

**The Challenge for Liquidity in Small Stock Exchanges and Trading Portals:
The Case of The Belgian Stock Exchange**

by

Steven E. Goune

Bachelor's degree in Accounting
Normandy Business School, France, 1980

Master's degree in Finance
Penn State University, University Park, 1983

SUBMITTED TO THE MIT SLOAN SCHOOL OF MANAGEMENT
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF BUSINESS ADMINISTRATION

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2005

© Steven E. Goune 2005. All rights reserved.

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part.

Signature of author: _____

MIT Sloan School of Management

May 6, 2005

Reviewed by: _____

Reto Gallati
Visiting Professor of Finance
Thesis Reader

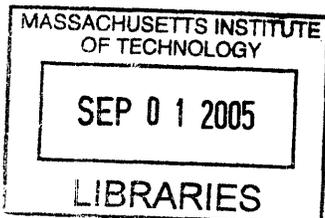
Certified by: _____

Roberto Rigobon
Associate Professor of Applied Economics
Thesis Advisor

Accepted by: _____

Stephen J. Sacca

Director, Sloan Fellows Program in Innovation and Global Leadership



ARCHIVES

The Challenge for Liquidity in Small Stock Exchanges and Trading Portals: The Case of the Belgian Stock Exchange

by

STEVEN E. GOUNE

Submitted to the MIT Sloan School of Management
on May 6, 2005 in partial fulfillment of the requirements for
the degree of Master of Business Administration

ABSTRACT

The world-wide consolidation in the electronic trading industry has provided evidence that small exchanges and trading portals need to deliver more than sophisticated technology, streaming quotes and market data. In order to deliver value and survive, they need to provide liquidity. Noteworthy among the most recent industry challenges is the dismal performance of exchanges like the Belgian Stock Exchange that finally caved in to the inevitable merger with the London Stock Exchange. The Italian exchange took similar action and so did a number of other small exchanges in the European Union. This development has exacerbated the debate over the need for small stock exchanges and portals to exist unless they can provide both superior technology and liquidity.

This paper proposes to examine the performance of the Belgian stock exchange and a select group of portals trading Belgian equities through the metric of liquidity access for fostering trade execution and capital flows. Illiquidity and the dislocation of a number of securities traded on the Belgian exchange are examined using transaction costs and the price impact of trading (as opposed to just asset prices) to explain such lack of liquidity. Concurrently, the intervention of aggregators of liquidity pools and the rising influence of noise traders (hedge funds) are analyzed to provide a framework for understanding the mechanisms used to attract liquidity. This serves to determine whether portals may continue to attract large pools of liquidity.

In closing, we suggest that capital assets are probably not mispriced in markets served by small exchanges, and thus arbitrage opportunities do not exist. Other factors related to timing, anticipation effects and outliers are more significant in determining whether liquidity providers initiate in those markets. The nature of the economies that these exchanges are designed to support is also a contributing factor to the dislocation and disintermediation of capital demand from local firms and truly large global organizations.

Thesis Supervisor: Roberto Rigobon
Title: Associate Professor of Applied Economics

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS	
INTRODUCTION	5
I. THE BRUSSELS STOCK EXCHANGE (BSE) AND THE BEL 20 INDEX	8
1.1. The Brussels Stock Exchange	8
1.2. The BEL-20 Index	10
II. THE 1990s EXCHANGES AND PORTALS LIQUIDITY CRISIS	12
2.1. Liquidity Factor in Stock Returns	12
2.2. Bid-Ask Spread Factor	13
2.3. Effect of Cross-listings	15
2.4. Technology Innovation, Governance and Regulatory changes	22
III. DISINTERMEDIATION AND THE 2000 MARKET BUBBLE	26
3.1. The Emergence of “Day-Traders”	26
3.2. Market Disintermediators	28
IV. THE NEW ONLINE TRADING PARADIGM	29
4.1. The Growth of Online Trading	29
4.2. Changes in Regulatory Frameworks and EU Harmonization	31
4.3. World-wide Market Consolidation	36
V. ANALYTICAL PERSPECTIVES	38
CONCLUSION	43
Tables and Figures	49
Appendices	50
Bibliography and References	52

ACKNOWLEDGEMENTS

This paper is dedicated my late mother, Goune Guilefeng Marie, who endowed me the gift of learning and inspired my drive for personal success through achievement in education.

I am grateful to my daughters Jennyfer Celine Goune and Kelsey Marie Goune for providing me the strength and inspiration to return to academics after several years in corporate life.

I wish to acknowledge the contribution of Dr. Roberto Rigobon for his guidance and insight during the preparation, draft and review of this thesis document. The mentoring was tremendous as was the technical input to help me focus my research and generate maximum learning.

Without the support of Abbe Fessenden, my partner and co-founder of Value-Add, LLC, this entire endeavor including my enrollment at MIT Sloan would not have been possible.

To all of the professors who taught me finance at MIT Sloan, including Reto Gallati, Jonathan Llewellyn, Anthony Marciano (University of Chicago) , S.P. Kothary, George Plesko, Andrew Lo, John Cox, and Stewart Meyers, I'd like to extend my sincere gratitude for the wisdom you shared with me during my tenure as a Sloan Fellow.

Without the support and comfort of my study group members Messrs. Hirofumi Hojo, Sanjay Inamdar and Hiram Samel, I would not have been able to pull through both personally and academically. I owe you so much for the moral support and encouragement that enabled me to hunker down and give my best to learn finance theory and practice from the masters at MIT Sloan.

To my colleagues Scott Douglass and Cynthia Perthuis at Bloomberg TradeBook, LLC and Kaufman Bros., LP (formerly with Instinet), I am forever grateful for your support of my project idea of applying and enrolling in the Sloan Fellows program at MIT.

Finally, I would like to acknowledge the contribution of Stephen Sacca and the entire Sloan Fellows front office for helping me to avail the opportunity to be counted among the great innovators and leaders who have walked through the pathways of Sloan buildings E-52 and E-51 on their way to leading and innovating new products and services that benefited mankind.

INTRODUCTION

The crisis that forced many European and American portals out of business and precipitated the merger of the Belgian Stock Exchange (BSE) with Euronext raised concerns over the viability of online trading platforms and small exchanges. This paper examines the factors that led to the inevitable surge in mergers and acquisitions (M&A) activity among exchanges and Internet trading firms and the overall consolidation of the industry. In contrast with the long-held belief that the crisis was prompted by macro-economic considerations or imbalances in the supply and demand for securities and trading services, this paper analyzes the impact of liquidity, or the bid–ask spread in the quote for securities traded on the BSE and online trading platforms, drilled down to four dimensions that include *width*, *depth*, *immediacy* and *resiliency*.

Hawawini and Michel¹ first raised the issue of the risk associated with the smaller, thinner and less liquid Belgian Stock Exchange in 1979. Their study used William Sharpe's Capital Asset Pricing Model² to establish a relationship between reliability, stability, size, liquidity, and structure of small exchange markets. To test the validity of their model for Belgian securities, they used data from 1963 to 1976 and found that risk measures were statistically insignificant when appraised by their T-statistic and average betas. They also noted that the US markets, which were broad and highly liquid with heavy trading, had less stable beta coefficients for individual stocks. One of their other findings was that portfolios traded on the BSE were more stable over time than those traded on larger stock exchanges, because by being listed in a small and regional market

¹ "An Assessment of Risk in Thinner Markets: The Belgian Case", Journal of Economics and Business.

² "Capital Asset Prices: A Theory of Capital Markets Under Conditions of Risk, Journal of Finance. 1964

BSE securities were isolated from “external disturbances” which caused them to attract more liquidity.

Twenty years later, as the world entered a new era of trading, the basic tenet of the Hawawini and Michel’s study changed dramatically. The world financial markets began to operate under a new paradigm using the Internet and online technologies. This resulted in opening access to new liquidity pools. Financial markets participants had also changed, thanks to increasing participation of institutional traders with higher levels of education who saw no boundaries as they moved liquidity across the globe. Globalization took hold thanks to access to faster and reliable communication across various channels. The face of the average BSE investors had changed dramatically from Exchange trader to Internet Direct Access trader. The end result was complete disintermediation of the value chain, with direct access traders and hedge fund managers leading the way with new sophisticated algorithmic trading. Exchanges have lost their monopolistic positions in Europe and in the US, and the Belgian Stock Exchange was forced to merge with the London Stock Exchange.

The liquidity crisis that hit the world’s financial markets in 2000 exposed smaller exchanges and large trading portals causing yet another transformation that led to a second wave of disintermediation. At the same time the European Union (EU) was entering a new phase of its common economic market process and needed to harmonize its currency and financial markets regulations across member countries which in turn affected the ability of smaller exchanges and portals to expand nationally.

We conclude that it is indeed the requirement of liquidity, or lack thereof, which prompted smaller exchanges like the BSE to merge, triggering the continuing wave of consolidations that has spread to trading portals and larger exchanges. Technology also played a significant role and rendered auction exchanges almost useless as the speed of execution through the internet ushered in a new breed of liquidity providers who offered better quality in execution, low cost and additional trading tools that added value to investors. We also argue that in today's liquidity environment a multi-factor analysis of stock betas using liquidity (or illiquidity) in a modified capital asset pricing model provides a more accurate and realistic estimation of stock returns because traders who seek to maximize return prefer to initiate (trade) in liquidity pools that are large enough to help minimize the cost and liquidity risk of trading.

This paper is organized as follows: Section I examines the BSE and its structure and offers background information on the exchange, its products and its evolution. Section II examines the impact of the 1990 liquidity crises and provides an analytical review of the dimensions of liquidity that may have driven markets lower, especially in Belgium. Section III provides an analytical review of the coalescing phenomena that may have hindered the growth and sustainability of small exchanges and trading portals. We also examine the implications on the industry's structure in Europe and around the globe. Section IV offers a background on the structural change that preceded the shock to liquidity in 1999 and the one that followed in 2000. Section V presents our conclusions and remarks. Appendices include supporting documentation on the liquidity changes noted in Europe at the peak of the Internet trading boom.

