

London's Big Bang:
A Case Study of Information Technology,
Competitive Impact, and Organizational Change

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Abstract

The London Stock Exchange's Big Bang on October 27, 1986 marked the arrival of sweeping and long-awaited deregulation. Numerous changes occurred simultaneously, including elimination of fixed commissions, marked increase in the number of market participants, change in the structure and ownership of trading firms, and perhaps most importantly rapid movement of stock trading off the floor of the Exchange. This remains the most rapid and complete regulatory reform of any market, and the most striking example to date of a regulatory event engineered to benefit the local financial industry. Since the overhaul of established securities trading practices, London's financial markets have undergone considerable change while continuing to operate smoothly; a number of benefits have been realized.

1. Introduction

On October 27, 1986, the London Stock Exchange experienced its Big Bang. This was the most rapid, and most comprehensive regulatory relaxation ever attempted by an exchange; it resulted in changes in the structure of the market and in trading practices by member firms. Perhaps most striking is the speed with which London's centuries old practice of face-to-face floor trading was abandoned and replaced with electronic, screen-based trading.

Big Bang resulted in major changes in the structure of the market, and the nature and number of participants [24]. Where previously there had been only two or three jobbers per stock, now twelve to sixteen market makers compete for most active issues. Just three major jobbers, Smith Brothers, Wedd Durlacher, and Akroyd & Smithers, controlled 75% of all market making. Together with a handful of brokers they *were* the equities portion of the Exchange. On Big Bang day, thirty six equity market makers were open for business. In Gilts¹ where

¹ British Government Bonds, which, unlike U.S. treasuries, are traded through the Stock Exchange.

previously two or three firms controlled the market, there are now 27 market-makers.

Despite the benefits to London as a financial center, the changes associated with Big Bang appear to have been counter to the interests of many stakeholders, both the partners in the dominant houses and the most senior and successful floor based traders. Pressured by overseas competitors and by imminent government regulatory action, the Exchange was able to get the 75% majority of its 5,400 individual members required for ratification of the Big Bang changes. There are fascinating issues of organizational change involved:

- o How was the Exchange able to get the necessary approval from an overwhelming majority of individual members potentially adversely affected by the proposed changes?
- o How does the membership view the changes that have now occurred?

Throughout Big Bang technology played a fundamental role as the enabler of the process. Information systems make possible the electronic trading that has replaced the Stock Exchange floor. It facilitates handling the greatly increased volumes and number of market participants that resulted. And, by improving surveillance, it enables some of the regulatory relaxations associated with Big Bang.

Four major forces were acting on stock exchanges at the time of Big Bang, and continue to be a factor in determining the evolution of securities trading:

- o There is increasing reliance on and use of information technology. Market mechanisms are now driven by information technology, and the demands of market participants for greater liquidity, more hedging techniques, and low transaction and settlement costs [4].
- o There is increasing competition among exchanges as technology removes or erodes geographic barriers [6].
- o There has been increasing internationalization of investor behavior [10], [25], [12].

Foreign gross activity in U.S. equities rose from \$26 Billion in 1975 to \$277 Billion in 1986. U.S. gross activity in foreign equities rose from \$3 billion in 1975 to \$101 billion in 1986.

- o And deregulation of major exchanges has continued: The Paris Bourse is undergoing its own *Le Petit Bang*. Tokyo has lowered commissions. And Canada commenced its own gradualist approach to deregulation with its *Little Bang* on June 30, 1987, ending separation of the four sectors of its financial services industry and allowing foreign ownership of securities trading firms.

As a financial center with centuries of experience, London enjoys a most favorable position. Additionally, since Big Bang, London's International Stock Exchange (ISE) has been at the forefront in exploiting the four trends listed above. Big Bang required three years to prepare for massive regulatory, technological, and organizational change. The ISE's use of technology produced a revolutionary change in London's market structure and trading practices. London's trading floor was rapidly abandoned, and a centuries-old tradition of face-to-face dealing was rapidly replaced with electronic trading. Within a week, between two-thirds and three-quarters of the trading had moved upstairs.

