J. Rodrigues da Costa (Portugal), Maria Eugenia Mata (Portugal)

Stock exchanges. How to meet the needs of our customers?

Abstract

Merging Stock and Derivative Exchanges seems to be unavoidable – even across national borders – since the extraordinary development of telecommunication and computer technologies has made both of them the efficient and inexpensive constituents of any proposal for a centralized market. However, Exchanges are not exactly equal to any other commercial enterprise and, in particular, they are not yet separable from the sovereign vectors that were traditionally connected to them. In the future things may be different, but we cannot forget that the world is still made up of independent countries. This makes a multinational company of Exchanges a new type of conglomerate that has no historical reference to guide us. The model of a multinational corporation expanding from the mother country to overseas markets seems not to be quite the right approach. Additionally, different countries are in different stages of their development and evolution, and financial maturity is an area of vast differences among nations. Therefore, the central management team of this particular multinational firm cannot organize and run the company in exactly the same way as any other global company. If the whole group does not exist to meet all the details of each individual national market, the small and undeveloped markets will not be able to participate in this consolidation movement. Those countries that have entered the NYSE Euronext group are a vivid proof of the inconveniences of such participation. The experience of NYSE Euronext deserves the attention of scholars, as this is the vanguard case of an undertaking of this nature.

Keywords: Stock Exchanges, national and geographical stock-markets consolidation, NYSE, Euronext, OMX, Derivative Exchanges, options, futures, volatility.
JEL Classification: G10, G20, G30.

Introduction

The Euronext concept was announced to the press in March 2000, and this new group of Exchanges was created in September 2000 through the merger of the three existing national Exchanges of Paris, Amsterdam and Brussels[1]. Although other integrating moves were underway at the same time in Europe – the Nordic group of Exchanges, for example – this was a significant and rather unexpected development. Soon after, in February 2002[2], Lisbon also joined Euronext along with the British Derivatives Exchange. Then, and while this Euronext group of Exchanges was still digesting this idea of a single entity serving the traditional and different national markets in Europe, another innovation was proposed in 2006 by American authorities: to merge this European group with a similar one that was then being constructed from scratch in the USA and already covering that country from coast to coast. This transatlantic project was implemented on April 4, 2007[3]. This means that currently one single Holding company offers a collection of trading centers – for cash and for derivative markets – that span a significant part of the globe from Western Europe to California. This is probably the most visible case, but another, parallel one emerged shortly thereafter based on the OMX Group of Exchanges, which has been created for the Nordic markets since the 1990s but which similarly merged with the American NADAQ company. That is, in less than 20 years, the world jumped from a model of independent companies that were designed to meet only the national trading – and after-trading – needs of investors and issuers in each individual country (only marginally were some listings received from other countries) to a model of Multinational Corporations that today give a coordinated direction to the different affiliates owned in different geographies. Yet short-lived experience and the importance of this innovation both suggest that some time might still be needed to properly assess those few multinational models established until now. It is also worth bearing in mind that both cases mentioned have halted at the current state of affairs, and that no other country has undertaken to transfer its market infrastructure to any of these two multinationals. Of course, two different technologies helped to facilitate these two cross-border moves: telecommunications and computers[4]. However, no one yet knows the long-term implications to the financial markets of this transnational *consolidation*[5] of na-

We thank Prof John Hustoff for his invaluable help in correcting our errors in English.

[1] Paris became the so called Societé des Bourses Françaises only in 1988, the Amsterdam Exchanges was created in 1997, and the Brussels Exchanges was born in 1999. Following the merger in 2000, each was renamed, respectively, Euronext Paris, Euronext Amsterdam, and Euronext Brussels.

[2] In Portugal the local organization was called BVLP – Bolsa de Valores de Lisboa e Porto and was also renamed as Euronext Lisbon after its acquisition by Euronext NV.

[3] Raiborn, Cecily A. and McGinnis, Michael (2008). "NYSE merger creates first transatlantic financial market", *Journal of Corporate Accounting & Finance*, Volume 19, Issue 3, pp. 65-73.

[4] Leport, Meredit (2010). "*NYSE Euronext to roll out all-in-one server*", Wall Street Letter, 0277-4992, Vol. 42, No 42, pp. 1-11.

[5] Consolidation is the same as a merger except that an entirely new firm is created, as both the acquiring firm and the acquired firm terminate their previous legal existence and become part of the new firm. Ross/Westerfield/Jaffe 2005, p. 797.

tional Exchanges. Neither can anyone yet foresee the impact of the intensified use of these two technologies. There are at least three main areas of uncertainty:

- what is the core business of these new multinationals: are Stock Exchanges simple facilitators of the free running of centralized financial markets, or are they technological companies that also serve those same markets? In other words, is IT a means to support globally interconnected markets or are securities and commodities markets simple "clients" of those technologies?
- does this interconnection of (geographically remote) markets increase or decrease price volatility in centralized markets? Are the participating national financial markets safer under such integrated models or, on the contrary, are they closer to some threshold of instability?
- is this model that merges different small Exchanges into one very large Exchange extendable to other countries – mostly very small economies – or are these minority markets subsatisfied with the predominance of the views that tend to arise within that larger and more mature market? This is of main concern to the current (multinational) incumbents, as it may preclude further expansions to new geographies.

This paper approaches these problems by comparing different national cases. The small countries' case might be very paradigmatic due to their relative small size, as well as to the accumulated experience in the NYSE Euronext Group, and because some small countries (such as Portugal) were still maturing their financial markets. Portugal, like Belgium, are not only small but are also closer to a large number of developing markets. A larger consolidation wave may occur in a near future. The Deutche Börse announced "advanced talks with NYSE EURONEXT to create the world's largest exchange operator by revenues and profits", in spite of antitrust European regulations, because competition for trading venues "in the wake of the financial crisis and rapid advances in technology are forcing exchanges to create global champions"[1] (The NYSE EURONEXT shareholders already approved this operation on July 8, 2011 to control the derivatives and the futures-and-options sector)[2]. In fact this will be a take-over, as the Deutche Börse shareholders will have about 60% of the new Netherlands-based holding with a value about $21 billion, leaving only the remaining 40% to the NYSE EURONEXT shareholders. Singapore also has a $8.3 billion merger plan for all the Australian ASX shares, while Russia's main Exchanges, Micex Group and RTS also announced a merger plan[3].

