Innovation and Competition in Canadian Equity Markets

Serge Boisvert and Charles Gaa, Financial Markets Department

- *Innovations in communications and information technology and the related globalization of financial markets are increasing the level of competition faced by Canada's established equity markets. Traditional stock exchanges are increasingly able to compete in each other's markets, and advances in technology have reduced barriers to entry, attracting new competitors such as Alternative Trading Systems (ATSs) to the market.*
- *Traditional Canadian stock exchanges have reacted to these competitive challenges in a number of ways. One major change was the recent restructuring of the principal Canadian exchanges. In addition, exchanges have changed their ownership structures, formed alliances, introduced new products or features, and improved their market quality through the introduction of new technology.*
- *Equity markets have had a long history of fragmentation (securities trading takes place in multiple markets, and there is no opportunity for orders to interact). Securities regulators have identified market fragmentation as a potential concern with respect to ATSs. This concern must be weighed against the possible benefits that competition and innovation can bring to Canadian markets. The Canadian Securities Administrators have proposed a framework that attempts to address this problem and that would allow ATSs to compete with the traditional exchanges for the first time.*

There has been a dramatic surge of interest in, and activity on, global equity markets in recent years. In Canada, the number of shares traded on the Toronto Stock Exchange (TSE) has doubled in the last five years, while the dollar value of trading has increased three-fold. Some 49 per cent of Canadians now hold equities in some form, twice the level of involvement recorded only 11 years ago (TSE 2000a). At the same time, media coverage of financial markets, particularly stock markets, reflects an almost unprecedented level of interest.

Why is this happening, and why now? Explanations have included the growing market presence of aging baby boomers investing for retirement, combined with a de-emphasis on state-sponsored pension plans; a relative decline in the importance of government debt in western financial markets; and lower interest rates on savings that cause investors to seek higher returns elsewhere. All these factors point to the current level of interest in stock markets as the product of demographic and cyclical macroeconomic factors. At the same time, however, some observers note that the current situation has novel characteristics. Specifically, this surge in equity market activity has been accompanied by rapid developments in information and communications technology. These innovations have made both access to, and information regarding, markets cheaper and more convenient, and this may have permanently altered the dynamics that drive markets.

As well, increased trading volumes have resulted in higher revenues for market-providers, raising the stakes in the trading-services industry. This has fuelled a sharp expansion of investment in technology and has also induced new entrants to the field. While less visible than stock market chat rooms, internet IPOs, or retail on-line trading, developments in, and the

increasing adoption of, information and communications technology are profoundly affecting the structure of equity markets. This article discusses the ways in which technological innovation, particularly improvements in communications and information technology, are heightening competition and creating the potential for important changes to the structure of equity markets.

Canadian Equity Markets: Definition and Structure

Definition and function of a stock exchange

A stock exchange is an organized market in which a participant can trade securities in a publicly visible manner, under recognized guidelines applicable to all members of the organization. As part of the financial system, exchanges can have an impact on economic growth through their effects on capital accumulation. Organized financial markets can reduce information and transactions costs and can help to bring savers and investors together more efficiently.[1] Levine (1997) outlines five functions performed by financial systems that can affect economic growth: mobilization of savings, allocation of resources, effect on corporate control, facilitation of risk management, and ease in the trading of goods, services, and contracts. It should be noted that, because of the benefits that fair and efficiently functioning exchanges can deliver to the public and to the economy, they are often considered quasi-public utilities. Inefficiencies in an exchange can affect the community at large, not just the direct market participants. For these reasons, as well as concerns over investor protection, exchanges have typically operated in a relatively regulated environment.

Traditionally, exchanges have been governed as non-profit mutual organizations, often created by dealers and brokers who decided to share the expense of setting up a trading facility. Given the limited space, access to the trading floor was determined through the sale of "seats" or membership status. Members were then the intermediaries for all others wishing to trade on the market, and, in that context, they were also the primary consumers of the exchange's trading services.

Exchanges can be broadly categorized into two types, each using a different "price-discovery" mechanism. The first type is an auction market, often called an "order-driven" market. In a pure order-driven market, all buy and sell orders are directed to a central location, called an order book, where they interact to create trades.[2] Price discovery—the process through which market prices are generated—results from the interaction of buy and sell orders.

This structure contrasts with that of a dealer, or "quote-driven" market, in which dealers announce prices at which they are willing to buy or sell securities, sometimes only in response to specific inquiries. In dealer markets, independent dealers, or market-makers, compete against each other for investor orders, committing capital to that activity and acting as principal in all transactions. Market liquidity and price discovery are determined through the interaction of the market-makers' quotes with orders.

In reality, markets rarely fit neatly into one of these two stylized descriptions. For example, many auction market exchanges rely on market-makers, called registered traders or specialists, to supply some liquidity and to contribute to a fair and orderly market by continuously displaying bids and offers. In exchange for meeting these and other responsibilities, market-makers typically enjoy such privileges as better access to information about orders and enhanced opportunities to trade with incoming orders.

A second modification often seen in auction markets is the presence of an "upstairs market" that facilitates trading outside the market's central trading mechanism. An upstairs market is often present in auction markets because of the difficulty these markets have in handling large orders: if a large transaction is sent to the central order book, it can lead to a large, adverse price movement. To avoid this effect, investment dealers can execute this type of transaction in two ways: first, by trading for their own account (acting as principal and putting their own capital at risk, as in a dealer market), or by finding an offsetting customer order in the (less-transparent) upstairs market.

The Canadian equity market

The existence of stock exchanges in Canada can be traced back more than 125 years. The Montreal Stock Exchange (now known as the Montreal Exchange or ME) was the first to incorporate in 1874, while the Toronto Stock Exchange (TSE) was founded in 1878. Other exchanges followed in the early years of the

1. For a recent study of the link between financial systems and growth, see Leahy et al. (2001). Levine and Zervos (1998) find that stock market liquidity and banking development are positively related to contemporaneous and future economic growth.

2. There are two main types of orders: market and limit. A market order means that the shares are to be bought or sold immediately at the best current market price. In contrast, a limit order specifies a price at which the investor would like to buy or sell a certain number of shares.