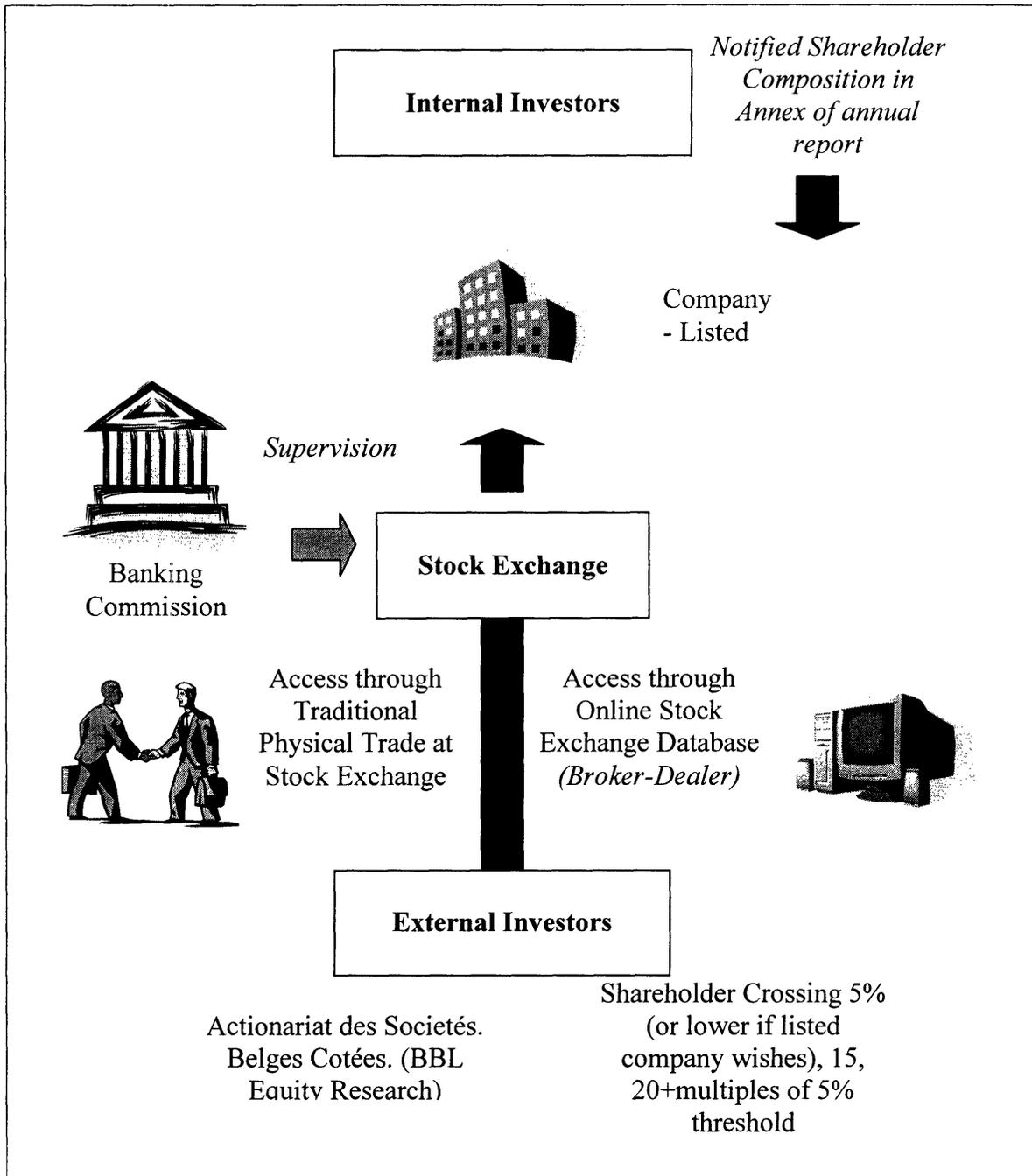
I. The Brussels Stock Exchange (BSE) and the BEL-20 Index

1.1. The Brussels Stock Exchange

The Brussels stock exchange – *La Bourse des Fonds Public de Bruxelles* - was established in the early nineteenth century by government decree on July 2, 1801 under Napoleonic rule. France ruled Belgium from 1795 to 1814. Belgium became fully independent country in 1831, but retained much of the French system. Throughout this period, *agents de change*, or brokers, were ministerial officials. They had a monopoly on trading in government securities (a system that remained in force in France until 1987) but were not permitted to trade for their own account as dealers.

The market operated with little regulatory oversight until the Great Depression of 1929-1935, when the government issued the first rules for regulating brokerages by royal decree, as part of a broader plan to stimulate the economy and capital markets. This decree was the basis for markets regulatory oversight until 1990 when Belgium introduced the Financial Transactions and Markets Act to modernize Belgium's stock markets and make them more competitive internationally. In 1995, the EU Investment Services Directive was set up to administer and supervise the securities markets. The Brussels Stock Exchange was officially established by royal decree in 1999 as integrated market operator comprising Belfox (Belgian Futures and Options Exchange), Bourse de Bruxelles (BSX) and CIK (the Central Securities Depository). The Belgian Stock Exchange operated using the following structure:

Figure 1. Structure of the Belgian Financial Markets



In September 2000, amid slowing demand and low trading volumes, the BSE was allowed to merge with the Paris Bourse and Amsterdam Exchanges to form Euronext, the

first pan-European exchange. Euronext was the first fully integrated cross-border market in equities and derivatives. The merger was as much an acknowledgement of the end of the stock exchanges as we had come to know them over the past decades as it signaled the dawning of a new breed of financial intermediaries and traders.

From a regulatory standpoint, companies traded on Euronext are listed on their home markets, but their shares are now traded on a single platform spanning all participating countries. Listing requirements have been harmonized, and efforts are now underway to do the same for derivatives trading platforms, clearing systems and settlement systems.

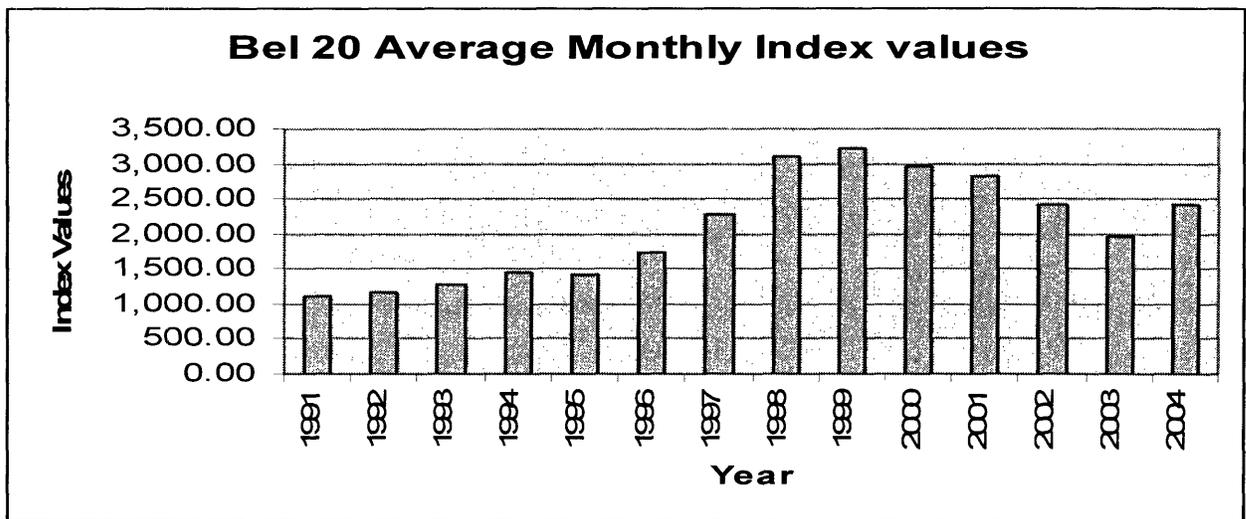
1.2. The BEL-20 Index

BEL-20	
Long name	Belgian 20 Price Index
Owner/publisher/sponsor	La Bourse de Bruxelles (Brussels Stock Exchange)
Constituents	20 Belgian blue chips
Construction principle	Capitalization-weighted value ratio
Base date	December 30, 1990
Base value	1,000.00
Interval of calculation	Real time (since March 18, 1991)

The BEL-20 is an index of Belgian shares that provides investment results corresponding generally to the price and yield performance of the entire universe of publicly traded securities in the Belgian market. The index typically includes stocks that are traded primarily on the Brussels Stock Exchange.

The key to understanding how the BEL-20 index affects liquidity is to examine why it was introduced and how this portfolio has impacted traders and investors in Belgian equities. The first fundamental analysis of the Index conducted by Ronald Anderson and Olivier Scaillet³ in 1997 showed that shares within the BEL-20 shares are sensitive to the Belgian Franc (BEF)/\$U.S. exchange rate and the price of oil, suggesting that the index is probably skewed toward industrial performance much in the same way as the Dow Jones. However, from a portfolio approach, the index is a composite and capital-weighted index. This means that the holder of the Bel-20 takes a position at the tip of the normal distribution of returns on the Belgian stock exchange because the index portfolio accounts for a large portion of the equities traded on the Belgian Stock Exchange. Beside, while not sold as such, this Index also gives the holder of Belgian bonds a call option on the index.

Figure 2. BEL-20 Average Monthly Index Values



Not surprisingly, since the introduction of the Index, 85 percent of the volume on the BSE has come from firms included in the Index.

³ "A new Index of Belgian Shares." Universite Catholique de Louvain.

This has had huge consequences for Internet retail traders, since they are not typical buy-and-hold investors. Not surprisingly, institutional, hedge fund and portfolio managers have become the primary users of the Index using it as benchmark for asset allocation at the expense of smaller web traders. Because these investors move massive amounts of funds and therefore can affect liquidity and price, many small internet traders have not been able to match their pricing power. Furthermore, spreads in these stocks have narrowed, which makes them less attractive to Internet day traders. The Index has also become a tool for derivative markets that are constructed so that they leave little room for arbitrage opportunities and represent more than just a microstructure of the Belgian securities market.

II. THE 1990S EXCHANGES AND PORTALS' LIQUIDITY CRISIS

2.1. Liquidity factor in stock returns

We have to go back to Acharya and Pedersen, and Andrew Lo and Jiang Wang's recent studies to explain one key aspect of the impact of liquidity on stock returns during the 1990 crisis. They have all showed in their studies of equilibrium asset pricing with liquidity risk⁴ (the risk arising from unpredictable changes in liquidity over time) that the required return on a security depends on its expected illiquidity, the covariance of its own return, illiquidity with market return, and market illiquidity, which may suggest the flight to liquidity during that crisis. They propose a liquidity-adjusted capital asset pricing model to improve the accuracy of return estimations in order to compensate for the lack of foresight that may have caused finance experts to miss the early signs of the 1990

⁴ "Asset Pricing with Liquidity Risk." CEPR Discussion Papers No 3749

liquidity crisis. They note that if a security's liquidity is persistent, a shock to its illiquidity results in low contemporaneous returns and high predicted future returns.

Tim Johnson also provides a perspective for understanding what happened by analyzing systematic variations in market liquidity that arises in endowed economies⁵ and offers the view that since liquidity drops are tied to a country's real economic success, "an individual security is more liquid if either its search technology is more efficient or there are a larger number of agents seeking to trade it." Johnson's principal argument is that price elasticities can be regarded as market impact functions that define bid-ask spreads and thus liquidity is low when markets are low and expected returns and volatility are high. He concludes that the liquidity of a securities market should be defined via "the elasticity of the substitution from that security to cash-like asset." Thus, we can assume that holders of suboptimal portfolios (Internet traders and market makers) demanded compensation for holding them, and their risk tolerance determined the bid-ask spreads they quoted to the investing public. As spreads widened, prices dropped, resulting in falling markets.