The introduction of new technology has been associated with a significant improvement in London's competitive position and a resulting increase in trading volumes. There was an increase in the average daily trading volumes, and in the markets ability to handle large and very large trades. And there was a substantial increase in the volume of non-U.K. equities traded in London.

2. Big Bang

Big Bang entailed major restructuring of most aspects of London's securities trading; it was not just automation of existing trading practices:

- o Industry players were restructured, merging, consolidating, and engaging in new activities.
- o Trading practices were restructured. Floor-based face-to-face trading was replaced by an electronic system of competing market makers.
- o The Exchange itself was restructured. It merged with ISRO, the International Securities Regulatory Organisation. And The Securities Association, a self-regulatory organization associated with the Exchange, was established.

The following four major changes were associated with Big Bang: unfixing of stock trading commissions, screen based trading, dual capacity operations of member firms, and opening of the Exchange to new members.

2.1.1. Unfixed commissions. A minimum scale for commissions was eliminated and rates were open to negotiation. This was especially significant for large bargains, and half of equities turnover after Big Bang was done *net*, with no commissions at all. According to a survey done in December, 1986 commission rates for small bargains rose slightly; for instance, the average commission on a £5,000 trade rose from 1.26% to 1.60%. Institutional rates fell about 30% to 40%; for instance, bargains of £100,000 were charged 0.39% on average before Big Bang and 0.28% afterward [22].

2.1.2. Dual capacity operations. Prior to Big Bang, firms could participate only as *brokers* or as *jobbers*. A dealer was an agency trader, acting as a stock broker for a client wishing to buy or sell shares. A jobber was much like a specialist on the New York Stock Exchange: A jobber maintained a *position*, or inventory of stocks, for his own account. He would buy from dealers with customers who wanted to sell, sell to dealers whose customers wanted to buy, and make a *spread*, the difference between his buying and his selling price, on all trades. All trades involved two broker-dealers, with fixed commissions, and a market maker, who took his spread. With Big Bang, the prohibition against performing both functions within a single firm were eliminated, and most firms chose to operate in *dual-capacity*, with both broker-dealer functions and market maker functions performed in a single firm.

2.1.3. Opening of the Exchange to outsiders. Restrictions on Exchange membership were lifted and ISRO members and foreign firms were allowed to acquire existing member firms or become members themselves. Considerable restructuring resulted. Prior to Big Bang a number of expensive and well-publicized acquisitions and mergers took place²: Barclays Bank acquired deZoete & Bevan, a broker, and Wedd Durlacher, a major jobber with strong equities and Gilts operations; the merchant bank S.G. Warburg acquired jobber Akroyd & Smithers, broker Rowe & Pitman, and Government Broker Mullens & Co., and Smith Brothers, the major equities jobber, merged with broking firm Scott

² Not all such ventures were immediately successful. In several cases, including Citicorp buying Scrimgeour Kemp Gee and Vickers Da Costa, Security Pacific's acquisition of Hoare Govette, and Midland Bank purchasing Greenwell & Co., mergers led to conflict in style and business culture and to large-scale defections. There appear to be serious difficulties when bankers move into securities broking.

Goff Layton to become Smith New Court³. There are now nearly 200 players in the London market including major foreign powerhouses like Nomura Securities and Merrill Lynch.

2.1.4. Screen-based trading. Firm bid and ask quotes were announced by competing market makers⁴ in alpha and beta stocks⁵. SEAO, the Stock Exchange Automatic Quotation System based on NASDAQ, was developed as an electronic, screen based system for market makers to publicize their prices.

