 2001,Competition and Integration among Stock Exchanges in Europe: Network Effects, Implicit Mergers and Remote Access, European Financial Management, 7, 39-72.

Doede, Robert W., 1967, The Monopoly Power of New York Stock Exchange, Unpublished Ph.D. Dissertation, University of Chicago.

Domowitz, Ian and Benn Steil, 1999, Automatization, Trading costs and the Structure of the Securities Trading Industry, Brookings-Wharton Papers on Financial Services.

Domowitz, Ian, 1995a, Financial Market Automatization and the Investment Service Directive, in Global Equity Markets: Technological, Competitive, and Regulatory Exchanges, Robert Schwartz (Ed.), Irwin.

Domowitz, Ian, 1995b, Electronic Derivatives Exchanges: Implicit Mergers, Network Externalities and Standardization, Quarterly Review of Economics and Finance.

Domowitz, Ian, 2001, Liquidity, Transaction Costs and Reintermediation in Electronic Markets, eBusiness Research Center Working Paper.

Domowitz, Ian, Jack D. Glen and Ananth Madhavan, 2001, Liquidity, Volatility and Equity Trading Costs Across Countries and Over Time, International Finance, vol. 4, 221-255.

Economides, Nicholas, 1993, Network Economics with Application to Finance, Financial, Markets Institutions &Instruments, vol.2, 5, December, 89-97.

Economides, Nicholas, 1995, How to Enhance Market Liquidity, In Global Equity Markets: Technological, Competitive, and Regulatory Exchanges, R. Schwartz (Ed.), Irwin Professional, New York.

European Commission Press Release IP/02/1785

Ferrarrini, G. (Ed.), 1998, European Securities Markets: The Investment Service Directive and Beyond, Kluwer Law International.

FIBV News Letters July (1999).

Foucault, Thierry and Christine Parlour, 1999, Competition for Listings, Exchanges, Trading Technology, CEPR Paper no 2222.

French, K.R. and J. M. Poterba, 1991, Investor Diversification and International Equity Markets, American Economic Review, 81, 222-226.

Gaspar, J. and E.L. Glaeser, 1996, Information Technology and The Future of the Cities, NBER Working Paper 5562.

Gehrig, Thomas, K. Stahl and X. Vives, 1994, Competing Exchanges: Do Large Markets Drive Out Small, CEPR- Conference Paper.

Gehrig, Thomas, 1993, An Information Based Explanation of the Domestic Bias in International Equity Investment, The Scandinavian Journal of Economics 21, 97-109.

Gehrig, Thomas, 2000, Cities and the Geography of Financial Centers, in Jacques Thisse, J.M. Huriot (ed.): The Economics of Cities, Cambridge University Press, 2000, 415-445.

Gehrig, Thomas, 1998, Competing Markets, European Economic Review 42, 227-310.

Glosten, L.R., 1994. Is the Electronic Open Limit Order Book Inevitable, Journal of Finance, vol.49, 4, 1127-1162.

Hagel, J. III and A. G. Armstrong, 1997, Net Gain, Harvard Business School Press.

Hasam, Iftekhar and Markku Malkamaki, 2000, Are Expansions Cost Effective for Stock Exchanges? A Global Perspective, Bank of Finland Discussion Paper 20/2000.

Hau, Harald, 2001, Location Matters: An Examination of Trading Profits, Journal of Finance, vol. 56, no. 5,1959-1983.

Huddart, Steven and John S. Hughes and Markus Brunnermeier, 1998, Disclosure Requirements and Stock Exchange Listing Choice, Journal of Accounting and Economics.

J.P. Morgan and McKinsey, 2002, The Future of Equity Trading in Europe: Balancing Scale, Scope and Segmentation.

Lee, R., 1998, What is an Exchange, Oxford University Press.

Macey, Jonathan and Hideki Kanda, 1990, The Stock Exchange as a Firm: The Emergence of Close Substitutes for the NY and Tokyo Stock Exchange, Cornell Law Journal, 1007.

Malkamaki, Markku, 1999, Are there Economies of Scale in Stock Exchange Activities, Bank of Finland Discussion Papers 4/99.

