

**The NYSE-Archipelago Merger: A Case Study in the Evolution of  
Exchange Structures**

By

James F. Walker

B.A. Economics, Catholic University of America, 1985

Submitted to the MIT Sloan School of Management  
In Partial Fulfillment of the Requirements  
For the Degree of

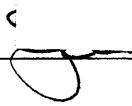
Master of Science in Management

In Conjunction with the Sloan Fellows Program on Innovation and Global Leadership

June 2006

© 2006 Massachusetts Institute of Technology. All rights reserved

Signature of Author \_\_\_\_\_

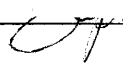


**James F. Walker**  
**MIT Sloan School of Management**  
**May 12, 2006**

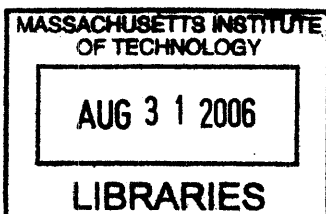
Certified by \_\_\_\_\_

**Andrew W. Lo**  
**Harris and Harris Group Professor**  
**Director, MIT Laboratory for Financial Engineering**

Accepted by: \_\_\_\_\_



**Stephen J. Sacca**  
**Director, MIT Sloan Fellows Program on Innovation and Global Leadership**



**ARCHIVES**

# **NYSE Archipelago Merger: A Case Study in the Evolution Exchange Structures**

By

James F. Walker

Submitted to the MIT Sloan School of Management on May 12, 2006  
In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Management

## **Abstract**

At the time of this writing, the NYSE had just completed its historic merger with Archipelago, LLC, while changing its ownership structure to a public company. The conditions leading up to this transformation are descriptive of the overall changes in “exchange structures” and the infrastructure of equity trading in the United States and around the world.

The document is written to be useful to an audience of both industry and non-industry executives. To accomplish this, we examine the historical underpinnings of exchanges, how they developed, identifying conditions that transcend structures themselves. We go on to describe the mechanics, governance, technology, and regulatory environment of exchanges today. From this we can examine the forces inducing and enabling changes in the market structures.

The “investment supply chain” is introduced as a framework to understand the flow of capital in the economy and the changing position of the exchanges and industry players. We consider the anatomy of trading, evolving technologies and the experience of non-US exchanges in the process of demutualization, technology infrastructure change and business model evolution.

The thesis also draws on inferences from similar economic shifts in other industries. The parallel industry discussion should serve as an intuition builder in understanding the forces at work, the time it may take to see an equilibrium state and the behavior of the participants. The thesis has relied heavily on interviews and perspectives of people close to these events: NYSE staff, ECNs, the buy and sell side, regulators and academics. As such, it attempts to provide an informed and balanced view of the current state of play and the momentum of events.

Thesis Supervisor: Andrew W. Lo  
Harris and Harris Group Professor  
Director, MIT Laboratory for Financial Engineering

<b>Section 1 - Introduction</b> .....	5
<b>Section 2 - Market History</b> .....	9
<b>2.1 Origins: Money and Markets</b> .....	10
<b>2.2 Merchants and Bankers: The First Intermediaries</b> .....	13
<b>2.3 Exchanges are born: Rules and Psychology of the Crowd</b> .....	15
<b>2.4 The New World and a New Market: the Emergence of Wall Street</b> .....	19
<b>2.5 The Wild West and Wall Street’s adolescence – 1850-1900</b> .....	21
<b>2.6 The Twentieth Century Part 1 Great Optimism to the Great Depression</b> .....	24
<b>2.7 Twentieth Century - Part 2: From Baby Boom Prosperity to May Day</b> .....	28
<b>2.8 The Twentieth Century Part 3: The Rise of Mutual Funds and the NASDAQ</b> ..	31
<b>2.9 Transition to the 21<sup>st</sup> Century: The Internet Age</b> .....	36
<b>2.10 “Play the ball from where it is”: Bringing it together</b> .....	38\\
<b>Section 3 – Market Structures</b> .....	40
<i>Labranche</i> .....	41
<i>September 11<sup>th</sup></i> .....	42
<i>Organization and Governance</i> .....	43
<b>3.1 Market Structures: Out of Chaos comes Order...</b> .....	43
<b>3.2 NYSE – Something Old, Something New, Something Borrowed and Something Blue...</b> .....	45
<i>Specialists and Market Makers</i> .....	47
<b>3.3 The Hybrid Market – A Prius or an Edsel?</b> .....	49
<b>3.4 NASDAQ – in this corner, the challenger. Weighing in with 3500 listings and \$8.7 Trillion in annual turnover...</b> .....	51
<b>3.5 Reg NMS and the Third Market – “I’m from the government and I am here to help”</b> .....	55\\
<i>National Market System (NMS)</i> .....	55
<i>Order Handling Rules (1997)</i> .....	56
<i>Regulation NMS 2005 (“Reg NMS”)</i> .....	56\\
<i>Order Protection Rule</i> .....	57
<i>Access Rule</i> .....	58
<i>Market Data Dissemination</i> .....	59
<i>Prohibition of Sub Penny Quoting</i> .....	61
<i>Summary observations on Reg NMS</i> .....	61
<b>3.6 ECNs – “If you build it and they will come...”</b> .....	63\\
<b>3.7 Archipelago and the NYSE – An Arranged Marriage?</b> .....	65
<b>Section 4 – The “Investment Supply Chain”</b> .....	68\\
<b>4.1 The Supply Chain evolves: Who moved my cheese?</b> .....	70
<b>4.2 The Anatomy of a Trade...</b> .....	72
<i>Limit Order Book</i> .....	75
<b>4.3 Trading Costs – the Devil is in the Details</b> .....	77
<b>Section 5 – Technology – The Rise of the Machines</b> .....	79
<b>5.1 Algorithmic Trading - An 800 lb. gorilla changes the game...</b> .....	80
<i>Algorithms</i> .....	81
<i>Program and DMA Trading</i> .....	84
<b>5.2 Technology lights up the Dark Books...</b> .....	85
<i>The Arms Race is on: Order Management Systems</i> .....	86

5.3 Exchange Traded Funds (ETFs) .....	87
5.4 Revenge of the Nerds - Observations on Technology.....	91
Section 6 – Lessons from Overseas.....	93
6.1 Exchanges in the “Flat World”.....	94\
6.2 “Houston... We have a problem...”- the learning curve with technology.....	98\
6.3 Merging of Exchange Structures- Gondwanaland Reunited?.....	100
Obstacles to Consolidation: Chinese Walls or Speed bumps? .....	101
Political Obstacles .....	102
Regulatory Frameworks.....	103
Platform Constraints.....	104
6.4 Conclusions and Observations .....	105
Section 7 – Lessons from Parallel Industries.....	106
7.1 Healthcare: Take your medicine .....	106
7.2 Telecom Industry – it’s the value of the Network... ..	110
7.3 Macquarie’s Equation: Demographics+ Income Streams+ Perpetuity Values = Toll roads? .....	112
Section 8 – The Business of Market Structures.....	114
8.1 Where’s the beef?! A search for value in the NYSE/Arca deal .....	115
8.2 International Securities Exchange – The “Ice-breaker” of the options market .....	120\
Section 9 – Choices and Conclusions.....	123
Duopoly.....	125
Price.....	126
The NYSE floor’s future .....	126
Competition.....	127
Innovation .....	127
Closing Comments .....	128
Interviews and Acknowledgements .....	129
Bibliography .....	131
Bibliography - Books .....	131
Bibliography – Thesis and Research Reports .....	132
Public Web Sites used for reference and research: .....	135
Articles- Periodicals .....	136
Martinez, Michael J. Big Board must now heed profit-minded shareholders, <i>Associated Press</i> , March 1, 2006 .....	137
Regulatory Documents-Testimony .....	139

## **Section 1 - Introduction**

“Endless money forms the sinews of war.”

**Cicero**, *Philippics*

*Roman author, orator, & politician (106 BC - 43 BC)*

**Creative destruction.** An ominous sounding concept and one of the core principles of the capitalist system. The expression was introduced by economist Joseph Schumpeter in his 1942 book *Capitalism, Socialism and Democracy* to capture the process of transformation from old industries to new. Creative destruction is a powerful economic concept because it explains the dynamics of industrial change: the transition from a competitive to monopolistic market conditions and back again. In Schumpeter’s description of the world, capitalism is characterized by a never-ending stream of entrepreneurs seeking to create value by destroying value in established companies that have enjoy some degree of success or monopoly power.

The concept, while overused by “dot.com” CEOs of the late 1990s bubble, references an important truism of capitalism: creative destruction occurs when something new kills something old. Business innovations challenge the status quo and create new competitive forces that challenge incumbents and create new industry structures. Incumbents are not doomed, however, as new triumphs over old only if it offers a better solution for the end customer. Or sometimes old just buys new to end the fight...

Successful innovation is normally a source of only temporary market power, eroding the profits and positions of old firms, then ultimately succumbing to the pressure of new inventions or business models. Target companies either reinvent their products and value proposition or they will succumb to the inevitable forces of the market. The cycle continues as new succeeds and becomes old...

Business people, for better or worse, often equate business to war. The philosophical analogy is rooted in the competition for advantage over rivals and the bounty that comes with the advantage. If war is analogous to competition then the territory business competes for are customers and their money.

The Cicero quote speaks to the catalyst for creative destruction. The motivation to innovate in business is always money: pure and simple, no apologies. The possibility of making substantial profits motivates and feeds the desire to innovate in every industry. In the pursuit and realization of their rewards, businesses provide consumers with a better product, service or delivery mechanism. Whether new kills old or old survives - the customer wins.

The same principle that applies to businesses and their need for evolution and efficiency has also come to apply to the institutions that serve the system. Competition and the concept of creative destruction extend beyond the for-profit business world: The political system provides competition for representation in government and the right to allocate resources and amend policies to suit the needs of the constituents. Academic institutions constantly update their courses of study and compete for faculty talent in order to compete for students and private donations. Non-profit institutions have to publicly champion their causes and represent their interests to remain relevant in order to draw public interest and funding. “Institutions” have become subject to the same forces of creative destruction as business.

The New York Stock Exchange is an institution steeped in history. It’s an institution that is justifiably proud of the essential role it plays in the American and world economy. An institution that has witnessed and facilitated the role of creative destruction first hand – as the companies it trades continuously develop or die. It’s also an institution that is largely unchanged in its workings during its 213 year history.

At the time of this writing, the NYSE is completing its historic merger with Archipelago and public offering of its shares. A member based institution - a core platform of the US financial system – is about to be thrust into a “war” for customers, changing economics and business model, the need to invest in infrastructure, and the realities of a corporate governance structure. The forces of creative destruction have arrived to market structures.

This thesis is an examination of exchange structures, the contemporary conditions inducing change and an evaluation of their future. “Market structure” is a seemingly simple term, but with broad interpretations depending on the audience. The term originally comes from the field of industrial organization, where it refers to a market share, profitability and pricing within a given industry. The notion is that you can infer the behavior of the participants from the structure. The term has more recently been applied to stock, bond, futures and derivative exchanges as a reference to the organization of securities trading platforms, the rules and procedures that govern them, the activities and requirements of the participants and the technology that enables them.