Alternative trading mechanisms were considered, and this was selected after careful study. It seemed desirable to implement only one mechanism. Second and third tier stocks did not have sufficient trading activity to make practical a single specialist like New York or competing dealers in open outcry like Chicago's futures and options trading pits. Competing market makers can support price discovery in the absence of the order flow volumes required by the other two mechanisms. And screen based trading seemed the only efficient way of monitoring and comparing a large number of competing market makers.

Trading screens were made available both downstairs, on the floor of the Exchange, and upstairs, in the offices of member firms; it was therefore possible to trade by selecting a market maker based on announced price and then contacting the market maker, either by telephone or by walking to his trading pitch on the floor. Despite member firms taking out three year leases on 224 floor positions, the floor trading crowd disappeared.

³ For a complete description of the mergers, acquisitions, and new entrants in London refer to the book *Big Bang* by Ian Kerr [18].

⁴ Bid and ask quotes are the prices at which a market maker is willing to buy (his *bid for*) or sell (his *ask for*) securities. The difference between a market maker's bid and ask prices represents his *spread*. The difference between the best bid available and the best ask available in the market at any time is called the *touch*.

⁵ Alpha stocks are the most actively traded issues, betas represent the next most actively traded shares, and gammas and deltas are the least active. There are about 125 alphas and about 550 betas. Firm quotes mean that the market maker is obligated to execute his trades at the prices shown; recently, firm prices have been offered for many gammas as well. Indicative prices, used for the remaining gamma stocks and below, are merely suggestive of the prices at which a market maker will trade, but impose no obligation on him to do so at that price.

3. Background

3.1. Factors that Affect a Market's Attractiveness

Several factors combine to make a market attractive [6], [16]:

- o **Liquidity** is perhaps most important in determining the attractiveness of a market. It is a measure of the market's ability to convert a security back into cash, and at the current price. A buyer must be found, and offering the security for sale should not depress the market price.
- o **Depth** measures the market's ability to absorb very large trades.
- o **Efficiency** has two components. Price efficiency describes the market's ability to offer fair prices, to adjust prices to capture available information. Execution efficiency describes the cost and speed of execution, and thus the relationship between the price in the market and the price actually paid or received by the end customer.
- o **Information and information access** are the characteristics most readily affected by technology. How widely will information be shared or disseminated? Will all players have access to information comparable to that enjoyed by the insiders? How quickly will information be available?
- o **Fairness** is a characteristic critically important to retail investors, and most readily influenced by regulation. It reflects the rights and privileges of the non-member, or non-insider, compared to those of more powerful or better connected traders.

3.2. Role of Technology

Technology has long played a role in changing securities trading. Communications technology, in particular, has for centuries had a major impact on trading practices. Garbade and Silber showed that a New York-Philadelphia exchange link via telegraph lines in 1846 and a New York-London connection in 1866 quickly cut price differentials between the linked markets [14]:

- o Quicker information flow supports price efficiency, rapid adjustment of prices to reflect supply, demand, and available information. By allowing arbitragers to exploit price differences among markets, information flow also facilitates efficient price setting across markets
- o The ability to be informed away from the floor, with greater dissemination of information to participants wherever they are located, improves efficiency, and can have a significant impact on liquidity

- o More efficient settlement reduces transaction processing costs and settlement delay, with associated reduction in opportunity costs and risk
- o Effective market surveillance, which improves fairness: Surveillance computers linked to SEAO can detect trades executed at other than the best price. Brokers risk losing their licenses by arranging client trades at disadvantageous prices. In effect, dual capacity is enabled by automated surveillance. Additionally, surveillance computers are being used by compliance departments to identify large scale or irregular share activity prior to a merger or acquisition. This occurs both within member firms, and within the various regulatory bodies attempting to identify insider trading⁶

Technology was essential to all aspects of London's deregulation, from making possible screen-based trading with greatly increased numbers of market makers, to making politically feasible ending the separation of dealing and jobbing functions.

Several other applications of technology to securities trading have been attempted, with far less striking effects.