Onado, Marco, 1998, The Competition between Exchanges or Financial Systems, in European Securities Markets- The Investment Services Directive and Beyond by Guido Ferrarrini (Ed.), Kluwer Law International.

Pagano, Marco and Ailsa Roell, 1990, Trading Systems in European Stock Markets: Current Performance and Policy Options, Economic Policy, 10, April.

Pagano, Marco, 1989a, Endogenous Market Thinness and Stock Price Volatility, Review of Economic Studies 56.

Pagano, Marco, 1989b, Trading Volume and Asset Liquidity, Quarterly Journal of Economics, May, 255-274.

Pagano, Marco, 1993, The Flotation of Companies on the Stock Market, European Economic Review 37.

Pagano, Marco, 1998, The Changing Microstructure of European Equity Markets, in European Securities Markets- The Investment Services Directive and Beyond by Guido Ferrarrini (Ed.), Kluwer Law International

Pagano, Marco, Ailsa A. Roell and Josef Zechner, 1999, The Geography of Equity Listing: Why Do European Companies List Abroad, CSEF Working Paper 28.

Pirrong, Craig, 1999a, The Organization of Financial Exchanges Markets: Theory and Evidence, Journal of Financial Markets 2, 329-357.

Pirrong, Craig, 1999b, A Theory of Financial Exchange Organization, Journal of Law and Economics.

Ramos, Sofia B. and Ernst-Ludwig von Thadden, 2002, Stock Exchanges Competition in a Simple Model of Capital Market Equilibrium, unpublished paper.

Ross, Stephen A., Randolph W. Esterfield, Jeffrey Jaffe, 1988, Corporate Finance, Fourth Edition, Irwin.

Sarkar, Asani and Michelle Tozzi, 1998, Electronic Trading in Future Exchanges, Current Issues in Economics and Finance, vol. 4, no 1.

Schwartz, R., 1995, in Global Equity Markets: Technological, Competitive, and Regulatory Exchanges, Robert Schwartz (Ed.), Irwin.

Shy, Oz and Juha Tarkka, 2001, Stock Exchanges Alliances, Access Fees and Competition, Bank of Finland Discussion Paper 22/2001.

Steil, Benn (Ed.), 1996, The European Capital Markets: The state of the Union and an Agenda for the Millennium, The Royal Institute of International Affairs, London.

Stigler, George, 1961, The Economics of Information, Journal of Political Economy 49, 213-225.

Stiglzer, George, 1964, Public Regulation of Securities Markets, Journal of Business 37, 117--142.

Strong, Norman and Xinzhonh Xu, 2002, Understanding the Equity Home Bias: Evidence from Survey Data, forthcoming on Review of Economics and Statistics.

Telser, Lester, 1981, Why there are Organized Future Markets, Journal of Law and Economics, April, 24, 1-22.

Telser, Lester and Harlow Higinbotham, 1977, "Organized Futures Exchanges: Costs and Benefits," Journal of Political Economy, 85, 969-1000.

Tesar, Linda and Ingrid Werner (1995), Home Bias and High Turnover, Journal of International Money and Finance 14, 467-92.

The Banker, August, 1998.

The Wall Street Journal 29 July 1999.

The Committee of the Wise Men (2000), Initial Report on the Regulation of European Securities Markets.

The Economist, 2 September 2000.

Tonk, Ian and D.Webbs, 1989, The Reorganization of the London Stock Market: the Causes and the Consequences of the Big Bang, London School of Economics, Financial Markets Group Special Paper 20.

Wells, Stephen, 1998, Financial Regulation Report, December.

Wymeersch, Eddy, 1998, The Implementation of the ISD and the CAD in National Legal Systems, in European Securities Markets-The Investment Services Directive and Beyond by Guido Ferrarrini (Ed.), Kluwer Law International, 1998.

COMPLETE LIST OF RESEARCH PAPERS

Extra copies of research papers are available to the public upon request. In order to obtain copies of past or future works, please contact our office at the following address: International Center FAME, 40 bd. du Pont d'Arve, Case Postale 3, 1211 Geneva 4. As well, please note that these works are available on our website ***www.fame.ch***, under the heading "Faculty & Research – Research Paper Series" in PDF format for your consultation. We thank you for your continuing support and interest in FAME, and look forward to serving you in the future.