1. The international landscape

Since the end of the Second World War, Europe has been a fertile territory for experiments in the area of centralized trade of financial instruments, including cash and derivative products and also for testing different models of post-trade infrastructures used in association with those markets. For cash markets, the story can probably best be seen as beginning at the end of the First World War, when a number of European countries experienced their first moves to consolidate some of their regional Stock Exchanges[4]. In fact, in 1914 Britain had no fewer than 22 such institutions, including Bristol, Halifax, Leeds, Cardiff and Sheffield, and some of them initiated a process of consolidation only after WWII, but even eleven of them remained open until the 1970s, when they were amalgamated with the *London Stock Exchange*. The last such Exchange to close was Liverpool, which carried out limited functions as recently as 1991. Switzerland also had seven historical cantonal Exchanges but, in a first step, these were reduced to the three, headquartered in the large financial centers of Zurich, Basel and Geneva, to which their regional businesses were transferred. Later, in the early 1990s, the Swiss decided to concentrate everything in Zurich, although leaving some limited marketing functions in both Geneva and Basel, due to their close ties with their local investors and issuers[5]. The consolidation movement in France began with a first step where all the regional *Compagnies des Agents de Change* – stock brokers associations – merged into a single entity in 1967[6]. The Stock Market Reform Act of January 22, 1988 then dissolved this *Compagnie des Agents de Change* and, in its place, created the *Société des Bourses Françaises*, incorporated as a limited company. At the same time, switching from the traditional floor trading to a computerized system adopted from the Canadian CATS model, enabled a first move to interconnect Paris with the six regional Exchanges – Lyon, Bordeaux, Lille, Marseille, Nancy, and Nantes – and subsequently concentrate the entire domestic market in Paris[7]. But this move was enlarged in 1999 by adding to that group of Ex-

[1] "D Börse and NYSE in talks" (2011). *Financial Times*, February 10, (1).

[2] "Luz Verde para Lisboa juntar-se a Frankfurt", *Jornal de Negócios*, July 8, 2011, p. 15.

[3] "German, US exchanges in merger talks", *The Wall Street Journal*, February 10, 2011, pp. 1, 21.

[4] Cassis (2006, pp. 60-73).

[5] Cassis (2006, pp. 218-219).

[6] Research on information economics and securities markets dating back to Stigler [*Journal of Political Economy*, 69 (1961), 213-225; *Journal of Business*, 37 (1964), pp. 117-142] argues that trading would tend to centralize in major market centers such as the New York Stock Exchange. On the viability and effects of competition between stock exchanges to the policy forefront see Brown, W.O., Mulherin, J.H.; Weidenmier, M.D. (2008). "*Competing with The New York Stock Exchange*", *Quarterly Journal of Economics*, 123 (4), pp. 1679-1719.

[7] Ibid, pp. 214, 272-273.

changes, the famous MATIF – centralized market for derivatives[1] – and changing the name to *Paris Bourse SBF*. In a single move at the end of the 1990s, Italy closed 10 of its 11 regional Exchanges and concentrated the entire domestic market in Milan. Further examples could be added, such as Norway – three markets concentrated into one, in Oslo – or Belgium – two into one, in Brussels. In other words, most western countries in Europe witnessed a generalized move of concentration of regional Stock Exchanges in the last years of the 20th century. There are good reasons for that evolution, as will be explained below, but it is worth mentioning here that there were also two very different courses of events to consider. The developments in Spain and Germany demand our attention as well[2]:

- Spain: although the four historical regional Exchanges – Madrid, Barcelona, Bilbao and Valencia – still exist as legally independent entities today, since the early 1990s they have been fully interconnected into a single electronic trading mechanism called SIBE, which is located in Madrid. Political considerations at least partially justify their legal survival, as do the physical presences of these four regional institutions in their historical contexts. These elements persist despite the market integration and despite the single post-trade infrastructure used for the entire national market;
- Germany: a number of states – the rather autonomous *lender* – still maintain their local historical Exchanges, and even Berlin reopened a brand new trading center some years after the fall of the Wall[3]. However, this surviving regionalism does not preclude that most of the trades (around 90% of the total German turnover) are today executed and settled in Frankfurt using the services provided by the Deutsche Börse Group of companies created in 1993 around the existing Frankfurt Stock Exchange[4].

Finally, two important cases must be borne in mind: both the Vienna Stock Exchange and the Irish Stock Exchange decided at the end of the 1990s to avoid the costs of an autonomous central computer for trading, and opted instead to purchase IT time from the Frankfurt Exchange for trading cash instruments[5]. It is probably the clearest paradigm of an outsourcing of part of the infrastructure needed to offer a centralized place to the local and international community of investors. The parallel picture for the US cash Exchanges is much less clear. Some consolidation has been seen since the 1990s, mainly within the new ECN (Electronic Communication Network) type of organizations, but, on the other hand, some new organized markets have been introduced, such as the Arizona Stock Exchange[6] and the ICE – Intercontinental Exchange (May 2000). This last case illustrates the dynamics of this country, as it was established in Atlanta to transform the existing OTC energy markets in order to provide price transparency, more efficiency, greater liquidity and lower costs than manual trading (such as voice or floor markets). In June 2001, ICE expanded its business into the Futures segment by acquiring the International Petroleum Exchange, now called ICE Futures Europe, and, in March 2009, acquiring *The Clearing Corporation*, which provides the clearing technology for Credit Default Swaps (known as "ICE Trust")[7].

These Exchanges add another chapter to this dynamic global picture[8]. Leaving aside the old commodity derivatives, the US market led this development in the 1970s when the Chicago Mercantile Exchange started the Financial Futures business in 1972, and the Chicago Board Options Exchange gave another level of visibility to the Options market in 1973[9]. That is, although derivatives were already traded on the floors of some traditional Stock Exchanges such as the AMEX (American Stock Exchange) and PHILEX (Philadelphia Stock Exchange), clearly the biggest markets emerged in Chicago from the middle of the 1970s on. Note that initially, all major successes in the derivatives world flourished primarily in specialized Exchanges independent of the traditional Stock markets, even if some historical locations also offered derivatives trading to the market[10]. Europe was a latecomer to this new field of financial derivatives, first with LIFFE (London International Financial Futures and

[1] MATIF = *Marche à Terme International de France*. Efforts by the Finance Ministry to modernize the Paris market resulted in the launch of a futures exchange, MATIF, on February 20, 1986, to trade contracts on government bonds. A year later, on September 10, 1987, an equity options exchange, MONEP was launched. In 1988, the MATIF added commodity contracts to its range of products.

[2] Faulconbridge, J., Engelen, E., Hoyler, M., Beaverstock, J. (2007)

[3] Berlin, after 1945, "was wiped off the map of international financial centers for obvious reasons". The other German stock exchanges are located in Bremen (merged with Berlin, in 2003), Düsseldorf, Hamburg, Hanover, Munich, and Stuttgart, and of course, Frankfurt.

[4] FWB Frankfurter Wertpapierbörse.

[5] On the failure of the proposed merger between Deutsche Börse and Euronext see Kasch-Haroutounian, M. Theissen, E (2009). "Competition between Exchanges: Euronext versus Xetra", *European Financial Management* 15 (1), pp. 181-207.

[6] Although founded in 1990 under another name, the company was recast in 1992 as AZX – Arizona Stock Exchange and both the headquarters and technology trading center were moved to Phoenix, Arizona. While the idea behind AZX was ahead of its time in the 1990s and anticipated the more successful ECNs, it had to close in October 2001 due to lack of volume.