- o The Intermarket Trading System (ITS) was implemented in 1978 to link five regional exchanges and the New York and American exchanges. Although 1,200 stocks are jointly listed, ITS trading supports just 4% of the shares' aggregate volume. In addition, a 1981 study by the SEC found no significant impact in reducing spreads [8].
- o Instinet, a Reuters subsidiary, is a "notice board" system for exposing block trades to the market. Instinet accounts for only 2% of the trading volume in the U.S.
- o The Midwestern Stock Exchange (MSE) in Cincinnati although technically superior to NYSE early, had only limited impact [8]. In 1983, trading was just 0.6% of composite volume in its 188 eligible stocks.

3.3. Competitive Impact

London appears to have intended to capture order flow from Continental exchanges, as articles entitled "Stock Exchange plans to lead world trading in international shares" [20] indicate, and to some extent they have succeeded. Tokyo does not appear to have been effected, and at present it is hard to demonstrate an impact on New York Stock Exchange.

⁶ Ian McKay, Midland Bank plc, Wholesale Systems, private correspondence 6 July 1988.

Continental exchanges were particularly vulnerable, due to problems with trading practices, liquidity, and execution and settlement efficiency. The Paris Bourse operated as a periodic call market⁷. Orders are submitted to an auctioneer and specify a quantity bid or offered and a limit price. One call price eventually rules, often after several iterations.

The Madrid market is plagued by incredible settlement difficulties [27]. Colin Grimsey, vice-president of Chase Manhattan Bank in London, noted that "we have maintained a presence in Madrid for over a year now and we are still unable to clearly identify how the settlement systems work." Although the Milan market has recently improved settlement, horror stories abound.

Stockholm introduced a sales tax of 1% on all securities transactions, paid by both the buyer and seller. Traders responded by moving volume off the Stockholm exchange for the most liquid Swedish issues, and prior to the October 1987 crash the most attractive stocks were five times more liquid in London than on their home Stockholm Exchange [21].

The problems faced by these exchanges had the effect of making each, in its own way, less attractive. London is more efficient than Paris in setting prices, than Milan and Madrid in execution and settlement, than Stockholm in transaction costs. SEAO disseminates price and trading information widely and rapidly. The two together bring in more trading, which makes the market more liquid, which itself brings in more trading and more liquidity. As George Hayter of the ISE notes, "London is more attractive. And information systems take geography entirely out of the account."⁸ London, therefore, has been able to capture order flow from Continental exchanges. Significant turnover of major issues has moved from Frankfurt and Paris, and major Swedish issues are now more liquid in London than on their home exchanges!

Most of the smaller exchanges that compete with major exchanges have attempted to respond to technological threats, at least to retain listings and order flow for domestic

⁷ In New York's specialist market, in London's competing market maker environment, and in Chicago's pits, prices change continuously to reflect the balance of buy and sell orders in the market. In a *periodic call* market, a batch of buy and sell orders is allowed to accumulate, and a market clearing price is then set.

⁸ George Hayter, personal interview, London, February 1988.

companies. *Le Petit Bang* has begun in Paris⁹. Milan has improved settlement procedures. And Toronto has attempted to use technology to recapture at least trading in Canadian issues away from NYSE [11].

At present New York is very different from London but has not been adversely affected. The NYSE is currently committed to its specialist system, in which a single, monopolistic market maker has an "affirmative obligation" to maintain an orderly market in each of the Exchanges 1,500 traded issues. This means taking a principal position and selling or buying when order imbalances occur. Automation has been essential to expand the capacity of the NYSE; automation has largely been directed at automating clerical details of the existing practice and trading mechanism [1] and little structural change has been attempted. New York may ultimately be threatened by London if inappropriate regulatory regimes are imposed in the wake of the October crash, but New York has not yet needed to respond to London.