A stock exchange has always been more than a just a place to trade – if not in reality then certainly in the psyche of the country. It represents one of the institutions upon which the market system is built and, as such, plays a vital role in the health of the economy. The markets the exchange structures enable are complex, instantaneous, and interdependent reflections of our economy – absorbing information and events in the process of moving hundreds of billions of dollars every day. Exchanges provide the mechanism for liquidity, price discovery, a consensus on the economy’s health and a referendum on investor’s views of the future; all important factors in the machinery of the economy. Market mechanisms and practices have formed over the history of markets – some growing from innate human behaviors others borne from trial and error. The thesis summarizes the origins of the modern markets structures in our discussion of the history of exchanges. Understanding the genesis of certain practices will help us understand how much of today’s activity is truly new and what is incremental.

The public markets and the exchange structures that enable them are an integral part of a larger investment “supply chain”: the movement of capital from an entrepreneur’s idea to publicly traded securities that provide equity returns for risk capital. In this process, the markets create a “currency” for successful companies; rewarding them with higher stock values that allow them to purchase other companies or assets. Nowhere does this supply-chain have a better expression than in the United States. Access to capital and the speed at which it finds its way into the system are what define the American financial and economic system and differentiate our economy from the rest of the world. However, the scale and success of the system created stationary inertia with US exchanges. Non-US exchanges have been faster to evolve their trading platforms and business models. Our discussion of their experience provides insights for what the NYSE may experience as it goes through its transformation.

Technology has been a defining influence in our world and no discussion of exchanges can be complete without considering its impact. Technology is enabling and empowering; it provides visibility and information not previously possible and cuts across time and place to allowing markets and transactions to exist where none did before. It’s the fuel of creative destruction; creating new possibilities demanded by users of the markets. Our discussion in this document focuses on those changes that are having the most impact on the behavior of the participants.

While the events unfolding are unique in the history of financial markets, they are not unique in the history of the American economy. There have been analogous shifts in underlying economics of several industries that can serve as intuition builders to the direction of market structures as well as the economics and strategies of the participants. Illustrating these parallel shifts will provide a basis to contemplate a series of alternate futures for the NYSE and public markets as a whole.

Since the construction of this work is concurrent with events, it won’t benefit from clarity of hindsight or time to reflect on precise outcomes. It’s my belief we won’t know or see the full impact of the changes for years to come. Changes of this magnitude are iterative, taking time to find their equilibrium and often duping observers into accepting the obvious, popular predictions as forgone conclusions.

The research and interviews conducted for this thesis have uncovered distinct points of view; influenced and colored by the personal history of the participants. As is the case with most debates, the truth will likely land somewhere in between and may not be evident right away. The “answer” comes in time will have iterated the system towards an answer that works for the participants and creating economics to sustain itself.

Ultimately, this work is built on the unifying hypothesis that creative destruction works. It presents those confronted by it with anguish and uncertainty in the process; but if the definition is: more, better, faster, cheaper - then it works. The much more elusive question we will attempt to answer is: what constitutes an *effective* market structure and can that mechanism be a growing business in its own right while properly serving its

constituents? Effective - not efficient – the debate on best execution and price is not as obvious as you think and won't be solved here.

Our conclusion comes together after a presentation of the history of exchanges, market structures and the regulatory environment, the “investment supply” chain, technology, the international experience, parallel industry experiences and exchanges as a business. There are opinions on Wall Street on the resulting business conditions of the NYSE/Arca merger. We'll go through these assumptions in the closing and offer an opinion on validity based on the story presented in this thesis.

To capture the mental model existing in each scenario I have attempted to simplify each scenario as much as possible. In simplifying, I make use of analogies, stories and vignettes to paint the pictures and set the tone for each section of the story. The format and style are meant to be both informative and entertaining. Given the real time nature of the work, it relies heavily on interviews from well-placed, key people in and around the Exchange. The analytics, raw data and graphics work to support to overall thesis and complete the picture for the reader. In this respect, the writing style may feel less like an academic thesis and more like popular narrative.

The Exchange has always been about price discovery: where willing buyer meets willing seller to determine a price they both deem to be fair. It's my intention that this work gives the reader, in the vernacular of the Exchange, the necessary information to close the spread on the story and determine their side of this trade.



## **Section 2 - Market History**

*"Say – what's that?"*

*Nothing but a tick."*

*Wher'd you get him*

*"out in the woods"*

*"What'll you take for him?"*

*"I don't know. I don't know that I want to sell him."*

*"All right. It's a mighty small tick anyway."*

*"Oh, anybody can run a tick down that don't belong to them. I'm satisfied with it. It's a good enough tick for me."*

*"Sho, ther's ticks a plenty. I could have a thousand of them if I wanted to."*

*"Well, why don't you? Becuz you know mighty well that I can't. This is a pretty fine tick, I reckon.*

*It's the first one I've seen this year."*

*"Say, Huck – I'll give you my tooth for him"*

*"Let's see it"*

*Tom got out a bit of paper and carefully unrolled it. Huckleberry viewed it wistfully. The temptation was very strong.*

*"Is it genuwyne?"*

*Tom lifted his lip and showed the vacancy.*

*"Well, all right," said Huckleberry, "It's a trade."*

*Huck enclosed the tooth in a percussion cap box that had lately been the pinch-bug's prison, and the boys separated, each feeling wealthier than before."*

Selection from **the Adventures of Tom Sawyer**

Mark Twain

**It's in our social DNA to trade.** What do you want and what will you give up for it. Negotiated bargains are at the root of legal systems, governments and religions; all incorporate some form of implicit or implied contract. Like Huck Finn and Tom Sawyer, each party desires what the other has under mutually acceptable terms. A deal is struck, "payments" are made and each party is better off.

Before skyscrapers and financial centers, banks and formal stock exchanges, human being instinctively understood dealing in a marketplace. Markets were at the center of economic life – a place where goods came together and could be sold or bartered at a price. A common location made the market efficient for both buyers and sellers; everything in one place, the ability to compare prices, examine goods and minimizing the need for transportation. Centralization induces the socialization process of market participants, improves the flow of information, and determines the clearing price and mutual terms for a trade. Where supply meets demand; these are the elements that make up the core of any market, the core of an economy and the core of economic behavior.

To establish a foundation for this thesis, a discussion of the history and origins of financial markets is in order. There are exhaustive works on the history of markets, their price fluctuations, the events and personalities that made them interesting. The intent here is not to provide a comprehensive history of the markets. Instead, we'll walk

through a chronology of market history as a framework to illustrate and understand the origins of characteristics we see in modern markets.

In each case, we see that market structures (if not market participants) have subconsciously learned from and built upon concepts from prior eras to add their own innovations. The notion here is that market structures today are a cumulative product of past events. As we consider the future of market structures the context of current practices can help us understand their value. Just as most ideas are not entirely new – neither are most mistakes.

The metaphor used to summarize each era's contribution to market structure evolution is "Building Blocks". Market structures and their development mirror the development of the modern economy. Each era throughout history experiences that build on our understanding of markets. History shows us that both positive and negative events generate learning and changes. It's the legacy of events from each era – the combination of success and failures – that provides better understanding of the current state.

This discussion of market history aspires to both entertain and inform. The insets are general interest, exploring genealogy and etymology of events to demonstrate the enduring impact historical events can have on contemporary language and practices. The evolution of markets and their structures reflects our basic nature as human beings. It reflects our strengths and frailties; ultimately showing the ability of financial markets to overcome setbacks and continuously improve. Unfortunately, many lessons learned throughout history are usually learned again by subsequent generations – in financial markets and in the course of human events - but that...is a topic for another thesis...

## ***2.1 Origins: Money and Markets***

I started this section with the notion that trade is intuitive. People seek what they need and look to bargain to acquire it. It follows then, that markets developed along with the needs of people in cities and communities, their complexity growing as civilization evolves. The earliest markets were primarily agricultural. Commercial activity accelerated when clusters of farms evolved into villages and again, when the first cities appeared on the flood plains of the Tigris and Euphrates rivers. The cities took root because of their arable surrounding areas – but city life could not be sustained by farming alone. It required imports and exports of goods it did not produce to serve its needs.

Trade between cities was encouraged by the existence of markets. It was common for goods and commodities to be shipped across long routes as early as the third millennium BC. As economies became more specialized the barter system showed limitations. In order for trade to function, common currency had to be developed and did so mostly in the form of commonly used commodities. Salt, as an example, was once used as money (the word salary is derived from the Latin word for salt), as were spices, rice and livestock. The problem presented with these commodities is that they were perishable.

Enter precious metals like gold and silver which grew to become the standard for trade. While metals presented the problem of storage and the very real problem of theft or plunder, they worked well as payment for trade and the store of value. They were desired by all trading partners, could be melted down into adornments as a visible sign of wealth, and ultimately were fashioned into coins; the latter facilitating a retail marketplace and payment of wages.

Gold and silver, while they have lost some of their appeal as a pure financial asset, have remained as a store of value in our financial system to this day. In a global economy, you can think of the gold system as the origins for the modern foreign exchange (FX) markets. Gold was acceptable to all parties, providing the ability to be converted into goods and back again into gold.

Modern markets provide for the exchange of one currency into another based on a rate the market sets. The FX market today is the largest and most liquid market in the world. Prices are set instantaneously by the market's assessment of political events, government policies, and stock and bond market movements. All of these factors represent the market's view of an acceptable exchange rate for the currency of that nation and what it will cost them to purchase goods. Currency movements reflect and affect on a macro scale the competitive position of a nation, the companies that deal in that currency and clout in the financial markets. This is very similar to desirability of goods and their conversion into gold.

#### Alexander: A Man of Many "Talents"

Alexander the Great was a general with enormous vision and skill. In his time, governments ruled on the basis of military strength: real or perceived. To project their strength upon rival nation, it was necessary to maintain and feed an Army in both peacetime and during a war. Not much different than the dilemma facing the United States today.

A major difference between now and then was there were no central banks or sources of funds for a government. The acquisitions of funds by the authorities came primarily through taxing and plunder. The larger the territory to defend, the larger the Army a king had to feed and maintain, the larger the necessity for acquiring wealth from his neighbors. Anyone with precious metals like gold or silver and the proper tradesmen could mint his own currency. Kings, Merchants and cities did just that – although the coinage was in many different forms there were a few common denominations.

The "talent" (from the Bible) was about 65 pounds of gold, silver or whatever was deemed of value in trade. This was considered to be the weight a human porter could carry over a distance. Talents were used to settle major accounts between merchants and governments. More to the point for the king, a talent could buy the services of between 10 and 20 mercenary soldiers for a year.

The etymology of the word talent here is interesting, mostly in the derivative sense. Talent originally seemed to imply your ability to buy - not do - certain things. This suggests that even in these times, money and the market for it were the true foundations of more obvious manifestations of power. It seems to be a recurring theme that access to resources, the connection to markets and production – not just what happens on the battlefields – determined the balance of power.

While Alexander had a magnificently trained standing Army capable of defeating most on the battlefield, his challenges were economic. In order to defeat the rival Persian's and their powerful Navy, Alexander understood he had to capture their port cities – their source of replenishment and money from trade. To do this, he would offer the governors of the city a fair tax rate, benevolent rule and peaceful trading environments if they would

submit to him without a battle. In fairness, Alexander's alternative to this offer was to sack the city and murder its rulers – so he did have the upper hand in these negotiations.

