

Wharton

Financial
Institutions
Center

The Future of Securities Exchanges

by
Ruben Lee

02-14

The Wharton School
University of Pennsylvania



The Wharton Financial Institutions Center

The Wharton Financial Institutions Center provides a multi-disciplinary research approach to the problems and opportunities facing the financial services industry in its search for competitive excellence. The Center's research focuses on the issues related to managing risk at the firm level as well as ways to improve productivity and performance.

The Center fosters the development of a community of faculty, visiting scholars and Ph.D. candidates whose research interests complement and support the mission of the Center. The Center works closely with industry executives and practitioners to ensure that its research is informed by the operating realities and competitive demands facing industry participants as they pursue competitive excellence.

Copies of the working papers summarized here are available from the Center. If you would like to learn more about the Center or become a member of our research community, please let us know of your interest.



Franklin Allen
Co-Director



Richard J. Herring
Co-Director

*The Working Paper Series is made possible by a generous
grant from the Alfred P. Sloan Foundation*

The Future of Securities Exchanges¹

Ruben Lee
Managing Director, Oxford Finance Group

FINAL VERSION 26/2/2002

1. Introduction

The future is not only out there, it is also what we make of it. This paper presents a range of predictions about securities exchanges. It seeks both to extrapolate logical conclusions from current trends, and to provide a virtual bully pulpit to ensure that all is for the best in the best of all possible futures. Four broad themes are discussed. They concern, respectively, information, industry, governance, and politics. Predictions are made about each of these themes, and comments are provided on why the predictions will come to pass, and on some of their commercial and regulatory implications.

2. Information

Prediction 1: Securities Exchanges will become Media Companies.

Advances in computer and communications technology have already changed the way securities exchanges operate in many ways.² The implications of recent technological progress have not, however, yet been fully appreciated. It is now the case both that the marginal cost of executing an extra trade on an electronic trading system is close to zero, and that the marginal cost of delivering quote and trade data to further customers is also close to zero, once they have been captured electronically. Together these advances will revolutionize the business models that some securities exchanges follow, by radically increasing the importance of revenues from the sale of the quote and trade data emanating from such exchanges.³

Historically, exchanges have had seven main types of revenues: 1) membership subscriptions, fees for 2) listing, 3) trading, 4) clearing, and 5) settlement, and charges for the provision of 6) company news, and for 7) quote and trade data.⁴ For many exchanges, however, all but the last of these sources is gradually disappearing.

Membership fees will continue to be paid as long as an exchange has members – but demutualization is bringing this to an end. Exchanges now have customers, not members. In many contexts, listing is subject to intense competition between exchanges, and thus the ability to extract high revenues from the provision of this service is limited. Furthermore, there is debate about whether exchanges should in fact still undertake this function, when they can use it as a competitive advantage against trading systems which do not provide it. In the UK, for example, it has been

decided that the London Stock Exchange (LSE) should lose its official designation as the Competent Authority for listing, which was handed over to the Financial Services Authority (FSA). The merits of this move are being debated in other jurisdictions. Most securities exchanges do not provide clearing and settlement services, and even for those that do, there is pressure on them to reduce their costs and charges. Only a few exchanges provide company information, and in most environments this is subject to intense competition from the data vendors.

Transaction fees are the largest source of revenues for most exchanges today. However, this may not continue. As the cost of processing an extra marginal trade on most automated trading systems has now become essentially zero, competition between trading systems is pushing transaction fees to this level. And even this may be too good to last. Payment for order-flow already exists in the brokerage market, and it won't be long before this takes root in the exchange market. Exchanges will be paying for the privilege of executing orders on their trading systems. And indeed, in some contexts, they are already doing this, via subsidies provided to market-makers, and incentives for investors, to use their trading systems.

So exchanges' key source of income will have to come from the sale of their quote and trade data.⁵ Even when a dominant exchange has faced competition from new trading systems, and even if such trading systems have succeeded in capturing some order flow, very rarely has a dominant exchange ever lost its position as the main source of price discovery for the securities it trades.⁶ Revenues from the sale of quote and trade data will therefore be more resilient than those from transaction fees.

In the language of the media industry which they will effectively have joined, exchanges will be content providers. As such they are likely to mimic the activities of other similar media companies. Most importantly, securities exchanges will seek even more assiduously than they have in the past, to control and exploit the intellectual property in the price and quote data arising from their trading systems.⁷

Prediction 2: There will be Many Years of Legal and Regulatory Battles over Whether Exchanges Own their Quote and Trade Data.

The concept of owning something may be viewed as the bundle of rights and obligations associated with the purchase and sale of the thing.⁸ When applied to the quote and trade information emanating from a securities exchange, the key questions regarding such ownership are: *Who* should have access to *What* quote and trade information, *When*, and at *What* price?⁹ There is wide disagreement about all these issues for three broad reasons. First, different constituencies in a market always wish to claim as many property rights as they can over quote and trade data, including the market participants who submit quotes to, and execute orders on, an exchange, the exchange itself, the data vendors which distribute such information, other competing trading

systems, and the end-investors. These conflicts have been endemic to exchanges, wherever and whenever they have operated.

Second, there is no single body of law and regulation that governs the dissemination of quote and trade data. Indeed, in any single jurisdiction, there may be up to seven different relevant bodies of law, including those governing securities markets, competition, copyright, confidentiality, a *sui generis* right in databases, misappropriation, and general contracts. Each of these bodies of law and regulation is both complex and controversial, resolving differences between them is the same only more so, and addressing cross-jurisdictional questions is even harder. The problem of conflicting bodies of law has been getting progressively more serious, recently, both as intellectual property rights have become viewed as more important, and with the creation of relevant new laws, such as the EU Database Directive.¹⁰

The third reason why there is great disagreement about ownership questions concerning quote and trade data is precisely that traditional models of the industry are being undermined as a result of recent technological advances. New entrants are seeking to create and exploit quote and trade data in ways that subvert traditional business models, and established market participants are looking to protect their commercial turf. The onset of the digital economy has greatly exacerbated this problem.

Prediction 3: Only if a Market-Wide Consensus is Reached, will such Battles Stop.

Given the intensity of the current debate, it will prove impossible for either regulators or courts, *by themselves*, to be able to determine an allocation of property rights concerning quote and trade data, which is definitive – in that it is not subject to further legal attack – and which is accepted throughout the industry. Where regulators have looked at this issue historically, they have only been able to come up with a solution on the basis of prior widespread acceptance of an appropriate allocation by the industry as a whole. The history of the SEC's examination of the pricing of quote and trade data provides a good example of this, and has been well summarised as follows:

the SEC staff has relied to a great extent on the ability of the SROs [i.e. the exchanges and NASDAQ] and Plans [i.e. the operators of the Consolidated Quotation System and the Consolidated Tape Association] to develop fair and reasonable fees that are acceptable to SRO members, information vendors, investors, and other interested parties.¹¹

As the current environment illustrates, the SEC will find it hard to decide on what policy to follow, without such industry-wide acceptance.

Prediction 4: Marginal Cost Pricing for Information Dissemination will be Neither Sustainable or Optimal.