Tokyo is a unique market. Tokyo has protected order flow through regulatory expedients: it is illegal for Japanese to sell Japanese shares other than on Japanese exchanges, and it is illegal for Japanese to own shares in Japanese companies in ADR form. It remains the most regulated major market, and although commissions have been lowered they remain fixed; for retail investors commissions are probably higher in other major markets. It has not been necessary for Tokyo to respond to London.

4. Principal Findings

The demise of the floor was astoundingly rapid and astoundingly complete. Many firms prepared for both floor-based and upstairs trading. As confirmed in articles and through our interviews with several senior equities traders, many firms took out three years leases on floor pitches as insurance in case SEAQ adoption was slow. Most firms had expected floor trading to remain, at least for a transition period of two to three years [7]. Although 28 firms had trading pitches on Big Bang day compared with 19 previously [26], during the first week only a quarter to a third of all trading was on the floor [19]. The floor crowd fell to between 200 and 300 after the first week, down from 1,800 to 2,000 before [7].

This rapid and complex change has several explanations:

⁹ In Paris, automation has been improved. Most significantly, the periodic call market has been replaced with continuous trading for the most active issues. When asked in personal interviews in June 1988 why continuous trading had been introduced, officers at *Commission des Operations de Bourse* and at the Bourse itself answered simply "London, of course!"

- o new trading rules favoring screen dealing and putting floor market makers at risk
- o expectations of behavior of self-brokered institutional customers
- o ergonomics: better ability to execute upstairs
- o self-reinforcing behavior of the floor community -- a collective decision reached as the sum of hundreds of decisions taken individually

4.1. Speed of the Demise of the Floor

The speed with which trading left the floor was clearly a surprise. An investment of several million pounds was made to upgrade the floor. Firms took three year leases on their trading pitches in preparation for Big Bang, and competed fiercely for available space. Yet the floor's share of bargains and turnover, and trader head count on the floor, all dropped rapidly in the first week of screen based trading. In fact, at the end of the first week, movement off the floor, and its resulting death were being discussed, and alternative uses of the floor, ranging from a dance hall to returning full circle to a coffee shop, were openly being reported in the press [2]. By January, the *Financial Times* published an article entitled "The Hexagonal Wine Bar." The death of the floor was already complete.

Traders were astounded by the speed. Anthony Lewis was chairman of Smith New Court, which included Smith Brothers, one of the three largest and most successful floor based jobbers before Big Bang. Not surprisingly, he was the most active advocate of preserving the trading floor, and he insisted that any screen based system be designed so that floor based trading remained a viable alternative. His firm made only minimal provisions for an upstairs alternative to the floor. Yet, his colleague Anthony Abrahams notes:

"Within five minutes of Big Bang, on Monday morning, it was clear to me that the floor was dead. I'm not bragging. I was the last person in the City to figure it out!"¹⁰

As John Wilson, head of equities at James Capel, added:

"The speed of transition to screen trading surprised me. I thought all the information you needed was on the floor; eye contact, sweat, movement. You could always tell from the eyes of the junior trader whether his

¹⁰ Anthony Abrams, Managing Director, U.K. Equities Trading, Smith New Court plc, personal interview, London, February 1988.

boss was long or short, and how badly they wanted to get out of their position¹¹."

And traders were clearly horrified by the changes. Wilson continued:

"I was horrified. Horrified. Absolutely shattered. It had been a great club."

Mr. R. Wilson Stephens, Honorary Market Official at the International Stock Exchange, added:

"I was horrified. What I miss about the floor is the supportive friends you develop there. They would know if you were having a bad day or a good one¹²."

Smith, New Court's Abrahams and Montagu's Pepper¹³ echoed the sentiment mourning the demise of the club. Abrahams clearly did not welcome changes from the practices that had enabled his firm to prosper.

Not all traders were astounded or unprepared. Bernard Leaver, now chief equities trader at Shearson Lehman London, anticipated the changes several years in advance, and parlayed his junior position in a small specialty jobber, Charles Pulley, into a position as chief equities trader of Security Pacific's Hoare, Govette through well timed and well selected mergers¹⁴.