2.2. Bid-Ask spread factor

While the studies referenced above can help us understand what happened, they need to be balanced by acknowledging the impact of trading behaviors and risk anticipation where trader's values are independent, as Michael Peters and Sergei Severinov⁶ observed. Peters and Severinov liken Internet trading to an auction market where sellers are free to

⁵ Dynamic liquidity in Endowed Economies, London Business School, July 2004.

⁶ Internet Trading Mechanism and Rational Expectations. University of Toronto and Duke University.

bid in any auction, and the results of traders' actions affect aggregate demand and supply. Prices will rise until enough traders drop out of the bidding process to satisfy demand at a given price for a given security that reflects all traders' rational expectations. The conclusion that emerges from their study is that liquidity can be defined as a market condition where traders can quickly buy or sell large numbers of shares when they want at low transaction costs. It is measured by the average trading cost, such as the difference between the market price at which an order is executed and the mid-price, regardless of whether it is a sell or buy order. As such, a measure of liquidity is the bid–ask spread and distinguishes between four dimensions of liquidity: *width*, *depth*, *immediacy* and *resiliency*. The bid–ask spread for a given number of shares determines the *width*. *Depth* refers to the number of shares that can be traded at given bid and ask quotes. *Immediacy* refers to the amount of time it takes to execute a trade; and finally, *Resiliency* is the time it takes before prices revert to former levels after a large order has been received by the market. The *quoted* bid–ask spread captures the cost of immediacy. It also provides insight into the dimensions of depth and width. The *effective* bid–ask spread is based on actual transaction prices, and is therefore, potentially, a poor indicator of immediacy. It generates information on depth and width. Trade size affects these spreads as does resiliency.

All these effects converged in Belgian markets as they staggered under the impact of the world-wide market liquidity crisis. In 1998, the Computer Aided Trading System (CATS) electronic market used in Belgium was organized as a limit order book where the cost of *immediacy* was determined by orders available in the limit order book. The continuous auction was organized as a discriminatory auction. A couple of years earlier, Degryse

had studied 25 shares in the limit order book in Brussels six times a day during ten trading days and measured the quoted spread (S_Q) for an order size of Q Belgian Francs as follows⁷:

$$S_Q = \left[\frac{A(Q) - B(Q)}{(A(0) + B(0)) / 2} \right]$$

where $A(Q)$ stands for the average ask price of a quoted size Q , $B(Q)$ the corresponding average bid price, and $(A(0)+B(0))/2$ is the mid-price for the smallest quote size (zero). A larger quoted size results by definition in a larger (or identical) average quoted spread, as the limit order book widens if Q increases. This procedure is applied for the limit order book excluding and including hidden orders.

In Degryse's study, electronic trading portals had the ability to show visible orders (fragmented orders) only when bid and ask prices were stated. Thus, the quoted bid and ask spreads were incomplete since hidden orders underestimated the true spreads for larger trades and overestimated them for smaller ones. Consequently, larger institutional traders rushed in to fill in order books of large trading portals.

2.3. Effect of cross-listings

The first threat to Belgian liquidity occurred when cross-listings began to proliferate due to the harmonization of markets regulations of member countries for listing and trading securities. The studies of Michael Halling, Marco Pagano, Otto Randl and Josef

⁷ The total cost of trading Belgian shares: Brussels versus London. Center for Economic Studies.

Zechner⁸ substantiate evidence for this threat. Firms that cross-listed in order to access foreign liquidity did so because trading and liquidity were converging on the most dominant markets. Belgian companies were particularly likely to turn to the most dominant markets after the EU harmonization, since the foreign investors felt they were not at a disadvantage in competing with domestic investors. The clearest evidence of the change in the liquidity profile of the Belgian stock exchange was provided by data on the liquidity on shares traded on the BSE and cross-listed shares. Degryse analyzed this trend in 1996 by comparing the cost for trading shares cross-listed on the BSE and the London Stock Exchange⁹. He used transactions, quotation, and limit order book data to investigate competition between the Brussels Computer Aided Trading System - CATS¹⁰ market - and London's Stock Exchange Automated Quotation – SEAQ International – by measuring the impact on liquidity using the quoted and effective bid-ask spread. He concluded that London's SEAQ International (SEAQ-I) had succeeded in capturing considerable trading volume in non-UK equities from other EU exchanges. This was particularly true for Belgian shares trading on London's SEAQ International and the Brussels CATS market. He compared direct and indirect trading costs for Belgian shares on both exchanges. He used a simultaneous record of quotes, limit orders, and transactions in both Brussels and London. His data for Brussels encompassed all limit orders. More precisely, the data incorporated not only the five best bid and ask prices and corresponding quantities, but also the other limit orders in the book. In addition, the data included *hidden orders*. As a result, he obtained unbiased estimates of the quoted bid–ask spread. The latter reflected the cost of *immediacy*. The results indicated that the Brussels

⁸ “Where is the market? Evidence from Cross-Listings.” University of Salerno, Italy.

⁹ “The total cost of trading Belgian shares: Brussels versus London.” Tilburg University, Tilburg.

¹⁰ CATS was superseded by the New Trading System (NTS) in 1996.

CATS market was considerably *tighter* than SEAQ International. However the SEAQ market was deeper. The results was effective spread pointed in the same direction in both cases. The advantage of Brussels in terms of the effective spread was smaller when compared to the results obtained for the quoted spread. Degryse also investigated the relationship between bid–ask spread and trade size. The quoted spread, by extension, increased with trade size. This feature was more important for non-cross-listed shares. The relationship between effective spread and trade size depended on the exchange. Trade size seemed to be important on the Computer Aided Trading System, which indicated a larger market impact for small and large trade sizes, and a smaller one for intermediate trade sizes. The analysis of total trading costs indicated that Brussels was cheaper for small transactions, while SEAQ International offered lower trading costs as illustrated below:

Table 1. Percentage quoted spread for cross-listed shares on CATS and SEAQ-I

Firm	CATS						SEAQ I					
	Quoted size in million BEF						Quoted size in million BEF					
	0 ^p	1	3	5	10	15	0 ^p	1	3	5	10	15
Cbr	0,36	0,39	0,46	0,52	0,71	0,95	1,93	1,93	1,93	2,19	-	-
Deh	0,22	0,28	0,38	0,48	0,69	0,94	1,22	1,22	1,22	1,22	1,24	1,29
Elb	0,25	0,29	0,34	0,39	0,52	0,65	0,94	0,94	0,94	0,94	0,94	0,95
For	0,51	0,62	0,89	1,13	1,82	2,67	2,84	2,84	2,84	2,84	-	-
Gbk	0,28	0,34	0,47	0,58	0,85	-	1,16	1,16	1,16	1,16	1,29	1,51
Gbl	0,52	0,62	0,86	1,13	-	-	1,77	1,77	1,78	1,79	1,98	-
Gib	0,37	0,49	0,72	0,94	-	-	1,32	1,32	1,32	1,33	1,88	-
Kb	0,36	0,42	0,58	0,71	1,04	1,38	1,50	1,50	1,50	1,50	1,50	1,61
Pet	0,30	0,35	0,41	0,48	0,66	0,85*	0,83	0,83	0,83	0,83	0,89	0,95
Sgb	0,43	0,56	0,82	1,05	1,66	-	4,09	4,09	4,09	4,09	4,24	-
Sol	0,33	0,40	0,58	0,75	1,13	1,64	1,87	1,87	1,87	1,88	2,00	2,12
Trc	0,40	0,46	0,61	0,76	1,12	1,57	1,94	1,94	2,11	2,46	-	-
Um	0,40	0,48	0,60	0,72	1,04	1,44	1,55	1,55	1,55	1,55	1,71	1,87
All shares	0,36	0,44	0,59	0,75	-	-	2,14	2,14	2,14	2,24	-	-

Source: BSE | LSE 1996

The table above reports the percentage quoted spread for cross-listed shares on both exchanges for various quoted sizes. The *quoted* bid–ask spread is the difference, for a particular trade size, between the lowest ask price and the highest bid price quoted (the inside market) on a market at a given point in time. The quoted bid–ask spread is calculated on the basis of the CATS limit order book for Brussels, and market makers’ quotes on SEAQ-I. A summary of the information is provided in the last line of the table, which gives an unweighted average of the spreads for all shares. The Brussels CATS market is rather *tight* for some shares; the bid–ask spread for the ‘*fourchette*’ or inside market (lowest ask and highest bid) is low. The quoted bid–ask fourchette varies from 0.22% for Delhaize (deh) to 0.52% for GBL. The market is not very *deep*. This is reflected in a large bid–ask spread for larger quoted sizes, or even a situation in which the limit order book runs out altogether. The quoted spread increases immediately with quoted size. This explains to a large extent the concentration of financial activity. More precisely, larger transactions frequently occur on SEAQ International, whereas smaller ones take place on the Brussels CATS market. Other features, such as customer relationships or the design of the trading system, may explain why investors might prefer to trade on the less efficient market but the most insightful is the higher execution risk for Belgian shares in Brussels compared to London.

The London market is a dealer market whereas the Belgian exchange is an auction market. The former seems to be better suited for handling larger orders especially in light of the mandatory trading volumes imposed by some exchanges, including the BSE. As a result, spreads are less variable on the SEAQ since the market is deep and spreads do not increase much with trade size, all of which leads to less execution risk for the Belgian cross-listed shares. The SEAQ quotes are executable at the inside which is very attractive for an investor seeking rapid execution and *immediacy*.