[7] On the discussion to transfer equities listed on the New York Stock Exchange (NYSE) by NYSE Euronext and NYSE Amex to its new data center in Mahwak, New Jersey, which included migration of other products and services in the lists, see Rodier, Melanie (2010). "NYSE Euronext Moves NYSE and NYSE Amex to New Data Center", Wall Street & Technology [1060-989X] Rodier ano. Vol. 28, issue 5, p. 11.

[8] Ross, Westerfield, Jaffe (2005), pp. 696-719.

[9] Li Jinliang (2010). "Cash trading and index futures price volatility", *Journal of Futures Markets*.

[10] Nielsson Ulf (2010). "Clearing and Settlement of Derivatives", *European Law Journal*, Vol. 16, Issue 4, pp. 477-500.

Option Exchange[1]) installed in London, in September 1982, and then MATIF (*Marché à Term International de France*) initiated in Paris, in February 1986, both adopting the American model of specialized Exchanges independent of the traditional domestic Stock Exchanges and tied only marginally to them. Other smaller European countries also started Derivative Exchanges some years later, such as Switzerland in May 1988 (SOFFEX) and Spain in November 1989 (MEFF), but in all these smaller cases the ties to their corresponding Cash Exchanges were somewhat closer. Oslo even opted from the very beginning to place cash and derivative products under a single roof. It is interesting to read the description Gorham and Singh make about the process of creating SOFFEX (Swiss Options and Financial Futures Exchange)[2]:

"…this market was not originally planned as an electronic exchange, the idea was to create a floor-based derivatives exchange with trading posts. But there was a slight problem. The three biggest Exchanges at Geneva, Zurich and Basle all wanted these new products to trade on their floors. An initial decision was made to list options at these biggest three. However it became clear that … it would be unnecessarily costly. Having the new exchange on the cyber space seemed to solve both the political and the cost problems, so with financing from the five Swiss major banks, SOFFEX was founded in December 1986.

However, this independent development of the Derivatives Exchanges in Europe soon changed tracks and in most places, both cash and derivatives segments evolved toward a single company. Suffice it to remember that the ultra-independent LIFFE is now part of a larger company – NYSE Euronext Group – which is dominated by the culture of the cash markets – a heresy in the "good old days" of the first Derivatives Exchanges! That is, at least in Europe, most countries decided to complement the initial consolidation movement of their regional Stock Exchanges with a subsequent merger between their respective centralized Cash and Derivatives centralized markets. In the US, once again, the picture is not as clear as in Europe, although some consolidation has also occurred in both the derivatives world – the Chicago Mercantile Exchange acquired the Chicago Board of Trade – and in the cash segment – Amex and Pacific Exchanges are now part of the NYSE group – and also between these two segments. Of course, the great size of the country and the liberal culture that permeates corporations and investors offer multiple viable alternatives and make it much more difficult to individualize single models, as in Europe.

It seems that a line must be drawn between the Anglo-Saxon world and Continental European countries in what respects *Post-trade*. Most (if not all) of these last countries adopted a model where trade and post-trade functions were (and still are, in most places) offered in a single package by the local Stock Exchange. On the contrary, England and the US both offer Trading, Clearing, Settlement, and Registration of issues (the post-trade functions) via different entities having some (or full) independence from the first layer. Probably, the most striking case is the Irish Stock Exchange, which has always used both the British CREST[3] organization (to register all Irish issues and to settle all trades agreed in that Exchange) and the British LCH-London Clearing House (to clear those trades). Post-trade in derivatives also shows a complicated picture as, even in the US, some Exchanges offer the entire package of services to investors, while a significant number of centralized markets have no post-trade subsidiaries, thus forcing investors to use an external Clearing House. There seem to be recent changes in this matter, as the example of the NYSE Euronext Group suggests. From an initial strategy of concentration in the trading segment only, the Group seems to have rediscovered the advantages of also offering Clearing and Settlement to its clients. Part of the explanation might be found in the larger profitability of these two post-trade services, but one cannot deny that an integrated service may be more appealing to a larger number of investors, therefore contributing to an enlarged market share in a world of increasing competition. A third reason may be found in the current philosophy of multiple interconnectivity between those three layers of services offered by different players. Any investor is supposed to be free to trade wherever it most pleases him and to clear and settle wherever it may be most appropriate to him. Therefore, even if an Exchange does not capture one trade, it may still be able to clear that trade or settle it in the end.

1.1. Legal status of Exchanges. In most of the world's developed countries, the domestic events indicate that any centralized market existing there came about as a practical response taken to facilitate

[1] When it started on September 30, 1982, it took the name of London International Financial Futures Exchange as it traded essentially Futures and a few options linked to short-term interest rates. At that time the Equity options market was run in a different exchange, the so-called London Traded Options Market, which was taken over by LIFFE in 1993. Later, in 1996, it also merged with the London Commodity Exchange, but again maintained its original name.

[2] Gorham, Michael and Nidhi Singh (2009). "Electronic Exchanges, The Global Transformation from Pits to Bits", Elsevier, pp. 37 and 38.

[3] CREST is the Central Securities Depository organization for the UK, Republic of Ireland, Isle of Man, and Jersey equities and for the UK gilts.

trading between buyers and sellers of commodities or securities. There, no flower market, no fish market, no fair, etc., has ever initiated its operations as the result of a sudden administrative decision taken by the local government, but only as the outcome of a set of agreements among economic agents following the (selfish) interests of their businesses. That is, Stock Exchanges in every one of those countries were the natural response of the respective financial system to the needs of local players. On the contrary, in many developing countries, because they came late to such a level of sophistication, public authorities were usually required to take the initiative to implement regional or national Stock Exchanges, whenever it was considered that positive externalities would result from their implementation and existence, for the national society[1]. That natural development of Stock Exchanges in Europe and in America justifies the legal status adopted in many countries: simple private associations of stock-brokers that were established to provide the means for their members[2] to trade securities. One important consequence of this particular legal nature of Stock Exchanges is their frequent tendency to refuse membership of such organizations to commercial banks, which explains why, often in the past, banks could not trade on the floors of those local Exchanges, and instead had to hire the services of Exchange members to do so on their behalf. Although this model prevailed long into the 20th century, during the 1980s some voices began to be heard stressing the advantages of another configuration for such Exchanges in the double sense that:

- a fully private corporation could be more efficient in supplying the different types of services demanded by their various constituencies; that is, instead of being a closed club, Exchanges would better operate as a normal private company subjected to the normal profit-oriented policies;
- and advocating the extension of membership to include commercial banks and other financial intermediaries in order to enlarge the distribution network for trading orders and also to be able to intermediate the very large orders originated from the increasingly important institutional investors; in fact, commercial banks normally control a vast network of branches that can be used to deliver the Exchanges' services to a much larger part of the population, and they also have a base of capital that offers less risky conditions to deal with the very large portfolios. Europe led a movement where all Stock Exchanges progressively changed their status from closed Associations of Stock Brokers to open Incorporated Firms whose shares were offered to the general public for investment. This implied a clear differentiation between the trading privileges of Exchange members and the ownership rights of shareholders, even if some members could take on both capacities. Some Exchanges even went a step further and listed their issued capital in some centralized markets[3]. Of course this movement did not alter the main goal of a Stock Exchange – to provide trading facilities – although in most places some other services were added in order to better service their clientele. As a matter of fact, a for-profit organization needs to search unceasingly for new business in order to increase the annual profits paid to its capital, and so cannot assume a passive attitude toward the market, as was the tradition in the earlier days of Associations of Stock brokers. This proactive position was also reinforced by their merger with Derivative Exchanges, where a tough aggressive attitude has always been a precondition of survival[4]. Opening membership to intermediaries outside the restricted (and relatively small) number of stock-brokers also contributed to the change of the culture inside the Exchanges, as the moment banks entered their "game" all members faced tougher competition due to the larger distribution network and the stronger capital base mentioned above. The US market was slightly behind Europe in this respect, but after some years passed that same trend was also embraced in most cases, in both the cash and derivatives segments.