The learning point is an early equilibrium of needs between rulers and the financial markets in their kingdom. Allowing them to function and produce wealth was an important source of power for military ambitions. We could also deduce the Mafia did not originate protection schemes; the Italians stole this idea from the Greeks as well...

Payment terms also had their roots in the early markets, becoming more sophisticated in their mechanisms in subsequent eras. Trade was both at the retail level, goods for individuals with payment made on the spot, to larger provisioning for expeditions and armies. Because much of the trade was local, terms could be worked out between the parties.

One indication of the nature of early roots of terms of payment is the word credit, the Latin Root of the word credit (cred-) meaning “trust”. As we will see in later incarnations of this concept, lenders evolved to a “trust but verify” mode of credit terms but nonetheless, credit and its role in the economy were an early expression of financial markets at work.

The credit card system today enables retail commerce in a similar way. Terms are understood by both parties, the credit arrives in the form the seller desires and the debit in the form desired by the buyer. The effect that credit and payment systems have had on the economy, and the earnings of corporations, cannot be underestimated. They enable an infinite number of business opportunities and close the distance between retailer and consumer. From Pay Pal enabling the world's largest flea market in EBay or the credit card enabling the instant transfer of credit between anonymous parties, the credit markets are a major enabler of a market economy.

### Building Blocks

- ❖ Markets are instinctive and natural: They tend to form without any central planning in response to the demands of the economy and an opportunity for participants to prosper. The earliest markets were for agricultural goods or provisions not produced by that economy. Those that could provide them did well. In markets today, you see the same phenomenon in the derivative markets; where markets have developed for instruments representing weather derivatives, energy transmission, credit swaps and market volatility.
- ❖ Common Currency: Markets and economies have to have a common exchange mechanism. As a store of value, gold and metals served this purpose, which persists to this day. Trade and markets need a desirable and common currency to function. Today, the system relies on electronic transfers of funds in medium or currency acceptable to both parties. “Currency” can also be in the form of securities. Those market and implied future value can be used in exchange for other assets. An effective market structure supports value in tradable securities in that each party views them as acceptable payment.
- ❖ Credit: Establishing a system of payment term or credit is the lifeblood of an economic system and critically important to enabling a retail economy. Retail

economies spur broad investment and accelerate activity throughout the economy. For market structures, the availability of credit and common payment terms enable the system to function.

- ❖ Governments need functioning markets: Access to money and a functioning economy are necessary to maintain political power and wage war. Money is just as often an instrument of war as the cause of it. As such, governments have a symbiotic relationship with their economy and especially with the financial resources it provides.

## ***2.2 Merchants and Bankers: The First Intermediaries***

The middle ages saw the rise of the first organized financial intermediaries. As centers of commerce reemerged after the Dark Ages, a new breed of merchant emerged to creating the concept of banking. By the late thirteenth century families of Italian speculators, such as Bardi and Peruzzi of Florence, had begun to make their mark in the world as merchant bankers. They dealt in cash and commodities and would provide safekeeping for the funds of the wealthy. They also pioneered “bills of exchange” (early LOCs) that guaranteed the payment of accounts in distant markets without having to ship bullion or gold coins.

The bankers were family members located in cities across Europe. This facilitated their ability to perform financial services on an international scale for merchants, feudal lords and institutions such as the Catholic Church all of whom were seeking to expand their influence and power. The use of guaranteed bills of exchange made for a more secure way of transferring money over distances. As we know from legends like Robin Hood, the roads were full of bandits in those days so transportation of anything of value was risky.

Early banking developed a system that was the genesis of the Demand Deposit system of today. Funds were deposited into a bank for safekeeping which created a pool of assets. The banks drew upon these loans to make loans to other customers (merchants and business people). Those loans circulated, at a premium, between cities by means of bills of exchange. In effect, several different parties were able to utilize the banks reserves at the same time - the modern concept of monetary velocity.

As can be expected, this was an enormous stimulus to trade. The bankers frequently took advantage of the equity in their “banks” to deal and speculate in all kinds of commodities. The bankers also charged for the safekeeping of the depositor’s wealth and for arranging the transfer of credit from one place to another. The bankers had figured out the combination of spread and fee revenue – an enduring concept for banks today...

Many of the earliest financial transactions were related to underwriting of exploration and plunder. Exploration and military adventures were arranged by kings interested in maintaining their position and power relative to neighboring fiefdoms. These adventures were expensive, but if successful would lead to large payoffs from the newly conquered territories.

These transactions could be considered the earliest “venture capital” deals. Plunder was good business, but risky. Good generals or ship captains were analogous to capable management in the VC worlds of today. A successful track record facilitated raising money from investors they had provided returns for in previous expeditions.

The merchants who provided these funds faced an interesting quandary. Dealing with the powerful feudal lords added to their reputation but could also bankrupt them in the event of a default. Since kings and princes were apt to renege on their debts without fear of retribution, the rates of interest demanded from them were extraordinarily high. As an example, when Charles the VII of France decided to launch an attack on Naples, the only bank that would provide him loans for this expedition was a prominent firm in Genoa at a rate of 100% per year.

A major innovation of the merchants and bankers of this time was the adoption of Arabic numerals over the Roman system. The influence of Islamic scholarship on Europe had grown considerably after the Crusades. The church and other conservative authorities resisted the idea of using the new notations, insisting on the predominance of traditional Roman characters. Bankers and merchants realized the Arabic system was far more efficient for keeping books and records so they ignored the pressure and implemented the system across Europe, paving the way for the numerals we use today.

A significant contribution of the bankers of this era was dual entry accounting. The first time dual entry accounting was formally codified was in 1494 - Luca Pacioli's *Summa de Arithmetica Geometria Proportionalita (A Review of Arithmetic, Geometry and Proportions)*. There is some debate as to the true origin; the method may have come originally from the Phoenicians use on shipping routes or by Muslim merchants keeping of their accounts. Whatever the case, it seems as if it was the Italian merchant bankers who spread the practice across Europe. The significance was a standard was developed – the GAAP of its time – that allowed merchants to view the books of a borrower or trade finance partner and understand the status of the accounts. The common language allowed for comparison of assets and trading of receivables for value.

The merchant princes and bankers of the 15<sup>th</sup> century not became very powerful, dynasties in fact. The most famous were the Medici. So powerful in fact that the Medici became the de-facto rulers of Florence without ever holding a public office. Tactics could sometimes be brutal (like the takeover artists of a later age), but despite their corruption, the Medicis had a benevolent side. They were among the greatest patrons of art throughout Europe, providing commissions for artists and ultimately assigning a value to art as a store of value.

The power they enjoyed gave them great influence, but as we know “absolute power corrupts absolutely”. Corruption always collapses on itself. The duopoly of the merchants and the Catholic Church gave way to the Reformation – shifting the power base power to another part of Europe and giving birth to the Anglo-Saxon/Dutch merchant tradition.

### Building Blocks:

- ❖ Financial Intermediaries: Financial intermediaries facilitating payments and trade between individuals and institutions are an essential part of the system – evaluating and assuming the risk of the transaction and bringing the network together are an important enabler of market structures.
- ❖ Risk and Reward: the bankers came to understand the differences in risk between ventures and priced them accordingly. “Management” track records, credit terms, use of proceeds and the ability exercise against collateral all play a part then, and now, in the price of capital. Not all risks are created equal – and the market organizes to recognize this.
- ❖ Sovereign lending risks: Lending to governments has always been risky – often more than lenders understand. When it goes sour, it has large ripple effects on the markets and the institutions that are exposed. Good governments helps the markets operate effectively – irresponsible governments will ruin them. Bankers have re-learned this lesson on multiple occasions, most recently in emerging markets.
- ❖ Tradable financial instruments: “Bills of exchange” not only facilitated trade but became a currency themselves. Since they have a terminal, collectable value to the holder they can be exchanged for cash prior to the maturity. The evolution of this market provided liquidity to the merchants and bankers that dealt in them and added to the overall velocity of trade. It was the instrument’s commonality that laid the groundwork for credit markets to develop.
- ❖ Standardized Accounting Practice: Standard accounting and practices of disclosure are instrumental in understanding the status of payments or the health of an enterprise. By standardizing the method for doing this, businesses and accounts receivable became transparent and tradable between parties. An early version of common standards - something learned again in the evolution of computer technology. Like GAAP reporting and SEC filings today, understanding the underlying instruments in a common framework is fundamental to markets and their structures.

### ***2.3 Exchanges are born: Rules and Psychology of the Crowd***

Today’s stock exchanges had their beginnings in the alleys and coffee houses of places like Antwerp and London. They were places where traders would come together to trade gossip and speculation about the prospects of their shares. The centralized nature of the “exchanges” became important as they provided an efficient way to transfer information - or misinformation – and to complete deals with other traders.

The original London Stock Exchange building was erected around 1567. Its presence contributed significantly to London’s importance as a financial center. The exchange and the area surrounding it concentrated the activity of stock and bond trading, adding participant to the markets and subsidizing the legitimacy of the institution.

“Propinquity”, or the physical proximity of individuals, proved to be an important catalyst for the development of effective and robust financial markets. One of the most basic functions of markets is “price discovery”: determining what an instrument or asset worth at any given point in time. The more interaction and communication between participants, the more efficient the process becomes.

The area surrounding the LSE had become known as Exchange Alley – later abbreviated to ‘Change Alley. Like most groups in formation, it experienced structural and cultural challenges as it developed. As an example, in 1690 a group of 150 stock traders were asked to cease doing business in the London Stock Exchange because of their business practices. The Exchange maintained what they believed to be a civil environment and the disorderly behavior of this group was considered a breach of their practices. Rules of engagement were starting to form.

Subsequent to their expulsion, the brokers continued their trade in the coffee houses on and around ‘Change Alley. The famous Lloyd’s Coffee House in this district gave birth to Lloyd’s of London – today the world’s most famous insurance company. ‘Change Alley, the curb traders of a later generation, was to play an important role in the events to follow.

The early exchanges by virtue of their physical layout created a “crowd” through centralization and consequently provide the first real glimpse into the nature of crowd psychology in markets. The establishment of exchanges as institutions and sources of capital in the Anglo/Dutch world set stage for two of the most famous follies in the history of markets: Tulip mania in Holland and the South Sea Bubble in England.

The first “Bourse”

Flanders had become a center of commerce, education and culture by the sixteenth century. Ghent and Bruges became vibrant cities in the rapidly growing European markets. In Bruges, there was active trading in commercial bills of exchange as early as the thirteenth century.

As the story goes, local merchants gathered in front of a house belonging to the commercially prominent and wealthy van Buerse family to trade bills and information. Because of this tradition, the name “Buerse” became synonymous with trade involving securities. Scholars contend that this is the origin of the word “bourse” – meaning a stock market. The Buerse home and the street around it are thought to be the site of the first stock exchange, - despite its informal status.

The Tulip mania in Holland was born out of crowd psychology – the belief that one can get rich through speculation. Tulip bulbs became the rage among Dutch aristocrats and rich merchants who were prepared to pay for access to the best bulbs. Possession of the “best” tulip bulbs was considered a display of prosperity, on par with gold and jewelry.