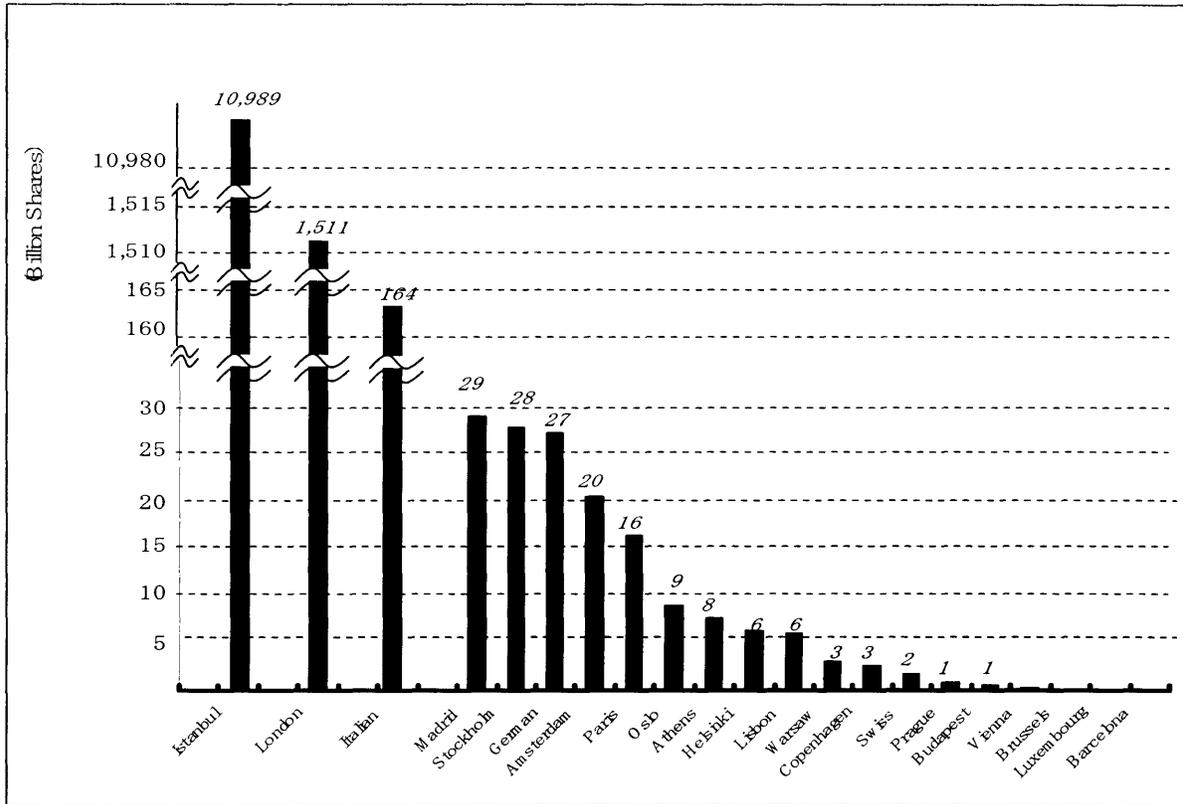
Non-cross-listed shares are less frequently traded than the cross-listed ones. This is also reflected in the liquidity of their markets. First, the market is not that *tight* (as can be inferred from the higher quoted spreads at the *inside market* - *fourchette*). Secondly, the limit order book runs out very fast. In addition, the quoted spread increases quickly with trade size. In other words, the limit order book for the non-cross-listed shares is not *deep*. Third, this suggests that traders willing to trade larger sizes against the limit order book must split up their orders into smaller ones (fragmentation). The need for splitting up trades is less present for the cross-listed shares. Traders submitting orders incur at least two costs: direct and indirect trading costs. The first is measured by the commission rate. The second represents the impact on the price of submitting an order, the spread. This table adds both cost components to obtain a picture of the competitiveness of the Brussels CATS and the London SEAQ-I market. Until 21 October 1994, commission rates on the Brussels stock exchange were fixed according to a decreasing schedule. The commission rate varied from 0.8% for transactions up to 5 million Belgian Francs (BEF) to 0.4% for transactions of 30 million BEF. The London Stock Exchange publishes yearly an overview of commission rates charged on SEAQ-I in its Stock Exchange Quarterly. Comparison of both schedules shows that commission rates on CATS are substantially higher than on SEAQ-I. In other words, in terms of direct trading costs, Brussels is more expensive than SEAQ-I.

In order to determine which market is actually more efficient in terms of total trading costs, the *quoted spread* is used as a measure for indirect trading costs. Applying the same exercise with the effective spread would not yield additional insights. We take as

indirect trading costs the unweighted average quoted spread for all shares. We offer total trading cost measures for CATS up to 6 million Belgian Francs (BEF) and SEAQ-I up to 7 million BEF, as this is the deepest size available for all shares. CATS outperforms SEAQ-I for deal sizes up to about 1.5 Million BEF. SEAQ-I provides lower trading costs for larger trades. The CATS percentage trading costs increases with deal size, as the quoted spread increases more than the commission schedule decreases. For Brussels, commissions are the major part of total transactions costs. The reverse holds true for SEAQ-I. The data on transactions are roughly consistent with this outcome. That is, large orders occur frequently on SEAQ-I, whereas small ones take place on CATS. In deciding where to trade, investors do not focus solely on trading costs. Therefore they do not necessarily use the more efficient market in terms of total trading costs. There are other features of a market's organization that are not reflected in the different measures of total trading costs. Examples include customer relationships with one or the other market, the differences in design of the trading system, and liquidity.

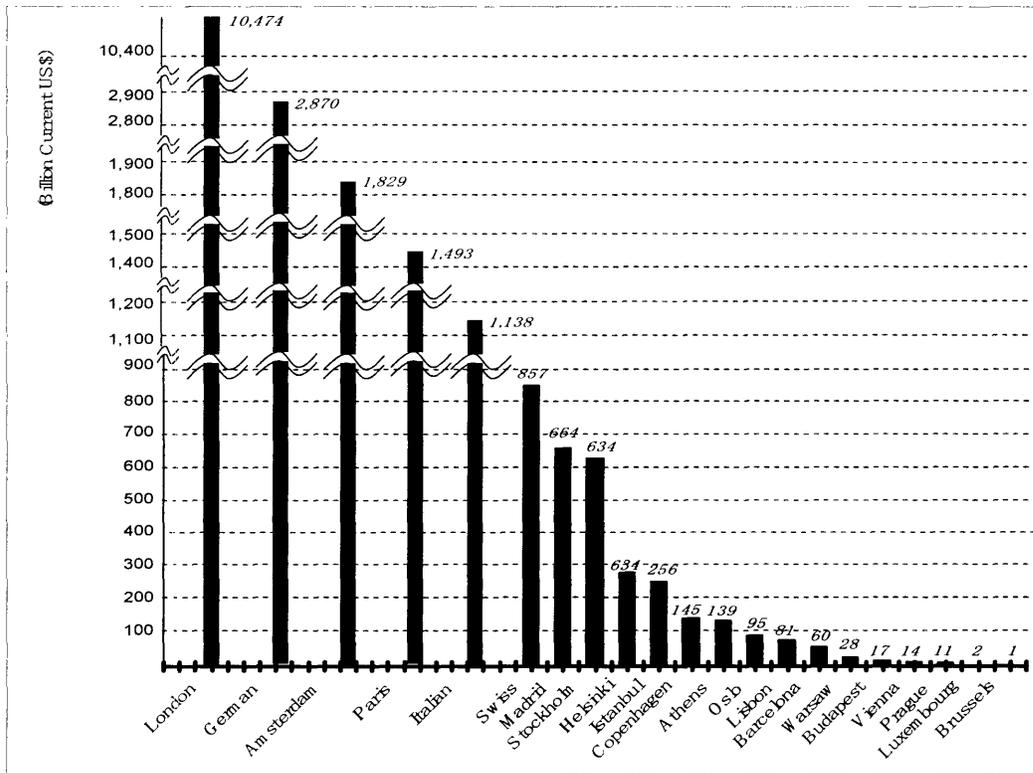
Commission rates on the Brussels stock exchange have been liberalized since October 1994. Some brokers and banks decreased their commission rates for large orders. Lower commission rates in Brussels have affected the strategies of SEAQ-I dealers and they have improved their quotes. Given the caveats mentioned above, trading costs in SEAQ-I and CATS seem comparable following liberalization of the Brussels market. Therefore, we can conclude that this liberalization enabled brokers to compete with SEAQ-I dealers for larger deals. The result was the sharp contrast between reported trade volumes on the BSE and other European Exchanges as illustrated below:

Figure 3. Number of Shares Traded (2000)



The difference is even more pronounced when this comparison is carried out on the basis of the value of shares traded. While the BSE has benefited as did other exchanges from the increase in the number of clicks (trades) since 1999, it trailed all the European Exchanges as illustrated below.

Figure 4. Value of Shares Traded (2000)



2.4. Technology Innovation, Governance and Regulatory changes

The competition between exchanges and portals began around the mid 80s as the London Stock Exchange Automated Quotation (SEAO) began to drive cross-border equity trades away from exchanges located in continental Europe by using a screen-based platform to trade shares of non-UK companies. This led the exchanges to modernize and become electronic as well. However, due to the structure of the markets, institutional traders still needed to be members of multiple exchanges, pay membership fees and abide by local government trading rules. The introduction of the Euro and the harmonization of capital markets made such fragmentation obsolete and led to a consolidation of markets. The

consolidation also had a significant impact on trading and liquidity as larger institutional investors began to concentrate their trading on a few European financial centers where they could access various pools of liquidity across the EU.

Liquidity was also affected by the change in the governance structure of the exchanges themselves. Exchanges ceased to be *mutuals* owned exclusively by members, and became public limited companies with shareholders. This trend went rapidly from smaller exchanges to larger ones as technology brought down the technology cost investment barrier to entry that had long kept many firms from offering the same services. This brought about a more open and “level trading field” allowing banks to disclose their conflicts of interest that had prevented them from acting as owners and users of exchanges. Exchanges had two principal customers, firms that sought to be listed and intermediaries that wanted to trade on the exchange. Thanks to the added transparency in the markets, new exchanges that focused on trading were able to compete. Because of their technological advantage, many took significant liquidity and market share away from the established exchanges. The membership fee at Tradepoint for example was £1,000 compared with over U.S.\$1 million at the NYSE.

The pressure for liquidity was fiercest among firms seeking permanent market making in order to maintain adequate valuations for their companies. Firms with liquidity can improve the beta of their stock which can have a significant impact on their internal cost of capital using the CAPM formula. Thus secondaries (seasoned offerings) have gradually sought trading platforms that offered deeper pools of liquidity rather than just

the exchanges that became the purview of firms seeking access to public capital markets. This led to a surge in *cross-listings* between the home exchange and exchanges that offered the best prospect for liquidity. The change in governance contributed to segmentation of the market as companies with limited float tended to migrate toward platforms that offered deeper liquidity, while intermediaries were most likely to seek avenues to trading large blocks or demand speed of execution.

The main objective of exchanges changed forever in the mid 1990s. Since exchanges needed to do more than list companies to generate revenue, they competed for users who generate large volumes of trades and thus generate higher liquidity. Technology had disintermediated the market, allowing customers to find buyers and sellers of securities directly without the need to go through the exchanges. With this double marginalization eliminated, trading portals found it necessary to operate as networks to attract only those investors that perceived their utility. Investors wanted liquidity and scale economies expressed as lower cost of trades. They sought the lower spreads that come with increased liquidity on exchanges and portals where most firms were traded.

Some evidence of home bias was still visible in the way fund managers directed trades and in the quality of portfolios they held. Lutje and Menkhoff examined the home bias effect¹¹ on the shares traded on European exchanges and portals. In their study of the factors and driving forces in home bias, they looked at informational asymmetries and advantages offered by home preference and noted that it no longer held true in the Internet age. In fact, home bias gradually meant sub-optimal diversification and poor

¹¹ Discussion paper No. 296. May 2004. University of Hanover, Germany..

performance. It was tied more closely to the degree of risk aversion of investors rather than any rational approach to investing. Still, equity managers were more likely to demonstrate home bias than bond managers.

Trading portals invested in technology to exploit the network effect and scale economies. The network phenomenon became very important and had implications for both competition and the explosion of trading portals that operated automated systems that brought together buyers and sellers of securities over-the-counter without the same burden of regulation that an exchange would face. Portals targeted end-users who had the ability to search and compare electronic trading platforms based on cost, service, convenience, speed, value of information and quality of communications. As Internet trading grew popular, the business became commoditized, leaving very little room for differentiation except on few attributes. The playing field was gradually leveling for new market participants, such as smaller financial institutions, small and medium-sized corporations, insurance companies, government agencies and even private investors – as well as existing users. The bond market eventually followed through with quote driven Euro-MTS system, leading others in search for better liquidity offered on trading platforms and lower volatility. Derivatives platforms joined later as options, futures and commodities traders followed their equity counterparts. This was the beginning of fully integrated trading platforms.