The transformation of securities exchanges into media companies will severely test current notions about the regulation of quote and trade dissemination. Attention is concentrated here on the question of what is the appropriate price for such information. Issues relating to the transparency of markets are ignored.¹²

In the jurisdictions where the pricing of quote and trade data has been examined either by regulators or by the courts, most of the following closely linked conclusions have generally been drawn: quote and trade information is a public good, it is typically provided by a monopolistic supplier, and should be provided either free, or at least at the marginal cost of delivering this information. A typical statement of this view was presented by the Director General of the Office of Fair Trading in the UK (the relevant competition authority), when examining whether the LSE (then called the International Stock Exchange) was charging a fair price for its information. He argued that,

any organisation with monopoly control over information which stems from the collective actions of market participants has a responsibility to exercise that control fairly and without discrimination and should ensure that such information is available as widely and cheaply as possible.¹³

In their assessments of what is a fair price for the quote and trade information arising on exchanges, regulators have normally based their recommendations on an assumption that exchanges are primarily trading systems selling transaction services. The price and quote information emanating from exchanges has thus been seen as a by-product. This will, however, be an inappropriate basis on which to decide regulatory policy in an environment when exchanges are effectively firms that manufacture price and quote information, when the cost of producing this information is thus the total cost of running an exchange, and when the fees exchanges are able to charge for trading services fall to zero.

A key rationale for requiring marginal cost pricing by exchanges when selling their data is that their behaviour is frequently considered anti-competitive, and against the public interest. The primary reason put forward to support this view is that an exchange is a natural monopoly due to the tendency for order flow to attract order flow. Given that one exchange is thus typically either the sole or the dominant forum for the trading in a particular asset, it thus also becomes the sole or the dominant source of price and quote information about the trading in the asset.

That an institution is a monopoly does not, however, mean that marginal cost pricing of its services is necessarily the optimal outcome. Although a prime reason why exchanges exist at all is to economise on transaction costs,¹⁴ the establishment and operation of an exchange are themselves costly activities which have to be financed in some manner. The imposition of marginal cost pricing, when marginal cost is essentially zero, would mean that the total revenues which an exchange receives would not cover its costs. In a first-best world, in which all forms of taxation are

allowed, it is typically advocated that a producer with a zero marginal cost of production, should still set the price for the good it is selling at the marginal cost of producing it, but that the resulting deficit should be financed by charging consumers some form of lump-sum fee or tax.¹⁵ Such fees are “non-distortionary” in that they do not affect the marginal costs which consumers face, and therefore still allow for the possibility of achieving an efficient outcome.

In most contexts, however, the idea of charging a lump-sum fee and marginal cost pricing to support the operations of an exchange would be unacceptable, so some other form of financing for the exchange must therefore be found. In such a second-best world, the best outcome in terms of output produced and price charged may not be close to that obtaining in the first-best world. One way of asking the question of what price an exchange should charge is to view the exchange as a public utility, and to require it to maximize social welfare, subject to the constraint that it not operate with a deficit.

Under these circumstances, the price the exchange should charge is inversely related to the elasticity of demand for information. The extent to which the exchange should set its price above marginal cost depends on the budget constraint, namely on the amount of losses it would incur if it did price the information at marginal cost, and on the extent to which these losses could be financed by lump-sum charges. When the constraint is non-binding, in particular when lump-sum fees may be charged, the price should be set at marginal cost to achieve the first-best outcome. If the required profit approaches the maximum possible in order to finance a large loss, and no lump-sum charges are allowed, the price the constrained producer should charge approaches the price that the monopolist will charge. This is the monopolistic profit-maximising outcome, when marginal revenue equals marginal cost.

It is important to note that it is not suggested here that the above approach should be adopted as the best way of determining would be a fair and reasonable price for a securities exchange to charge for its quote and trade data. The aim here is much less ambitious, but still radical enough given current regulatory beliefs. It is simply to show that a regulatory approach advocating marginal cost pricing by itself for the dissemination of securities exchanges’ data will not be either sustainable or optimal.

The most recent official recognition of the difficulties arising from the ownership of quote and trade data has been in the US. Following market concern about a range of issues relating to data dissemination, the previous Chairman of the SEC convened an Advisory Committee on Market Information in 2000, to review the following broad issues:

- (1) the value of transparency to the markets;
- (2) the impact of decimalization and electronic quote generation on market transparency;
- (3) the merits of consolidated market information;
- (4) alternative models for collecting and distributing market information;
- (5) how market data fees

should be determined and evaluated; and (6) practical matters relating to the joint market information plans, such as appropriate governance structures and issues relating to plan administration and oversight.¹⁶

The Committee was also convened, in part, to respond to an earlier SEC concept release which proposed that the Commission adopt a “flexible, cost-based approach” for evaluating whether market information fees and revenues are fair and reasonable.¹⁷

The conclusions of the Advisory Committee are noteworthy, as much as for what they did not say, as for what they did. The Committee first strongly rejected the arguments for the Commission’s proposed flexible cost-based approach, viewing it essentially as a “ratemaking” approach, which was “unwise and, ultimately, would prove unworkable”. Such a “public utility” cost-based ratemaking approach was thought to be resource-intensive, to involve arbitrary judgments on appropriate costs, and to create distortive economic incentives.

The Committee also considered one other pricing model for quote and trade data, which it termed a “most favored nation” structure. Under this model, exchanges would be required to make their “core” data available to any person or entity for the same price. The fees would be enterprise-based, whoever the buyer was or whatever their business model, and there would be no restrictions on redistributing the data. The Advisory Committee did not reach a consensus about this pricing model. It did find, however, that altering market data pricing would be likely to benefit one user group at the expense of another, and in particular that a strict one-fee-fits-all structure would tend to benefit large users at the expense of smaller ones, which the Committee said could lead to something akin to monopsony pricing. Accordingly, the Committee did not recommend adoption of this approach.

At first sight, the most surprising aspect of the Committee’s conclusions was that they contained no specific recommendations for changing the way in which the SEC determined and evaluated market information fees.¹⁸ This was despite the fact that the Committee was charged with examining precisely this issue, despite the fact that it expressly disagreed with the Commission’s concept release for how data fees should be determined and evaluated, and most importantly despite the lack of a satisfactory approach in use by the SEC. On due consideration, however, the inability of the Committee to deliver a consensus on an appropriate pricing model for quote and trade data is probably best viewed as a foretaste of the future legal and regulatory battles to come.

3. Industry

The future of three aspects of the industrial structure of securities exchanges are examined here: the evolution of competition in the market for exchanges, the possibility of linkages between exchanges, and the extent to which securities exchanges will seek to offer clearing services in addition to providing trading systems.

Prediction 5: A Few Exchanges will Dominate Trading.

This is the easiest of all predictions to make, as it is already the case.¹⁹ The domination of trading by a few securities exchanges will become more pronounced over the next few years, however, and will also have some implications which have not yet been fully understood.

The reason for the domination of a few securities exchanges is the now widely recognised positive network externality associated with order execution. A positive network externality is an advantage that a network has over potential competitors, and also a benefit that accrues to the users of such a network, which is dependent on the fact that other participants are already using the same network.²⁰ A network externality arises in the provision of an order execution facility, because the likelihood of a trader receiving an execution of his order on a trading system is higher if other traders already send their orders to the trading system. A trading system with a large number of orders will have an advantage over any new competing systems to which only a relatively small number of orders are submitted. Order flow thus attracts order flow, and liquidity attracts liquidity.