N° 76: Profitable Innovation Without Patent Protection: The Case of Derivatives
Helios HERRERA, ITAM and Enrique SCHROTH, HEC-University of Lausanne and FAME; *January 2003*

N° 75: Who Are The Best? Local Versus Foreign Analysts on the Latin American Stock Markets
Jean-François BACMANN, RMF Investment Products and Guido BOLLIGER, University of Neuchâtel and FAME; *April 2003*

N° 74: Innovation and First-Mover Advantages in Corporate Underwriting: Evidence from Equity Linked Securities
Enrique SCHROTH, HEC-University of Lausanne and FAME; *November 2002*

N° 73: On the Consequences of State Dependent Preferences for the Pricing of Financial Assets
Jean-Pierre DANTHINE, Université de Lausanne, FAME and CEPR; John B. DONALDSON, Columbia University; Christos GIANNIKOS, Baruch College, City University of New York and Hany GUIRGUIS, Manhattan College; *October 2002*

N° 72: Are Practitioners Right? On the Relative Importance of Industrial Factors in International Stock Returns
Dušan ISAKOV, HEC-University of Geneva and FAME and Frédéric SONNEY, HEC-University of Geneva, University of Neuchâtel and FAME; *February 2003*

N° 71: The Allocation of Assets Under Higher Moments
Eric JONDEAU, Banque de France, DEER and ERUDITE, Université Paris 12 Val-de-Marne and Michael ROCKINGER, HEC Lausanne, CEPR and FAME; *December 2002*

N° 70: International Evidence on Real Estate as a Portfolio Diversifier
Martin HOESLI, HEC-University of Geneva, FAME and University of Aberdeen (Business School); Jon LEKANDER, Aberdeen Property Investors Nordic Region; Witold WITKIEWICZ, Aberdeen Property Investors Nordic Region; *February 2003*

N° 69: Conditional Dependency of Financial Series: The Copula-GARCH Model
Eric JONDEAU, Banque de France, DEER and ERUDITE, Université Paris 12 Val-de-Marne and Michael ROCKINGER, HEC Lausanne, CEPR, and FAME; *December 2002*

N° 68: The Capital Structure of Swiss Companies: An Empirical Analysis Using Dynamic Panel Data
Philippe GAUD, HEC-University of Geneva; Elion JANI, HEC-University of Geneva; Martin HOESLI, HEC-University of Geneva, FAME and University of Aberdeen (Business School) and André BENDER, HEC-University of Geneva and FAME; *January 2003*

N° 67: Linear-Quadratic Jump-Diffusion Modelling with Application to Stochastic Volatility
Peng CHENG, HEC Lausanne and FAME, Université de Lausanne and Olivier SCAILLET, HEC Genève and FAME, Université de Genève; *November 2002*

N° 66: Optimal Asset Allocation for Pension Funds Under Mortality Risk During the Accumulation and Decumulation Phases
Paolo BATTOCCHIO, IRES, Université Catholique de Louvain; Francesco MENONCIN, IRES, Université Catholique de Louvain and Olivier SCAILLET, HEC Genève and FAME, Université de Genève; *January 2003*

N° 65: Exploring for the Determinants of Credit Risk in Credit Default Swap Transaction Data: Is Fixed-Income Markets' Information Sufficient to Evaluate Credit
Daniel AUNON-NERIN, HEC-University of Lausanne and FAME; Didier COSSIN, HEC-University of Lausanne, FAME and IMD; Tomas HRICKO, HEC-University of Lausanne and FAME and Zhijiang HUANG, HEC-University of Lausanne and FAME; *December 2002*

N° 64: Dynamic Allocation of Treasury and Corporate Bond Portfolios
Roger WALDER, University of Lausanne, International Center FAME and Banque Cantonale Vaudoise; *December 2002*

N° 63: Understanding the Economic Value of Legal Covenants in Investment Contracts: A Real-Options Approach to Venture Equity Contracts
Didier COSSIN, HEC-University of Lausanne, FAME and IMD; Benoît LELEUX, IMD, Entela SALIASI, HEC-University of Lausanne and FAME; *October 2002*