1.2. What services are needed. The reflection on what services are needed from centralized markets is a very important one for many reasons. First of all, any type of private company, Exchange or not, must address two central questions to guaranty its survival:

- *which* clients should be targeted? Domestic and/or overseas? Issuers of shares, bonds, etc., members of the Exchange, banks, individuals, institutional investors of every kind, newspapers, governments, and people interested in economic data?

[1] Ulrich (1906, pp. 17-45).

[2] The word member is a direct consequence of this club-like character initially adopted by most Stock Exchanges. Only members of such a club could enter the Trading Room and trade securities on behalf of his/her clients. And in most places only individuals, not firms, could be members of Exchanges.

[3] This listing of the shares of a Stock Exchange in its own market may raise the question of a potential conflict of interests: who, inside the Exchange organization is sufficiently independent to decide any measure against this issuer – suspension of trading, delisting – if such case were to arise?

[4] Brown, Goetzman, Ross (1995).

- *what* do these different segments want the organization to provide? And how best should the Exchange segment that world of clients?

Second, the main "*raison d'etre*" of an Exchange is to offer a facility for investors to trade securities through the specialized intermediation of its members, but even this core business may actually involve many different partial requirements[1]:

- *Tradability*: speed of trading, so that an investment position can be taken or unwound without much delay and without significant price changes.
- *Price disclosure*: indication without delay of the current price of every trade executed – prices and quotations in real time; also historical prices are sometimes needed, and so they must be kept in large databases.
- *Transaction costs*: low trading commissions to investors, and (more important) low price sensitivity to large orders.
- *Good image*: visibility of the name of the listed company with a positive image attached to that listing status.
- *Easy access* of issuers to this market (the administrative requirements and the decision time after the application is submitted) and low burden to be listed and to remain so.

In third place, however, bargaining is only the beginning of the story, as an investor also demands a set of subsequent services necessary to implement the agreed trade:

- *Clearing*: guaranty of final execution of any agreed trade, even if the counterpart fails to deliver the security or to pay the counter-value.
- *Settlement*: inexpensive and efficient mechanism to transfer ownership of the traded instruments and the money of such a trade.
- *Central Securities Depository (CSD)*: simple and inexpensive registration of issues – shares, bonds, etc. – along with an effective and timely service of controlling the ownership of securities in order to facilitate the implementation of the frequent corporate events decided by the respective issuers (dividend payments, amortizations, rights issues, etc.[2])

Fourth, between these two groups of important services, experience has shown that a number of other functions tend to be better executed if in the hands of an Exchange. Besides Trading, Clearing & Settlement, and Custody, financial markets need many more services to work efficiently, and as a result, some Exchanges have responded by developing an aggressive marketing strategy to meet those evolving demands, as for example[3]:

- share (and bond) *indices* of various types and for various segments;
- derivatives and *new products*/instruments;
- new *trading segments* and/or specialized listing facilities;
- a service to *facilitate the compliance* by listed companies of the information and accounting disclosing rules;
- financial *education* of the different types of clients and of the relevant opinion makers;
- historical *databases* covering both traded information – prices, volumes, trades, etc. – and the Annual Reports of all listed companies;
- easy and less expensive *interconnection* with other markets, post-trade facilities, and membership.

In other words, what is now at stake is a strategic definition of what types of services can better be offered to whom by an Exchange in the current circumstances of a globalized and highly competitive world. No longer can we live in a model of closed-border nations, and an added technical knowledge is a prerequisite to regulators, issuers, and investors. Before everything, we should address the question: do we need a centralized market in each and every country?

2. Rationale for the consolidation of Exchanges

If so many countries evolved from regionalized Exchanges into national solutions, and even accepted their subsequent integration into transnational conglomerates of organized markets, and also if Derivatives Exchanges also merged amongst themselves or with the traditional Stock Exchanges, it must have been through the mobilization of some very powerful forces.

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[1] In fact, the NYSE's mergers with Archipelago and with Euronext brought questions about the viability and effects of competition between Stock Exchanges to the policy forefront. Brown, W.O., Mulherin, J.H., Weidenmier, M.D. (2008). "Competing with the New York Stock Exchange", *Quarterly Journal of Economics*, 123 (4), pp. 1679-1719. Nov. 2008 examines the largely forgotten but unparalleled episode of competition between the NYSE and the Consolidated Stock Exchange of New York (Consolidated) from 1885 to 1926. Such an empirical analysis "suggests that this historical episode of stock market competition improved consumer welfare by an amount equivalent to US$9.6 billion today".

[2] On the plan of New York Portfolio Clearing, a joint venture between the Depository Trust and Clearing Corporation and NYSE Euronext, to clear over-the-counter interest rate swaps, see Kentz, Mike (2010). "NYPC To Clear IR Swaps", *Derivatives Week*, [1075-2412] Vol. 42, issue 44, pp. 1-12.

[3] Chemmanur Thomas J. (2008). "Competition and Cooperation among Exchanges", *Journal of Applied Corporate Finance*, Vol. 20, Issue 3, pp. 76-90.

2.1. A typical organization chart. As mentioned above, even if Exchanges were created simply as places to facilitate the contacts between buyers and sellers, present day markets demand many more functions from such organizations. The following diagrams illustrate those functions and their interrelations at two levels: a macro-view of the main functions necessary for the market to work, and a micro-view focusing on the trading facility itself.