A caricature history of the evolution of competition between securities exchanges in Europe illustrates a range of themes which will be important more generally for the future structure of the exchanges industry. Although it is widely debated, the first stirrings of life in the exchange market are normally thought to have occurred in Amsterdam, where the stock exchange was founded in 1602. Wherever the first exchange was created, however, the population of exchanges has followed the standard cycle for any new species.

Cyclical periods of over-abundance and growth in their number have been succeeded by periods of famine and contraction, and then superseded once again by over-abundance. The original exchanges arose organically as a way of reducing the costs of trade in a region, and to this day that remains their primary function. For many the transportation and communication costs of reaching these newly-born entities were quickly seen to be excessive, and soon the neighbouring regions were rearing their own tame little markets. Then, just when lots of countries could start to boast a colony of indigenous exchanges, the costs of order-routing and information dissemination dropped substantially with the introduction of the amazing new technologies of the day - the telephone, telegraph and ticker-tape. Very rapidly, most of the regional exchanges were slaughtered to feed the dominant national exchange.

The cycle is now repeating itself. For years in Europe, the national exchanges grew fat and happy without any competition. Then, in a bout of computerisation in the mid 1980's, the LSE got ambitions beyond its domestic turf. In a fit of territorial expansionism, it took on the Continental bourses. That it was at first extremely successful in guzzling their liquidity, and then subsequently found this very same elixir of trading being sucked back to the domestic bourses from which it had leaked, was irrelevant to the final outcome. The fight was on again, and the consolidation over time

of the national exchanges had become inevitable.

What was initially perceived as a battle between rivals of the same genus, however, became much more complicated with the birth of the MONSTERS (Market Oriented New Systems for Terrifying Exchanges and Regulators). The development of the first of these trading systems, Instinet, created a nimble-footed beast that could dance between the inefficiencies of the American and European exchanges. Although Instinet painted itself eponymously as a network for institutions (i.e. investors), its prime bread and butter was always the inter-dealer business. For decades, Instinet faced no predators in this food chain, and prospered accordingly. Then, suddenly, with the introduction of the amazing new technologies of the day – further computerisation and the internet – a veritable menagerie of acronymic MONSTERS evolved to fight each other and also the exchanges.

In order to understand the whole, you have to understand the parts. And the key elements that make up securities exchanges are the 3 I's: Issuers, Investors, and Intermediaries. Previously each of these categories of market participants had a well defined nature, undertook clearly specified functions, and had well defined relationships with each other. Furthermore, and critically, exchanges provided a forum for the three components of the market to deal with each other. Issuers issued stock via Intermediaries. Investors bought stock via Intermediaries. Intermediaries traded on Exchanges.

Unfortunately the MONSTERS irreversibly muddied the gene pool. “Until recently the great majority of naturalists believed that species were immutable productions, and had been separately created.”²¹ Unlike previous cycles in the population growth of exchanges, however, genetic modification meant that inter-category breeding became rife, and species purity was no more.

Intermediaries bought MONSTERS in the vain hope of maintaining their franchise. Intermediaries bred MONSTERS using self-created incubators to try to create B2B exchanges. As a last resort Intermediaries even became MONSTERS, in an act of cannibalism, so as to disintermediate themselves rather than be consumed by others. Investors bought MONSTERS in the hope of maintaining their influence on the markets. Investors used MONSTERS to disintermediate the exchanges. Investors became MONSTERS to disintermediate the Intermediaries. Even the Issuers used MONSTERS to seek capital sustenance directly from Investors, and thus bypass the Intermediaries and exchanges.

Despite the creation of all these new trading systems, however, no single national exchange has yet been supplanted by a new trading system – whatever they are called, and whomever owns or operates them.

The above fable illustrates several important economic aspects of the industry for securities

exchanges. First, the structure of the industry in Europe has not been constant. At the most simplistic level, it started off as a monopoly (with a single municipal exchange), swung to a more competitive environment (with competing municipal exchanges in the same country), returned to a monopoly (with a single consolidated national exchange), became more competitive (with competing national exchanges and other types of trading systems), and is now becoming more consolidated and monopolistic again (with potentially just one or a few European exchanges). A similar caricature can also be applied to the history of the US exchanges.²² The fact that the industry structure is consolidating again has an important implication for the optimal governance structure of exchanges, as discussed below.

Second, the industry cannot be well described as being contestable. One key element of a contestable market is that if a new entrant comes into the market and offer goods or services (in this case the service of order execution) at a marginally lower price than incumbents in the industry, customers will respond quickly to price changes and switch to the new provider. As there are no switching costs, new entrants can take advantage of above-competitive profits or inefficient cost structures, and “hit and run entry” is possible.

In the market for securities exchanges, however, incumbents are normally not threatened by new entrants. A trading system that already attracts a large amount of orders will have an advantage over any new competing systems. Even if all investors appreciated that a particular new system would be unequivocally better than the already-existing one, *if* it could attract all the orders currently flowing to the incumbent system, the new system might still not succeed in attracting much order flow. While it would be better for the market as a whole to move to the new system, it might still be individually rational for each market participant to submit his orders to the old system until everybody else submitted their orders to the new system. This is precisely because it is to the already-existing system that order flow is currently directed.

The fact that the market for securities exchanges is not contestable has an important regulatory implication. In contestable markets, there is little need to worry about anti-competitive behaviour on the part of incumbents in the industry. Any such behaviour will be rapidly punished by a new entrant. The key goal of the regulators of such markets is to ensure that entry and exit costs, to and from, such markets remain low. Even though entry and exit costs are now low in the market for securities exchanges, as trading systems can be bought relatively cheaply off-the-shelf, dominant incumbent securities exchanges still, however, have many ways in which they can exploit their monopolistic positions without worrying about the activities of new entrants.

A third implication of the above history that monopoly, and not fragmentation, will be the major regulatory problem concerning securities exchanges. Notwithstanding the almost universal acceptance of the proposition that such exchanges will consolidate, the clamour of concern about

the existence of multiple exchanges and trading systems remains extremely loud, both in Europe and the US.²³ This focus of regulatory attention will prove to be mistaken.

One further important aspect of the future structure of the exchanges industry that is not captured by the history presented above is noted here. It is that in the future, as in the past, the network externality associated with an order execution facility or trading system will be powerful, but not all-powerful. The fact that a new system is more automated or operates more cheaply than an existing one will not necessarily reduce the network externality available to the first one. To compete successfully against an existing network, a new trading system has to attract not just a few clients, but a whole network of clients. This is possible – but only, typically, by finding a new group of customers who previously had no access to the market, or by having such an amazing new technology that everybody wishes to switch to it as soon as it is available. Both strategies are extremely difficult to implement.

Prediction 6: Most Exchange Linkages will Fail – Unless they Lead to a Merger or Acquisition.

Many exchanges threatened by a fall in trading volumes, or a decline in the number of companies listed on them, have sought to survive by linking with other exchanges. Few, however, have been willing to sacrifice their identity by merging with other exchanges to form larger combined entities. There are many ways in which linkages between exchanges may work, without an outright merger. Any subset of the various functions undertaken by the cooperating exchanges can be shared, including their marketing, listing, order routing, information dissemination, order execution, matching, clearing, settlement, and administration services. Sharing standards (for example on communications, messaging, and technology) or investments, are two important ways of reducing costs. There are also many different contractual procedures by which shared delivery of these services can be implemented. For example, one exchange can purchase services from another exchange, both exchanges may agree to sub-contract delivery to a third party, or a joint venture may be established.