By the 1630s the entire country was gripped with tulip speculation. For a few years, the profits were extraordinary – enriching the merchants who cultivated and sold the bulbs. A few thoughtful politicians tried unsuccessfully to introduce legislation to control the speculation. Everyone was buying from the dealers for supply and trading with each



other for in the secondary market looking for profits. Nothing seemed to slow the pace down until in 1637 a group of dealers held one of their periodic auctions...and nobody bid. Within months prices had completely collapsed, bankrupting thousands and by extension causing the Amsterdam stock exchange to collapse. This was first great crash of modern stock market history. This one was confined to Amsterdam – but as later generations found out, panic spreads quickly across national borders.

The “South Sea Bubble” was centered on a less tangible article of trade, but with equally unfortunate results. In order to issue debt more cheaply, the government created debt issues tied to ownership of commercial privileges and trading routes. This cost the government nothing, but investors saw value and were willing to invest at lower rates of interest. In 1693, the going rate on government debt was around 14%. In 1698, the East India Company offered bonds for £2 million pounds at a rate of 8% in return for the extension of trading privileges. The lower rates had obvious appeal to the government, so in 1711 they issued £10 million pounds from the South Sea Company in return for exclusive trading rights to Spanish South America. This was so successful that in 1719, the South Sea Company proposed to take over the finance of the entire national debt; the government hit their bid.

As the story goes, the directors of the company were greedy and incompetent, talking up the price of their shares with inflated estimates of the value of their trading and financing rights. A lesson learned again at multiple points throughout history, most recently with technology hucksters of the late 1990s. Predictably, this ended poorly, with the government learning to not delegate their financing to a single company.

#### The Mississippi Bubble

Amazing but true; almost simultaneously with the South Sea Bubble was another speculative scheme of equal magnitude. This one took place in France, orchestrated by an emigrated Scotsman named John Law.

The bubble was the result of rampant speculation in the shares of a company founded by Law with similar characteristics to the South Sea scheme. It was based on the promise of riches from the slave and tobacco trades, linked at the time to French territories in the US. Law convinced the French government they could pay down their debt by trading in the newly issued shares. The government printed money in response – which was readily accepted by speculators seeking to buy shares.

When it became clear that the price of the shares bore no relation to the actual finances of the company, the markets crashed – causing markets all over Europe to do the same (an early version of contagion). Despite what were probably good intentions, Law was blamed for the entire disaster and was forced to flee the country. The government assumed his business debts and bailed out the economy the way they do today – by raising taxes...

Early on the government experimented with using annuities and lotteries to raise funds. They also used something called “tontines”, a group annuity that allowed the last few survivors to split the income. However, the sales of these instruments were generally disappointing. What did sell were government bonds. The success of their issuance promoted the growth of government debt. Between 1751 and 1801 the outstanding government debt rose from £70 Million to over £450 Million Pounds.

Contrary even to some of today's economic wisdom, the increase in issuance did not create a bankrupt government or economic recession. It did create a boom for the LSE and "Exchange Alley". There were few alternatives to these easily tradable, interest bearing securities and there was considerable demand for them. Since banks did not pay interest on balances at the time, merchants put their spare cash into bonds as a productive store of value.

From a speculators point of view it was also a lively market. Bonds would trade up or down in value based on political events and most specifically, the fortunes of the British Army. Since communication was poor at the time, and no one really knew what was going on in the wars, prices were highly susceptible to bad information.

By the end of the eighteenth century, the world was becoming more globalized. Trading had become more commonplace and participants understood its mechanisms more clearly. The old philosophy of mercantilism, in which every nation looked out for itself, was gradually being replaced by the kind of global economy foreseen by Adam Smith in the *Wealth of Nations*. (It's an interesting coincidence that his work was published in 1776 - the year America was born.)

Robust and formal financial markets continued their growth in London, Paris and Frankfurt. In 1801, the London Stock Exchange reorganized itself as a private club with 550 members and moved to an upscale facility next to the Bank of England. That same year, the Paris Bourse moved to its present quarters in the Palais de la Bourse and the Bank of France was established. The markets in both countries would play a pivotal role in financing the Industrial Revolution in both Europe and America.

#### Building Blocks:

- ❖ Central Location: As noted in the opening section, the flow of information and negotiation seeks some central place. Historically it has been a physical place; it may be a virtual place in the future. Propinquity – or physical proximity, improved efficiency and price discovery. This concept is central to the debate today on whether or not the NYSE floor adds value.
- ❖ Rules of Engagement: Rules and regulations are essential to the functioning of financial markets and any modern exchange structure. The earliest exchanges, even though informal, essentially became self-regulating organizations, creating and enforcing their own set of rules to govern trading activity. Market structures today have robust and complex rules to govern trading and engender trust in the markets. The newest market structures – ECNs and "Dark Books" – are aware of this and are refining their rules as their venues evolve.
- ❖ Excess Speculation: overestimating probabilities for success is human nature – it's what allows lotteries and casinos to exist. Regulators, financial institutions, regulations, advances in portfolio theory and technology have not eradicated this basic tendency. In fact, it seems to be a regular part of the capital market cycle, as we see in later years with everything from railroad and automobile stocks, high yield debt, commercial real estate and more recently the Internet bubble. Market

structures need to be able to accommodate this inevitability and handle the shocks, surges in trading volume and ultimately the disappointment they create.

- ❖ **Market Contagion:** International markets have more correlation than logically they should. While economies may not always directly rely on one another, the confidence in one system will affect the confidence in neighboring or similar systems. The interconnectedness and speed of communications today only serves to hasten the process.

#### ***2.4 The New World and a New Market: the Emergence of Wall Street***

Stock trading began on the eastern seaboard of the United States in the late eighteenth century. The early inhabitants of the Mid-Atlantic and New England region were primarily of Dutch and British descent. As a result, they were an extension of the established Anglo-Saxon legal structures, understanding of risk, trade finance, banking and economic behaviors. Stock markets and financial instruments were familiar and comfortable

The United States had three banking centers in this era – New York, Philadelphia and Boston – with Philadelphia initially being the most influential of the three. As expected, these markets are where securities trading markets emerged. The battle for supremacy in securities trading was primarily between New York and Philadelphia, with Boston not establishing a formal exchange until 1834.

##### **Foreign Bank Ownership**

The U.S. Treasury Department was established in 1789, followed two years later by the First Bank of the United States, and headquartered in Philadelphia. This institution functioned reasonably well but was dissolved in 1811 due to pressure from state chartered banks. Also, the banks stock had become attractive to foreign investors, particularly British, raising the fear that the bank could fall into control of foreigners.

A point that resurfaces later in history, in the recent experience of the London Stock Exchange and perhaps in present day public for profit strategy of exchange structures. Will the US be willing to allow a foreign entity to control a critical part of our financial infrastructure? As public companies, in theory, exchange structures are eligible to be acquired. With the push to gain more trading volume and revenue diversification, mono-line structures like the NYSE will be seeking to round out their product line. Consolidation of exchange structures across national borders makes economic sense, however politics and national interests will clearly be a factor.

Both financial centers began with business being done in the coffee houses – similar to the tradition in London. In fact, the most frequented coffee house for traders in Philadelphia was called the “London Coffee House”. Its New York counterpart was the now famous “Tontine Coffee House” – located down the street from the current New York Stock Exchange.

Competition is generally a good thing; however market participants of the time recognized the need for more formal organization and rules. In May 1792, the famous meeting under the Buttonwood tree occurred on the spot where 68 Wall Street now stands. A group of New York brokers and traders met to establish a formal exchange with prearranged rules for doing business. A formal building to house the exchange, however,

would not appear for another 15 years, with the brokers continuing to trade in the coffeehouses and taverns of southern Manhattan.

In the early days of the exchanges, trading was almost entirely in government bonds. Banks and insurance companies started to appear on the scene as the nation's economy grew. Because of some legislative missteps (Pennsylvania outlawing private banks for a short period), and geographic advantage, New York grew to become the principal financial center in the US.

#### By Land or By Sea – Early Arbitrageurs

The early arbs were equally as interested in exploiting any information advantage they could find. Developments in European finance and politics were vitally important to the U.S. – with security values changing accordingly. In the days before the transatlantic cable, information about developments in Europe arrived via ship; the trip to Philadelphia taking a full day longer than New York. This meant that New York brokers, including agents of foreign banks and investors, had the opportunity to get information first. The New Yorkers, understanding the advantage of asymmetric information, would head for Philadelphia on horseback – arriving in time to use the information to the disadvantage of the brokers in Philadelphia.

The Philadelphia brokers fought back, constructing a series of signal towers on hilltops across New Jersey. Signalers manning these towers were capable of transmitting messages from New York to Philadelphia in as little as ten minutes. The towers worked so well that they remained in place until 1846, when the telegraph was invented.

This period was characterized by the emergence of investment banks and financiers underwriting new ventures. The surge in public works, like turnpikes and canals, required underwriting of considerable size – a boom to the growing markets. As we see in emerging markets today, trading in the early years was characterized by the balance of tremendous optimism in the future of the economy and frequent panics caused by rogue speculators or overextended banks. Consequently, the stock market was viewed by the public as a risky place to put your money. Insiders with information could make a fortune while the public was at their mercy.

#### Building Blocks:

- ❖ Communications and markets are natural complements: – as communication technology grows and improves– so does market participation and volume. The timeliness of information, or information advantages by one party, can provide enormous returns for those that have them. A debate related to NYSE specialists of today.
- ❖ Financial Centers: As we stated, the concept of a physical place for a market has importance in how participants communicate. Beyond the exchange itself, financial centers attract supporting, complementary and spin-off companies. Whether it is Wall Street of this period, the Exchange Alley in London or the Merchant banks of Florence, there was always value to the interaction and concentration of people engaged in the trade. The resulting talent pool from the cluster of activity makes it attractive for firms to continue to form in that city.
- ❖ Integrity and Public Trust: Trust in the integrity of markets is what attracts public investors and lends credence to the capital raising process. When the public, or

non-money center institutions/individuals, perceive that insider dealings are controlling the markets then that liquidity is apt to dry up and will take considerable time to return.

- ❖ Fear of Foreign Ownership: Xenophobia is not a new concept. It quickly becomes inflated when foreign ownership of what is considered a national asset is at stake. It's an issue that a publicly traded NYSE may have to answer at one point. Exchanges can be viewed as just a place (or platform in modern terms) or as an integral part of a financial system. The financial system is based on trust and adherence to rules between parties. Whether it was the purchase of early American bank shares by the recently ousted British, or the attempt to purchase the LSE by the not-yet-forgiven Germans, we see that foreign ownership of a Nation's financial assets is complex

### ***2.5 The Wild West and Wall Street's adolescence – 1850-1900***

As we've emphasized, the relationship between governments and bankers are important if not periodically strained. The Civil War period presented a situation where the government was in need of enormous amounts of financing and the markets had developed to where it was feasible to provide it.

Financing the Civil War added to the prestige and credibility of the New York Stock Exchange as well as injecting enormous liquidity into the markets. In 1867, the NYSE joined forces with the Open Board of Brokers, a rival exchange, effectively doubling its membership and becoming the premiere exchange in America. The business generated by wartime securities issuance allowed the NYSE to expand its membership, update its buildings and become a major player in the world's financial picture.