20th century, but, by 1999, four main stock exchanges were operating in Canada—the ME, the TSE, the Alberta Stock Exchange (ASE), and the Vancouver Stock Exchange (VSE).[3]

The TSE has gradually established itself as Canada's principal market for equity trading; in 1998, its share of equity trading reached almost 90 per cent. In March 1999, these four main stock exchanges announced an agreement to restructure the Canadian markets into areas of specialization. The agreement was implemented at the end of 1999 and in early 2000. As a result, the trading of senior equities was consolidated on the TSE, derivatives trading was transferred to the ME, and the ASE and the VSE, after merging to become the Canadian Venture Exchange (CDNX), specialized in the trading of junior securities.[4]

The rationale behind the restructuring was a desire to strengthen the overall competitiveness of the Canadian exchanges by reducing fragmentation. At the time, this was seen as especially critical, given the increasing globalization of markets and the growing competition between traditional stock exchanges and new trading mechanisms. In addition, the restructuring promised to eliminate some duplication and simplify trading rules and regulation, thereby contributing to lower costs for issuers, dealers, and investors. Finally, each exchange hoped to increase its expertise by concentrating its efforts on a specific segment of the financial market.

The TSE is by far the largest exchange in Canada. At the end of December 2000, market capitalization on the exchange was $1,434 billion with 1,421 companies listed (the average issue size was almost $850 million). To put this in perspective, in terms of market capitalization of domestic companies, as of December 2000, the TSE was the eighth-largest equity exchange in the world, but it was 15 times smaller than the largest (US$770 billion versus US$11,442 billion in market capitalization at the New York Stock Exchange (NYSE)).[5] The volume of activity on the TSE, like most other exchanges in the world, has surged in the last few years. In 2000, an average of 131,000 transactions was made each day, representing an average of 162 million shares for a total value of $3.8 billion. From 1998 to 2000, the number of transactions grew by a factor of 2.5, and the dollar value of trading and the number of shares traded almost doubled.[6]

The Canadian Venture Exchange (CDNX) officially commenced trading on 29 November 1999. Given its focus on small and emerging companies, the average equity market capitalization of the 2,600 firms listed on the exchange is relatively low at $5.7 million. Thus, total market capitalization was roughly $15 billion in December 2000, only 1 per cent that of the TSE. The structure of the Canadian equity market is continuing to evolve, following an agreement in principle between the CDNX and the TSE, under which the CDNX would become a wholly owned subsidiary of the TSE. Shareholders of both exchanges voted in favour of the merger in May 2001, and regulatory approval was granted in late July.

The TSE and CDNX operate under a similar market structure. Both have a modified electronic auction / order-driven market.[7] The TSE market structure can be characterized as a modified continuous auction market because of the role played by two groups to support the trading process: registered traders and investment dealers. The role of investment dealers in the upstairs market is very important to the TSE, and it has grown over the years. In terms of value of activity, the share of upstairs trades has increased from 37 per cent in 1984 to around 53 per cent in 1996, of which 90 per cent were large or block trades (TSE 1997). The upstairs market is still estimated to account for 50 per cent or more of the TSE's trading volume. The growth of "upstairs trading" can be attributed to many factors, including the growing importance of institutional investors since the 1970s, concentration among investment dealers and institutional investors, regulatory changes, and technological progress that allows participating organizations to perform upstairs trading with small retail trades.

Following the restructuring of the Canadian exchanges, the ME became the market for derivative products. Futures and options contracts on interest rates, indices, and individual stocks are now being offered by the

3. Other smaller exchanges were also present: the Winnipeg Stock Exchange, The Winnipeg Commodity Exchange, and the Toronto Futures Exchange. The Canadian Dealing Network (CDN) was recognized as a quotation and trade-reporting system.

4. Small-sized Quebec companies (approximately 130) continued to be listed in Montreal, but the CDNX platform is used. In the autumn of 2000, the ME and the CDNX reached an agreement for the transfer of those companies to the CDNX, but regulators have still not approved the agreement.

5. For more details, see the International Federation of Stock Exchanges (IFSE) Web site at www.fibv.com/statm.asp.

6. The restructuring of the exchanges, in particular the transfer of all senior equity trading to the TSE, accounts for some of this increase.

7. The TSE was one of the first exchanges in the world to introduce computerized trading. It closed its traditional open-outcry trading floor in 1997, becoming the first North American stock exchange to do so.

ME. As well, at the end of 2000, 128 small companies were still listed on the exchange, for a total market capitalization of $1.1 billion.

A new exchange has recently appeared on the Canadian landscape. On 26 April 2000, Nasdaq Stock Market Inc. (Nasdaq) and the Government of Quebec announced that they had reached an agreement to establish a new exchange: Nasdaq Canada. The arrival of Nasdaq in Canada will be accomplished in three phases. In the first phase, Nasdaq terminals will be installed in the offices of those Quebec dealers who are members of the U.S. National Association of Securities Dealers (NASD), allowing them direct access to the U.S. Nasdaq market. In the second phase, a new Canadian stock exchange would be created: Nasdaq Canada. Canadian-based companies could then be listed in Canada on the new exchange. Finally, in the third phase, Nasdaq Canada would be linked to other Nasdaq exchanges to form a global exchange, allowing trading 24 hours a day. The first phase was launched on 21 November 2000. The second phase, originally scheduled for early 2001, has been delayed until mid-2002.

While these are the main exchanges currently active in the Canadian market, a new type of marketplace is likely to emerge in the near future: "the alternative trading system" (ATS). This has been made possible by advances in computer technology and telecommunications. In simple terms, an ATS is a computer system that brings together orders from buyers and sellers. Furthermore, order interaction is predetermined and is set by the system operators, not by relying on a discretionary process. Many other terms have been used to describe similar systems: Electronic Communication Networks (ECNs), Non-Exchange Trading Systems (NETS), or Proprietary Electronic Trading Systems (PETS).

ATSs can succeed by offering investors enhanced flexibility and reduced trading costs. More precisely, ATSs have features that can potentially make them attractive to various participants. They can provide anonymity to trading parties, since often only the size and price of an order is displayed (a feature highly valued by some institutional investors). At the same time, those systems can provide more transparency than traditional markets by making their order books completely public. Furthermore, because they use state-of-the-art technology, ATSs can execute trades less expensively and faster than exchanges. In addition, they can sometimes allow participants to use more complex order management. For example, investors can post conditional orders, or they can use reserve or hidden orders (only part of an order is revealed to the market). Finally, an ATS can succeed by offering services not provided by traditional exchanges, such as after-hours trading.