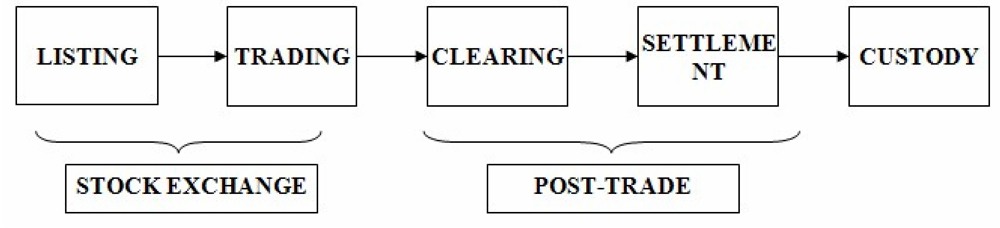

Fig.1. Trading and post-trading functions associated to Stock Exchanges

At the macro level, Stock Exchanges usually provide the following central services:

1. **Listing:** process of screening the quality of the issuing applicant and of the specific issue before admitting that security to trading on the Exchange. For derivative products, this word also means selecting the characteristics of the contracts – underlying asset, size, etc. – as well as the dates – first and last trading days – between which each contract can be negotiated on the Exchange.
2. **Trading:** the technical means – the trading floor or the central computer – offered to the members to seek the transaction counterparts necessary to execute the orders received from their clients.
3. **Settlement:** final execution of the agreed trades on the Exchange with simultaneous transfer of ownership and payment of the counter-value. Normally, settlement takes place some fixed number of days following the trade session in which the agreement was struck.
4. **Custody:** this involves the register of each issue – shares, bonds, etc. – and the timely control of ownership of those securities. As a sub-product, execution of corporate events such as payment of dividends are easily offered to investors and issuers by these Central Securities Depositories (CSD).
5. **Clearing:** after the positive experience discovered with its use in association with Derivatives Exchanges, because a guaranty of final execution is crucial for investors in long-term contracts, this "insurance" is also becoming common with some Stock Exchanges, such as Euronext, London Stock Exchange, Deutsche Börse, etc.

Not all Exchanges offer this full portfolio of services. Historically, some countries have opted for this integrated approach – the so called *Silo Model* – but the concept of competition is now infiltrating this area of the financial industry and leading to an open-architecture solution where some independent post-trade organizations offer their services to a multitude of Exchanges from which investors can choose following their trade transaction. Moving down one notch to the micro level, that is, the "restricted" business of Stock Exchanges, there are more functions that are worth mentioning:

1. Trading and Surveillance (market and members): the core functions of any Exchange.
2. Legal and Government/Supervisor Relations department.
3. Listing (of issues) and Compliance (issuers) department.
4. Marketing (including promotion and education) and Innovation of products and services.
5. Study and Statistics department.
6. IT department.
7. Human resources.
8. Administrative Financial/Accounting services.
9. Risk management (particularly important when Derivative instruments are also offered).
10. Public Relations are important for good communications with the press and other media.
11. Investor Relations may be necessary if the Exchange is run by a corporation that is listed. Sometimes, functions (10) and (11) can be given to other departments, especially in small Exchanges.

This list helps to understand the advantages and drawbacks an Exchange can extract from consolidating with other Exchanges depending on their similarities and/or on the heterogeneity of their respective markets served.

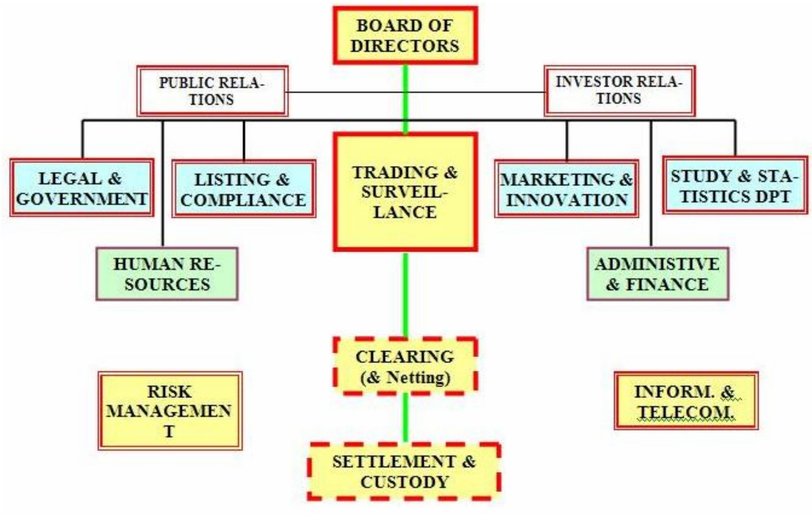

Fig.2. Reference organisation chart of a stock exchange

2.2. Advantages of consolidation. *2.2.1. Avoiding duplications.* There are four areas where consolidation has a strong impact: Trading & Surveillance, IT department, Administrative & Finance, and Risk Management.

From the moment that Trading has been automated through the use of central computers, this is the intuitive example of an operational cost that can be reduced if a group of Exchanges share the same computer and the same software: Trading and Surveillance means and personnel located in one place can service all geographic markets; the overall IT infrastructure – computers and telecommunications – can be used by the different Exchanges of a group without further costs, and technological standardization also reduces periodic investment costs. As a spin-off benefit, most of the personnel in the IT area can be concentrated in a single location. But the consolidation of the central trading machine brings along some other important consequences, principally for small Exchanges integrating much larger counterparts:

- it facilitates access of the members of one Exchange to the domestic markets of all the other associated Exchanges – they gain access to a much wider "window"[1] – since all of them use the same communication language and the same type of brokers' terminals;
- common trading rules, listing rules, etc. are facilitated by the adoption of the same trading platform; additionally, this eases the access of international intermediaries to small markets because all markets follow the same rules and use the same terminals and communication protocols;
- listed issues can easily be observed in the different geographies participating in this consolidated group of Exchanges.

Another area of heavy benefits is located in the Finance and Accounting departments, mainly after Europe has moved into a standardization of the accounting rules – IASC standards[2] – but also because integrating local treasuries brings significant economies of scale to the group – lower precautionary cash balances – and some economies of experience. Human Resources and Risk Management may both benefit from consolidation as well, but on a minor scale. This is because, for the first case the local characteristics of the population and labor laws, and, for the second, the particularities of the local infrastructure to be (risk) controlled and the statistics parameters of the local market, deserve an attention that can only be provided by local people. In any event, it should not be forgotten that in any process of migration to common centralized services, each affiliate must maintain a minimum technical capacity – in terms of number and quality of human means – to be able to dialog with the center of the group, with the local authorities, and with local outsourcing providers. The outsourcing user can never risk the possibility of being captured by the outsourcer, or the buyer of the service will be serving that supplier instead of being served by him! All of the other functions can benefit only marginally from consolidation. And the case of the Marketing Department may even become more difficult to manage as it becomes "sandwiched" between the common policies of the center – trade marks, communication campaigns, etc. – and the responsibility to study the local environment in order to adapt the response of

[1] Mind that this "window" tends to be larger than the simple sum of the individual markets of the participating Exchanges, as their consolidated size makes connection to multiple data-vendors much more appealing.

[2] IASC = International Accounting Standards Committee, the worldwide organization setting the standards for the accounting profession, established in 1973.

the affiliate to the local needs. For this adapted response, it must cooperate closely with the Study and Statistics department, another example in which integration may be counterproductive, as is the case with countries trailing the pack in terms of financial literacy and knowledge of the characteristics of the domestic market.