This was the period of ruthless and colorful Wall Street characters. It saw the likes of J.P. Morgan, Jim Fisk, Jay Gould and E.H. Harriman providing capital for "the robber barons" like John D. Rockefeller, Henry Frick, Commodore Vanderbilt and Andrew Carnegie. Wall Street was the place where the game and drama played out – access to capital, speculation and manipulation. This combined with the technology advances of the telegraph and telephone, started the NYSE on one of its most colorful periods of expansion – the years between the Civil War and the turn of the Century.

The growth and infrastructure needs of the nation were very similar to the situation in China today: a virtually insatiable demand for capital with a perception of unlimited opportunity. Railroads were opening up vast new territories in the US creating business opportunity for entrepreneurs and more activity in the financial markets. Formal government oversight of markets was either undeveloped or not defined yet – creating an enormous opening for unscrupulous operators.

The invention and rapid acceptance of the Telegraph in the 1840s was a significant stimulus to trading on Wall Street during the 1850s and 1860s. It attracted investment from cities around the nation and made the rapid dissemination of market information a

daily occurrence. Like the Internet of a later age, this had an enormous effect in creating interest in the markets and driving trading volume. Subsequently, the completion of the transatlantic cable in the 1860s made instantaneous communication between the Continents possible for the first time. This set the stage for increasing linkages of market movements and the flows of capital between the continents.

#### The First “Wirehouse”

The government’s sale of bonds was necessary to finance the Civil War. A little known Philadelphia investment banker named Jay Cooke was hired by Treasury secretary Salmon Chase to help with floating a series of huge government bond issues. Cooke managed to sell these bonds with the help of a large network of sales agents scattered around the North. He communicated with them by telegraph, thus establishing the world’s first “wire house”, a term later used to describe NY brokerage firms with branch large networks (Merrill Lynch, Smith Barney or Morgan Stanley).

Instant communication had enabled an extension of securities marketing outside of New York. This greatly enhanced the speed and depth of capital raising process. In short, this was the beginning of retail financial services.

Markets were established around the world, with stock markets appearing in places like Tokyo, Toronto, Rio de Janeiro, Mexico City, and Johannesburg. The capital raising process for modern economies had begun to take root. Communications and technology as well as an increased demand for capital and risk returns were feeding the growth. While market structures were privately run, self-regulated member organizations, they had begun to have an effect on the economies of their host nations.

Stock markets were now past their birthing stage, but were far from mature. You could say they had the characteristics of adolescents: volatile, moody, immature and unpredictable. Excess speculation caused this period to be characterized by frequent panics (later named crashes). Since the market was in the hands of a relatively small number of people, panics could be caused by the foolishness or greed of one individual. Speculators as well as respectable bankers became overextended with regularity.

Markets did not yet have the buffers of Regulation “T” to govern leverage, SEC/NASD rules to examine practices, transparency in reporting or central banks to provide liquidity in times of crisis. Not that all of these have eliminated greed and foolishness; to the contrary, both are alive and well. The difference today is in the recovery after market events which the today’s regulatory and central bank infrastructure serve to coordinate recovery from market mishaps.

To this end, market recoveries were highly dependent on speculators to restore liquidity after a market mishap. They were usually drawn in by profit opportunity and the publicly their participation would draw. J.P. Morgan was often the central figure of the financial dramas of the time; sometimes causing the crisis, sometimes helping to resolve and sometimes doing both. A colorful and legendary figure, Morgan was the star of the show for a 30 year period – acting as an investment banker, speculator and central banker all in one larger-than-life character.

The role of information, while always important to the functioning of markets, was now becoming a significant business on its own. Newspapers and services directly devoted to coverage of business and markets are founded: the *Financial Times* of London begins in 1888 and in 1889 Dow Jones & Co. launches the *Wall Street Journal*.

Charles Dow was a journalist, not a Wall Street insider in any way. Consequently, the paper he created was to be useful to a broad audience, not just the Wall Street crowd. Dow recognized that to the average reader, the market trends were murky on a day to day basis, buried underneath the plus and minus ticks of the reported prices. Cycles had become apparent to the readers of the Journal – but had never before been quantified. On May 26, 1893, the Wall Street Journal introduced the Dow Jones Industrial Average which was to become the enduring benchmark for the markets.

He began devising averages in 1884 with 11 stocks, most of them railroads as they represented America’s most substantial companies at the time. There were only a few Industrial companies on the exchange at the time and most of them were highly speculative. His indexes evolved to where railroads were eventually shed, and placed in their own 20-stock railroad average (renamed the transportation index in 1970).

Today there are plenty of indexes and indicators, most branded by investment banks or financial publishers to tell investors what the market is doing overall or in a sector that interests them. The durability of the Dow is in the selection of the companies, which make up most of the critical sectors of the economy; and its flexibility changing the representation as new companies or industries emerge. (Siegel chart for appendix)

Of the original 12, only General Electric remains in its current form today, with the others still existing but disappearing through some form via acquisitions. The averages, like the market, are a reflection of the creative destruction theme we started with. The economy, reflected by the capital markets and, for purposes of this work, the market structures all build upon themselves and morphing to serve the needs of the economy.

<b>Original Dow 12 – 1896 vs. 2005</b>	
<b><u>1896</u></b>	<b><u>2005</u></b>
American Cotton Oil	Unilever (UN) (Anglo-Dutch)
American Sugar	American Sugar Refining (private)
American Tobacco	RJ Reynolds (RJR), Fortune Brands (FO)
Chicago Gas	Peoples Energy (PGL)
Distilling and Cattle Feeding	Millennium Chemicals (MCH) and (FO)
General Electric	General Electric (GE)
Laclede Gas	Laclede Group (LG)
National Lead	NL Industries (NL)
North American	We Energies (WEC)
Tennessee Coal and Iron	US Steel (X)
U.S. Leather (pfd)	None
U.S. Rubber	Michelin (Paris)

Inventions and innovations such as the telegraph, telephone, the ticker tape machine and the transatlantic cable all fueled the growth of the markets and optimism in the future.

Most of the optimism was well founded, but the market structures and practices would ultimately have to be restructured for the modern world.

#### Building Blocks:

- ❖ Communications technology: Communication and information is the heartbeat of financial markets so it stands to reason that as communication technology grows and improves– so does market participation and volume. The invention of the telegraph, telephone, the transatlantic cable and the ticker-tape machine are among the inventions that revolutionized markets and drove volume. Market structures and practices quickly adopted these technologies as their advantage was clear.
- ❖ Market News and Information: The founding of the *Wall Street Journal* and the *Financial Times* within a year of each other was telling. Both publications would go on to play a fundamental role in world markets – reporting events and prices to a broad audience. Equally as important was their interpretation of the events in the market – in turn shaping the attitudes and actions of market participants. Market information became a business.
- ❖ Leverage: opportunity and problems: Leverage is an important part of financial markets – the ability to magnify a position or trade multiples of cash available provides liquidity and opportunity to market participants. At the same time, it can magnify the decisions of relatively few parties creating the conditions for panics and bubbles. While leverage is monitored and regulated in today’s markets, it manifests itself in a variety of different forms, creating similar problems today as those of this era. In the late 1990’s, the failure of the hedge fund Long term Capital Management, precipitated a Wall Street “Club-Style” bailout reminiscent of this era.
- ❖ Globalization: In earlier eras we saw the beginning of markets influencing the direction of one and other – mostly through psychology. This era saw the beginnings of significant cross border flows of portfolio capital. The markets were integrated into national and global events, from the Civil War and California Gold Rush – while the US had begun to absorb significant investment for Europe recognizing the opportunity for superior returns.

### ***2.6 The Twentieth Century Part 1 Great Optimism to the Great Depression***

The turn of the century in America was marked by great optimism, highlighted by the possibilities of technology and a spirit of almost unlimited potential. There was enormous confidence across the globe to what benefits technology would bring to the economy and our standard of living. On Wall Street, it was a world characterized by America’s wealth of natural resources, with manufacturing and heavy industry playing an increasing role.

Trading had been growing rapidly in the years leading up to the 20<sup>th</sup> century, tripling in the years between 1896 and 1899; it would double again by 1901. As trading grew, there was a need for more space, so the Exchange invited eight of New York City’s leading



architects to join a competition to design a building that both housed them and reflected their ambitions. The institution was growing rapidly - physically and in its trading volumes - but had not evolved past its 19<sup>th</sup> century practices just yet.

#### New Digs for the Exchange

In 1903 the NYSE moved to its current location on 18 Broad Street – an extravagant building that reflected the optimism of the time. It had an enormous marble trading floor – at the time one of the largest spaces in the nation at 109x140 feet -with walls rising 72 feet to the gilded ceilings.

At a cost of over \$4MM at the time (approximately \$100MM in today's dollars), it was an ambitious project by almost any standards. The new building was among the first structures to employ air conditioning, a full time physician on staff, and separate dining rooms for smokers and non-smokers.

The trading floor was to be expanded again in 1922, 1969, and 1988. In 2000 a fifth trading floor was added at 30 Broad Street.

What is relevant historically is that the market structure and the building were inextricable from each other. Growth of the exchange had always meant growth of the physical place and number of people. Old habits die hard as physical place, the trading floor and the need for specialists will likely be decided in the next decade.

The frequent panics and overextensions of the market became of increasing concern. In 1907, there was a run on the overextended Knickerbocker Trust Company that caused yet another panic on Wall Street. Lacking a Central Bank to manage the crisis, the Street found itself in the hands of a very small group of solvent bankers lead by JP Morgan.

To avoid a complete meltdown of the markets, Morgan persuaded Theodore Roosevelt's Treasury secretary to inject \$25 Million into the system to prop up liquidity. The cooperation between private bankers and the government in a time of market crisis, a first in the history of markets, was crucial to avoiding a catastrophe. This episode ultimately influenced the passage of The Federal Reserve Act in 1913, to provide a safety net in the form of federally funded regional banks.

Globalization intensified as World War I dragged America reluctantly onto the world scene. With a large and growing economy, the US became a huge creditor nation to the powers of Europe, resulting in an acceleration of market linkage. The debt burden facing Europe after the War was crippling to their economies. Exchanges across Europe sought to reconstruct their capabilities and resume trading as their economies rebuilt – but this would take some time. The London Stock Exchange saw its position as the top securities market in the world conceded after the War to the NYSE.

After the War, a booming reconstruction and export economy solidified America's optimism and its position in the world. The resulting prosperity brought the broader public into the markets during the well documented boom in the 1920s. Ordinary Americans with no background in investing or reliable information of any kind were now speculating regularly in the stock market. The allure of leverage reared its head again with investors discovering the practice of buying stocks on margin; initially, reaping big

profits through its use. It was the classic bubble scenario; yet because of the optimism in America's position in the world almost no one believed the situation called for caution.

The boom and the demand for access to securities trading fueled the growth of retail brokerages, who succeeded by applying techniques learned from mass retailing to the distribution of securities. Firms like Merrill Lynch, Smith Barney, Paine Webber and EF Hutton all experienced significant growth during this era. Merrill Lynch was the most visible and successful of these firms, later adopting the slogan "From Wall Street to Main Street" to reflect the scope and clientele of the firm. The public's confidence in the markets grew dramatically during this period having significant influence on the growth of the exchanges and markets.