In Canada, the role of ATSs, and how to incorporate them into capital markets, has been debated for more than 10 years. So far, ATSs have been allowed to operate in only a restricted fashion; that is, to operate only as members of an existing exchange and offer trading in only certain types of instruments. The fear of market fragmentation has been the main justification for this policy. (Market fragmentation is discussed further below.) Instinet was the first firm to try to establish an ATS in Canada, in 1988. However, Instinet installed terminals in Canada only in 1995 (and only foreign companies were listed). In 1995, another company, Versus Technologies, also installed terminals on dealers' desks.

In recent years, the attitude towards such systems has changed, and most market participants recognize the benefits that ATSs can provide (TSE 1997). As well, the growing presence of ATSs in the U.S. market, in the context of strong economic integration between Canada and the United States, and the regulatory approach of the U.S. Securities and Exchange Commission (SEC) have probably provided some momentum to move ahead. In July 1999, and then in a revised version in July 2000, the Canadian Securities Administrators (CSA) presented a proposal to accommodate more widespread operation of ATSs in Canada.[8]

Pooling Liquidity: Market Consolidation, Fragmentation, and the Role of Technological Change

Market quality and liquidity

Marketplaces, or exchanges, can be thought of as firms that compete for order flow on the basis of market quality. While difficult to define precisely, market quality includes such considerations as informational efficiency, volatility, transparency, and liquidity. In a broad sense, however, one might think of market quality as describing the explicit and implicit costs borne by participants in the course of trading securities (Domowitz and Steil 1999; Schwartz and Weaver 2001).

Attempts to compare markets in terms of quality have focused on liquidity. A difficult concept in its own

8. Canadian Securities Administrators is a forum for co-operation among Canada's 10 provincial and 3 territorial securities regulatory authorities.

right, market liquidity is typically measured along four dimensions: tightness (the difference between buy and sell prices, or the bid-ask spread), depth (the size of transaction that can be absorbed without affecting prices), immediacy (the speed with which orders are filled), and resiliency (the ease with which prices return to "normal," following a temporary order imbalance) (BIS 2000).

Network externalities and their implications for the structure of equity markets

An important feature of market liquidity is that it exhibits positive feedback. Put simply, a highly liquid market is attractive to potential participants, and as the number of participants increases, liquidity improves, resulting in a market that is still more attractive to those not yet participating. And so on. Unfortunately, this feedback effect also works in reverse: as participants withdraw from a market, perhaps in favour of another, liquidity suffers, increasing the likelihood that others will follow.

The self-fulfilling "liquidity effect" described above can be explained with reference to network externalities. Centralized markets, such as most equity markets, can be viewed as networks, with each trading participant acting as a network node (Economides 1993). The value of a network to each participant increases with the number of constituent nodes. Network economics has also been usefully applied to railways, mail systems, and the telephone. For example, at the time when only 1,000 households in North America had one, the telephone was not particularly useful: the chances that one could pick up the phone and call any given person were practically nil. Over time, as more telephones (i.e., nodes) were added to the network, the benefit to the next potential customer became ever greater. Likewise, the addition of each new participant to a centralized market increases the number of potential trading counterparties for each of those already participating.

Network externalities are useful in explaining the "first-mover advantage," which seems to have favoured incumbent exchanges over time. The fact that market liquidity already exists in a certain market represents a competitive advantage. However, from a wider perspective, a first-mover advantage can be problematic in that it can sustain a suboptimal equilibrium. While the formation of a larger network, or a high degree of uniformity in the public's use of a specific market arrangement or technology, may be positive in terms of efficiency, this gain, along with the coordination problems of moving to new arrangements, can hinder the introduction of potentially superior innovations.[9]

Perhaps most important for this discussion of market structure, network effects imply a tendency towards consolidation. Along with economies of scale, industries featuring network externalities clearly favour size.[10] World equity markets, while still somewhat fragmented, have become increasingly consolidated over time.

The much-discussed globalization of markets is a continuation of developments that have seen regional equity markets gradually giving way to the dominance of national, and now global, trading centres over the last two centuries (Angel 1998). Facilitated by reductions in language, regulatory, and cultural barriers, financial market consolidation has been driven, to a large degree, by improvements in transportation and, more recently, communications technology. While impediments to interregional and international securities trading remain, the geographic obstacles that once protected regional markets are no longer as relevant as they once were.

In the recent past, regional stock exchanges have closed in England, Germany, Italy, and Switzerland. In addition, while the United States once featured a stock exchange in virtually every major commercial city, there are now only a handful (Angel 1998). Similarly, as discussed above, Canadian stock exchanges were recently restructured along specific product lines to generate gains from consolidation.

Given greater scope to reap network externalities through advances in technology, competition among rival exchanges is often resolved through mergers and alliances. Network externalities dictate that there is much to gain from combining isolated pools of liquidity. That is, mergers can result in greater market quality and, therefore, in enhanced future competitiveness. Given these considerations, one would expect a tendency towards alliances among exchanges (Domowitz and Steil 1999).

In addition, positive-feedback cycles with respect to liquidity imply that the successful entrance of a competing market is usually characterized by a relatively abrupt and rapid movement of trading from one

9. For instance, it has been argued that the QWERTY keyboard configuration prevailed over a technically superior competing system (Dvorak) simply because of such a first-mover advantage.

10. For more on the economies of scale and scope and how they contribute to consolidation in financial markets, see Box 1.