4.2. Reasons for the Change

There are several reasons, or partial explanations, for the demise of the trading floor:

- o New trading rules: making firm quotes for alpha and beta stocks through SEAQ
- o Improved ergonomics and access to information upstairs
- o Improved access to colleagues within the firm upstairs
- o Expectation that major institutional clients would want to be self brokered, and would want telephone access to upstairs market makers
- o Self reinforcing trends and self fulfilling expectations: if enough traders left the floor, the remainder would be forced to follow

¹¹ Mr. John Wilson, personal interview, London, May 1988.

¹² Personal interview, London, May 1988.

¹³ Mr. Gordon Pepper, Director and Senior Advisor, Midland Montagu, personal interviews May and July 1988, London.

¹⁴ Personal interview, London, May 1988.

4.2.1. Role of firm price quotations for alpha and beta stocks. This meant that you could get beaten up quite badly if prices moved against you. If you were occupied handling trades on the floor you were not monitoring your quote in SEAQ, and you would then be obligated to deal with the next person who said "Done!" Upstairs you could be buffered by the telephone, affording you time to move your price before the trader could reach you. This was first explained to us by Anthony Abrams, and was reinforced by Gene Lockhart, Chief Executive Officer, Information Systems, Midland Bank.

4.2.2. Role of improved ergonomics upstairs. Some third party vendors are actually able to supply changing price information faster than SEAQ. Increasing importance of additional information is obvious when viewing multi-million dollar upstairs dealing rooms, where each equities traders is equipped with four, five, or even more screens and banks of telephones. As Bernard Leaver, Managing Director of Shearson Lehman Hutton, notes:

"Information plays a far greater role in trading decisions than it did. Trade figure, Reuters data, and other information are available more easily in the office than on the floor."

Real time feeds from newspaper wire services, and reliance on computer modeling, are already factors. Eventually computerized program trading will also be a factor.

4.2.3. Role of improved access to colleagues upstairs. The design of upstairs dealing rooms supported much better interaction among firms' employees. Sales personnel, selling to customers by telephone, had improved access to the market research staff since they were together on the same dealing floor. Similarly, sales personnel, supporting the firm's broker function, had immediate access to the firm's market makers. Brokers are legally obligated to take a customer's order to the market maker offering the best price, whether this is the market maker associated with his firm or not. In practice, orders from preferred customers are seldom taken outside the firm; rather, the market maker, contacted by his firm's sales personnel with a firm order, will usually match the best price displayed in the SEAQ yellow strip¹⁵. Major firms like Barclays deZoete Wedd designed, and redesigned their trading floors, attempting to find the optimal configuration to support interaction among their staff members [9].

¹⁵ Firms making the best bid or ask prices, and having done so earliest, are displayed in a wide yellow strip near the top of a SEAQ screen for a security. All market makers' quotes are displayed below, in smaller fonts.

4.2.4. Role of self brokered institutional clients. Market makers expected a significant portion of their institutional clients to self broker. Their best customers were expected to make their own investment decisions, to demand to bypass brokers, and to deal directly with a firm's market making personnel. As Mr. Jeremy Tighe, Director of Foreign and Colonial Pensions Management, notes, many fund managers considered it "macho to self broker."¹⁶ The dissemination of price information through SEAQ made it possible to self broker, and the expectation was that this in fact would occur. Perhaps as much as half of turnover was done *direct* the week of Big Bang.

Although about half of institutional orders are now done *net*, without commission, with the investment firm profiting only from spread, self brokered trades are down considerably. Exchange rules require the broker to obtain the best available price. And, as Tighe notes, the broker does provide valuable information. Smaller firms, unable to afford full market research facilities, often choose to continue to pay commissions, to receive the research that the best brokers can provide.

Thus, self brokered trades are not the factor that they were expected to be. Still, the expectation that larger accounts would choose to be self brokered, requiring improved telephone access to market makers from outside, no doubt contributed to the move off the floor.