At the time of the crash in 1929, there were approximately 120 regional securities exchanges in the US, in places as widespread as St Louis, Cincinnati and Denver. Not all of these were ethical or efficient places to do business, but the demand for trading venues proved to be enough for these exchanges to be established.

Whodunit? The case of the missing speculators...

It's commonly accepted that the Crash of 1929 was caused by millions of speculators getting overextended around the country. The common folklore of the time has almost every man, woman and child in America speculating on the stock market. However, the stories of mass market speculation in the 1920s may be unfounded or at least exaggerated.

There is an estimated figure from Robert Sobel's classic study of panics that approximately 3 Million Americans were shareholders of a total US population at the time of 120 Million. Most of the three million were not speculators but were in the market for investment purposes. Most of the three million, according to Sobel, were "upper middle class" people living in the cities looking to receive long term gains and income from their investments.

It may have been a case of too much too fast; the market just running out of buyers (like the tulip auction in Holland), instead of mass sellers covering margin.

On October 24<sup>th</sup>, Black Thursday, the crash began - with almost \$10 Billion on paper being wiped out by 11AM in the morning (approximately \$115 Billion in today's dollars). A consortium of bankers convened quickly to put together a plan to bail out the markets. Trading stabilized for the day, but the following Monday prices began to drop again. The support that the markets received the prior week failed to materialize prompting prices to continue falling. Tuesday was an election day, the markets were closed and when they opened again on Wednesday, prices continued their downward spiral. Except for a few weak rallies, stocks would continue to fall for the next 3 years.

The market's crash was unfortunately not isolated to market speculators. The aftermath caused a rash of very public failures of financial institutions. In turn, these caused the public to panic about the security of the bank deposits, creating the classic "run on the bank" scenario. This was the chain of event that lead, at least in part, to the great depression and significant changes in market practices and the role of the Federal Government.

To provide a sense of the magnitude of the boom and subsequent bust during this period, consider that in 1921 the Dow Jones Average was around 75. On the last day of 1928 it hit 300 for the first time, peaking in September on 1929 at 381.17 – a five-fold increase in 8 years. After the October crash, the market continued down until July 1932, where it bottomed at 41.22; the market lost 91% of its peak value. To put this in context of our most recent market drops, consider the NASDAQ at 5000 in the year 2000 going under 500 by 2003 (it bottomed post bubble at 1700). Or the Dow going from its high of 11,700 during the same period going under 1170 (it bottomed at 7500). The market crash of 1929 was one of the greatest destructions of wealth in history. It's estimated that of the \$50 billion in new securities offered during that period, half became completely worthless.

After the crash and the ensuing depression, public confidence in the markets completely disappeared. There Roosevelt's administration believed that if the economy were to recover, the public's faith and participation in markets needed to be restored. The Congressional hearings produced the Securities Act of 1933 and the Securities Exchange Act of 1934. Very simply, there were two principal intents of the laws:

- 1) Companies offering securities to the public must tell the truth about their business, the securities they are selling and disclose the risks and,
- 2) People who sell and trade securities must put investor's interests first. While the intent of the law is clear and understandable, the interpretation and application is still evolving today.

An outgrowth of the legislation was the creation of the Securities and Exchange Commission (SEC) in 1934, with the famous Joe Kennedy (father of JFK), as its first chairman. Regulation of market practices and regulatory structures were to become a major and influence in the future of Wall Street.

#### Building Blocks:

- ❖ National Financial Infrastructure: This is the era where the government's role in the economy expands to include managing the economy, the banking system and seeking to stabilize the markets. While the government does not manage the stock market directly, it is their stated responsibility to manage the economy towards full employment and does so through fiscal stimulus and managing money supply and interest rates through the Federal Reserve. In times of market crisis (which we have yet to eliminate), its necessary to have a central bank to determine if and how much liquidity the system needs to stabilize. Additionally, the government created deposit insurance to guarantee the value of bank deposits, to attempt to eliminate the "run on the bank" scenarios.
- ❖ Investment Supply Chain: the stock and bond market's linkage to the economy was now evident to everyone. The influence on the banking system and overall liquidity had highlighted the effects of the market beyond direct and willing participants. The health, perceptions and proper functioning of markets influence the end demand of an "Investment Supply Chain" that spans from the funding of

entrepreneurial activity, to the banking system, to public markets and macro-economic policy. This is a concept to be developed further later in this paper. Suffice to say the prosperity of the country, and by extension the political fortunes of those in office, are intrinsically tied to the health of this supply chain.

- ❖ Retail Brokerages Emerge: This era saw the expansion of stockbrokerages around the country. The appearance of branch offices dealing in stocks increased interest in stocks and investing. While it would take years for confidence to be restored in the markets after the Crash, broadening distribution of securities proves to be a big future source of liquidity and demand for the markets. The growth of these firms had a big influence on the structure of exchanges, and their growth in subsequent years. The public's perception of fair and equitable treatment in the investment process is a critical driver of the investment supply chain. The growth of the retail business would add new participants and new concerns for markets – they could no longer be managed or regulated like a poker game for speculators.
- ❖ Federal Regulation of the Securities Industry: The Securities Acts of 1933 and 1934, and subsequently the Investment Company Act of 1940, were all designed to create the regulations and oversight to avoid circumstances that created the Crash. A powerful national regulator in the SEC was formed and would have a substantial influence over the development of a National Market System and the securities business in the years to come. Prior to this period, markets had always regulated themselves and established their own rules. The philosophy had always been “laissez faire” – it was not the governments business to interfere in private markets. It was now clear that the capital markets had effects far beyond just the direct participants. As such, the Federal Government's role expanded dramatically.
- ❖ Visibility and Transparency: While far from a cure-all for future market problems, complete disclosure and transparency of publicly traded companies had not been required or even considered necessary until this point. The burden was placed on those taking capital from the public to abide by certain practices that would allow investors to make fully informed decisions and evaluate risks. This continues to be an objective of Securities regulators today – a more sophisticated version of what our Italian merchants were seeking with their bookkeeping in the 1500s.

## ***2.7 Twentieth Century - Part 2: From Baby Boom Prosperity to May Day***

When World War I began, markets had to be closed to mitigate the effect of chaos and disruption in Europe. At the start of World War II, there was still a perception that the U.S. markets were isolated from Worlds events. This view was quickly proved wrong as the markets dropped 23% in one 2-week period in response to Germany's invasion of the Low Countries and France.

After the tide of the war changed, stock prices began to rise at a rate not seen since the 1920s. After the War, Wall Street found itself the undisputed center of the financial world, with war ravaged Europe and Asia looking at years of reconstruction and debt. Other currencies became pegged to the dollar under the Bretton Woods Agreement of

1944 – the international summit that mapped out the post-war economic and financial structure.

The boost the war provided to the US economy was significant, and the momentum and optimism that followed caused a post war surge in the markets that ran steadily from the 1950s to the mid 1960s. In 1953, average daily volume on the NYSE crossed 1 million shares never to look back. Much of this success was due to the retail brokerage houses growing their participation on behalf of individual clients. Merrill Lynch became the nation's largest brokerage house with 100+ offices around the country. The rise in volume also spurred a rise in IPOs during this period, increasing the visibility of exchanges and restoring their credibility. The depression era and World War still fresh in the minds of Americans, equities needed to rebuild a popular following.

As trading volumes grew, the clearing and settlement infrastructure became increasingly strained. In the days before electronic settlement, the exchange was still settling trades by paper/book methods and delivering physical certificates. The problem grew exponentially into the 1960s when, in response to the growing backlog, the Exchange was forced to shorten trading hours to allow firms to catch up on settling trades. For the period between 1966 and 1969 the exchange was closed on Wednesday afternoons to allow firms to catch up on delivering stocks. The problem was significant enough where it caused some firms to go under. The Exchanges and Member firms recognized, at this point that they would have to build an electronic trading platform if trading volumes were to grow. Firms that were not able to make the investment in technology and infrastructure did not survive through this period.

Another development was the growth of the American Stock Exchange, a competing exchange to the NYSE that had begun life as the New York Curb Agency (NYCA). The name was a reference to a prior era where non-NYSE brokers would trade with each other on the streets and “curbs” outside the NYSE. The Amex moved indoors in 1921 at its current headquarters on Trinity Place. While it has never challenged the NYSE's supremacy, it had provided an alternative for public offerings for newer or start-up companies to the NYSE. The emergence and characteristics of this market showed how competing exchanges could co-exist and complement one and other – each representing different needs within the investment supply chain.

In 1971 the Bretton Woods accord which provided for the management of exchange rates collapsed resulting in currencies became free floating commodities. Commodity traders in Chicago quickly determined that money could be traded on perceptions of future value just like any other commodity. In 1973 CBOT launched a subsidiary, the Chicago Board Options Exchange (CBOE). Inspired by the idea of currency options, they expanded the concept to include options on stocks, stock indexes, bonds and ultimately on other forms of financial paper. Derivates trading was born. The derivative exchanges would make possible an entirely new type of trading and risk management expanding rapidly in the years to come.

A major event, of the 1970s was deregulation of commissions. Until this time commissions on stock transactions had been regulated by the SEC. The SEC had been arguing for some time that the commissions charged for trades should be negotiable. The notion was strongly opposed by members of the NYSE and the AMEX, not surprisingly, as the current system was good for them.

The pressure for change was significant, mostly as a result of the growing information age. When NASDAQ began operations in the early 1970s, it offered electronic posting of prices in brokers offices and discounted prices for its better customers. In 1971, the NYSE was forced to accept negotiated commissions for trades involving more than \$500,000 and on May 1, 1975 – the famous May Day – fixed commissions were abolished altogether.

Negotiable commissions led to an enormous increase in volume by institutional investors. The lowering of commissions made it possible for them to be more flexible and creative in their investment strategies. Economics 101 was at work: lower the friction costs and volume will follow.

The effect of competition changed the landscape of stockbrokerage and made the electronic players of a later age possible. It also underscored, from the regulators standpoint, that reduction of costs for market participants as an institutional objective. The concept of reduced friction cannot be underestimated in its effect on markets and their structures: whether it is reduced friction in cost, speed, regulation or information they all have proven to increase in trading volumes. This is a recurring throughout this thesis and an important catalyst in the issues the exchange faces today.

#### Building Blocks:

- ❖ Automated infrastructure: post war prosperity produced a roaring return of good markets and volume levels the system was not prepared or designed to handle. It became clear that the NYSE and its member firms would be heavily reliant on technology going forward to scale their businesses. Efficient, scalable trading platforms were to become a must and in some cases a competitive advantage
- ❖ Derivative Markets: while successful, the significance of the first derivative markets was not yet fully understood. The introduction of options on individual stocks and later, futures on indexes, would make trading more efficient, flexible, leveraged and creative. Approached intelligently, derivatives trading provided institutions with an effective new tool for managing risk. Used without full understanding of the instruments, derivatives offered the potential for institutions and investors to hurt themselves even more quickly. Activity and price discovery on the NYSE was now linked, in part, to another market that focused on pricing future value, direction and demand. This development ultimately made pricing more accurate by reflecting more participation.
- ❖ Reduced Friction = more trading: De-regulation, a trend that would continue through the 1980s, brought competition in pricing into the fray for the first time. The reduction of friction costs not only created an enormous increase in volume,

it gave rise to the discount brokerage business which made the markets increasingly accessible to a new population of investors.