Box 1: Economies of Scale and Scope in the Provision of Trading Services

In a recent study, Hasan and Malkamäki (2000) examined economies of scale and scope across 38 exchanges over the period from 1989 to 1998. The authors looked at two functions performed by exchanges: the matching and processing of trades and firm-specific functions (such as marketplace regulation and activities related to the listing of companies).[1] By separating the two functions, an exchange can see where the potential gains might come from and which activity would benefit most in terms of efficiency if it were combined with that of another exchange. The authors found that North American and European exchanges reported much greater economies of scale than those of other countries. For North American exchanges, doubling the value of trading and the number of listed companies would boost costs by only 49 per cent. For European exchanges, total costs would rise by 90 per cent. They found substantial economies of scale for the largest exchanges. Results for economies of scope were similar: North American and European exchanges had more to gain in the multi-task production (trade processing and the listing of companies). These results imply that mergers and alliances between large exchanges (which typically operate within similar regulatory structures and may be more committed to spending a higher proportion of resources on human capital and trading systems) could be quite profitable and could allow exchanges to become more competitive. However, they also indicate that alliances between exchanges that do not focus on trying to benefit from these economies of scale (e.g., by not consolidating trading-system software or operations) could be only a temporary solution (Malkamäki and Topi 1999).

1. Theory suggests that simple information (like market orders) is easy to centralize while more complex information may require more face-to-face contacts. Activities required for listing procedures and communication with companies might thus be better handled by national exchanges.

venue to another, in response to apparently small advantages, once a critical level of liquidity has been achieved. These are known as "tipping effects" (Domowitz and Steil 1999). A classic example is the competition between the Deutsche Terminboerse (DTB) derivatives exchange and the London International Financial Futures and Options Exchange (LIFFE) for trading in 10-year Bund futures contracts during 1997–98. In 1997, the DTB was the first non-U.S. exchange to be granted the right by U.S. authorities to solicit members based in the United States. Prior to commencing U.S. trading, the DTB had 35 to 40 per cent of the world market, with LIFFE dominating the rest. By spring 1998, the DTB's market share had grown to 70 per cent, and by summer it was nearly 100 per cent (Domowitz and Steil 1999).

Forces limiting consolidation

The factors discussed above imply an evolution of equity market structure towards a degree of consolidation that simply does not, indeed perhaps cannot, exist. Obviously, significant barriers preserve segmentation in global equity markets.[11]

While deregulation has occurred in recent years, important regulatory differences between jurisdictions persist, and impediments to international investment continue. For example, even in the case of Canada and the United States, whose economies and capital markets are very closely integrated, Canadian investors are encouraged to purchase Canadian stocks by the tax treatment of dividends and by foreign-content limits for certain types of savings (Beaulieu and Bellemare 2000).

As well, differences in accounting standards, and therefore the additional expenses involved in meeting exchange-listing requirements in a foreign country, often present a meaningful barrier to mid- and small-sized companies. Time-zone differences are also a

11. Malkamäki and Topi (1999) present factors that slow the consolidation or integration of securities markets.

significant factor segmenting markets, as are language and cultural differences.

Further limitations to consolidation, even within regional markets, stem from the fact that participants do not have homogeneous trading needs. Certain markets may offer features that are attractive to some investors but not to others. "Clientele effects," such as these, can preserve distinct marketplaces. For instance, institutional traders often desire anonymity and opaqueness, while retail traders typically favour systems with a high level of transparency. Some traders prize immediacy, which dealer markets may be relatively better equipped to provide than order-driven markets.

The role of technical innovation

Improvements in technology have facilitated the long-term trend of equity market consolidation, within regions, nations, and now on a global scale. Above all, financial markets depend on information and on the efficient and timely communication of that information. Improvements in communications technology have effectively decreased the geographical barriers that segment markets. As further consolidation of equity markets became feasible through changes in technology, combined with deregulation and improved information flow, network effects and economies of scale have virtually ensured that equity markets would become more integrated.

Improvements in technology have facilitated the long-term trend of equity market consolidation, within regions, nations, and now on a global scale.

But in addition to allowing traditional exchanges to compete in each other's markets, recent advances in information technology have also given rise to new competitors. Electronic systems, such as ATSs, can be cheaper to develop and operate than traditional exchanges. Therefore, barriers to entry have fallen, and the market has become more contestable. Where regulation allows, automated auctions are beginning to challenge the traditional exchanges, amounting to a technology-driven reversal of the long-standing trend towards market consolidation.

Some observers argue that this reversal in direction, towards market fragmentation rather than consolidation, will be temporary, to the extent that it materializes. According to this analysis, following a transitional stage featuring multiple liquidity pools, network externalities might be expected to be reasserted and dominate the longer-run evolution of the global market structure (Madhavan 2000).

Impact of Globalization, Competition, and Innovation on Canadian Markets

Globalization and international competition

Globalization is the manifestation of developments that have increased the linkages among countries and their financial markets. In terms of the framework discussed in the previous section, globalization describes the reduction in the long-standing barriers to consolidation of financial markets. To the extent that they are present, economies of scale and scope also contribute to the consolidation of exchanges through mergers or alliances.

From the perspective of traditional Canadian equity markets, globalization can present a challenge. As parts of a relatively small open economy, Canada's markets compete against much larger and more liquid foreign markets, particularly in the United States. This competition manifests itself most clearly in the decision of Canadian firms to list on U.S. exchanges, either in addition to, or instead of, Canadian venues. The success of any exchange depends critically on its ability to attract and keep listings—failure to do so will result in it becoming marginalized over time.

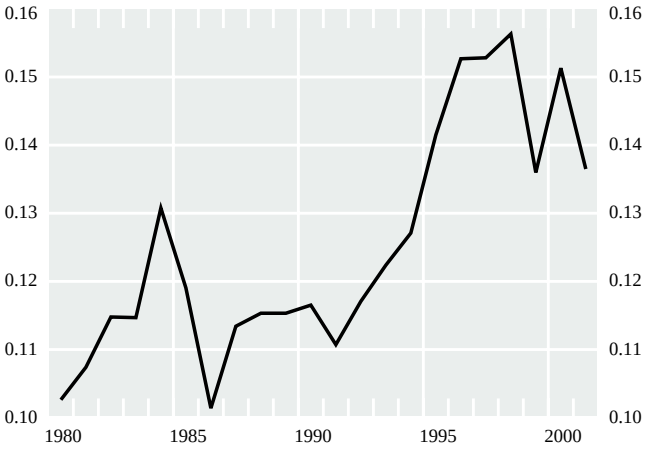
Studies have indicated that a significant number of Canadian firms are deciding to list on U.S. exchanges (Chart 1). This is also the case for firms from other countries, particularly European firms. At the same time, the TSE's share of the total value of trading in Canadian cross-listed securities has recently fallen (Chart 2). (For more on cross-listing, as well as a discussion of the motivations of Canadian firms in deciding to list on foreign exchanges, see Box 2.)