By the year 2000, there were 27 trading portals in Europe, one of which operated in Belgium. Most were registered as broker dealers and in a few cases as exchanges. They

offered better functionality than exchanges as well as having better pricing and more transparency in price information. Investors became less dependent on brokers or intermediaries as the Internet provided them improved customer service through access to real-time market data, historical data, documentation, greater accessibility, better pricing, valuation models and risk analysis. Settlement, clearing and custody services were also available on the Web, ushering in the advantages of straight-through processing (STP) that allowed traders and market makers to trade, clear and settle on the same platform.

III. DISINTERMEDIATION AND THE 2000 MARKET BUBBLE

3.1. The Emergence of Day Traders

By 2002, nearly 200 European online broker sites were providing online trading. They were led by Consors Discount Broker in Germany with 500,000 customers and €5 billion in assets. The equity market fell that year sending the European top indexes down twenty five percent (25%) which undermined these portals' growth. With consumers trading volumes cut in half, these brokers began to accumulate staggering losses. This led to the onset of aggressive cost-cutting. The brokers could only break-even if they served frequent traders at low cost to attract infrequent traders. Consequently, brokers had to achieve critical mass of frequent traders and focus their investment and sales effort toward maintaining and nurturing the high-end, risk-friendly customer (known as "elite brokers"), and active "day traders". The sites that were able to optimize their offerings were those that could serve fewer frequent traders. These traders were expensive to

recruit and difficult to keep¹². Large banks began to fold their brokerage sites into multichannel banking offerings to cut servicing costs and serve infrequent traders with simpler offerings. According to Forrester research, the result was integrated brokerage service earning about 10 euros per customer. Although this service doubled investor base, it still was not sufficient to cover infrastructure costs. Forrester Research also reported, at the peak of the Internet boom in 2002, that the number of people trading stocks and bonds on-line across Europe was expected to rise from 3.2 million to close to 10 million in 2007. As they rode the dot.com frenzy, many people became "day traders," trading stocks and shares over the Internet in the hope of making a killing. Several analysts believe that the early success of many on-line brokerages was due primarily to the activities of these "day traders."

Germany was predicted to become the biggest market by far growing from an estimated 1.7 million on-line traders in 2002 to almost 3.5 million in five years. As the number of traders rose, the kind of people who actually traded changed dramatically; More and more traders who went on-line in Europe could only be classified as "cautious." The "get rich quick" traders, on average, completed around 19 transactions per year, while "cautious" traders completed only one and two per year. Newer research by Forrester showed that the fastest growing segment of traders would be the cautious savers who would account for 24 percent of the market. The projection for the "get rich quick" traders saw their relative numbers fall to just 23 percent of the market. All of this suggests that as banks and other financial services companies moved forward, more

¹² Commission Break Even was Euro220/year according to Forrester research.

products aimed at cautious investors were needed. Consequently, intermediaries needed to launch more "hand holding" products.

3.2. Market Disintermediators

By 2001, decimalization in the US and the increasing rarity of the so-called "day traders" of the Internet boom had an impact on the revenues and the Net Capital of many larger brokerage houses dependent on high-frequency traders. Charles Schwab discount brokerage cut 10 percent of its staff, or about 1,880 employees, to cope with weak client trading volume. At that time, it processed a daily average of 117,500 revenue trades, down 25 percent from 2000.

There had been a high level of interest in the banks' services. This allowed customers to buy and sell shares over the Internet without having to open a separate trading account. One of the advantages bankers had over competitors in this space was their ability to work from their own customer base, since many customers already banked on-line. Furthermore banks were able to build their services from existing infrastructure, which kept costs down. Another unique feature was that trades were settled immediately with funds paid into or debited from the customer's account. It was also only "execution" meaning that they offered no advice on whether shares should be bought or sold. In addition, shareholdings were held in electronic form on behalf of the customer rather than in "paper" certificate form. The service was developed by firms like Goodbody Stockbrokers, a fully owned subsidiary of Ireland's AIB Bank. "It allows people to buy and sell stocks while sitting at their PCs and without having to try and get through to their stockbroker" admitted one of its managers.

Europe's online retailers were not paying sufficient attention to fulfillment costs, trusting that growing volumes and squeezing vendors would solve their cost problems. Complex and expensive online retail fulfillment costs form the bulk of retailers' operating costs (15 per cent of sales on average). Good cost control in this area required three skills: accurate demand forecasting, creative labor management and central vendor partnering, none of which trading portals possessed.

Finally, electronic derivatives trading had begun to break down traditional market barriers and change the nature of business relationships. The Internet enabled traders to access and exchange information quickly and easily, and to serve multiple customers simultaneously. Delivery, pricing, trade analytics, information provision and competitiveness changed fundamentally as a result.

IV. THE NEW ONLINE TRADING PARADIGM

4.1. The Growth of Online Trading

The introduction of Internet trading led to a worldwide increase in total executions in value and volume of shares traded, which also affected volatility on most exchanges. Was the increase in trading coincidental to the spread of the Web or was it a direct result? James J. Choi, David Laibson, and Andrew Metrick¹³ attempted to answer this question. Their research led them to conclude that there was evidence that the effect of Internet trading was very large on trading frequency, turnover and transaction size. They also found that young, male traders with high salaries and retirement plan balances were most

¹³ How does the Internet affect Trading? Evidence from Investor behavior in 401(k) Plans. Journal of Financial Economics.

likely to trade via the Web, consistent with societal stereotypes of Web traders. Conversely, retired and job-terminated participants were less likely to trade using the Web. The authors speculate that since ex-employees were out of the workplace, they were less likely to know about plan changes like the new Web-based trading opportunities. Participants who traded frequently by phone prior to the introduction of Web trading were also less likely to try the Web. The lower effort cost of Web transactions led this class of traders to execute smaller dollar value transactions in their Web trades relative to phone trades. Consequently, small trades that were not worth a time-consuming phone execution were performed quickly on a Web-based trading system. Per Choi, Laibson and Metrick, the average phone transaction per their data was 75 percent larger than the average Web execution. In their analysis, these differences were driven by demographic contrasts between the typical phone and Web traders. While high balance retirement plan participants (usually older) were most likely to *try* the Web, low balance participants (usually younger) were most likely to *trade frequently* on the Web. Hence, low balance participants conducted a relatively large share of Web transactions.

Thanks to the Internet and the spread of online trading, commission costs on buying and selling stocks plummeted as trading volume soared, encouraging individuals to trade more than ever. In general, economies benefited from more trading, but it is disturbing that the trading surge took place in retirement savings plans, an investment vehicle where investors should be patient and have long-term objectives rather than wheel and deal for a quick buck. Internet traders challenged financial market theory and history wherein a

disciplined, long-term approach with minimal trading would greatly increase the odds investors will reach their long-run financial goals. Even after accounting for stock price volatility or increased overall market volume, the Web effect remained very significant. Daily trading frequency nearly doubled, and daily turnover -- the fraction of balances traded -- increased significantly as well. The transaction frequency effect was greater than the turnover effect because Web access lowered average transaction size and increased Web trading on low-balance accounts belonging to young traders.

Choi, Laibson, and Metrick found that most participants who tried the Web stuck with it. Of those participants who tried the web, 88 percent made their next trade on the web. Conditional on a first and second Web trade, 94 percent made their third trade online, and 96 percent of Web traders made their fourth trade online.

4.2. Changes in Regulatory Frameworks and EU Harmonization

The US has always been the trend setter in the brokerage industry. As a result when the “IT revolution” of the mid-seventies brought about innovation in information and communication technology, it had a particularly dramatic impact on the financial services industry world-wide, especially trading execution. Furthermore, the enactment of the Electronic Funds Transfer Act by Congress in 1978 set the stage for the use of electronic systems to transfer funds and provided the potential for substantial benefits to consumers. The ensuing improved stability and efficiency of the financial system was followed by speedy processing and transmission of information that enabled cost reductions, wider networking and globalization on an unprecedented scale. The Electronic Funds Transfer Act authorized financial institutions to make electronic funds transfer terminals available

to their customers, protect the privacy and security of customers, prohibit unfair discrimination among financial institutions and monopolistic practices in the use and availability of electronic funds transfer terminals. It also prescribed remedies and penalties.

The combination of change in the regulatory landscape and the advent of new technology paved the way for the entry by a handful of smaller convenience-oriented banks seeking to take advantage of the lower price offerings that electronic banking allowed. These banks sought to take advantage of the low cost for servicing price-sensitive consumers. In the maturing traditional banking industry, differentiation was geographic and focused on customer income. Large and smaller banks had failed to address changing customer needs and customer segmentation gaps prevailed throughout the industry (from consumer finance to commercial banking). When the Federal Reserve Bank relaxed some of the reserve requirements against specific assets and deposits, bank members began to engage in sweep activities to move reserves into more productive uses, unlocking a vast amount of liquidity that had long been trapped under manual and bureaucratic processes both of banks and the federal reserve system. Since the Fed does not pay interest on monies on reserve, these institutions had an added incentive to become efficient at sweeping idle balances and used the deployment of technology at large money center banks to minimize reserve balances. The introduction of technology also made it easier to direct funds from the Federal Reserve, setting off a trend that permeated other segments of the consumer banking industry and leading to the explosion of B2B and B2C. This was the beginning of a tidal wave that changed the face of the banking industry, unleashing massive capital investments in Internet banking, consumer finance and electronic trading.

The information technology revolution offered a great opportunity for money center and regional banks to leap forward in the Internet age where they stood to benefit from advantages of scale and reach, thanks to the American consumers' growing adoption of the Internet. By allowing financial institutions to engage in a broader spectrum of activities, and in essence repealing parts of the Glass-Steagall Act (that sought to limit banking activities), the Financial Service Modernization Act of 1999 (a.k.a. Gramm-Leach-Bliley Act) encouraged the convergence of the banking, insurance and securities industries while maintaining appropriate safety and soundness safeguards. Legal barriers that had historically separated these industries were substantially eliminated from federal law, and the new federal law preempted any impeding state law in many respects. The concept of separation between banking and commerce was clarified, reaffirmed and reinforced by the Act.

The advance of information technology not only strengthened the incentive of non-financial business firms to engage in banking but also ushered a new breed of broker-dealers known as discount brokers into the financial markets using the Internet. They included firms such as Charles Schwab, Ameritrade, E-Trade, Instinet, Bloomberg TradeBook, LLC, Island, Archipelago and DLJ Direct.