2.2.2. Liquidity, volatility, and cost of capial. If more foreign members can easily and directly access our domestic market via their electronic connection to the same central computer, then more interested parties observe our domestic share and bond issues. This naturally leads to larger local trading volumes, which may help to reduce price jumps resulting from larger orders[1] – both of which are crucial variables for small domestic markets. Also, small markets may benefit from the capital capacities and the accumulated expertise that intermediaries headquartered in more mature markets may bring to the domestic market. This is particularly important for those countries (like Portugal) where financial intermediaries do not yet have the tradition of being market makers in this securities market[2]. These factors may have consequences for the average Cost of Capital for large issuers headquartered in small markets, since they can more easily tap into foreign pools of liquidity where more buyers are available to take up those large issues. In the same direction of lower costs goes the impact upon volatility as more stability may reduce the liquidity premium demanded by investors[3]. The risk of taking a large position in a company is reduced if prices do not wander so widely, a result of the attention paid by a greater number of intermediaries and investors.

2.2.3. Innovations. An aggressive competitive posture is a key mechanism to gain market share in a globalized world, and therefore Exchanges can no longer take the traditional passive view that innovations are a responsibility of issuers only and that Exchanges exist just to provide the "physical space" for the local market to work freely. Derivative Exchanges were the first organizations to find this necessity to continuously invent new products to offer to the market, as every Future or Option Contract must first be designed by the Exchange before being offered for trading as a hedging or speculative instrument. More recently, even traditional Stock Exchanges care for new innovations, and the recent years are rich in this respect: new indices are being invented everyday, new segments of markets[4] are being designed and promoted to issuers and to investors, new communication channels are being constructed to facilitate issuers' compliance with the ever increasing demand for disclosure of data and of relevant events, etc. Of course, some innovations might be a competitive instrument of one partner Exchange only and therefore local creativity cannot always be shared among the different Exchanges of one group. Each Exchange still needs to survey its market and to invent (and promote) the products and services that are needed for that particular market. One main task in this area of promotion in some places is the "sale" of the very basic concept of the Capital Market as a complementary financial channel to fund corporations and even banks. However, some advantages might still exist in the consolidation of different national Exchanges in this area of innovation, especially when such inventions reach the level of being introduced into the market. For example, a local index may be invented in one place, but its daily (inexpensive) calculation and (wide) disclosure may be executed by the common central computer of the Group of Exchanges.

2.2.4. Third party needs. The world today is increasingly interconnected, and this means that issuers from all over the world – mainly large ones – sometimes need to tap foreign financial markets to raise capital for their internal development. Stock Exchanges find here a number of business opportunities in the following segments, among others:

1. *Listing of foreign issues*: a group of Exchanges offers a much wider window for a foreign company to expose its securities than any of its individual partners; also credibility is normally associated to that group of Exchanges which is an exclusive asset much valued by outsiders.
2. *Technology*: since centralized markets today run on central computers and because they need a connecting network covering the world, non-integrated Exchanges can save time and resources by opting for the computer and the telecommunication technologies already tested in those places; that is, IT products have become a by-product of the expertise already accumulated by innovative Exchanges.
3. *Marketing and education*: again, front runners develop experience in these fields that can be of great value to less advanced markets, where it

[1] Notice that this may be only part of a larger story.

[2] It is interesting to note that banks see themselves as natural market makers in foreign currencies but tend to show a terrific resistance to assume the responsibility of liquidity providers to shares and/or bonds.

[3] On the cost of trading large capitalization equities on the hybrid order-driven segment of the London Stock Exchange and the centralized electronic order book of Euronext see Gajewski, J.F., Gresse, C. (2007). "Centralised order books versus hybrid order books: A paired comparison of trading costs on NSC (Euronext Paris) and SETS (London Stock Exchange)", *Journal of Banking & Finance*, 31 (9), pp. 2906-2924.

[4] See for example the launch of two types of Multilateral Trading Facilities (MTF) in Europe by NYSE Euronext, NYSE Arca Europe – a displayed pool of liquidity for blue chips already listed in any European Stock Exchange – and SmartPool – a real dark pool version of MTF.

can be applied with simple translation of manuals or with slight adaptations to the local environment.
4. *Post-trade*: issuers and investors headquartered in remote geographic locations may appreciate the possibility of interconnecting local Exchanges to CSDs and Clearing and Settlement Houses located in large financial markets; these requirements point toward open architectures where every Exchange is connected to every post-trade organization.
5. *Risk management*: leading markets – cash and derivatives – may also sell their accumulated expertise in this crucial area of competence.

2.3. Problems arising from consolidation. In spite so many positive features of consolidation, several problems may also be found, mainly when the different partners in the group have very different sizes and/or levels of maturity.

2.3.1. The general framework. The world comprises a number of nations[1] each having accumulated a special history that distinguishes it from all the others. In particular, the norm is for each domestic economy to have characteristics very much of its own. But, most important are the social idiosyncrasies that close some societies to some products or services or that require some adaptations in them in order to be accepted locally. It is this very effect that requires any export company to adjust its exports to the particularities of its foreign clients and sometimes even to design new products to match some special external demand. Financial products are much more similar among themselves than are other, more material, products, but even here a perfect match between production and market needs cannot be overlooked. It is this local adjustment requirement that tends to be overlooked by the central decision makers after the consolidation of a group of Exchanges, particularly if the smaller parts of that group contribute only marginally to the annual profits[2]. Under the pressure to reduce global costs through the concentration of each organizational function in one geography only, central management easily treads on these local requirements, assuming that what is best for one of the large regions is also a good fit for all. In industrial parlance, even if Production can benefit from concentration, it may occur that Marketing and Sales would be better off by remaining local[3].

2.3.2. Multinationals. Consolidation of Exchanges across national borders – as in the European cases of Euronext and OMX groups – is yet a rather recent innovation (around 10 years old) and every one is still learning from daily practice how to run such new conglomerates[4]. Recall that the great leap forward in this field of multinational companies, most of them devoted to industrial activities or services, started in the interwar period (industrials) or following the Second World War (services) – that is, many of them were born about 65 years ago or more – and that move was mainly led by large firms in the US[5]. One of the basic characteristics of that historical experience is that most multinationals explore essentially one single type of product – either cars, or electronic products, or distribution services, oil, etc.[6] It also seems that more diversified groups tend to be more fragile enterprises, as the examples of the American ITT and the Dutch Philips[7] suggest. That is, it seems that adapting a portfolio of very different products/services to different countries in this world is much more demanding than coping with the needs of different markets with a single type of product or service. Another important characteristic is that, as a rule, multinational firms did not begin their history at such level of internationalization, as that presence abroad is, instead, the final step of a long-term evolution process from a simple domestic firm that, after exporting a significant part of its annual income, thinks that a physical presence abroad may improve its performance in those host countries and/or in some others around those foreign-installed premises[8]. It is little wonder that the most common case is for the domestic model and the internal culture to be first transplanted to the host

[1] More than the concept of "countries", it is the different fabrics of each nation that is of relevance. Also it may happen that one country includes different nations in its single territory.