While it is apparent that competitive pressures have been increasing, the question of whether or not Canadian exchanges can continue to be competitive is one

Chart 1

Proportion of Interlisted Shares on the TSE: 1980–2001*

Number of Canadian-based issues interlisted on U.S. exchanges / number of companies listed on the TSE

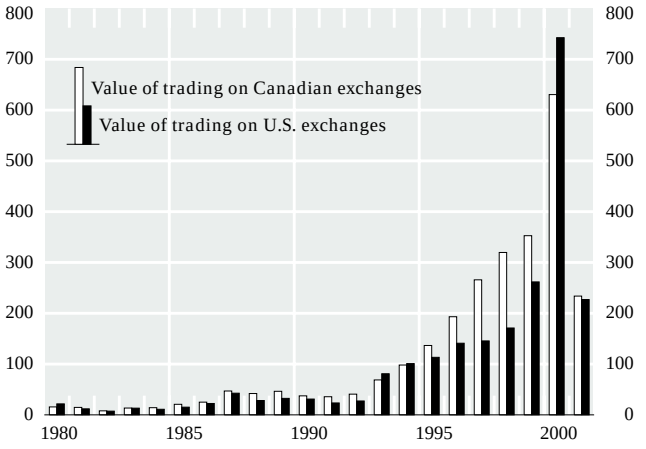


* Note: 2001 corresponds to year-to-date as of 31 May
Source: TSE *Review*

Chart 2

Value of Trading in Canadian-Based Interlisted Shares: 1980–2001*

Canadian dollars, billions



* Note: 2001 corresponds to year-to-date as of 31 May
Source: TSE *Review*

of relative market quality. As we have seen, market quality is difficult to quantify, although some research has sought to do so with respect to trading costs. For example, Elkins / McSherry Co., Inc. calculated equity-trading costs in 42 countries between September 1996 and December 1998.[12] Both explicit (commissions) and implicit (estimated market impact) costs were measured. For the full sample, explicit trading costs averaged 46 basis points. (A basis point is one one-hundredth of a percentage point.) Implicit costs amounted to 25 basis points on average. This suggests that total costs of trading can significantly affect the net return of a portfolio. Total costs varied significantly between countries and declined over time for most economic regions.

While it is apparent that competitive pressures have been increasing, the question of whether or not Canadian exchanges can continue to be competitive is one of relative market quality.

Several studies have compared implicit and explicit trading costs on the TSE and NYSE, for various types of trades, and under varying conditions, but these investigations have failed to reach a unanimous verdict with respect to overall costs.[13] Smith et al. (2000a) examined the trading of Canadian firms on the NYSE and TSE (67 companies). One of their conclusions was that price-impact costs (i.e., an implicit trading cost) for cross-listed securities were lower on the TSE, and that this result held after controlling for the larger average size of trades on the NYSE, as well as for differences in price volatility and firm size. Interestingly, they found that although market quality was the primary determinant of the location of trading activity, 23 per cent of the TSE trades and 34 per cent of the NYSE trades could have been executed on the other exchange at a better price. That result suggests that factors other than cost could explain where a trade is actually executed. They suggest that clientele effects could be part of the answer. Investors, at least in part, might trade in their home market for reasons of convenience and familiarity.

12. Data from 135 institutional investors involved in more than 600,000 trades. See Domowitz, Glen, and Madhavan (2000).

13. For more information, see TSE (2000b), Smith et al. (2000a), Domowitz, Glen, and Madhavan (2000), Ahn, Cao, and Choe (1998), and Foerster and Karolyi (1998).

Box 2: Cross-listing

Listing on foreign exchanges can bring companies a number of benefits.[1] The most obvious is the ability to raise capital more cheaply, as well as to tap into a broader source of capital (Pagano, Röell, and Zechner 2000). Cross-listing can help to reduce barriers (regulation, transaction costs, or informational) to foreign investors, reducing market segmentation and leading to an increase in investor base and investor recognition. A company might see benefits to cross-listing on an exchange where there are more analysts focused on a specific industry, or where the market is more liquid, or where there are higher standards with respect to disclosure or corporate governance. Firms can also take advantage of relative mispricing in the domestic versus the foreign market.[2]

The attractiveness of the U.S. markets has been such that many exchanges around the world, not just Canadian exchanges, are facing similar challenges. Over the years, U.S. exchanges have been significantly increasing their listings of foreign companies. On the NYSE, the number of foreign listings increased very slowly from 1956 to the mid-1980s, from 25 to about 50 listings. Since then, the number of foreign listings has exploded, especially in the 1990s, reaching about 430 at the end of 2000. Foreign listings now account for about 10 per cent of total trading volume on the NYSE.[3]

Two recent studies (Pagano, Röell, and Zechner 2000; and Pagano et al. 2000) looked at the cross-listing phenomenon from 1986 to 1997, with a special focus on European and U.S. exchanges. The authors found that the number of European companies cross-listing their shares increased markedly and that it was mainly to the benefit of U.S. exchanges. For instance, over the 11-year period studied in their first paper, the number of European companies listing on U.S. exchanges increased to 206 from only 52, while cross-listings on other European exchanges increased modestly from 147 to 180. In contrast, the number of U.S. companies listing on European exchanges declined from 284 to 184.[4] A similar pattern was seen for firms of other countries: U.S. exchanges captured an increasing share of foreign listings over the period. In their second paper (Pagano et al. 2000), the authors also looked at the cross-listing decision of European companies by comparing the receiving exchanges with the originating exchange. They concluded that European companies were more likely to cross-list in more liquid and larger markets, on exchanges where many companies from their industry were already present, and in countries with better investor protection and with more efficient courts and bureaucratic infrastructure.

With regard to the Canadian experience, it should be noted that cross-listing is not a new phenomenon. In fact, the first foreign listing on the NYSE was a Canadian company in 1872. Figures show that Canadian companies have increasingly sought to list on foreign exchanges. The number of Canadian companies trading on U.S. exchanges currently stands at around 200, compared with only 82 companies in 1980.[5] Furthermore, many of these Canadian companies are not listed on a Canadian exchange. In November 2000, 42 Canadian companies were listed on Nasdaq without being listed on a Canadian exchange.