Of the many attempts at cooperation between exchanges that have been proposed, few have been implemented, however, and of those that have been realized, most have failed. This will continue to be the case because of a problem that is unavoidable in linkages, as opposed to mergers, between securities exchanges, namely the difficulty of creating credible contractual commitments between cooperating partners. To achieve this, not only do such agreements have to be initially beneficial for the participants, they have to continue to be so even in a changing environment. If material circumstances vary, as often occurs, one or more of the participating exchanges may decide that the original contractual agreement is no longer appropriate. It is normally then hard for the other participating organizations to insist that the dissenting exchange honour its original agreement. The costs of enforcing any such contract are typically too high to warrant any legal

attempt to do so, particularly in an international environment. More importantly, however, even if a participating exchange could be forced into an action it perceived as unfavourable, it is frequently the traders who use one of the cooperating exchanges who do not support the linkage, and they normally cannot be compelled to employ it. There would thus be little point in forcing an unwilling exchange to continue honouring its initial participation agreement without the active support of the traders using the exchange.

Linkages are never neutral in terms of their effects on the various patrons of the participating exchanges, where the term patron is used in a very wide sense to refer to all the many types of participants that interact with an exchange.²⁴ As a result, one or more constituencies at exchanges potentially cooperating in a joint initiative frequently fear that it, or they, may be worse off if such a project were established. The governance structures of the collaborating exchanges determine how any benefits obtained by the scheme will be distributed, and whether those constituencies which believe their interests might be harmed have the power to change or obstruct its implementation.

The most likely way in which it is possible to align fully the objectives of any exchanges cooperating with each other is via a full merger between them. There are two key aspects of a full merger that reduce tension between participating exchanges. The first is that the distribution of any gains between such exchanges becomes irrelevant, as they all share in any such gains via their equity in the merged vehicle. Clearly the initial terms of any such merger determine the future shares of the gains. The second beneficial attribute of a merger in this context is that the credibility of agreements between elements of a single merged institution is typically much higher than could obtain with any contractual agreements between different institutions. This is because, while still possible, it is difficult to unwind such mergers. It is important to stress, however, that there are many other factors that can and do obstruct the success of mergers in general, and of mergers between securities exchanges in particular, including legal, regulatory, political and cultural issues. These difficulties are not examined here.

The above discussion highlights a difficult trilemma facing many securities exchanges when considering their future commercial strategy.²⁵ They face three broad options, all three of which have major problems. The first is to attempt to prosper by themselves – a task that is becoming progressively harder given the paucity of liquid shares on many such markets, the trend for these stocks to be traded or listed on the larger markets, and the limited extent to which regulators in the larger jurisdictions, with the most capital available, allow such exchanges to access their markets directly. The second option is to try to build larger virtual markets by establishing cross-border linkages with other exchanges – but as noted above, such linkages frequently fail. The final option is to merge with other exchanges to form a larger, typically regional, alternative. Not only does this

of course mean that the identity of the participating exchanges may disappear, the difficulties both of agreeing a merger, and of successfully implementing it once agreed, are high.²⁶

Prediction 7: Vertical Integration by Securities Exchanges into Clearing will lead to Anti-Competitive Behaviour.

In Europe, unlike in the US, the issue of whether securities exchanges should also provide clearing services, has not been settled and remains also highly controversial. Various benefits have been put forward in support of vertical integration between an exchange and a central counter-party (CCP), or operating what has come to be called in Europe a “vertical silo”. First, vertical integration may let a trading system platform be directly linked with a CCP, so that trades can be electronically matched and routed to the CCP’s clearing system. Such straight-through-processing reduces operational risks by decreasing the manual processing of trades. Second, if an exchange owns a CCP, the exchange may benefit by obtaining a source of revenues from the CCP that is not directly correlated with those arising from other sources available to the exchange. The combined revenue streams may be less volatile than the revenue from the exchange’s other businesses. Third, there may be economies of scope between the different activities undertaken by the exchange and the CCP. Fourth, proponents of the vertical silo model maintain that it does not reduce competition, but rather lets exchanges compete by offering different full service options. Market participants can thereby compare the full service offerings of vertically integrated exchanges (in trading and clearing together), and then choose between these various full service options.

Notwithstanding the above arguments, it is predicted here that if exchanges do operate both trading systems and CCPs, then some of their behaviour is likely to be anti-competitive. This prediction is based on two major claims: first, that CCPs have elements of a natural monopoly, and second, that by owning a CCP an exchange may exploit this monopoly to its own advantage in a manner that inappropriately restricts competition by other exchanges and trading systems. The demutualization of exchanges means that they are more likely than before to seek to take advantage of any monopolistic power that owning a CCP might give them, compared to the previous situation where both exchanges and CCPs were operated for the most part as non-profit mutual organizations.

A CCP often has elements of a natural monopoly because it benefits from a positive network externality which may arise from two sources. The first is because the benefits of netting – one of the key functions provided by a CCP - are dependent on the number of traders using the CCP. The more traders that use a CCP, the more that netting is likely to reduce the number and volume of trades that need to be settled. Once a CCP has been established in a market to deliver netting, all market participants are therefore likely to choose to use this CCP to net their trades over any potential competitor. In most circumstances, if participants already net most of their transactions

through a particular CCP, the benefits of sending additional transactions to the same CCP in terms of the reductions in settlement instructions and volumes are likely to be greater than those achievable by netting the transactions through any alternative CCP.

A second reason why the operation of a CCP often gives rise to a network externality concerns the collateral that market participants are typically required to put up to support their trading activity via a CCP. The more assets that are cleared through a single CCP, and the more this CCP is able to offset margin positions in one type of asset against positions in other types of assets, the lower the amount of collateral that is likely to be required. This is because the risk associated with the combined portfolio is likely to be less than the sum of the risks associated with each of the individual positions, given any correlations in the returns of the relevant assets. Once a CCP starts to dominate clearing in one or more assets, it is difficult for new competitors to offer market participants similar reductions in collateral for this range of assets, while still employing appropriate risk-management procedures.

There are many ways in which a securities exchange may seek to exploit the monopoly power of a CCP, if it owns one. It may seek to cross-subsidize its trading system by using the profits it obtains from its CCP. The possibility of doing this may be increased by the difficulty of distinguishing the costs of clearing from the costs of trading in a vertical integrated organization.²⁷ The ability of trading systems without access to such cross-subsidies to compete with an exchange supported revenues from a CCP may be limited.

An exchange may also restrict access to its CCP to other competing trading systems. In order for netting to be viable it is necessary that positions can be off-set against each other in a clearing-house, or be fungible with each other. Without such fungibility, no netting is possible. The extent to which market participants will be able to net any positions they take on different trading systems, is therefore dependent on whether these trading systems have access to the relevant CCP. If, for example, one exchange owns the CCP on which most clearing is done, and restricts access to this CCP by another competing exchange, market participants will not be able to net any trades they execute on the second exchange through the first exchange's CCP. The ability of the second exchange to compete with the first exchange will therefore be reduced.