Traditionally the EU securities markets operated as cartels with vertical integration as a result of the currency segmentation of the markets with limited number of exchanges and multiple clearing and settlement structures. Since the early 80s, EU securities market regulators began to strive to integrate their markets and address the constraints raised by

technological advances. EU policy makers needed to revisit the regulatory set-up of their securities markets and set up a Financial Services Action Plan (FSAP) in 1999 to address the ancillary coordination issues. The initial task of the FSAP focused on legislative procedures and mechanisms for stimulating the functioning of their markets among all involved intermediaries and institutions. Market supervision was a key concern, given large differences in legal and institutional structures among member countries. Noteworthy among the obstacles was the “single passport” to eliminate barriers at the national level.

By and large, regulatory matters centered on: (i) the clarification of objectives and level of regulation; (ii) interpretation and enforcement of securities market rules; and (iii) the harmonization needed for mutual recognition. The “country of origin rule” for the application of conduct of business rules in cross-border securities trading was also an important consideration.

With the emergence of Alternative Trading Systems (ATS or trading portals) in the early 1990s, the Investment Service Directive (ISD) was established to strengthen rules for cross-border trading and address listing and trading rules. The Forum of European Securities Commission (FESCO)¹⁴ was also created to establish standards of conduct for

¹⁴ The Forum of European Securities Commissions (FESCO) assembles the following 17 statutory securities commissions of the European Economic Area (EEA): Bundes-Wertpapieraufsicht (Austria); Commission bancaire et financiere/Commissie Voor Het Bank- en Financiewezen/ Kommission fur das Bank- und Finanzwesen (Belgium); Finanstillsynet (Denmark); Rahoitustarkastus (Finland); Commission des operations de bourse (France); Bundesaufsichtsamt fur den Wertpapierhandel (Germany); Capital Market Commission (Greece); Financial Supervisory Authority (Iceland); Central Bank of Ireland; Commissione Nazionale per le Societa e la Borsa (Italy); Commission de surveillance du secteur financier (Luxembourg); Stichting Toezicht Effectenverkeer (Netherlands); Kredittilsynet (Norway); Comissao do Mercado de Valores Mobiliarios (Portugal); Comision Nacional del Mercado

market participants, especially for institutional investors. The result of these actions was the separation of listing and trading which, in essence, redefined the role of exchanges as institutions that serve the public interest with the principal duty of ensuring the listing function. This was indeed a restructuring of the exchanges. Thus the trading function was more the purview of trading platforms that included the exchanges themselves. Clearing settlement and custody was kept separate to “maintain a competitive and open environment”. The EU regulators felt that this restructuring would maintain a necessary fragmentation and a level playing field among intermediaries. This redefinition of the Exchanges and their role in the financial markets was a key development in the transformation of European markets. The business of exchanges was redefined to include activities that earned fees on transactions, price quote services and membership fees. Exchanges also kept listing authority but clearing and settlement was no longer a necessary part of an exchange. Trading platforms were redefined as transaction companies that bring together buyers and sellers of equity shares, derivatives and commodities products on a virtual platform that indicates prices and volumes, routes orders, and provides execution services. While exchanges were allowed to offer trading platforms, this development was critical to fostering a segmentation of the market that encroached on the traditional largest revenue base of most exchanges. European exchanges generated most of their income through trading, followed by services such as

de Valores (Spain); Finansinspektionen (Sweden); Financial Services Authority (United Kingdom). The European Commission attends FESCO meetings as an observer. The Chairman of the IOSCO European Regional Committee is also invited as an observer. FESCO is chaired by Georg Wittich, Chairman of the Bundesaufsichtsamt für den Wertpapierhandel (Germany).

listings, clearing, settlement and data license and membership fees as illustrated in table below:

Table 2. Exchanges Revenue (1998)

Type of revenue	EU Exchanges	US Exchanges
Listing fees	19.3%	32.1%
Transaction fees	45.1%	39.7%
Services	24.4%	22.6%
Other	11.2%	5.7%

Source: FIBV data 2001

This structural change in revenue allocation set off the consolidation of emerging European markets as they sought to maintain their leadership in trading which could now only occur with liquidity.

Finally, the introduction of the Euro in 1999 can be credited for unleashing a deeper transformation in the EU securities markets as well. As technology caused physical Exchange floor trading to disappear in favor of anonymous trading, so did the introduction of the Euro, because it took away many of the home biases.

4.3. World-wide market consolidation

At the turn of the century, there were thirty two (32) large exchanges in Europe. That number has been reduced to three with prospect for a further consolidation as the Deutsche Bourse that operates the Frankfurt Exchange considers the acquisition of the

London Stock Exchange. This move to acquire Europe's largest exchange by volume of shares traded underscores the need for liquidity to offset two critical factors that have changed the industry landscape across Europe, Asia and the United States. Volumes on Exchanges are stagnant and competition from electronic trading platforms has cut trading fees by nearly 12 per cent according to a recent report by the Wall Street journal. It is expected that acquisitions produce cost savings and attract larger pools of liquidity, these being the only options for survival of these exchanges. The battle for control of the LSE is just a recent illustration of the importance of liquidity, because the LSE is increasingly the destination of choice of market makers and other dealers of security who perceive its platform as having less imbedded execution risk due to the size of liquidity that it attracts.

The recent decline in the value of seats on the world largest stock exchange has raised concerns about the automation of the NYSE and the ability of its specialists to survive a growing trend toward online trading. Seat prices dropped from \$1.04 million to \$0.975 million between November 2004 and January 2005 and are down significantly from a record \$2.65 million 5 years ago. The dramatic drop in prices signals the change in investors' perception of the value of trading through the specialists when the vast majority of liquidity pools are accessed via Internet portals. Although the NYSE is still the destination of choice for over 82.9 per cent of the equities traded in the US, it is rivaled by its European counterparts who benefit from more efficiency and transparency thanks to electronic trading. Among the various issues facing the NYSE and other exchanges are operating cost rise and declining trading volume. Although the Exchange has increased its trading volume against rivals NASDAQ and Archipelago, its market

share for equities has dropped slightly below 80 per cent. The Exchange itself is now considering a change to allow trades to be executed electronically, bypassing the specialist and depriving them of potential income, a development that may have contributed to the cut in the value of the NYSE membership. The proposed SEC regulation to divert some orders to electronic markets is also a source of concern. The NYSE is exploring new avenues to increase share volume, which include the possibility of longer trading hours to attract more international business for the exchange. This would inevitably allow the NYSE to compete with the European exchanges for liquidity, trading and listing. The 212 year old exchange is indeed acknowledging the changing competition dynamic and chances are that it will amend the regular trading session schedule to compete globally.

The current battle for the acquisition of the LSE by the Deutsche Bourse and the M&A activity in the trading portal space demonstrate structural constraints arising from lack of liquidity to support the excess capacity built five years ago in anticipation of higher trading volumes. Those barriers are not likely to fall soon, as Investment Technologies Group, Inc. (ITG), Instinet and others have discovered. Liquidity is the key driver of the increasingly competitive and commoditized electronic trading industry.

V. ANALYTICAL PERSPECTIVES

Electronic derivatives trading broke down traditional market barriers and changed the nature of business relationships. The Internet enables traders to access and exchange

information quickly and easily, and to serve multiple customers simultaneously. Delivery, pricing, analytics, information provision and competitiveness are all undergoing major changes fundamentally as a result. Lieng Seng Wee and Judy Lee¹⁵ explored the impact the Internet and electronic platforms on derivatives trading, and the new opportunities opened to market participants. They concluded that “the Internet was poised to become the central platform that allows wholesale financial players to conduct their business more efficiently, rapidly and cost-effectively.” In their view, the trading paradigm itself was due to change as large financial intermediaries and money center banks jumped on the band wagon. Noteworthy among them were Morgan Stanley with Creditex, its new Internet-based global trading and information company for credit derivatives, launched with the financial backing of JP Morgan and Deutsche Bank following the model outlined in figure 5 (see page 41).

When on-line brokers like Ameritrade first started up, few on the institutional side of the business considered them a threat. More recently, on-line equity trading firms such as E*Trade, Charles Schwab and DLJ Direct have left some of the more traditional financial institutions standing. Many are still playing catch-up, while losing trade, money and liquidity to electronic upstarts. Today, no financial institution can afford to ignore the opportunities provided by the Internet and electronic platforms.

Eurex, the Swiss/German electronic futures exchange, is a good example of the power of electronic trading. It has leapfrogged over its rival, the London International Financial

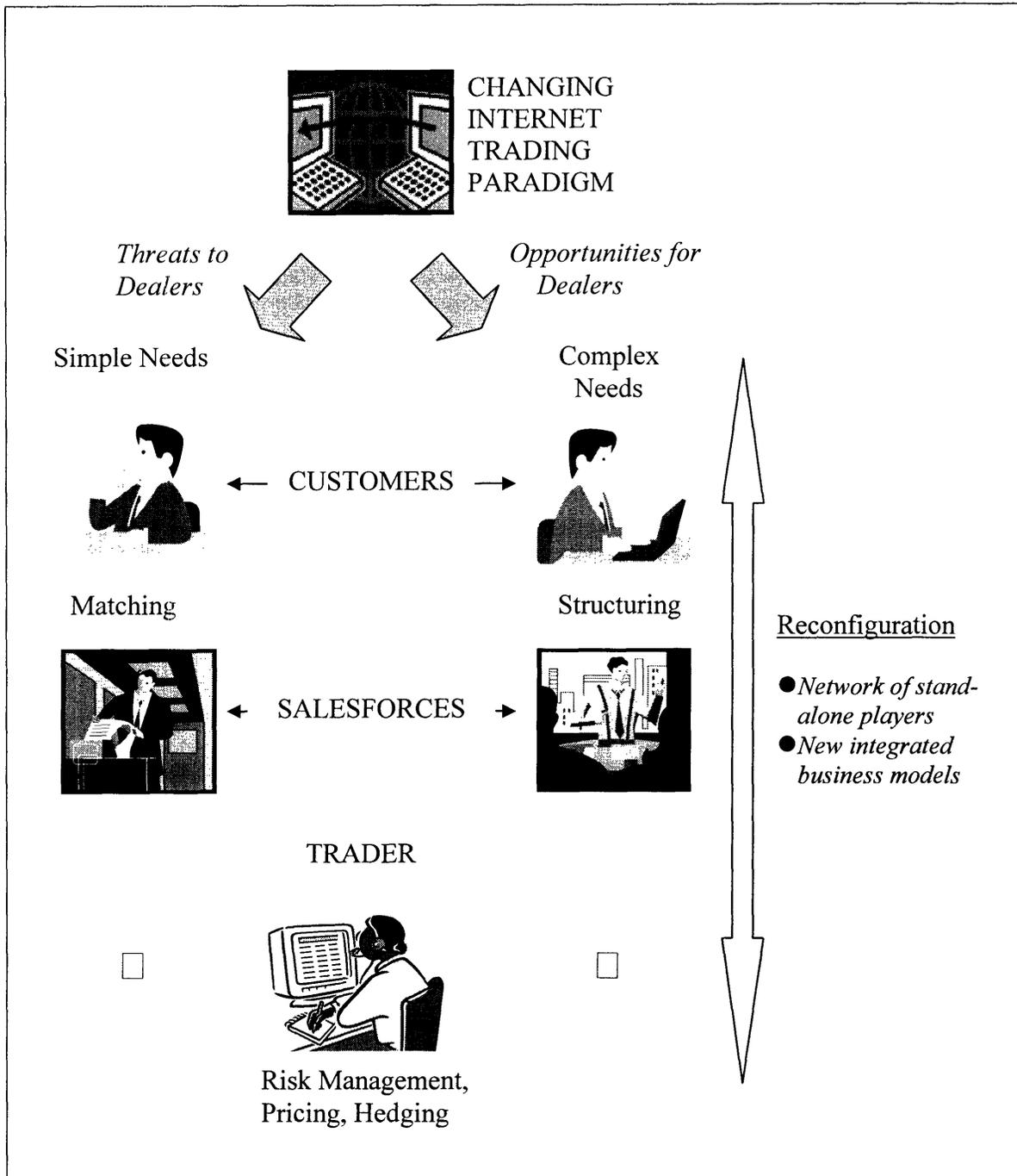
¹⁵ Lieng Seng and Judy Lee. “Breaking Barriers”, Risk Magazine, Electronic Trading Supplement.