4.2.5. Role of self reinforcing trends. A confluence of factors, from changed trading rules to the expectation of self brokered trades, moved much of the crowd upstairs. Then, as Wilson notes, "You couldn't defy it -- you had to follow the crowd." You can't trade by your self! Smith New Court was among the most successful of the old jobbers, and its chairman Tony Lewis was certainly most committed to remaining on the trading floor [2]; yet within days of Big Bang Smith New Court had decided to move off the floor, and did so as soon as dealing facilities were available upstairs. Since traders benefit from exposure to as many orders as possible, the floor is valuable only if a sufficient number of traders use it. As more traders moved more of their volume upstairs, they rapidly tipped the preferences of others.

In summary, numerous factors acting together, ranging from requirements of the new trading rules to response to the behavior of other traders, rapidly moved all equities activity off the floor.

5. Managing the Organizational Change

The changes made on the single day of Big Bang exceeded the regulatory changes made in

New York over a decade. New York appears wedded to concept of specialist market; given the power of the specialists in the exchange, and the attractiveness and profitability of their position, this is not surprising¹⁷. Some would say it is nearly impossible to make comparably sweeping changes in New York today.

Certainly vested interests were affected. Smith Brothers, Akroyd & Smithers, and Wedd Durlacher accounted for three fourths of the jobbing market, and were certain to lose share. The entrance of new competitors, especially well capitalized foreign players like Merrill Lynch, Goldman, CitiCorp, Security Pacific, Credit Suisse First Boston, and potentially Nomura and Daiwa as full equities market makers, had to have been seen as a threat!

As noted above, the changes encompassed in Big Bang required vote of 75% of the individuals who were members of the Exchange. Why was London able to implement these changes?

A partial explanation can be found in the pressures facing London. The Exchange needed to settle a restrictive trading practices lawsuit. The suit was brought against the Exchange by the British Office of Fair Trading. In October 1983 the suit was settled. The three major changes were ending fixed commissions, permitting dual capacity, and installing an improved price dissemination system. And there was pressure from Bank of England, which wanted to increase the number of Gilt market makers.

London also faced competitive pressures. The *de facto* upstairs institutional market, and the threat of Reuters to support that market and ISRO to provide both the rules and the mechanism, had to be taken seriously. Share was eroding. As George Hayter notes, "An Exchange has no God-given right to exist, ordained from on high. An exchange is a business like any other."¹⁸ Unless you are the most efficient, most attractive place to trade, you will be destroyed. And, as John Wilson notes, there was a real threat from American and Japanese markets: "If we don't change, the Americans and the Japanese are going to come in and do it their way."

But the ISE was seizing opportunities as well as responding to threats. Foremost was the opportunity to compete with Gilbert and Sullivan stock exchanges on the Continent. Additionally, the ISE was able to profit from London's centuries old position as a world financial capital: London has a long tradition as traders, it is the center of the Eurobond market, and

¹⁷ Some may argue that after October's crash this is less true, but it is worth noting that not a single specialist has voluntarily given up his franchise in the past decade, including all bear markets.

¹⁸ Personal interview, London, May 1988.

¹⁶ Personal interview, London, May 1988.

close to half the world's foreign exchange volume is still centered here. And timing created the opportunity to profit from wave of orders associated with Thatcher government's privatisation and popular capitalism efforts.

Additionally, members of the Exchange were ready, even eager, for change. Brokers wanted to be jobbers, jobbers wanted to be brokers. A former jobber we spoke to assured us that there was widespread belief that "Brokers make money without taking risk," while a former broker assured us that "Jobbers make money without having to know anything, without having to sell, without having to pay for a research group." John Wilson summarized it tersely:

"The grass is always greener on the other side. Dealers wanted the easy job of jobbing. Jobbers were enthusiastic about talking directly to clients."