4. Governance

Prediction 8: Demutualisation will be Neither Necessary Nor Sufficient for the Prosperity, or even Survival, of Securities Exchanges.

The trend to demutualize securities exchanges started in 1992 with the “companisation” of the Stockholm Stock Exchange.²⁸ Since then many other exchanges have demutualised, and most of the rest now have plans to do so.²⁹ A key goal of demutualizing a securities exchange is to enhance

the exchange's ability to react to competition from other exchanges and trading systems. A wide range of merits of demutualization for exchanges have been suggested.³⁰ Most importantly, demutualization may allow a securities exchange to be more responsive to the needs of its users and customers, and particularly investors and issuers, and to reduce the need for the exchange to satisfy the interests of the financial intermediaries who were previously its members and owners. This may facilitate an exchange granting direct access to its trading system to market participants other than financial intermediaries.

The cost-savings to investors, and indirectly to issuers, of having such direct access without any intermediation can be considerable.³¹ A nonprofit or cooperative exchange whose members are financial intermediaries will be loath to grant access to its trading system directly to investors. To do so would disintermediate, and thereby imperil the livelihood of, the members whose very welfare the exchange existed to serve. A for-profit non-member-owned system, on the other hand, would have no such qualms, as it would not have to satisfy the preferences of the financial intermediaries trading on its system.

Many other anticipated benefits of demutualization have been identified. It may allow an exchange: 1) to modernize its technology; 2) to create a valuable currency for strategic alliances and acquisitions; 3) to obtain a governance and management structure that is more agile, flexible, and swift in its ability to respond to industry and market conditions, and that is not subject to "cumbersome decision-making and strategic gridlock";³² 4) to unlock members' equity, and buy out the vested interests of traders; 5) to avoid concentration of ownership power in a particular group of exchange participants; 6) to reward key market participants in equity, thus giving them a financial incentive to bring business to the exchange; 7) to create a catalyst for pursuing new business strategies; 8) to provide both a valuation benchmark and liquidity for investors; 9) to obtain an initial infusion of capital and to gain easier ongoing access to capital; and, 10) to improve financial decision-making, by ensuring that resources are allocated to business initiatives and ventures that enhance shareholder value.

Although it is beyond the scope of this article to analyze in depth the future governance of securities exchanges, several brief comments on this topic are made here.³³ As the above list of potential benefits of demutualization indicates, demutualization may have many different effects on a securities exchange. What the list does not show is that many of the anticipated benefits may in fact either not materialize, or may be obtainable with a mutual governance structure. It is suggested here that there is no perfect governance structure for a securities exchange. Rather, a cost-benefit analysis needs to be undertaken for any specific exchange considering such a move, and this analysis needs to take account of the industrial structure in which the exchange operates. If an exchange operates a monopoly, there are strong merits in it being operated on a mutual basis, as

outlined below.

The merits of demutualization for an exchange in a developing market are particularly debatable. Steil argues that in such circumstances, the creation of commercial, for-profit trading system operators “should be considered a priority”.³⁴ This is because the demutualized form is believed to lower trading costs for investors significantly, and because the establishment of a mutual exchange is thought likely to entrench the vested interests of brokers in maintaining the mutual status of an exchange so as to bolster their business positions. While both these arguments are valid, they are not believed determinative, especially in a developing context, for two reasons. The first is simply that in many such economies the level of financial sophistication is very low, as is the number of participants in the market. The second is that the creation of any financial institutions in a developing market is extremely hard, and the creation of investors is frequently much harder than the creation of the brokers. Any cost savings that a demutualized stock exchange with direct investor access might bring are therefore likely to be low compared to the benefits the presence of brokers, with ownership interests in an exchange, may yield in actually helping bring the market into existence. The question of sequencing of development of capital markets is, however, admittedly both controversial, and an area where little research has been undertaken.

Two types of evidence will confirm the prediction that demutualisation will be neither necessary nor sufficient for the prosperity, or even survival, of securities exchanges. First, the most successful exchange in the world will continue to be the New York Stock Exchange (NYSE), and this exchange will not demutualize – for reasons discussed below. Second, some of the exchanges which have demutualized will not prosper, and indeed some of them will not survive. None of the three strategic options open to them will be robust enough to withstand the difficulties they face.

Prediction 9: Demutualised Exchanges will require Significantly more Regulation than Mutual Exchanges – Not because of the Difficulties of Self-Regulation, but rather due to Likely Anti-Competitive Behaviour.

The large amount of regulatory interest in the demutualization of securities exchanges has focused to date on whether demutualization is compatible with self-regulation, and if so how self-regulation should be changed to adapt to take account of demutualization. Some people have argued that the emergence of demutualised for-profit exchanges exacerbates the conflicts of interests associated with running an exchange and being an SRO, and that because of their commercial incentives demutualised for-profit exchanges should relinquish their regulatory responsibilities.³⁵ Karmel suggests that a non-profit exchange may enjoy a greater aura of acting in the public interest than does a for-profit exchange.³⁶ In contrast, many exchanges have suggested that demutualization will give them an added incentive to maintain high regulatory standards, as they will attract more order flow and business by doing so.

It is believed here both that the conflicts of interests that may be present in a demutualised for-profit exchange are no more worrying than those present in a mutual exchange, and that similar types of programs may be adopted to reduce the harmful effects of such conflicts of interest as are used in the mutual context.³⁷ Six of these strategies are particularly important. First, the decision-making process of an SRO should be transparent, with public consultation, solicitation of comments, and justification of any decisions made. Second, the decisions of an SRO should be subject to due process, with appropriate appeals procedures. Third, there should be a diversity of representation on the board of an SRO, with representatives of all major market constituencies. Fourth, there should be regulatory oversight of SRO procedures and decisions. Fifth, conflicts of interest should be publicly disclosed. Finally, there should be procedures to minimize, but not necessarily eliminate, such conflicts of interests.

The major regulatory problem arising from the demutualization of a securities exchange will not be self-regulation, but that of anti-competitive behaviour. Given that a few securities exchanges will dominate trading in most securities, even in the presence of alternative competing trading mechanisms, and that as demutualized entities they will seek to maximize profits, they will seek to do what all monopolistic enterprises do, namely raise price and reduce output.

Standard corporate governance procedures will not stop this happening. A key goal of demutualization is precisely to disperse ownership to a wider group of market participants than just financial intermediaries. However good the corporate governance structure of a demutualized securities exchange, it will therefore be difficult for a wide group of shareholders to exert any influence to stop such anti-competitive activity. Indeed, to the extent that the owners of securities exchanges are not users of the exchanges, they will have no incentive to do so. On the contrary, as shareholders, the owners will benefit from any monopolistic profits that these exchanges are able to obtain.

It is here that the main advantage of the mutual governance structure will once again be seen. The central attribute of a mutual or cooperative securities exchange is that the users of its services are also its owners. A cooperative exchange's customers can therefore control the prices the exchange sets, and ensure that even if it operates effectively as a monopoly, by dint of being the dominant provider of execution facilities, the exchange does not charge anti-competitive prices. This will reduce the need for regulatory oversight of the competitive position of the exchange.