N° 62: Integrated Market and Credit Risk Management of Fixed Income Portfolios
Roger WALDER, University of Lausanne, International Center FAME and Banque Cantonale Vaudoise; *November 2002*

N° 61: A Framework for Collateral Risk Control Determination
Daniel AUNON-NERIN, HEC-University of Lausanne and FAME; Didier COSSIN, HEC-University of Lausanne, FAME and IMD; Fernando GONZÁLEZ, European Central Bank and Zhijiang HUANG, HEC-University of Lausanne and FAME; *December 2002*

N° 60: Optimal Dynamic Trading Strategies with Risk Limits
Domenico CUOCO, The Wharton School, University of Pennsylvania; Hua HE, School of Management, Yale University and Sergei ISSAENKO, The Wharton School, University of Pennsylvania; *Winner of the 2002 FAME Research Prize*

N° 59: Implicit Forward Rents as Predictors of Future Rents
Peter ENGLUND, Stockholm Institute for Financial Research and Stockholm School of Economics; Åke GUNNELIN, Stockholm Institute for Financial Research; Martin HOESLI University of Geneva (HEC and FAME) and University of Aberdeen (Business School) and Bo SÖDERBERG, Royal Institute of Technology; *October 2002*

N° 58: Do Housing Submarkets Really Matter?
Steven C. BOURASSA, School of Urban and Public Affairs, University of Louisville; Martin HOESLI, University of Geneva (HEC and FAME) and University of Aberdeen (Business School) and Vincent S. PENG, AMP Henderson Global Investors; *November 2002*

N° 57: Nonparametric Estimation of Copulas for Time Series
Jean-David FERMANIAN, CDC Ixis Capital Markets and CREST and Olivier SCAILLET, HEC Genève and FAME, Université de Genève; *November 2002*

N° 56: Interactions Between Market and Credit Risk: Modeling the Joint Dynamics of Default-Free and Defaultable Bond Term Structures
Roger WALDER, University of Lausanne, International Center FAME and Banque Cantonale Vaudoise*; November 2002*

N° 55: Option Pricing With Discrete Rebalancing
Jean-Luc PRIGENT, THEMA, Université de Cergy-Pontoise; Olivier RENAULT, Financial Markets Group, London School of Economics and Olivier SCAILLET, HEC Genève and FAME, University of Geneva*; July 2002*

N° 54: The Determinants of Stock Returns in a Small Open Economy
Séverine CAUCHIE, HEC-University of Geneva, Martin HOESLI, University of Geneva (HEC and FAME) and University of Aberdeen (School of Business) and Dušan ISAKOV, HEC-University of Geneva and International Center FAME; *September 2002*

N° 53: Permanent and Transitory Factors Affecting the Dynamics of the Term Structure of Interest Rates
Christophe PÉRIGNON, Anderson School, UCLA and Christophe VILLA, ENSAI, CREST-LSM and CREREG-Axe Finance; *June 2002*

N° 52: Hedge Fund Diversification: How Much is Enough?
François-Serge LHABITANT, Thunderbird University, HEC-University of Lausanne and FAME; Michelle LEARNED, Thunderbird University; *July 2002*

N° 51: Cannibalization & Incentives in Venture Financing
Stefan ARPING, University of Lausanne; *May 2002*

N° 50: What Factors Determine International Real Estate Security Returns?
Foort HAMELINK, Lombard Odier & Cie, Vrije Universiteit and FAME; Martin HOESLI, University of Geneva (HEC and FAME) and University of Aberdeen; *July 2002*

N° 49: Playing Hardball: Relationship Banking in the Age of Credit Derivatives
Stefan ARPING, University of Lausanne; *May 2002*

N° 48: A Geometric Approach to Multiperiod Mean Variance Optimization of Assets and Liabilities
Markus LEIPPOLD, Swiss Banking Institute, University of Zurich; Fabio TROJANI, Institute of Finance, University of Southern Switzerland; Paolo VANINI, Institute of Finance, University of Southern Switzerland; *April 2002*

N° 47: Why Does Implied Risk Aversion Smile?
Alexandre ZIEGLER, University of Lausanne and FAME; *May 2002*