To evaluate how cross-listing affects Canadian stock exchanges, one must also consider their ability to maintain their market share of trading in a security, once it is cross-listed on a foreign exchange. Over the last few years, the Canadian exchanges' share of the value of trading activity in Canadian-based cross-listed securities has decreased. In 1997, this share was almost 65 per cent, but in the first five months of 2001, it had fallen to 52 per cent. The TSE's share of the volume of shares traded, however, has not fallen from the 57 per cent recorded in 1997. Moreover, it has been observed that the decline in the TSE's market share of value of trading coincides with a period of exceptional growth in U.S. equity markets, a period during which a small number of relatively high-profile Canadian firms were receiving a great deal of attention from U.S. investors.

1. See Karolyi (1998) for a survey of the literature on cross-listing.

2. These reasons are to a large extent similar to the responses obtained in a National Financial Communications and Scotia Capital Markets (1998) survey of 45 Canadian companies that were cross-listed on U.S. exchanges. It was found that the companies accessed the U.S. market with specific benefits in mind: greater access to capital, greater liquidity for their securities, increased institutional investment, as well as analyst coverage.

3. For more, see market data provided by the NYSE Web site: www.nyse.com/marketinfo/marketinfo.html.

4. That paper also looked in detail into the characteristics and the behaviour of European companies that cross-list. They found striking differences between firms that cross-listed on other European exchanges and those that cross-listed on U.S. exchanges.

5. In contrast, the number of foreign companies listing in Canada has declined from 65 in 1980, to approximately 25 currently.

It seems clear that there will always be room for a Canadian equity market. Mid-to-small-sized Canadian firms simply do not attract the interest of foreign investors, just as the stocks of smaller foreign companies are relatively unknown in Canada. For those companies, the informational advantage of national exchanges and the different national market participants (intermediaries as well as investors) will remain important. However, concern on the part of Canadian equity market providers stems from the fear that the TSE might see its biggest successes, the trading in its most liquid stocks, migrate to foreign venues, potentially reducing the TSE to the de facto role of "junior" equity market on an international stage. In turn, losing the revenues generated by listing, trading in, and selling market data with respect to these most liquid issues would affect the profitability of an exchange, which could further weaken the competitive position. Lower revenues could make it more difficult to continue to invest in the exchange infrastructure in order to remain competitive, increasing the necessity for the exchange to form an alliance or to merge.

On the other hand, as impediments to international securities trading are reduced over time, foreign investors interested in the shares of Canadian firms will be more likely to trade on the market they consider to be superior, regardless of location. If the TSE offers a market for Canadian securities that is competitive in terms of quality, efficiency, and integrity, it might be expected to benefit as these barriers diminish.

Competition from ATSs

ATSs have had the most success in the United States, where they became significant in the mid-1990s, by taking advantage of certain regulatory and technological changes.[14] The U.S. Securities and Exchange Commission (SEC) estimates that ATSs represent 30 per cent of trading in Nasdaq shares and 3 per cent of NYSE-listed listed shares (SEC 2000b). Island, an ATS specializing in retail trades, which has been particularly successful, in January 2001 accounted for 10.9 per cent of the value of trading on the Nasdaq. At the same time, Instinet, which has specialized in inter-dealer trading and the institutional market, represented 14.4 per cent of Nasdaq trading value.[15] In Europe, on the other hand, ATSs have yet to present a serious challenge to established traditional exchanges (FESCO 2000; FSA 2000).

14. See McAndrews and Stefanadis (2000) for an overview of the emergence of ATSs in the U.S. market.

15. Nasdaq monthly market data can be found at www.marketdata.Nasdaq.com / mr_outline.asp.

While ATSs apparently represent a competitive challenge to what might be seen as the established order in world equity markets, it is interesting to note that many of the large, international broker-dealers own shares of these emerging systems. At the same time, they continue to hold memberships, and have more general interests, in the exchanges that ATSs hope to compete against. This would allow these firms to diversify their risks at this time of rapid evolution.

As described earlier, ATSs have yet to emerge as a competitive force in Canada. While the institution of a more permissive set of rules seems imminent, ATSs are not currently allowed to operate in Canada except as members of an established exchange. This stems from concerns over the potential fragmentation of liquidity. There are, however, factors in the Canadian market that might influence the proliferation of ATSs differently than in the United States.

In explaining the success of marketplaces, it is useful to return to the issue of market quality— what do these new markets have to offer, what advantages do they bring?

In explaining the success of marketplaces, it is useful to return to the issue of market quality—what do these new markets have to offer, what advantages do they bring? In this case, ATSs such as Island offer an open-order-book trading environment, which is not available on the Nasdaq, a dealer market. This is pointed to as a significant factor in explaining the relative success of ATSs in some U.S. dealer markets (e.g., Nasdaq), as opposed to markets that are already characterized by order-book price discovery, such as Canada's, most markets in Europe, and the NYSE (FSA 2000). One area where ATSs could offer a feature currently lacking in the Canadian market would be after-hours trading.

There are also regulatory factors that might have facilitated the growth of ATSs in U.S. Nasdaq securities. For instance, while in some U.S. exchanges, such as the NYSE, member firms were, until recently, prevented from trading in listed securities off the exchange, the Nasdaq market imposed no such restrictions on its participants (Sirri 2000). Aside from regulating

exchange members, it is also important to note that SEC regulation has also supported competition from these new entrants: While they perform services that are essentially identical to those of traditional stock exchanges, ATSs have been allowed to classify themselves as "broker-dealers" for the purposes of regulation, a designation that carries a significantly smaller regulatory burden than the term "exchange."

The proliferation of ATSs in the United States has corresponded to the rapid expansion in trading and market activity. To the extent that future growth might be curtailed, one might expect a relatively slower rate of expansion in the exchange-services industry, including the entry of new competitors such as ATSs (Benhamou and Serval 2000).

How are exchanges reacting?

At a fundamental level, the potential for any significant change to the organization and structure of Canadian equity markets represents a competitive challenge to the Canadian stock exchanges for the central and primary role that they currently hold. It is therefore not surprising that these institutions have been taking measures to improve market quality in response to, and in anticipation of, these challenges.