If on the one hand a broker-owned exchange finds it hard to allow direct access to investment institutions, thereby unnecessarily raising their trading costs, while on the other hand a for-profit demutualized structure allows an exchange to exploit any monopoly power it has, again unnecessarily raising trading costs, a logical conclusion would be for investors to seek to own their own securities exchanges. A non-intermediated but mutual exchange owned by end-investors would

resolve both these problems. Given the network externality associated with existing systems, however, it is not foreseen that this will arise in the predictable future.

5. Politics

Prediction 10: Political Intervention in Securities Exchanges' Activities will Grow.

The nature of regulation is not simple. Although the analysis of the political economy of markets has a long and distinguished history, many financial economists and lawyers view the regulation of markets essentially as a technical exercise. They believe that regulation is essentially a multi-stage analytical process: the objectives that are in the public interest need to be identified and interpreted; the tools available to the regulator need to be characterised; the manner in which these tools may further the desired objectives needs to be understood; a balance between conflicting objectives needs to be determined; a choice over the regulatory tools to be adopted must be made; and any regulatory or legal instruments adopted need to be appropriately enforced. Both the history and the current environment of securities exchanges show, however, that in addition to this technical process, the politics of regulation are also extremely important for the development of securities exchanges.

There are three reasons why political intervention in the arena of securities exchanges is likely to be more crucial in the future than in the past. First, the fact that technology is changing the structure of the market for exchanges and making it more competitive, is likely to mean that those entrenched market participants which cannot compete in the economic marketplace are more likely than before to seek to use political means to protect their interests than they have done in the past. Second, the consolidation of trading into a few exchanges will increase the power of these few exchanges. Such an agglomeration of power will not go unnoticed by the politicians. Third, the increasingly international nature of both competition and consolidation between exchanges, will inevitably bring with it increased national and international political involvement.

The relationship between securities exchanges and politics is both complex and context-specific. Four examples of how politics will become more important in shaping the future activities of exchanges are noted here, concerning respectively demutualization, consolidation, location, and aid.

Demutualization

The potential demutualization of the NYSE has been, and will continue to be the subject of intense political debate in the US. In 1999, the NYSE Chairman indicated that the exchange was committed to demutualization.³⁸ Following a hearing at the Senate Banking Committee there appeared to be bipartisan support initially for demutualization.³⁹ The proposal was strongly resisted

by the past Chairman of the SEC, arguing that “we simply cannot allow the mandate of self-regulation to take a back seat to the exigencies of short-term profit”.⁴⁰ Subsequently, the NYSE Chairman stepped back from his earlier statements concerning the possibility of the exchange’s demutualization, noting that it would not happen until after the conversion to decimalization, and even then that the exchange might abandon the sale if it decided it no longer needed the capital that an IPO would raise to compete with other trading systems.⁴¹

Consolidation

Politics will be a key factor in determining whether, and how, securities exchanges consolidate in the future. The recent takeover of the London International Financial Futures Exchange (LIFFE) by Euronext NV illustrates two important points in this context.⁴² The success of Euronext NV, against a competing bid from the LSE, was critically dependent on the willingness by the British political and financial authorities (primarily the government, the central bank, and the regulator) to sanction such a takeover, or at least not to intervene to prevent it.⁴³ UK officials simply, and rightly, believed first that they did not know what would be best in this context, and second that allowing a foreign institution to purchase LIFFE would increase the attractiveness of the UK as a financial centre. This political will reflected a wider cultural attitude among both the management of LIFFE, and more generally among market participants in London, to disregard almost completely the nationalities of the bidders.

It is, however, extremely hard to conceive of any other jurisdiction with a large financial centre where a similar possibility might have occurred, be it France, Germany, or indeed the US. In all these countries, the political and financial establishment would be unwilling even to consider such a takeover. To ask the question of whether the Nasdaq market could be bought by a French-dominated institution such as Euronext, is to answer it. The political reality is that the major securities exchanges in these countries are currently believed too much a part of the national political fabric for their national identity to be subsumed into any foreign or regional entity.

Political concerns about domestic, as well international consolidation, can also be important. The fact that the potential merger of the NYSE and the Nasdaq market is not even being discussed in the US, is testament not only to the historical rivalry between the two markets, but also to two wider political objectives. The first is a widespread, and long-held, desire to maintain some form of competition to the NYSE. The second has arisen much more recently. Following the September 11th tragedy, a key political aim has been to ensure that the financial infrastructure for the US is based on a distributed network, and not centred in a single location. While back-up and redundancy facilities make this feasible at one single institution, such as the NYSE, the merits of having two institutions (i.e. both the NYSE and Nasdaq), one of which could take the slack if the other failed, have not been lost on policy-makers in Washington.

Location

A highly charged political issue is the location of exchanges. Historically, there used to be a strong tie between the presence of a securities exchange in a particular location, and the fact that that location could be a financial centre. To access the trading system, a market participant had to be physically present at the trading system. This is no longer true. Trading systems can be both located and registered in jurisdictions that are different from the locations in which most of the market participants using the trading systems are located. Even if there were no trading system operated by a company either registered or regulated in a particular jurisdiction, this would have little relevance for the development of the jurisdiction as a financial centre, where firms to choose employ people for the provision of financial services – as long as national investors and financial intermediaries have access to other markets.

The markets they operate perform a wide range of economic and political functions. They offer fora for trading, investment, speculation, hedging, and arbitrage. They serve as mechanisms for price discovery and information dissemination. They provide vehicles for raising finance for companies. They are frequently pivotal elements in the success of financial centres. They are used to implement privatization programs, and may play an important role in the development of emerging economies. Steil correctly notes that “the world already has far more functionally identical trading systems and CSDs than it needs”, but then concludes that “a government which does not actively attempt to exploit this overcapacity in fostering the growth of a local equity market is doing a great disservice to its citizens and its domestic enterprises”.⁴⁴

The issue of location of exchanges is not just relevant for developing markets. In 6/2000, the New York State Assembly agreed to provide a significant financial package to ensure that the NYSE stayed in New York.⁴⁵ Of the expected \$1.7 billion total cost for the project, New York City agreed to finance the total cost of the land acquisition, estimated to be between \$360 and \$400 million, a portion of the \$240 million estimated for the new construction, and also an additional \$215 million from its 2001-2002 executive budget submission. The Senate Majority Leader announced that “the New York Stock Exchange is closely tied to the economy of New York City and New York State, and so intertwined with the economic history and growth of the United States that it’s imperative that we keep it here”.

The proposed iX merger between Deutsche Börse and the LSE provides a similar illustration of the increasing influence of politics on exchange decisions. The planned merger became a channel for a range of disparate political interests groups in the European Union to pursue their divergent goals, almost all of whom voiced their opinions against the merger, or rather against what they painted the merger to represent. From purely an economic viewpoint, the city where both iX and the high-tech joint-venture should have been located was irrelevant. The success of an exchange is not

dependent on where the black box and operational staff supporting the trading system is placed. Indeed, the success of a financial centre is also increasingly becoming divorced from the success of any exchanges located in the financial centre. Remote access means that market participants will choose their locations, not on where the exchanges are based, but on many other criteria. These include the existence of a sufficiently large and well qualified group of professional service providers, the ease of living in the location, the tax environment, and the language.