N° 46: Optimal Investment With Default Risk
Yuanfeng HOU, Yale University; Xiangrong JIN, FAME and University of Lausanne; *March 2002*

N° 45: Market Dynamics Around Public Information Arrivals
Angelo RANALDO, UBS Asset Management; *February 2002*

N° 44: Nonparametric Tests for Positive Quadrant Dependence
Michel DENUIT, Université Catholique de Louvain, Olivier SCAILLET, HEC Genève and FAME, University of Geneva; *March 2002*

N° 43: Valuation of Sovereign Debt with Strategic Defaulting and Rescheduling
Michael WESTPHALEN, École des HEC, University of Lausanne and FAME; *February 2002*

N° 42: Liquidity and Credit Risk
Jan ERICSSON, McGill University and Olivier RENAULT, London School of Economics; *August 2001*

N° 41: Testing for Concordance Ordering
Ana C. CEBRIÁN, Universidad de Zaragoza, Michel DENUIT, Université Catholique de Louvain, Olivier SCAILLET, HEC Genève and FAME, University of Geneva; *March 2002*

N° 40: Immunization of Bond Portfolios: Some New Results
Olivier de La GRANDVILLE, University of Geneva; *February 2002*

N° 39: Weak Convergence of Hedging Strategies of Contingent Claims
Jean-Luc PRIGENT, Thema, Université de Cergy-Pontoise; Olivier SCAILLET, HEC Genève and FAME, University of Geneva; *January 2002*

N° 38: Indirect Estimation of the Parameters of Agent Based Models of Financial Markets
Manfred GILLI, University of Geneva; Peter WINKER, International University in Germany; *November 2001*

N° 37: How To Diversify Internationally? A comparison of conditional and unconditional asset allocation methods.
Laurent BARRAS, HEC-University of Geneva, International Center FAME; Dušan ISAKOV, HEC-University of Geneva, International Center FAME; *November 2001*

N° 36: Coping with Credit Risk
Henri LOUBERGÉ, University of Geneva, Harris SCHLESINGER, University of Alabama; *October 2001*

N° 35: Country, Sector or Style: What matters most when constructing Global Equity Portfolios? An empirical investigation from 1990-2001.
Foort HAMELINK, Lombard Odier & Cie and Vrije Universiteit; Hélène HARASTY, Lombard Odier & Cie; Pierre HILLION, Insead (Singapore), Academic Advisor to Lombard Odier & Cie; *October 2001*

N° 34: Variable Selection for Portfolio Choice
Yacine AÏT-SAHALIA, Princeton University & NBER, and Michael W. BRANDT, Wharton School, University of Pennsylvania & NBER; *February 2001*
(Please note: The complete paper is available from the Journal of Finance 56, 1297-1351.)

N° 33: The Characteristics of Individual Analysts' Forecast in Europe
Guido BOLLIGER, University of Neuchâtel and FAME; *July 2001*

N° 32: Portfolio Diversification: Alive and Well in Euroland
Kpaté ADJAOUTE, HSBC Republic Bank (Suisse), SA and Jean-Pierre DANTHINE, University of Lausanne, CEPR and FAME; *July 2001*

N° 31: EMU and Portfolio Diversification Opportunities
Kpate ADJAOUTÉ, Morgan Stanley Capital International, Geneva and Jean-Pierre DANTHINE, University of Lausanne, CEPR and FAME; *April 2000*

N° 30: Serial and Parallel Krylov Methods for Implicit Finite Difference Schemes Arising in Multivariate Option Pricing
Manfred GILLI, University of Geneva, Evis KËLLEZI, University of Geneva and FAME, Giorgio PAULETTO, University of Geneva; *March 2001*

N° 29: Liquidation Risk
Alexandre ZIEGLER, HEC-University of Lausanne, Darrell DUFFIE, The Graduate School of Business, Stanford University; *April 2001*

N° 28: Defaultable Security Valuation and Model Risk
Aydin AKGUN, University of Lausanne and FAME; *March 2001*

N° 27: On Swiss Timing and Selectivity: in the Quest of Alpha
François-Serge LHABITANT, HEC-University of Lausanne and Thunderbird, The American Graduate School of International Management; *March 2001*