Given the self-reinforcing nature of market liquidity, the established Canadian stock markets continue to enjoy a considerable advantage over any potential competitors. If the benefits in terms of cost, or other advantages, are perceived to be substantial, however, trading can migrate to other venues quite abruptly, as with the "tipping effects" described previously.

In attempting to address competition and improve market quality, the primary strategy of the traditional Canadian equity markets has been one of maximizing liquidity and improving efficiency through consolidation. As described earlier, Canadian stock exchanges have undertaken significant restructuring, the stated objectives of which were to concentrate liquidity, eliminate redundancy, and improve efficiency by consolidating trading in each of three securities classes at only one location. The recent merger agreement of the TSE and CDNX can be seen as a straightforward continuation of this strategy.

For those exchanges that conduct their markets on an electronic platform, further investment in computer and back-office systems can be a useful strategy. By providing enhanced services, additional capacity, improved reliability, or by reducing their operating costs, exchanges can attempt to improve market quality. The CDNX is expected to benefit from the adoption of the TSE's trading platform once the merger between the two exchanges is complete.

One of the advantages that competitors, particularly ATSs, can offer potential participants is a new option or feature that is not available on the incumbent market. Exchanges have tried to develop some of these features either as part of, or in conjunction with, their primary market. Along these lines, the TSE is working with ITG Canada to launch a periodic call auction market for institutional investors, called POSIT. The TSE is also working with Ashton Technology Group to introduce an anonymous system that will match trades at the beginning of the day using the volume-weighted average price (VWAP).

In a stated bid to increase trading volumes in shares cross-listed with the NYSE, the TSE instituted decimalization in April 1996, and in January 2001 it commenced trading in penny increments for stocks with share prices greater than $5.[16]

Exchanges can facilitate competitive changes by demutualizing their ownership structure.[17] Mutual ownership by participating broker-dealers can be associated with problems in incentives and governance. Essentially, when the owners of an exchange are also some of its primary participants, changes to improve market quality might be blocked if those changes conflict with the broader interests of some of the members. Through demutualization, an exchange may be better able to focus objectively on improving the market. In addition, if ownership is made public, or at least more open, it is easier to raise the capital necessary for investments in projects to improve market quality, such as system upgrades, or providing new exchange features to participants. The TSE demutualized and became a for-profit entity in April 2000; its shares are not traded publicly at this time.

Perhaps the most striking response to competition, and one that is apparently being considered by almost all of the world's stock exchanges, is that of an alliance or merger with one or more competitors (Domowitz and Steil 1999). As discussed earlier, network economics tells us that there are tremendous potential benefits in terms of market quality to be derived from pooling the liquidity of competing markets. In this context, the TSE has been pursuing

16. Ahn, Cao, and Choe (1998), Opdyke (2001), and Opdyke and Zuckerman (2001) discuss the impact of decimalization on transaction costs, liquidity, and trading activity.

17. For more information on the demutualization of stock exchanges, see IOSCO (2000).

discussions related to the proposed Global Equity Market (GEM), an alliance that would provide direct linkages with the NYSE, the Tokyo Stock Exchange, the Hong Kong Exchange, Euronext, and others, representing in total some 60 per cent of world market capitalization.[18]

Regulatory Issues in Response to Globalization and Innovation

As the pace of change has accelerated and as globalized markets appear increasingly ready to flee what they perceive as overregulated or poorly regulated jurisdictions, the regulation of securities markets has become more difficult. International co-operation among regulators is becoming increasingly important, as globalization and the growth in automated trading systems blur the boundaries separating one jurisdiction from another (Blume 2000). In this context, some regulators are de-emphasizing approaches and policies that are prescriptive with respect to market structures and market mechanisms and are focusing instead on creating a regulatory environment, where, within certain limits, structures are allowed to evolve according to the dictates of free market interactions (SEC 2000a; CSA 1999).

Regulators wish to promote innovation and competition in securities markets. At the same time, however, despite the potential benefits in terms of innovation and efficiency, heightened competition among markets (as described in the previous section) may also represent a problem from the public's perspective, as well as to the more parochial interests of traditional market providers. Specifically, Canadian regulators, among others, have sought to address concerns relating to market fragmentation, where securities trading takes place in multiple markets and there is no opportunity for orders to interact.

Network economics tells us that a decline in market participation can have a disproportionately large and negative impact on market quality. While network effects also imply that any fragmentation should be transitional in nature, and that consolidative forces should reassert themselves in the long run, given the importance of market quality as a public good, caution on the part of policy-makers seems warranted. Regulators worry that fragmented markets and fragmented price information leave participants with no assurance that the price at which they trade represents the best price available. Fragmentation may also be of concern with respect to financial stability, since illiquid markets may be less resilient and robust during periods of extreme volatility in financial markets (CGFS 2001).

Market fragmentation

Fragmentation is by no means a new phenomenon, although the recent gathering of competitive forces in equity markets has certainly brought it to the forefront in the minds of many regulators.

Here, we discuss three main sources of liquidity fragmentation, both potential and realized, in Canadian equity markets.

First, and most pervasive is "internal" fragmentation, which occurs when participants in the centralized market conduct trades "off exchange," bypassing the market's order-matching function. Upstairs trading, while useful, and perhaps necessary for reducing the market-impact costs of large "block" trades, represents internal fragmentation and may account for 50 per cent or more of the trading volume on the TSE (TSE 1997; Smith et al. 2000b).

Internalization of order flow is a form of internal fragmentation that occurs when a participating broker-dealer fills a customer order on its own, at, or slightly better than, the best current market price (as regulation often requires), instead of passing it on to the exchange's order book. When a stock is actively traded, a broker-dealer may receive opposing retail orders nearly simultaneously. By essentially crossing these orders, it earns a commission from both parties and can keep the spread between the bid and ask prices. In so doing, it acts as a dealer, using the exchange's quotes passively to set the trade price. In the United States, this practice has proven so profitable that many brokers have entered into arrangements (termed "payment for order flow") under which they receive compensation in exchange for routing customer orders to a particular market-maker.