### ***2.8 The Twentieth Century Part 3: The Rise of Mutual Funds and the NASDAQ***

The mid 1970s found the United States in an economic funk: political upheaval in Watergate, the effects of the Oil Shock, lost prestige overseas and the beginnings of the Japanese threats to American industry. While the Dow briefly approached 1,000 in 1975, it did so only briefly, remaining in a trading range until 1981. The stagnant environment was about to give way to a flow of new funds - coupled with Reagan era optimism - starting the markets back on an upward trend; crossing through 1000, to 1,500 in December of 1985 to over 2,000 in 1987.

“May-Day” activity had caused a huge surge in institutional trading and effectively created a new business. Market structures and the firms servicing these clients began to change to accommodate to the new business and demands of their biggest customers. While profits seemed stagnant for Wall Street during much of the 1970s, there were three events on the horizon that would have a lasting effect on markets, their structures and the Street’s prosperity during the 1980s and early 1990s: the growth of mutual funds, junk bond financed takeovers, and the rise of the NASDAQ. Curiously, all three had been around for some time without impacting the markets in any meaningful way; their incarnations in this era would be a different story.

#### *Mutual Funds:*

The role mutual funds and collective investment pools have had in influencing market structures cannot be underestimated and warrants a thorough explanation. Here we’ll briefly explore their history, growth and modern day influence. Trading mechanics and trends will be more fully explained in later sections.

Asset management companies represent what we term today the “buy” side of the market. They represent the customers of the exchange, or at least representation of the end customer, in that they are the purchasers of securities. Their purchases have historically been executed through their “sell” side counterparties. The “sell-side” of the business includes the institutional brokerages that service these companies and execute their trades (Goldman Sachs, Merrill Lynch, Morgan Stanley etc...). The terminology and positioning of the players becomes important later in the thesis as we look at alignment of incentives.

The first mutual fund, in the modern understanding of the concept, was a closed-end fund called Foreign and Colonial investors formed in the mid 1800s in Scotland. The concept of pooled investment for greater diversification was not fully understood at the time, never really taking hold. The idea was dormant until three executives in Boston pooled their money in 1924 to create the first open-ended mutual fund. The Massachusetts Investors Trust was formed on March 21, 1924. The fund was started with \$50,000, growing to \$392,000 by the end of its first year of operation. It continued to grow

through the balance of the decade, up to the Crash in 1929, as it proved to be a viable method for managing a portfolio for a group of investors. The fund actually still exists today run by the same group that started it, the Massachusetts Financial Services (MFS) mutual fund group, under the same Massachusetts Investors Trust name.

The subsequent stock market crash slowed the promising products growth; even through the 1950s and 1960s as the markets returned, they were viewed as an obscure and expensive way to invest. Even Charlie Merrill, the founder of Merrill Lynch and a champion for the individual investor, felt strongly that the expenses of the funds were not in the best interests of his clients and refused to allow his firm to offer them. Since they lacked broad distribution and public acceptance, there were only around 270 mutual funds with approximately \$48 Billion in assets by the end of the 1960s. This may sound substantial, but given their 40+ years in operation, they had little effect on markets or investor preferences and still represented a small portion of overall activity on the exchanges.

What was about to change was 50 million Baby Boomers entering the work force. The economic conditions they faced, the raging inflation of the 1970s and 1980s, led many people to abandon their parent's traditional aversion to risk and notions of thrift acquired during the Depression. Boomers were more inclined to finance consumer purchases, have two-income households and recognize the need to save for their own retirements.

As a result, mutual funds became the vehicle of choice for long term savings of this generation, moving the asset needle from \$48 Billion in 1969 to over \$6 Trillion by the end of the 1990s. As you can see from chart 2.1, mutual funds assets entered a period of exponential growth during this period. Looking at it another way, it took 50 years from the Investment Company Act of 1940 for the industry to cross \$1 Trillion in assets (1990), the next Trillion dollars took 3 years (1993), the Trillion after that took 3 years (1996), and then one Trillion of assets was added each year for the balance of the decade.

The significance of this event is three-fold: First, it facilitated unprecedented amounts of liquidity to the equity markets, helping to fuel the greatest boom(s) in history. Second, it brought the middle class investor into the markets in a fashion where he could be represented by a professional investor. Third, it transferred enormous market power to the asset managers (buy-side), enabling them to extract better terms from the exchanges.

As noted earlier, through much of US financial market history, the markets were the playground of institutions close to events and of wealthy, privileged investors. The average investor was now seeking returns in the equity market in a systematic way represented by a knowledgeable third party. The exchanges would now have to cater to a much more sophisticated retail investor; represented by their intermediary asset management companies like Fidelity, Vanguard, Wellington and MFS. In a way, the retail investor had become "unionized" where they could be better represented in the markets. A new player had emerged in the investment supply chain and they would exercise significant power and influence in the years to come.



**Chart 2.1****US Mutual Fund Industry: Net Assets, Number of Funds and Shareholder Accounts**

Year	Total Net Assets (Billions of Dollars)	Number of Funds	Shareholder Accounts (thousands)
1940	\$0.045	68	296
1945	1.28	73	498
1950	2.53	98	939
1955	7.84	125	2085
1960	17.03	161	4898
1965	35.22	170	6709
1970	47.62	361	10,690
1975	45.87	426	9,876
1980	134.76	564	12,088
1985	495.39	1,528	34,098
1990	1,065.19	3,079	61,948
1991	1,393.19	3,403	68,332
1992	1,624.54	3,824	79,931
1993	2,069.96	4,534	93,214
1994	2,155.32	5,325	114,383
1995	2,811.29	5,725	131,219
1996	3,525.80	6,248	150,024
1997	4,468.20	6,684	170,363
1998	5,525.21	7,314	194,078
1999	6,846.34	7,791	226,346
2000	6,964.67	8,155	244,839
2001	6,974.95	8,305	248,816
2002	6,390.36	8,244	251,224
2003	7,414.40	8,126	260,882
2004	8,106.87	8,044	267,363

Source: Investment Company Institute (ICI)

*Junk Bonds: Leverage Excess Redux or Equity in Drag?*

Fueling the rise in the markets was a wave of mergers spurred by the emergence of “junk bond” financings. Michael Milken and his firm Drexel Burnham Lambert pioneered the underwriting and use of lower grade credit bonds to finance takeover and merger activity to enormous initial success. For the NYSE and NASDAQ, the result was activity in stocks that considered asset rich but with moribund management or meager growth prospects. For those that recognized this value, Milken and Drexel became a new source of financing for those seeking to realize this value.

The relevance of junk bonds to exchange structures was in linking the stock exchange to yet another derivative market that would influence its value and the information flows necessary to trade equities. Junk bonds were really part equity and part debt – with trading characteristics of each. Price discovery had to become more sophisticated to account for the risk and opportunity of the stocks that were tied to high-yield finance. The high-yield market sharpened price discovery, valuation methods and introduced a new dynamic to M&A that the markets would absorb. The more sophisticated derivatives of the coming decades were born largely from this era. In short, the junk bond boom made the markets more efficient and brought new accountability to corporate America.

The 1987 Crash or Black Monday punctuated the party of the 1980s. The crash was the single largest point drop in history, erasing a half trillion dollars in value in the U.S. markets. The crash was the beginning of problems for the junk market and Drexel – it would end badly for both about 3 years later.

Unlike the crash of 60 years prior, the market's subsequent recovery was aided by the intervention of a central bank and the newly installed Alan Greenspan. The institutional reforms of prior eras now provide effective some effective boundaries that allowed for markets to correct themselves without broader damage to the economy.

#### London Calling: The Big Bang

Financial markets and institutions were changing during this era to reflect the increasingly global perspectives of their clients. Competition was increasing the pace of trading and reducing costs – forcing institutions to consider the choice between reforming their rules or obscurity. This had an unsettling effect on the storied institution of the London Stock Exchange.

While the London Banking community had benefited from the creation of the Eurodollar market, the London Stock Exchange had refused to accept any meaningful reforms to grow with the times. They were still living in the highly protected world of fixed commissions and barriers to competition that New York had left behind a decade before. In the late 1970s and 1980s, the LSE and London's financial firms were loosing business to overseas competitors at an increasing rate. Ultimately, their distress became a call to action for Margaret Thatcher's government to take a page from the American book on de-regulation.

On October 27, 1986 London allowed ownership of member firms by foreign competitors, eliminated the distinction between brokers and dealers allowing them to deal directly with the exchange, abolished fixed commissions and allowed for technology aided trading. The outcomes were, in the local dialect, "brilliant"; foreign capital poured in, trading volumes grew and London became the model for reform. Their structures were adopted by a number of other exchanges. Not a cure-all for the competitive woes of Europe, but the Big Bang's reform of the LSE's exchange structure likely saved London's exchange from becoming irrelevant if not extinct.

#### *The NASDAQ*

Before it was the NASDAQ it was called the Over the Counter (OTC) Market – a place for risky, low volume stocks not worthy of listing on the NYSE. The OTC market was a place where you could hit it big - but it had an equally risky profile. Quotes and trading were murky at best. There was scant information and research on the companies listed there and spreads were enormous.

Technology, once again, was what enables the change in the markets. There had been a long standing desire to consolidate quotes electronically so buyers and sellers could route their orders to the best price. In the late 1960s and early 1970s, this became a reality with the National Association of Securities Dealers (NASD) assuming responsibility for building the Automated Quotations (AQ) system – becoming the NASDAQ exchange.

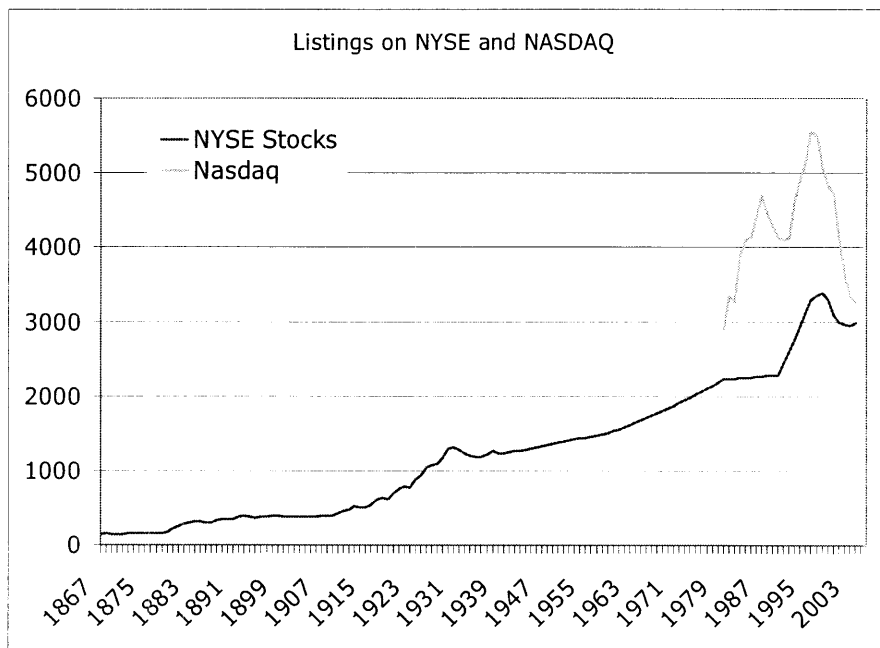
The innovation cycle had kicked into gear in the 1970s and 1980s with advances in information and communications technology. The companies participating in this boom were young, venture or bootstrap financed, fast growing enterprises. In the

entrepreneurial spirit of Silicon Valley, companies and ideas would continue to be tested and tried until they found a market. Ultimately, they would be in need of equity capital to continue their growth.