N° 26: Hedging Housing Risk
Peter ENGLUND, Stockholm School of Economics, Min HWANG and John M. QUIGLEY, University of California, Berkeley; *December 2000*

N° 25: An Incentive Problem in the Dynamic Theory of Banking
Ernst-Ludwig VON THADDEN, DEEP, University of Lausanne and CEPR; *December 2000*

N° 24: Assessing Market Risk for Hedge Funds and Hedge Funds Portfolios
François-Serge LHABITANT, Union Bancaire Privée and Thunderbird, the American Graduate School of International Management; *March 2001*

N° 23: On the Informational Content of Changing Risk for Dynamic Asset Allocation
Giovanni BARONE-ADESI, Patrick GAGLIARDINI and Fabio TROJANI, Università della Svizzera Italiana; *March 2000*

N° 22: The Long-run Performance of Seasoned Equity Offerings with Rights: Evidence From the Swiss Market
Michel DUBOIS and Pierre JEANNERET, University of Neuchatel; *January 2000*

N° 21: Optimal International Diversification: Theory and Practice from a Swiss Investor's Perspective
Foort HAMELINK, Tilburg University and Lombard Odier & Cie; *December 2000*

N° 20: A Heuristic Approach to Portfolio Optimization
Evis KËLLEZI; University of Geneva and FAME, Manfred GILLI, University of Geneva; *October 2000*

N° 19: Banking, Commerce, and Antitrust
Stefan Arping; University of Lausanne; *August 2000*

N° 18: Extreme Value Theory for Tail-Related Risk Measures
Evis KËLLEZI; University of Geneva and FAME, Manfred GILLI, University of Geneva; *October 2000*

N° 17: International CAPM with Regime Switching GARCH Parameters
Lorenzo CAPIELLO, The Graduate Institute of International Studies; Tom A. FEARNLEY, The Graduate Institute of International Studies and FAME; *July 2000*

N° 16: Prospect Theory and Asset Prices
Nicholas BARBERIS, University of Chicago; Ming HUANG, Stanford University; Tano SANTOS, University of Chicago; *September 2000*

N° 15: Evolution of Market Uncertainty around Earnings Announcements
Dušan ISAKOV, University of Geneva and FAME; Christophe PÉRIGNON, HEC-University of Geneva and FAME; *June 2000*

N° 14: Credit Spread Specification and the Pricing of Spread Options
Nicolas MOUGEOT, IBFM-University of Lausanne and FAME; *May 2000*

N° 13: European Financial Markets After EMU: A First Assessment
Jean-Pierre DANTHINE, Ernst-Ludwig VON THADDEN, DEEP, Université de Lausanne and CEPR and Francesco GIAVAZZI, Università Bocconi, Milan, and CEPR; *March 2000*

N° 12: Do fixed income securities also show asymmetric effects in conditional second moments?
Lorenzo CAPIELLO, The Graduate Institute of International Studies; *January 2000*

N° 11: Dynamic Consumption and Portfolio Choice with Stochastic Volatility in Incomplete Markets
George CHACKO, Harvard University; Luis VICEIRA, Harvard University; *September 1999*

N° 10: Assessing Asset Pricing Anomalies
Michael J. BRENNAN, University of California, Los Angeles; Yihong XIA, University of Pennsylvania; *July 1999*

N° 9: Recovery Risk in Stock Returns
Aydin AKGUN, University of Lausanne & FAME; Rajna GIBSON, University of Lausanne; *July 1999*

N° 8: Option pricing and replication with transaction costs and dividends
Stylianos PERRAKIS, University of Ottawa; Jean LEFOLL, University of Geneva; *July1999*

N° 7: Optimal catastrophe insurance with multiple catastrophes
Henri LOUBERGÉ, University of Geneva; Harris SCHLESINGER, University of Alabama; *September 1999*

N° 6: Systematic patterns before and after large price changes: Evidence from high frequency data from the Paris Bourse
Foort HAMELINK, Tilburg University; *May 1999*

N° 5: Who Should Buy Long-Term Bonds?
John CAMPBELL, Harvard University; Luis VICEIRA, Harvard Business School; *October 1998*