[2] Bunge, Jacob, Pearson, David, (2010). "NYSE Gets Derivatives Boost", *Wall Street Journal* – Eastern Edition, Vol. 256 Issue 29, p. C3, reports on the 184 million U.S. dollar profit posted by NYSE Euronext in the second quarter of 2010, an amount attributed to growing derivatives business and asset sales. Bunge, Jacob (2010). "NYSE, Nasdaq Pass ISE in Options Trading", *Wall Street Journal* – Eastern Edition, Vol. 255 Issue 3, p. C5 reports on the gains received by Nasdaq OMX Group Inc. and New York Stock Exchange (NYSE) Euronext in the options market in December 2009 to conclude that the International Securities Exchange (ISE) experienced a decline in trading activity (based on figures issued on January 4, 2010).

[3] Aron A. Gottesman, Jouahn Nam, John H. Thornton Jr., Kevin Wynne (2010). "NYSE listings and firm borrowing costs: An empirical investigation", *Global Finance Journal*, Volume 21, Issue 1, p. 26-42.

[4] The use of the word Conglomerate is meaningful as it is intended to stress the loose character of the recent consolidation of Exchanges due to historical and legal differences.

[5] Chandler (1977), Djelic (1998), Hertner and Jones (1986), Jones, Schroeter (1993), Amatori and Jones (2003), Jones (2005).

[6] Jones (1995).

[7] Mind that although Philips started at the end of the 19th century in southern Holland with the famous electric light bulb, it later expanded into a number of consumer appliances and also to professional electrical equipment, such as medical products and telecommunications systems. However, some of those different segments always showed difficulties in integrating with the original business of the company. The great success always remained in the non-professional sector of this company. Wit, Meyer (1999), Lightfoot (1992), Jones (2004). On ITT see Lekachman (1980), Gaughan (2002).

[8] Jones (2000), Caves (2007), Dunning and Lunden (2008).

country, with a subsequent adaptation of the subsidiary (but not always) in terms of products and organization to the peculiarities of the host country and to the special needs of the host market[1]. Only after many years with important operations in multiple foreign countries may the company evolve to a real multiethnic and multicultural organization, finally losing the initial dominance of the original "language" or "religion"[2]. But, even in this more internationalized state of evolution, multinationals tend to maintain at home[3] both the Research & Development and the Central Marketing functions, with only some operational marketing activities regionalized to the foreign affiliate(s). The simple fact that the twin concepts of *home country* and *mother company* continues to be used in most multinationals reveals the uneven balance of influence between the different parts within the entire company. Also ownership of an affiliate is typically controlled by the mother-company, even if some local minority partners are necessary in some countries for political reasons and/or to "open some local doors"[4]. In summary, a Multinational Company tends to "export" its domestic model to the places where it establishes a physical presence, adapting to the local market the minimum amount necessary to better position its products and services abroad. Exaggerating a bit, one could say that, more often than not, it is up to a host market to accommodate an incoming multinational than for the subsidiary to influence the entire company[5]. The point is that the recent examples of cross-border consolidation of Exchanges do not seem to replicate the above typical historical path of multinationals. Both NYSE Euronext and NADAQ OMX resulted from a merger of historically independent national companies with the added feature that each member Exchange maintains a monopoly in its country. Exporting culture and operational procedures to these sovereign markets may easily lead to difficulties with the local clients and authorities[6], especially because there is some nationalistic character attached to each Stock Exchange that makes them more or less dependent upon the local regulators and governments[7]. Additionally, a national Stock Exchange has a number of local stakeholders (beyond the obvious shareholders) that must be taken into account when serving that domestic market: government, banks, companies, universities, lawyers, newspapers, etc[8]. In conclusion, although a transatlantic group of Exchanges can perfectly well be organized as a multinational corporation, it seems appropriate to stress some particular characteristics of this innovative case, and to admit that the overall organization and its staffing must recognize the necessity of a minimum intimacy between each local affiliate and the market it serves.

2.4. The most vulnerable areas of concern. The main area of concern is the Marketing function, here understood in a very broad sense. As a service provider, the local Exchange must try to meet the needs of the different segments of its own clientele. But it must also "attack" proactively and in a timely way its domestic market to show the advantages of some new products and services. The question is how to do the second and whether this activity can be designed in a tailor-made way at a location remote from the center of the group. Bear in mind that:

- different countries have different levels of financial literacy and that this in turn determines different parlance in the promotion of products and services and different needs for financial education;
- continental Europe tends to use mainly the banking industry to finance the local corporations – something which is in stark contrast to the Anglo-Saxon world[9] where even short-term money is significantly intermediated by the market in additional to the banking channel. These facts suggest that most marketing activities cannot be entirely consolidated into one single place – even if concentrated in a market different from the larger one – and the different local Marketing Departments need to be maintained to a significant size to be able to respond to the local needs. Additionally, education of the different local stake-holders requires a prolonged and heavy investment to develop that local financial market. As a supporting organization for those marketing activities, a local Exchange also needs a sizable Study and Statistics department. In particular, lack of technical publications and historical databases continue to be a restrictive characteristic in most continental European countries, and these can be better produced by such a technical department. Another area of activity for this department is the production of historical data necessary for the Risk Department to manage the level of risk of the daily operations at both trading and post-trading

[1] Donaldson (1996).
[2] Keegan (1980).
[3] Blomstrom (1996).
[4] Chandler (1990a).
[5] Chandler (1990a).
[6] Guillen (1994).
[7] Gruber (2005).

[8] On the transfer of the responsibility of regulating the U.S. equities and options markets of NYSE Euronext to the Financial Industry Regulatory Authority (Finra) see Bunge, Jacob (2010). "Finra Takes Over NYSE Beat", *Wall Street Journal*–Eastern Edition, Vol. 255, Issue 104, p. C13.
[9] Jones (2005a).

levels. Finally, the fact that each Exchange must work in a full sovereign legal environment – national laws and national supervision – together with the necessity to translate all operational rules of the Group of Exchanges to the national culture makes it imperative to maintain some local capacity in the Legal department to deal with both responsibilities.

Conclusions and policy implications: time for reflection on this innovative cross-border model

In spite of the restricted history registered so far about these set of innovations, created and experimented in Europe and across the Atlantic Ocean, there may be something to be gained in undertaking a first trial to analyze the effects of these new models on stability, liquidity, volatility, and cost of capital[1]. The current transnational association of Exchanges can be viewed as a simple continuation of the initial movement that merged the different regional centralized markets that existed within various countries that subsequently fused national Exchanges from a number of countries in Europe. But we can also wonder whether the additional variables introduced in the current multinational model by these successive moves in this industry have a positive or negative impact on two distinct areas of concern, a question that only the future may answer appropriately:

- market needs: can the integrated company detect and meet the particular needs of each domestic market where it is now present? If not, further expansion to other geographies will be blocked;
- stability edge: are those markets inherently more or less stable with such an interconnected electronic Exchange? If closer to instability, what can be done or contrived in order to achieve greater stability?