Futures and Options Exchange, in terms of trading volumes. Average daily trading volumes on Eurex almost doubled in a year, to 1.6 million contracts in November 1999.

Lower transaction costs were one of the keys to that exchange's success. Online traders and information providers have virtually squeezed brokers out of the market. Brokers will have to provide genuine value-added services – knowledge, content and depth – to survive. Trading houses will find their roles changing. Increasingly plain vanilla derivative products will trade on electronic platforms. Existing sales staff will be able to concentrate on promoting their electronic trading system to new clients since they can use the Internet to channel product offerings to meet specific client needs as well as to view their clients' needs on a real-time basis. Traders are now free to concentrate on more complicated and structured products, and eventually products with increasing complexity will also trade electronically.

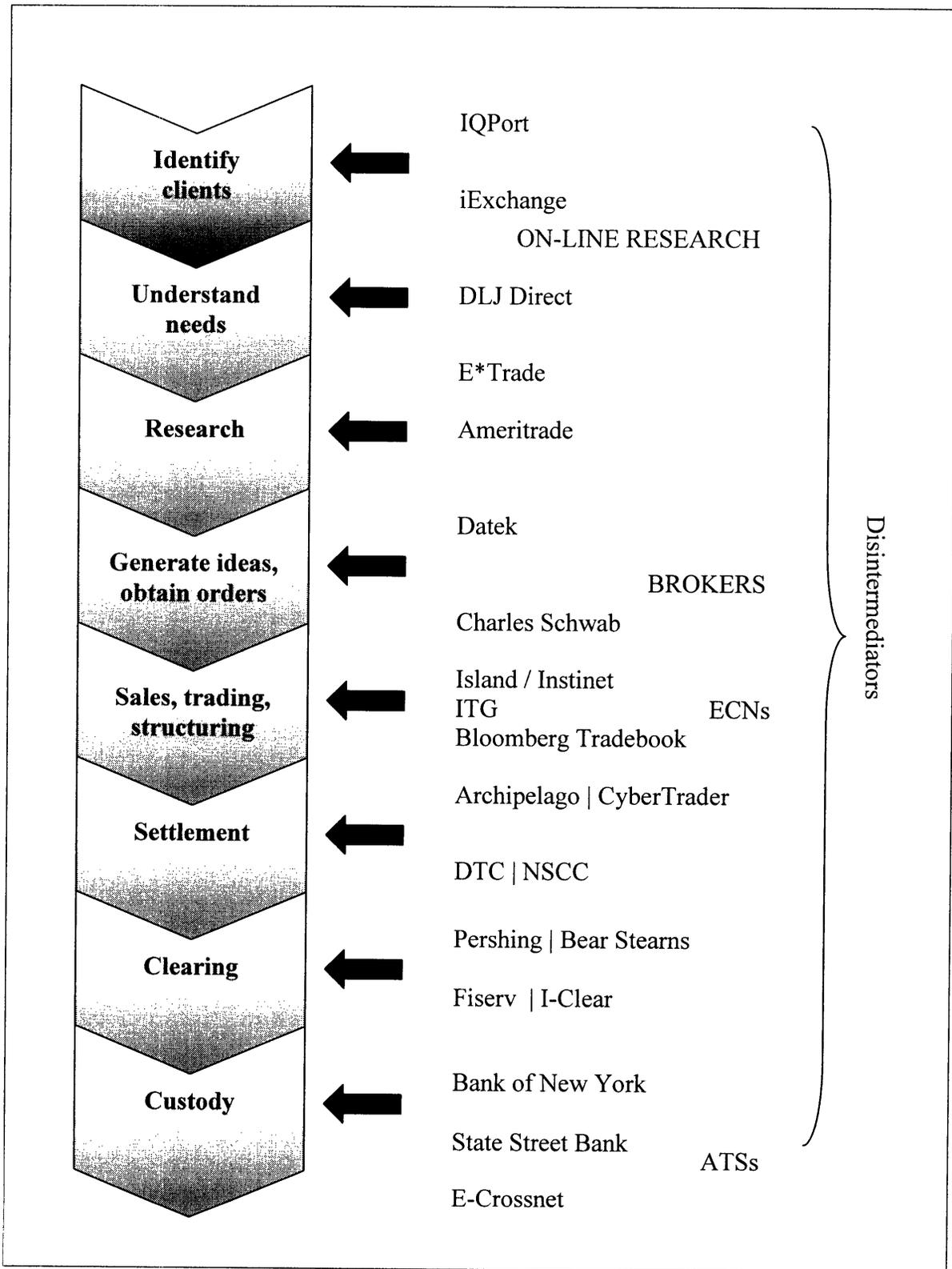
The Internet attracts a wide range of potential clients to visit, browse, and study offerings, price, and test and execute trades. Gathering a database of Web site visitors provides the opportunity for financial institutions to cross-sell new products and services and improve customer loyalty by providing targeted information. Electronic trading is also leading to the integration of back-office processes. The potential for T+1 (real-time plus one day) clearing and settlement and global straight-through processing has become real. Derivative portals could potentially support all components of the value chain and allow customers to outsource the majority of their back-office processes with significant cost savings.

Figure 5. The Changing Internet Trading Paradigm



Online brokerages are now changing their business model and are no longer competing on cost alone as illustrated below:

Figure 6. The broker - dealer value chain



Instead, they are offering customers financial information and advice, quality customer service, and innovative technology. Discount online brokerages, in particular, are focusing on innovative technology to attract customers. Seventy-seven percent of discount firms offer real-time streaming quotes, none of the full-service brokerages does.

CONCLUSION

The recent changes in the structure of stock exchanges and trading portals in Europe and especially in Belgium demonstrate that European markets development have promoted their integration. The trend toward more horizontal integration of markets has benefited larger exchanges where cross-listing was most likely to occur. Smaller exchanges were confronted therefore with the only remaining option of building derivative products to entice firms seeking to arbitrage the national economies and not the performance of a single stock. In the long-term, this has been good for financial markets in general because these actions removed unnecessary speculative volatility from markets that might not have otherwise grown at sustainable rates. The result of stable markets is deeper and more resilient liquidity as we have noted in the cross-analysis of the London stock exchange and the BSE. An examination of the recent liquidity addition to the Belgian exchange as a result of the introduction of the Bel-20 index also corroborates our observation regarding the use of an index to arbitrage local economies and their positive effect on the liquidity of stocks included in that index.

In Arrow Debreu's world there is no such thing as financial intermediation. But as this case proves, the Belgian economy has benefited from frictions that favored

intermediation of financial contracts, markets and institutions. These intermediaries have facilitated pooling of capital and risk, providing investors with access to liquidity who would have been otherwise forced to withdraw funds or sell assets from investments. In this and many regards, greater liquidity has given lenders and borrowers greater access to long-term capital at the aggregate level, thus spurring Belgium's economic growth.

The incentive for stock market participants has also changed in the past decade. Buy and hold strategies have given way to a new paradigm bolstered by the size and globalization of stock markets and their liquidity and the dilution of corporate control and governance. New intermediaries' groups have acquired the capacity to mobilize capital and stimulate specialization in the Belgian economy. In equilibrium, the new and old actors in the Belgian financial markets have made these markets more efficient thanks to increased access to liquidity.

Trading portals emerged first and foremost because of the technology they provided. There is evidence that Internet traders focused only on one aspect of liquidity, speed of execution. This aspect was not sufficient to sustain liquidity in their platforms. Eventually the law of averages caught up with them as deep liquidity seekers focused on venues that provided quick access to buy and sell securities for increasing trade size. The result was that exchanges and portals that provided liquidity were able to modernize their technology and offer a wider array of services. The segmentation advantage that trading portals offered at the beginning of the Internet boom dissipated quickly when Banks and other intermediaries entered the online trading space.

Looking to the future, disintermediation should serve the surviving players well. The new traders will no longer be those seeking to trade on the speculative impulse of other auctioneers in the market, but rather disciplined investors seeking to take advantage of an arbitrage opportunity (hedge fund) or trade an index to gain exposure to an economy or sector. This gives further merit to examine the issue through the lens of the liquidity adjusted capital pricing model in order to account for the lack of or increase in liquidity. As Acharya and Pedersen suggested, a security's return depends on the covariance of its own return and illiquidity and market return and market illiquidity. As we have observed in the case of several securities currently included in the Bel-20, their "net betas" have improved with liquidity and suffered when market illiquidity has increased, thus causing a sell-off. The net beta therefore is a function of the stocks tradability in periods of market downturn and illiquidity.

Stock markets and indexes have become more volatile and may fluctuate in response to news and economic development, a political event, the introduction of regulation, market conditions and the adverse behavior of an issuer. The increasing volatility in world exchanges has allowed Direct Access Trading (DAT) to expand, aided by the deployment of smart routing systems that give these traders the ability to execute series of limited orders like market orders, thus enabling spread savings with minimal risk for not being filled or not liquidating a position quickly enough. The performance of exchange traded funds and indexes may vary with timing, additions or deletions from the Index. In addition, foreign securities involve a greater risk including the risk of currency fluctuations. These new market attributes continue to create the enabling conditions for

Direct Access Traders (DATs) to prosper as traders seek arbitrage opportunities and short-term speculative profits.

Today's internet traders have the training and knowledge of trading strategies that allows them the opportunity to trade directly with various points of liquidity (execution destinations) across the globe without the manual intervention of a broker. Noteworthy among recent developments is the introduction of risk management tools that allow these traders to view exposures and margins as a single unit, and drill down to their detailed exposures in any given market or exchanges. Routing engines have the capacity to accept market data feeds, use these risk management tools to check various parameter limits, send orders to trade out of any risky situation and handle an increase in volume to support derivatives through an exchange specific algorithm across multiple time zones. Favorable regulatory reforms around the world, improving connectivity and front-end technologies and diminishing costs for order flow will serve to boost this segment of traders that already represents about 19 per cent of NASDAQ and NYSE trade volumes and 30 per cent of shares traded through Electronic Communication Networks (ECNs) according to a recent report by the Tower Group in the US.