N° 4: Capital Asset Pricing Model and Changes in Volatility
André Oliveira SANTOS, Graduate Institute of International Studies, Geneva; *September 1998*

N° 3: Real Options as a Tool in the Decision to Relocate: An Application to the Banking Industry
Pascal BOTTERON, HEC-University of Lausanne; *January 2000*

N° 2: Application of simple technical trading rules to Swiss stock prices: Is it profitable?
Dušan ISAKOV, HEC-Université de Genève; Marc HOLLISTEIN, Banque Cantonale de Genève; *January 1999*

N° 1: Enhancing portfolio performance using option strategies: why beating the market is easy.
François-Serge LHABITANT, HEC-University of Lausanne; *December 1998*

International Center FAME - Partner Institutions

The University of Geneva

The University of Geneva, originally known as the Academy of Geneva, was founded in 1559 by Jean Calvin and Theodore de Beze. In 1873, The Academy of Geneva became the University of Geneva with the creation of a medical school. The Faculty of Economic and Social Sciences was created in 1915. The university is now composed of seven faculties of science; medicine; arts; law; economic and social sciences; psychology; education, and theology. It also includes a school of translation and interpretation; an institute of architecture; seven interdisciplinary centers and six associated institutes.

More than 13'000 students, the majority being foreigners, are enrolled in the various programs from the licence to high-level doctorates. A staff of more than 2'500 persons (professors, lecturers and assistants) is dedicated to the transmission and advancement of scientific knowledge through teaching as well as fundamental and applied research. The University of Geneva has been able to preserve the ancient European tradition of an academic community located in the heart of the city. This favors not only interaction between students, but also their integration in the population and in their participation of the particularly rich artistic and cultural life. ***http://www.unige.ch***

The University of Lausanne

Founded as an academy in 1537, the University of Lausanne (UNIL) is a modern institution of higher education and advanced research. Together with the neighboring Federal Polytechnic Institute of Lausanne, it comprises vast facilities and extends its influence beyond the city and the canton into regional, national, and international spheres.

Lausanne is a comprehensive university composed of seven Schools and Faculties: religious studies; law; arts; social and political sciences; business; science and medicine. With its 9'000 students, it is a medium-sized institution able to foster contact between students and professors as well as to encourage interdisciplinary work. The five humanities faculties and the science faculty are situated on the shores of Lake Leman in the Dorigny plains, a magnificent area of forest and fields that may have inspired the landscape depicted in Brueghel the Elder's masterpiece, the Harvesters. The institutes and various centers of the School of Medicine are grouped around the hospitals in the center of Lausanne. The Institute of Biochemistry is located in Epalinges, in the northern hills overlooking the city. ***http://www.unil.ch***

The Graduate Institute of International Studies

The Graduate Institute of International Studies is a teaching and research institution devoted to the study of international relations at the graduate level. It was founded in 1927 by Professor William Rappard to contribute through scholarships to the experience of international co-operation which the establishment of the League of Nations in Geneva represented at that time. The Institute is a self-governing foundation closely connected with, but independent of, the University of Geneva.

The Institute attempts to be both international and pluridisciplinary. The subjects in its curriculum, the composition of its teaching staff and the diversity of origin of its student body, confer upon it its international character. Professors teaching at the Institute come from all regions of the world, and the approximately 650 students arrive from some 60 different countries. Its international character is further emphasized by the use of both English and French as working languages. Its pluralistic approach - which draws upon the methods of economics, history, law, and political science -reflects its aim to provide a broad approach and in-depth understanding of international relations in general. ***http://heiwww.unige.ch***

INTERNATIONAL CENTER FOR
FINANCIAL ASSET MANAGEMENT AND ENGINEERING

40, Bd. du Pont d'Arve
PO Box, 1211 Geneva 4
Switzerland
Tel (++4122) 312 09 61
Fax (++4122) 312 10 26
http: //www.fame.ch
E-mail: admin@fame.ch

UNIVERSITÉ DE GENÈVE
THE GRADUATE INSTITUTE OF INTERNATIONAL STUDIES
UNIVERSITE DE LAUSANNE