In what respects Market Stability, because free markets are inherently volatile in prices and involve different risks, the word stability is used here with a double, but precise, sense. In what respects *Vulnerability*, making each domestic market dependent upon a single central infrastructure – even if duplicated with a back-up computer – does not eliminate the heavy dependence on the working conditions of that center (it can close due to political or physical reasons), neither on the operability conditions of the telecommunications network connecting the various physical locations (national markets) to the trading engine and to the post-trade organizations. This is the added risk of the interconnected model: everyone is less affected by small interruptions but nobody is immune to a rare but catastrophic technical failure or political event that will inevitably happen sometime in the future, with the added characteristic that whatever the event is, it will certainly affect a huge portion of the world market. Size becomes a problem, not an advantage, unless some autonomy is guarantied for the extreme possibilities. In what respects *Risk*, increasing tough competition between trading members coupled with higher computer speeds favour trading mechanisms with decreasing latency times between the input orders and the output trades[2]. This increased speed may place our integrated markets closer to an unstable situation expressed by increased volatility of agreed prices[3] (which may lead to a halt of trading) due to an effect that is already recognized and well known ("positive feedback" in the jargon of physicists). In fact, when the trading mechanism adopted by an Exchange was slow – especially with the traditional openoutcry system between floor brokers using manually received orders – and particularly when traders took long periods of time to digest incoming new information, a slowly developing price jump in response to significant new information was the worst possible consequence in that market. Nothing existed to amplify that original slow and small jump. However, when vast amounts of data pour continuously upon every trader and, more importantly, when that trader is forced to take decisions in shorter and shorter periods of time in order to stay ahead of the competition, there is a much larger risk of starting a vicious circle – the positive feedback – that will magnify the impact on prices of that initial "small" information. Traders no longer decide rationally, but need to insert orders based only on intuition or on human feelings[4]. What is new is that the conditions for this vicious circle to begin have now improved – a result of the accelerated trading speed made possible by the economies of scale brought about by the merger of the different Exchanges and by the increazed competition resulting from the larger num-

[1] Carole Comerton-Forde, Kar Mei Tang (2009). "Anonymity, Liquidity and Fragmentation", *Journal of Financial Markets*, Volume 12, Issue 3, pp. 337-367.

[2] Because of high-frequency traders, market centres are spending millions to upgrade their infrastructures to accommodate for the demand for speed and the increase in volumes. See Babcock, Charles, (2010). "NYSE Wants Growth From New Data Centers", *InformationWeek*, Issue 1261, pp.18-18 "reports on the investment of the New York Stock Exchange (NYSE) on two data centers in the attempt of NYSE Euronext Inc. to establish itself as a technology leader".

[3] Recall the so called "flash crash" that occurred on the NYSE on May 6, 2010.

[4] This magnification effect is even stronger with negative price changes as the corresponding loss tends to be more valued by operators than positive ones, and therefore to make them even more nervous. The result may be a sudden accumulation of sell orders – potentially irrational orders – for the same instrument, which will magnify that initial negative change, and the vicious circle becomes self-generating and self-sustaining.

ber of members negotiating on the same instrument and in the same market. The increased correlation between different domestic markets and between instruments lubricates the development of such vicious circles. On the contrary, small and independent Exchanges would be satisfied with the old and slow trading technologies, and that would not lead any member to install "Algorithm Trading" in that trading system. Also, the correlation between national markets was less pronounced. Any merger of Exchanges affords room (makes more money available) to accelerate the entire trading process, but that added speed must still be squared with the slow decision process used by humans; humans, at the same time, are also subject to increased pressure to produce positive results from their trading intermediation.

Therefore, response comes either from switching to "Algo" trading – and that is inevitably subject to the model limitations of the decision logic implanted in those automatic machines – or from less digested human reactions, which are therefore less rational and/or more intuitive. In both cases, centralized markets tend to be closer to the frontier of instability and, most likely, for a market to show larger price swings than merited by the importance of the piece of new information driving the price change. These two aspects of stability do not condemn the association of different Exchanges into a multinational company but both deserve some careful attention from their different constituencies:

- as to the risk of interruption, the advantages of centralization must be compared to the costs of a likely breakdown in one or more markets; here guidance can be obtained from military practices, as any army always combines the concentration of power required to defeat the enemy with the need for any local leader to maintain a minimum level of independence from headquarters in order to cope with cases of emergency;
- as to the instability risk, computer systems must include some mechanism that detects, delays, and even (perhaps) halts the input of additional orders – mainly electronic and large orders – when the distance to the event horizon of instability narrows too much.

In what respects to Vulnerabilities of Small and Illiterate Domestic Markets, all the advantages from any integrated model interconnecting a number of Exchanges come from the concentration in one place – naturally the center – of a number of common functions. However, this centralization increases the physical distance from the decision makers located in that center to the various remote national markets and also tends to focus their attention exclusively on the overarching themes associated with the entire organization. The natural result of this is a significant decrease of attention (and of instruments available) to tackle the small problems of those distant markets. This effect is even more pronounced if the distant markets have widely varying levels of financial development. Here the risk is that a simple cost benefit analysis may lead to full neglect of the long-term investments necessary for small markets to draw closer to the more advanced ones. Let us illustrate this. Subjecting "David and Goliath" to a single system, only the mighty Goliath will receive attention from that system. The weak David may be entirely forgotten, especially if his diet is still one of "baby food", a food that is not in the "warehouses" of the central team because no longer in use over there! Paradoxically, these "minor" local needs may represent the central condition for survival of the cross-border integrated model, as a failure to improve the small member Exchanges precludes the expansion of that model to additional countries and markets, if not even to an unwinding of that very model through a withdrawal of the small partners from the association. Below is a list of a number of products and services that may be overlooked by a multinational firm of Exchanges. It illustrates what may still be needed in such small and/or less developed markets:

1. Provide a Share Index for Small Caps.
2. Promote Futures and Options Markets[1].
3. Develop the still young ETF segment.
4. Collaborate with the EU initiative to increase Financial Literacy.
5. Promote Market Making in securities by Local Banks.
6. Favor the traditional Retail Market to compensate for the natural advantages of institutional investment.
7. Mobilize local Academia to make small markets better understood in external countries.
8. Create a Special Segment for Non-listed Companies that may need temporary access to a centralized market.

Other problems may arise after the efficiencies of consolidation come to be gained through faster and more integrated electronic operational systems. Despite installing back-up systems, the very size of the enlarged geographic area covered introduces greater vulnerability to political meddling and catastrophic events. At the same time, more information and more velocity may bring us closer to the threshold of instability with the likely immediate consequence of amplified price volatility due to data overload.

[1] On the importance of Options in Stock Exchange to foster competition among the members, Chapman, Peter (2010). "Exposure' Under Assault", *Traders Magazine*, Vol. 23, Issue 316, pp. 52-55.

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