And, as the Exchange and its member firms had grown over the previous twenty years, personnel had begun to specialize. There were now professional full time floor based trading staff; partners and senior personnel were already upstairs, selling over the phone. They might walk an order over to the floor, but were no longer based on the floor. The move upstairs could actually have given them *better* control of their operations and feel for the market.

Finally, the Exchange was well positioned to make changes. It enjoyed an excellent systems group, with both the technical skills necessary to implement changes and the vision to determine what was going to be required to compete. And there was an excellent *ad hoc* strategic planning function in place to prepare for settlement of the Unfair Trading Practices lawsuit.

6. Conclusions

London does appear to have enhanced its competitive position. Our earlier work has suggested that it is difficult to use information technology to gain and defend competitive advantage, unless certain conditions are met:

- o The innovation should play to some intrinsic strength, so that competitors cannot readily duplicate it. In particular, it is useful if the strength is not in information technology, but represents some portfolio of assets that competitors cannot readily acquire; in this case, duplication of the system will not provide competitors with comparable benefits [5].
- o Or, competitors should be unwilling to, or uninterested in matching the innovation. This gives you lead time needed to seize market share [5].

- o And some form of switching cost is useful, keeping customers from defecting, and preserving marketplace gains [3].

London has long been a financial capital for Europe, and this strength was leveraged by Big Bang. The U.K. leads in foreign exchange volume, with \$90.0 billion in average daily turnover in 1986. The comparable figures were \$58.5 billion in the U.S. and \$48.0 billion in Japan. The Eurobond market is based in London. And high quality market research is a noted strength in London. When a London broker, Savory Milln, issued a "buy" recommendation it pushed Peugeot's shares up, after similar advice from Paris analysts failed to move the price [17]. Additionally, competitors ranging from major exchanges like the New York and Tokyo Stock Exchanges to far smaller Continental exchanges, appeared uninterested in comparable restructuring.

There were at least two sources of switching costs to protect London's gains. When trading operations are established, there is of course a significant cost associated with moving them to another country. And liquidity follows liquidity; that is, there is a cost penalty associated with trading in less liquid markets, which other things being equal keeps investors trading in established trading centers. Thus, in the absence of self-destructive regulation or other change in London there should be sufficient switching costs to provide sustainable competitive advantage.

Benefits to London, all documented in quarterly Quality of Markets Reports, include the following:

- o increased trading volume, liquidity, and depth
- o reduced spreads and institutional commissions¹⁹
- o increased trading of foreign securities on the London exchange

This last includes both systematic and persistent increases in volume captured from Continental exchanges, and expedient use of London to trade when an issue's home exchange undergoes a temporary disruption or suspension of trading²⁰.

A considerable increase in liquidity followed Big Bang. Average daily turnover was £643 million for the first 9 months of 1986. In the first three months after Big Bang, average daily

¹⁹ Spreads have increased again since the Crash of October 19 and 20th, and retail commissions are above their levels prior to Big Bang.

²⁰ Peter Cox, International Stock Exchange, telephone conversation May 1988.

turnover nearly doubled, to £1,161 million [22]. The depth of the market also increased. Larger transactions have become more common and have a less severe impact on prices than before. Bargains greater than £1 million now account for 19% of turnover value [23]. And there has been a marked increase in trading volume of non-U.K. issues. Estimates are imprecise because prior to Big Bang, member firms did not have to report trades in foreign equities except when they dealt with other member firms [24], and subsequent to Big Bang, trading through SEAQ-International by former ISRO members not yet members of the ISE was not reported; still, estimates are that daily volume increased from £290 million before Big Bang to £1 billion after [6].

There are lessons for New York and other established exchanges. Since information systems can reduce the importance of geography, and of geographically protected franchises, people will ultimately trade in the most attractive markets. "This is a bit like water finding its own level. Exchanges will adapt, and meet somewhere in the middle."²¹ Exchanges that cannot adapt are likely to lose order flow, and ultimately to lose listings.

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