From the perspective of the exchange, internalization and payment for order flow fragment liquidity and reduce the incentives for vigorous price competition (SEC 2000a). Although the precise extent to which internalization is present in Canadian equity markets is not known, TSE rules allowing this practice were criticized for encouraging dealers to trade "off-exchange" (TSE 1997). In 1998, the TSE adopted new rules governing order exposure and customer-principal trading in an attempt to address the problem.

18. As a first step towards the creation of the global exchange alliance, the TSE and the NYSE announced in May that the order books of both exchanges would be linked in 2002, allowing investors to see the orders available in both markets.

Trade of cross-listed Canadian securities on international markets can also be seen as fragmentation from the vantage point of Canadian markets, although it may represent market consolidation from a global perspective. As previously discussed, international competition for trading in the most liquid Canadian stocks is a significant challenge to liquidity on the TSE.

The final type of fragmentation is "external"—that associated with potential competition from ATSs. While ATSs may be expected on the whole to have a positive impact on market liquidity, through enhanced efficiency or through the introduction of innovative market structures that facilitate networks, it has been recognized that their immediate effects may be fragmenting.

Addressing fragmentation

While regulators would like to foster innovation through competition, they also wish to avoid the negative effects associated with fragmentation. Of the three forms identified above, however, only external fragmentation has seemed to lend itself to an effective and straightforward regulatory response. In Canada, internal fragmentation has been seen as the byproduct of a market's internal procedures and membership rules, with respect to which regulators have traditionally been reluctant to apply prescriptive measures.[19] Moreover, mechanisms such as upstairs trading seem to contribute to the quality of markets by reducing the market-impact costs of large trades, so that, in this case, fragmentation might be appropriate.

It is likewise unclear what a national regulator can, or should, do in the face of fragmentation stemming from competition from international markets—they have no authority to impose integration, as may be done with respect to fragmented domestic markets. Furthermore, Canadian firms decide to list on foreign exchanges for a variety of very good reasons, as discussed in Box 2, and preventing them from doing so would not seem to be beneficial, even if it were possible. Listing decisions are appropriately based on considerations of market liquidity and market quality.

External fragmentation, essentially the potential for division of liquidity because of new entrants in the domestic market, has been addressed by regulators, such as the CSA.

Canadian Securities Administrators Proposal for ATSs

In July 1999, the CSA published a document proposing a regulatory framework within which traditional markets and new markets could operate in Canada. After receiving comments on the original proposal, the CSA published a new proposal in July 2000.[20] At publication, no time line had yet been put forward for its implementation. Moreover, following consultation with stakeholders, the final framework may differ from the July 2000 proposal.

The primary goal of the proposal is to design a framework that allows competition and yet minimizes the risk of fragmentation. To achieve that objective, the proposal defines a new entity, the marketplace, which can be either an exchange (such as the TSE or CDNX) or an ATS. Under certain conditions, an ATS would be required to register as an exchange, which implies a somewhat greater regulatory burden. The proposal also sets out a number of trading rules, which will apply to all marketplaces, ensuring that ATSs will follow trade practices as currently applied by exchanges and covering such issues as short selling, front running and insider trading, best execution, manipulation and fraud, principal trading, and trading hours. Following the release of the ATS proposal, the TSE and the Investment Dealers Association of Canada proposed the creation of a stand-alone market regulator. TSE Regulation Services (TSE RS) and CDNX are attempting to harmonize their market integrity rules and, in April 2001, released for comment the proposed Universal Market Integrity Rules, which they have suggested should be applied to the trading of securities on all exchanges and ATSs (CSA 2001).

To address the potential for fragmentation within this new, expanded framework, the proposal requires all marketplaces to share order information with a centralized data consolidator, who will then supply that information to the public at large (the identity of the marketplace would be made public but not the name of the buyer or seller). Furthermore, a marketplace must provide all other marketplaces with access to its orders. Upon receipt of an order, the marketplace can use its own trading rules, and it can charge fees for the execution of the incoming orders from another marketplace. But that fee cannot be set in such a way that it would effectively create barriers. Finally, the proposal requires participants to provide the marketplace

19. For a discussion of internal fragmentation in U.S. equity markets and some suggested regulatory measures, see SEC (2000a).

20. In the July 2000 proposal, the CSA separated the equity and the fixed-income markets for purposes of market consolidation and market regulation.

with information on orders (price and size) received from customers. Block orders of $100,000 or more are exempted, and thus upstairs markets could continue to operate.[21]

The proposal calls for ATSs to contract with an approved self-regulatory organization to provide market regulation. While in many respects practical, this has raised concerns, stemming from the fact that, at this time, the only organizations capable of providing such oversight are the exchanges (CSA 1999). The potential for conflict of interest on this count has been made even more clear by the recent reorganization of the TSE as a for-profit entity. The extent to which for-profit exchanges should continue to operate as self-regulatory organizations is a topic that is being debated in many countries (IOSCO 2000). In April 2000, the TSE announced the creation of TSE Regulation Services in order to separate the market regulation function from its for-profit business activities.

Conclusion

As financial markets become more global in nature, factors that have traditionally segmented regional and national equity markets are diminishing, and markets are competing more and more on the basis of market quality, of which liquidity is an important component. Network economics implies that, in the absence of significant barriers, markets will tend towards consolidation, driven by self-reinforcing "liquidity effects."

Improvements in communications and information technology are heightening competition among equity market providers: (i) by enhancing the capabilities of established stock exchanges to compete in each other's traditional markets; and (ii) by reducing barriers to entry, allowing new competitors to emerge in the form of "alternative trading systems" or ATSs. While the first factor facilitates the observed long-term trend of equity market consolidation, the second implies a potential for market fragmentation.

The established Canadian stock exchanges have reacted, and are reacting, to this increasingly competitive environment by demutualizing, introducing decimalization, consolidating operations and trading along lines of specialization, and attempting to offer innovative and improved services.

While competition and innovation are seen as positive for the development of Canadian markets, securities regulators worry about the potentially negative effects of fragmentation. The Canadian Securities Administrators have released a proposal which, if implemented, would allow ATSs to operate in Canada, independent of the established stock exchanges.

21. This rule is similar to the Order-Handling Rule and the Mandatory Quote Rule in the United States. According to many observers, the introduction of these rules in 1996–97 supported the growth of ATSs.

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