The consolidation in the exchange and trading portals will expand toward the point where the convergence of liquidity and technology is optimal, thus allowing internet traders to compete on an almost leveled playing field with market makers and specialists. It is therefore conceivable that the structure of capital markets as we know it today will change and be replaced by regional exchanges trading electronically. Portals, as we have

known them, will gradually disappear in favor of electronic exchanges with E-trading platforms. This new focus probably will be on value-added services to de-commoditize trading executions. Already we are witnessing an increase in the use of sophisticated algorithms that allows computer trading programs to trigger buy and sell orders that sweep liquidity through various pools of available shares of stocks in multiple exchanges without any human intervention. This enables portfolio strategists to take positions in particular securities or indexes or to take advantage of mispricing or mistimed positions that they can exploit. The emergence of hedge funds is yet another indication of the importance of liquidity. As a combined group these firms have been able to attract over U.S.\$1 trillion in assets that they have the freedom to move with little regulatory oversight. Already firms like Fidelity, Goldman Sachs and Merrill Lynch in the U.S. are seeking deeper involvement in electronic trading to meet the demand of holders of large pools of liquidity such as hedge funds who need access to increasingly larger shares in order to execute sophisticated trading strategies that require frequent entry and exit from markets. The impact of externalities arising from traders on exchanges and portals is also strongly felt in Europe where capital flows are consolidating to manage the same need that global investors have for high liquidity.

The changing landscape of the securities markets and the increasing effort by exchanges and portals to introduce new services and products is not likely to abate. Over time, it is likely that exchanges will become just large consolidated portals allowing a trade to be entered in one market and traded across several exchanges and then cleared and settled at its destination with little or no human intervention. Investors demand cheaper, faster

service and the U.S. floor-based futures and options exchanges are also moving to electronic trading thus ending face-to-face barter altogether. The issues here are more than economics and cost, it is also about technology. In an automated market, market makers automatically send data to exchanges' servers with the number of contracts they are willing to buy or sell. The quotes are passed around electronically to investors and brokers who only need to click a button to execute a trade. Automated quotes can handle an unlimited number of quotes, something which is impossible for a specialist to do, and it takes milliseconds. In today's trading environment, it is impossible to articulate the value for keeping a floor-based exchange. They are bound to disappear within a few years.

The world financial markets have adopted electronic trading and cross-listings will continue unabated. Even the NYSE cannot escape the pressure of electronic trading. It recently announced plans to adopt a hybrid form which is simply a transition to full electronic trading in the years ahead. This is acknowledged by the NYSE's decision to acquire electronic trading exchange and former ECN Archipelago. The NASDAQ retaliated by acquiring Instinet Trading to capture market share (and trap liquidity) and prepare for the intensifying price war in the increasingly commoditized electronic trading space. The Philadelphia Stock Exchange just announced its intention to seek a merger partner citing the liquidity squeeze that the NYSE and NASDAQ mergers will inflict on its business.

TABLES AND FIGURES

	PAGE
Figure 1 Structure of the Belgian Financial Markets	9
Figure 2 BEL-20 Average Monthly Index Values	11
Figure 3 Number of Shares Traded (2000)	21
Figure 4 Value of Shares Traded (2000)	22
Figure 5 The Changing Internet Trading Paradigm	41
Figure 6 The Broker-Dealer Value Chain	42
Table 1 Percentage quoted spread for cross-listed shares on CATS and SEAQ-I.	17
Table 2 Exchanges Revenue (1998)	36

APPENDICES

Transition of "Number of Shares Traded"

(Unit: Million Shares)

Rank as of 1998	Exchange	Yearly transition			Exchange	Rank as of 2000
		1998	1999	2000		
1	Istanbul	2,242,531 →	5,823,858 →	10,988,930	Istanbul	1 (→)
2	London	834,085 →	1,061,316 →	1,511,212	London	2 (→)
3	Italian	144,332 →	130,508 →	163,921	Italian	3 (→)
4	German	60,565 →	83,682 ↗	29,078	Madrid	4 (↑)
5	Madrid	15,049 →	20,429 ↗	27,901	Stockholm	5 (↑)
6	Stockholm	11,915 ↘	15,127 ↗	27,341	German	6 (↓)
7	Amsterdam	11,830 ↘	14,690 ↗	20,474	Amsterdam	7 (→)
8	Paris	9,114 →	11,776 →	16,454	Paris	8 (→)
9	Oslo	6,256 →	8,935 →	9,025	Oslo	9 (→)
10	Athens	3,766 →	8,114 →	7,753	Athens	10 (→)
11	Helsinki	2,380 →	3,564 →	6,346	Helsinki	11 (→)
12	Barcelona	2,034 ↘	2,731 ↗	6,120	Lisbon	12 (↑)
13	Warsaw	1,947 ↘	2,728 ↗	3,126	Warsaw	13 (→)
14	Swiss	1,789 ↘	1,982 ↗	2,619	Copenhagen	14 (↓)
15	Lisbon	1,750 ↘	1,733 ↗	1,748	Swiss	15 (↓)
16	Copenhagen	1,278 ↘	773 ↗	823	Prague	16 (↑)
17	Budapest	597 ↘	476 ↗	616	Budapest	17 (↑)
18	Prague	429 ↘	229 ↗	291	Vienna	18 (↑)
19	Vienna	267 ↘	63 ↗	52	Brussels	19 (↑)
20	Brussels	61 ↘	19 ↗	22	Luxembourg	20 (↑)
21	Luxembourg	20 ↘			Barcelona	21 (↓)

Transition of "Value of Shares Traded"

(Unit: Million Current US\$)

Rank as of 1998	Exchange	Yearly transition			Exchange	Rank as of 2000
		1998	1999	2000		
1	London	6,508,098 →	7,622,973 →	10,474,160	London	1 (→)
2	German	1,794,068 →	1,863,933 →	2,870,363	German	2 (→)
3	Amsterdam	949,544 →	1,132,068 →	1,829,458	Amsterdam	3 (→)
4	Swiss	789,843 →	685,936 ↘	1,492,512	Paris	4 (↑)
5	Paris	694,293 ↗	680,831 ↗	1,137,719	Italian	5 (↑)
6	Italian	577,972 ↘	514,567 ↘	857,233	Swiss	6 (↓)
7	Madrid	370,917 →	402,134 →	664,313	Madrid	7 (→)
8	Stockholm	262,907 →	374,845 →	633,915	Stockholm	8 (→)
9	Istanbul	107,262 ↘	243,770 ↗	284,174	Helsinki	9 (↑)
10	Copenhagen	82,264 ↘	135,633 ↗	256,444	Istanbul	10 (↓)
11	Helsinki	71,095 ↘	133,070 ↗	145,420	Copenhagen	11 (↓)
12	Lisbon	61,543 ↘	84,028 ↗	138,646	Athens	12 (↑)
13	Athens	59,792 ↗	71,651 →	95,059	Oslo	13 (↑)
14	Oslo	53,110 ↗	53,643 →	80,777	Lisbon	14 (↓)
15	Barcelona	37,746 →	39,511 →	60,273	Barcelona	15 (→)
16	Budapest	20,643 ↘	26,794 →	28,336	Warsaw	16 (↑)
17	Warsaw	20,127 ↘	18,560 →	16,930	Budapest	17 (↓)
18	Vienna	20,057 →	14,402 →	14,031	Vienna	18 (→)
19	Prague	7,355 →	6,820 →	10,599	Prague	19 (→)
20	Brussels	2,523 →	1,686 ↗	1,603	Luxembourg	20 (↑)
21	Luxembourg	1,338 →	1,241 ↘	1,182	Brussels	21 (↓)

BIBLIOGRAPHY AND REFERENCES

Anderson, Ronald, Davy Reinard and Olivier Scaillet (1997), "A new Index of Belgian Shares." IRES, Université Catholique de Louvain.

Becht, Marco (2000), "Company Law and Capital Market law." ECARES, Université Libre de Bruxelles.

Carey, Theresa (2004), "NYSE clarifies its automation campaign." eWeek Enterprise News and Reviews.

Choi, James J., David Laibson and Andrew Metrick (2001), "How does the Internet affect trading? Evidence from investor behavior in (401K) plans." Harvard University and The Wharton School of the University of Pennsylvania.

Degryse, Hans (1999), "The total cost of trading Belgian shares: Brussels versus London." *The Journal of Banking and Finance*, Vol. 23, Issue 9.

Deloitte and Touche (2001). "Usage of online brokerages down."

Financial Engineering Ltd. (2000). "The Internet and Trading."

Galper, Joshua I. (2000), "Value Chain Control in Financial Markets: Stock Exchanges and Central Securities depositories." Master of Business Administration Thesis, Sloan School of Management, Massachusetts Institute of Technology.

Halling, Michael, Marco Pagano, Otto Randl and Josef Zechner (2004), "Where is the market? Evidence from Cross-Listings." Working Paper No.129, Center for Studies in Economics and Finance, Università Degli Studi di Salerno.

Hamilton Charlotte, Therese Torris and Paul O'Connell (2002), "Surviving The Investment Downturn." Forrester TechStrategy Report.

Hawawini, Gabriel A. and Pierre A. Michel (1979), "An Assessment of Risk in Thinner Markets: The Belgian Case." *Journal of Economics and Business*, Volume 31.

Johnson, Timothy C (2004), "Dynamic Liquidity in Endowment Economies." London Business School.

Lannoo, Karel (2001), "Updating EU securities market regulation." Report of a CEPS task force.

Lo, Andrew and Jiang Wang (2001), "Trading Volume: Implications of an Intertemporal Capital Asset Pricing Model." Working Paper, Laboratory For Financial Engineering, MIT Sloan School of Management, Massachusetts Institute of Technology.

Lütje, Torben and Lukas Menkhoff (2004), “What drives home bias? Evidence from Fund Managers’ Views.” Discussion Paper No. 296 University of Hannover, Germany.

Marphatia Arjun and Nitesh Bakliwal (2003), “Direct Access Trading Platforms.” Financial Services Group, Tata Consulting Services.

Nieuwerburgh, Stijn Van, Frans Buelens and Ludo Cuyvers (2004), “Stock Market Development and Economic Growth in Belgium.” NYU Stern School of Business and the University of Antwerp.

Peters, Michael and Sergei Severinov (2003), “Internet Trading Mechanisms and rational Expectations.” University of Toronto and Duke University.

Renneboog, L. (1996), “Ownership, Managerial Control and the Governance of Companies Listed on the Belgian Stock Exchange”, Working Papers from Tilburg, Center for Economic Research.

Schwert, William G. (1990), “Stock Market Volatility”, Financial Analysts Journal, May-June 1990.

Securities and Exchange Commission (2001). Office of Compliance Inspections and Examinations: Examinations of Broker-Dealers Offerings. Online Trading: Summary of Findings and Recommendations.

Wee, Lieng See and Judy Lee (2000), “Breaking Barriers”, Electronic Trading Derivatives, Risk Magazine.