The location of an exchange still, however, remains a vital political symbol for the success of a financial centre. And it is here that there a critical divergence arose between British and German interests. Given London's current position as the pre-eminent financial centre for Europe, iX should unquestionably have been based London if the intention was to develop a European financial centre to combat that of the USA. This assumed, however, that the Germans would be happy to give up their ambition for developing Frankfurt as a European financial centre on the back of, what was then, the success of the Neuer Markt – an assumption that was self-evidently false.

The dominant British political voices heard about the merger were from the Conservatives who attempted to use the merger proposal to exploit Labour tensions on European policy. The exchanges' initial statement that all shares would have to be quoted in euros was seized upon by the Tories, and attacked as a direct endorsement for Britain to join the euro. Labour kept quiet about the issue, because it did not want to expose its own divisions about Europe. Although not party to the proposed merger, the French had a direct interest in seeing it fail, as its success would clearly and adversely have affected the potential for Euronext to thrive.

Aid

The final issue noted here where politics directly affects the development of securities exchanges, concerns the provision of aid and technical assistance. The US, via USAID, has been at the forefront of providing technical assistance for the foundation and development of capital markets and securities exchanges in many regions throughout the world. While the absolute amount of money that the US provided in 2000 for international aid (\$9.581 billion) was greater than from each of the 22 country members of the OECD bar Japan (which gave \$13.062 billion), the proportion of its GDP that America allocated to aid in 2000 was the lowest of all these countries (0.1%, compared with the average of 0.39%, with the UN target of 0.7% for the wealthy nations, and with the proportions given by Denmark, the Netherlands, Sweden, Norway, and Luxembourg which each gave more than 0.7% of their GDP).⁴⁶

Obviously, the provision of technical assistance for the development of securities exchanges is only a small part of the whole USAID budget, and also no assessment is provided here of the value of providing such assistance. Nevertheless, given the range of pressing demands on USAID,

unless the total American budget on aid is increased, a highly political question, continued US support for the development of securities exchanges and capital markets around the world must be in question.

6. Conclusions

This paper examines the future of securities exchanges. It seeks both to extrapolate logical conclusions from current trends, and to provide a virtual bully pulpit to ensure that all is for the best in the best of all possible futures. Four broad themes related to securities exchanges are discussed, concerning respectively, information, industry, governance, and politics. The following ten predictions are made:

- 1) *Securities Exchanges will become Media Companies.*
- 2) *There will be Many Years of Legal and Regulatory Battles over Whether Exchanges Own their Quote and Trade Data.*
- 3) *Only if a Market-Wide Consensus is Reached, will such Battles Stop.*
- 4) *Marginal Cost Pricing for Information Dissemination will be Neither Sustainable or Optimal.*
- 5) *A Few Exchanges will Dominate Trading.*
- 6) *Most Exchange Linkages will Fail – Unless they Lead to a Merger or Acquisition.*
- 7) *Vertical Integration by Securities Exchanges into Clearing will lead to Anti-Competitive Behaviour.*
- 8) *Demutualisation will be Neither Necessary Nor Sufficient for the Prosperity, or even Survival, of Securities Exchanges.*
- 9) *Demutualised Exchanges will require Significantly more Regulation than Mutual Exchanges – Not because of the Difficulties of Self-Regulation, but rather due to Likely Anti-Competitive Behaviour.*
- 10) *Political Intervention in Securities Exchanges' Activities will Grow.*

References

- Advisory Committee On Market Information. *A Blueprint For Responsible Change*. Prepared for the SEC (14/9/2001).
- Angel, James J. *Consolidation in the Global Equity Market: An Historical Perspective*. Working Paper, Georgetown University (19/2/1998).
- Atkinson, A.B. & J.E. Stiglitz. *Lectures on Public Economics*. New York: McGraw-Hill. (1980).
- Black, Bernard S. *The Legal and Institutional Preconditions for Strong Securities Markets*. Stanford Law School Draft (7/2000), also Vol. 48, *UCLA Law Review* (2000).
- Boland, Vincent & Charles Pretzlik. *How the LSE managed to let Liffe slip away*. *Financial Times* (3/11/2001).
- BTA Consulting. *To Be or Not To Be: Demutualisation Survey*. (2/2001).
- Buck, James (ed.). *The New York Stock Exchange: The First 200 Years*. Greenwich Publishing Group (1992).
- Coase, R.H. *The Firm, the Market, and the Law*. Chicago: University of Chicago Press (1988).
- Coffee Jr., John C. *The Coming Competition Among Securities Markets: What Strategies Will Dominate?* Working Paper No. 192, Columbia University School of Law (24/9/2001).
- Darwin, Charles. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. London: John Murray, Albemarle Street (1859).
- Domowitz, Ian and Ruben Lee. *The Legal Basis for Stock Exchanges: The Classification and Regulation of Automated Trading Systems*. Northwestern University & Oxford Finance Group (5/1996).
- Domowitz, Ian and Ruben Lee. *On the Road to Reg ATS: A Critical History of the Regulation of Automated Trading Systems*. Vol. 4, No. 2, pp. 279–302, *International Finance* (2001).
- Domowitz, Ian & Benn Steil. *Automation, Trading Costs, and the Structure of the Trading Services Industry*. pp. 33-92, *Brookings-Wharton Papers on Financial Services*, Robert Litan & Anthony M. Santomero (eds.), Brookings Institution Press (1999).
- Domowitz, Ian & Benn Steil. *Innovation in Equity Trading Systems: The Impact on Transaction Costs and the Cost of Capital*. In Richard Nelson, David Victor, & Benn Steil (eds.) *Technological Innovation and Economic Performance*. Princeton University Press (2001).
- Dwyer, Paula. *Rethinking Wall Street: What do a for-profit NYSE and Nasdaq mean for investors?* http://www.businessweek.com/1999/99_41/b3650168.htm Business Week Online (11/10/1999).
- Euronext NV. *Recommended Cash Offer for LIFFE (Holdings) plc*. (29/10/2001).
- European Union. *Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases*. Official Journal L 077, pp. 20-28 (27/3/1996).
- Forum of European Securities Commissions (FESCO). *Proposed Standards for Alternative Trading Systems*. Consultative Paper, FESCO/01-035b (11/6/2001).
- Grasso, Richard A. (Chairman, NYSE). *Letter to Members Concerning "Demutualization"*. (2/9/1999).
- Grasso, Richard A. (Chairman, NYSE). *Public Ownership of the U.S. Stock Markets*. Testimony before Committee on Banking, Housing and Urban Affairs, US Senate (28/9/1999).
- Hansmann, H.B. *The Ownership of Enterprise*. Cambridge, MA: Harvard University Press. (1996).
- Honoré, Anthony M. *Ownership*. In A.G. Guest (ed.), *Oxford Essays in Jurisprudence*. Oxford: Clarendon Press (1961).

- International Organization of Securities Commissions. *Issues Paper on Exchange Demutualization*. (6/2001).
- Karmel, Roberta. *Demutualization of Exchanges as a Strategy for Capital Market Regulatory Reform*. Inter-American Development Bank (forthcoming 2002a).
- Karmel, Roberta. *Turning Seats into Shares: Causes and Implications of Demutualization of Stock and Futures Exchanges*. Hastings Law Review (forthcoming 2002b).
- Kowalski, Robert. *NYSE Votes to Shutter Old Electronic System, Opposes SEC Order Book Plan*. TheStreet.com <http://www.thestreet.com/stocks/brokerages/915301.html> (4/6/2000).
- Lee, Ruben. *What is an Exchange? The Automation, Management and Regulation of Financial Markets*. Oxford University Press (1998).
- Lee, Ruben. *A Future History of Exchanges: Creationism vs. Evolution?* Handbook of World Stock and Commodity Exchanges, Reuters (2000).
- Lee, Ruben. *Promoting Regional Capital Market Integration*. Prepared for Inter-American Development Bank (1/2001).
- Leighton-Jones, Phillipa. *BVLP shareholders to approve Euronext Merger in January*. www.efinancialnews.com (21/12/2001).
- Levitt, Arthur (Chairman, SEC). *Dynamic Markets, Timeless Principles*. Speech at Columbia Law School (23/9/1999).
- Levitt, Arthur (Chairman, SEC). *Market Structure Issues currently Facing the Commission*. Testimony before Subcommittee on Securities, Committee on Banking, Housing and Urban Affairs, US Senate (27/10/1999).
- Liebowitz, S.J. & S.E. Margolis. *Are Network Externalities a New Source of Market Failure?* Vol. 17, pp. 1-22, Research in Law and Economics (1995).
- London International Financial Futures Exchange. *LIFFE Board Recommends Euronext Deal to its Shareholders*. Press Release (29/10/2001).
- New York State Assembly. *Agreement Reached to Keep Stock Exchange in New York State*. Press Release (22/6/2000).
- Office of Fair Trading. *The International Stock Exchange*. (4/1988).
- Securities and Exchange Commission. *Regulation of Market Information Fees and Revenues*. Securities Exchange Act Release No. 34-42208 File No. S7-28-99 (9/12/1999), 64 FR 70613 (17/12/1999).
- Securities and Exchange Commission. *NYSE Rulemaking: Notice of Filing of Proposed Rule Change To Rescind Exchange Rule 390; Commission Request for Comment on Issues Relating to Market Fragmentation*. (Release No. 34-42450; File No. SR-NYSE-99-48) (23/2/2000).
- Shah, Ajay & Susan Thomas. *Displacing the Liquidity of an Entrenched Market: One Case Study*. IGIDR Bombay (16/1/2000).
- Skeete, Herbie (ed.). *The Compaq Handbook of World Stock, Derivative & Commodity Exchanges 2001*. Mondo Visione (2001).
- Steil, Benn. *Borderless Trading and Developing Securities Markets*. World Bank, International Monetary Fund, and Brookings Institution, 3rd Annual Financial Markets and Development Conference (19-21/4/2001).
- Szeles, Nora & Gabor Marosi. *Isolation or Association: A Difficult Choice for a Regional Exchange – The Example of the Budapest Stock Exchange*. Josph de la Vega Prize, FESE/ECMI (3/2001).

Varian, H.R. *Microeconomic Analysis* (2nd. edition). W.W. Norton & Co. (1984).

Notes

- ¹ The opinions expressed in this article are those of the author alone, and not necessarily those of the Oxford Finance Group, or any of its clients.
- ² See p. 4, Lee (1998) and Domowitz & Lee (1996).
- ³ For the most part, in fact, exchanges issues their clients with a *license* to use their data, rather than *sell* it to them.
- ⁴ A few exchanges have other important sources of income, including technology sales and fines.
- ⁵ There is a fine legal distinction between the terms “data” and “information”. See p. 141, Lee (1998).
- ⁶ See Shah & Thomas for an exception (16/1/2000).
- ⁷ Other implications of exchanges joining the media industry are not discussed here. For example, a key question will be whether exchanges will continue to operate “distribution channels” in media terminology, and in particular whether they will continue to provide technology solutions for the routing of orders, trades, and information.
- ⁸ Following Honoré (1961).
- ⁹ See ch. 8, Lee (1998) for an extensive discussion of the notion of ownership in this context.
- ¹⁰ European Union (27/3/1996).
- ¹¹ As noted by the Advisory Committee on Market Information, Section IV.C. (14/9/2001).
- ¹² The key questions concerning transparency are precisely *Who* should have access to *What* quote and trade information, *When*?
- ¹³ See p. 3, Office of Fair Trading (4/1988).
- ¹⁴ See p. 9, Coase (1988).
- ¹⁵ See ch. 7.6, Varian (1984) and ch. 15.2, Atkinson & Stiglitz (1980).
- ¹⁶ Covering Letter, Advisory Committee on Market Information (14/9/2001).
- ¹⁷ SEC (9/12/1999).
- ¹⁸ Section VII.D.3. Advisory Committee (14/9/2001).
- ¹⁹ See p. 5, Coffee (24/9/2001).
- ²⁰ See Liebowitz & Margolis (1995).
- ²¹ See preface, Darwin (1859).
- ²² See Angel (19/2/1998).
- ²³ See, for example, FESCO (11/6/2001) and SEC (23/2/2000).
- ²⁴ Following Hansmann (1996).
- ²⁵ See, for example, Szeles & Marosi (3/2001).
- ²⁶ Although the case of Euronext NV, with its subsidiary exchanges Euronext Amsterdam, Euronext Brussels, Euronext Lisboa, and Euronext Paris, provides an example of how a merged institution can still retain the identities of its constituent parts.
- ²⁷ See CREST (7/2001) and Saville (7/2001).
- ²⁸ See pp. 35-37, Lee (1998).

- ²⁹ BTA [p. 11, (2/2001)] reports that only 21% of mutual exchanges said that they were not going to demutualize, or had no plans to do so in the foreseeable future. It stated that those that had no such plans were exclusively in closed emerging market economies.
- ³⁰ See BTA (2/2001), Karmel (forthcoming 2002*a*) and (forthcoming 2002*b*), and Chs. 2-3. Lee (1998), and references therein.
- ³¹ See Domowitz & Steil (1999) and (2001).
- ³² See Grasso (28/9/1999).
- ³³ See ch. 2, Lee (1998).
- ³⁴ Steil (19-21/4/2001).
- ³⁵ Wisbey (6-7/7/2000).
- ³⁶ See last paragraph, Karmel (forthcoming 2002*b*).
- ³⁷ Many of the practical responses to enhance self-regulation at a demutualised exchange have been discussed in IOSCO (6/2001).
- ³⁸ See Grasso (2/9/1999) and (28/9/1999).
- ³⁹ See Dwyer (11/10/1999) reporting the Chairman on a hearing held on 28/9/1999.
- ⁴⁰ See Levitt (23/9/1999) & (27/10/1999).
- ⁴¹ See Kowalski (4/6/2000).
- ⁴² See Euronext (29/10/2001) and LIFFE (29/10/2001). Euronext NV is the holding company of the three exchanges, Euronext Amsterdam, Euronext Brussels, and Euronext Paris.
- ⁴³ See Boland & Pretzlik (3/11/2001).
- ⁴⁴ Steil (19-21/4/2001).
- ⁴⁵ New York State Assembly (22/6/2000).
- ⁴⁶ Source: Organization for Economic Cooperation and Development (OECD), Net ODA flows in 2000, as quoted in <http://www.globalissues.org/TradeRelated/Debt/USAid.asp?so=p2k#oda> (1/2/2002).