There was a time when IPOs were a relative rarity that occurred only when a company had reached a certain level of maturity. They would have to rely on bank debt or other sources of equity as public markets were not available. In the 1980s, the ease of quotations on the NASDAQ and the growing capital from mutual funds made public offerings on the OTC a comparatively less risky proposition.

Chart 2.2 shows the listings on NASDAQ from its inception versus the NYSE. While listings do not make a direct inference on superior liquidity, the number of stocks listed on the NASDAQ exceeds the NYSE.

**Chart 2.2**



As its legitimacy increased with its electronic market structure and transparency, the NASDAQ would become a competitor for listings of increasingly larger and important companies. In the 1980s, you would see Microsoft, Intel, Cisco and Apple all list on the NASDAQ – without any intention of moving to the NYSE once they became larger. This was a significant departure from past behavior where the NYSE could expect successful companies to seek listings on their exchange. A real competitor was emerging

#### Building Blocks:

- ❖ NASDAQ – the rise of a new exchange: the “investment supply chain” had continued to evolve to a point where the capital raising process moved more efficiently downstream to smaller companies. The boom in issuance of new stock

for technology and telecom companies during this period was a primary contributor. The nature of the companies they traded made it possible to innovate and for the NASDAQ to try to improve on NYSE practices. In making the capital markets accessible to a new type of company, the markets were structured to fuel the growth of Venture Capital and technology of the decades to follow. It also became evident that after years of dominance by the NYSE, there was room to compete and innovate with new structures and methods of trading that would be accepted by the customers.

- ❖ Mutual Funds and the Buy-Side: the “unionization” of the retail investor was a major event. Americans elected to allow an intermediary represent them and in the process created the power of the buy side. Now the retail investor would primarily (by dollar measures) be represented by a professional intermediary. The power of collective pools of assets is extended to hedge funds in a new and more exaggerated way at the time of this writing. The effect of the growth was to bring an increasing sophistication to the customers of the exchanges and begun the shift in power to the buy-side.

### *2.9 Transition to the 21<sup>st</sup> Century: The Internet Age*

Welcome to the Revolution. It was catchy, sexy, futuristic and believable. “This Internet thing is for real” was a phrase that was frequently invoked by everyone from Al Gore (its inventor) to William Shatner (its pitchman) to Generation “X” slackers turned entrepreneurs...

In 1994, the Internet came into the general public’s consciousness with the introduction of the Mosaic web browser and the embryonic World Wide Web. By 1996, it became obvious to most companies that public web presence was not optional – though at first the possibilities were thought to be confined to publishing and information flows.

The lure of the web was undeniable; it would be challenging the basic premises of every business model. The reduced prices of getting to millions of consumer worldwide and the possibility of selling everything from books to dog food, promised to overturn established business models. The term “E-Commerce” entered the technology lexicon, spawning companies and ideas devoted to scores of Business to Business (B to B) and Business to Consumer (B to C) business propositions. Although later, the acronyms would be a way to humbling poke at those that left their day jobs to take a shot at the gold rush – recast as Back to Banking (B to B) or Back to Consulting (B to C). Like the railroad booms of a century before, the wrong question was being asked as it related to investment: will it change the world? Yes. Are the securities a good investment? Well, it depends...

The speed at which the Internet took hold was remarkable. Chart 2.3 shows the adoption of the Internet across a variety of age and demographic segments. The demographic segments of the population that had the ability and interest in stock investing (older and more educated) reached almost universal adoption. The effect this has had on exchanges is via the financial institutions that provide trading to retail and institutional clients.

### Chart 2.3

#### Internet Access Increases Among Americans of All Demographic Groups Percent of U.S. Adults with Internet access

	1997	1999	2001	2003	2005
All US Adults	24	42	66	78	79
<b>Age</b>					
Less than 35 Years	30	51	75	85	85
35 to 54 Years	30	51	74	85	85
55 Years and Older	8	20	43	62	64
<b>Education</b>					
High School or less	10	23	47	64	64
Some college or associates degree	33	56	80	90	90
College or postgraduate degree	48	73	91	96	96
<b>Household Income</b>					
Less than \$35,000	14	26	48	64	64
\$50,000 to \$149,000	40	64	84	92	93
\$150,000 or more	56	81	95	97	97

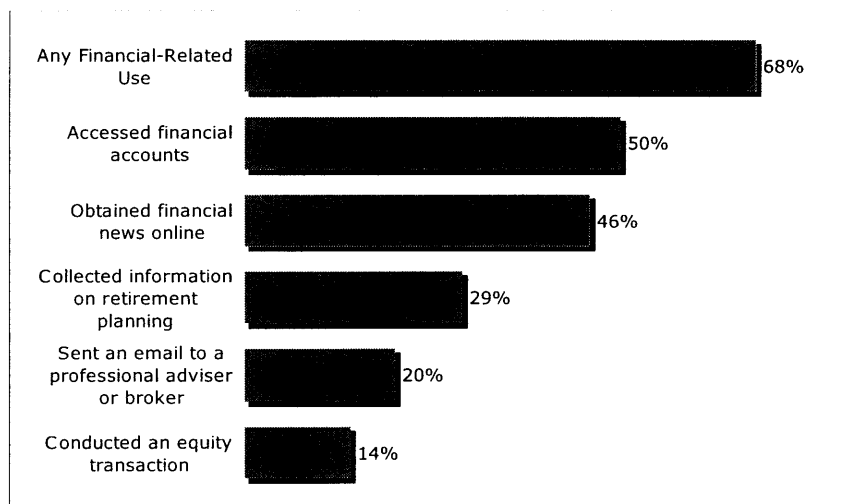
Source: Mediamark Research Inc., cited in US Census Bureau Statistical Abstract of the United States 1997-2003

Without the benefit of reflection, the markets are still sorting through what the lasting impacts will be. That said, it did create enormous activity and competition in the world of retail trading. Financial services firms were among the early adopters of the web. Financial transactions being the perfect internet product: information driven and not physical in nature.

The early predictions on the impact on retail investing turned out to be vastly overstated. As the promises of easy trading riches failed to materialize (they didn't learn from history either) the internet bust proved to be a setback the misguided strategy of the internet brokers. However, one offshoot for the exchanges was the increase in retail order flow and the emergence of brokerages that served to collect and aggregate that flow. Companies like Knight Trading have become very successful aggregators of this order flow and an influential member of the trading landscape.

Chart 2.4 shows responses to an ICI survey on use of the Internet by investors. The span of use demonstrates some of the functions investors consider to be valuable. What stands out is that the primary use conceived by the institutions, equity trading, comes up with only 14% of the respondents indicating they have done a trade via the internet. Internet trading is definitely here to stay; its growth with the retail investor may have another incarnation to become more broadly useful to higher net worth investors. As of 2005 Ameritrade, the leading online broker still has an average account size of only \$41,000. What is clear is, however, is that the internet is changing the information flow available to all investors and will ultimately find more rational and useful utilities for investors.

**Chart 2.4**  
**Investors Use of the Internet**



Source: ICI Investor Survey

**Buliding Blocks:**

- ❖ **Financial Services and the Internet:** Internet brokerage firms create a whole new class of investors and traders. The trading is very inexpensive, reducing friction and initially causing excess speculation in this class of investors. However, this period finds acceptance of the use of the Internet for financial transactions, the “friction effect” causing financial institutions to adjust fees and practices to accommodate customers.
- ❖ **Third Markets and ECNs:** technology makes new trading strategies possible improving efficiencies and taking advantage of reduced friction. The rise of algorithmic trading and third market venues has the dual effect of increasing volume and fragmenting liquidity away from the incumbent exchanges. This is covered at length in the coming sections.
- ❖ **Exchange Structures as Public Companies:** OM in Sweden was the first for-profit exchange, going back to the 1980s. The trend accelerated in the late 1990s To compete in the open architecture world for trading its become necessary to change exchange governance, expand trading capabilities and obtaining the capital to make the investments to survive

***2.10 “Play the ball from where it is”: Bringing it together***

The market for money is no different, in principle, to any other market: buying and selling of different forms of capital – equity, debt or their derivatives - for a price. This detour through the history of markets, lick Huck Finn’s trade, provides a foundation as we consider the future of market structures as public, for profit, technology-dependent entities. At the same time, it should inform the view that events, both exogenous and endogenous, are what usually induce meaningful changes to markets and their structure.

We have to “play the ball from where it is” as they say in the golf, not from where we might like it to be. All institutions and individuals wear their history, exercising it in due time or in response to events – or maybe not at all. The topic of this thesis is focused on “market structures” themselves, not the markets as defined by the companies, prices, characters and events that define them. Market structures, however, evolve just as the markets themselves do; providing more efficient, effective and creative gateways to the capital markets.

We opened the discussion with the notion that “creative destruction” – capitalism’s brand of Darwinism. It assures consumers get a better product and the risk takers get paid for the effort - throwing out what it doesn’t need and rewarding what it does. Each of the “Building Block” sections teases out principles that were produced by each era and endure today. Having passed the test of time they contribute to the market structures of today. The current round of changes in market structures will likely be additive to these principles, perhaps eliminating some and enhancing others.

There are a number of questions left to be refined and answered: What makes an “effective” market: Is it more volume? Low transaction costs? Speed of execution? Anonymity? Transparency? Does an exchange need to be a place? What should they charge for and what should they give away? Can it be a self-regulated organization as a profit center? More likely, it is some combination of the above with the all of the requisite tradeoffs. We will look to shed light on these questions as we progress. In the coming sections we turn to contemporary views of market structure, mechanics and the challenges market structures face today with a specific emphasis on the NYSE.

## **Section 3 – Market Structures**

The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man...

**George Bernard Shaw**

*Irish dramatist & socialist (1856 - 1950)*

**By the year 2000**, the “world”, as defined by the rules of the New York Stock Exchange, had been largely unchanged in the professional memories of the participants. Certainly markets and the participants had changed, technology and information flows had improved and volume continued to climb. However, the methods in which members traded on the exchange remained largely the same with only incremental changes. The end customers, mostly the asset managers, felt they had limited input and were not treated as the true customer. It was their view that the Exchange was being run for its membership: the sell side, specialist firms and floor brokers. For the member-owned public utility, it was clear who the “members” were. In this bastion of capitalism the customer’s voice didn’t really count...

Life had been good for the NYSE constituency during the boom years – member firms, floor brokers and specialists were reveling in their success their market’s position. It was hard to envision a need to adapt, unless, of course, you spoke to the buy side customers. The “buy-side”, in Wall Street parlance, refers to firms that manage money on behalf of clients – mutual funds, pension funds or hedge funds. The “sell” side is the brokerage firms that enact those orders on their behalf. The NYSE leadership at the time considered the “customers”, or at least their key constituency, to be the sell side and the exchange membership.

The buy side was considered to be “unreasonable” in their demands of the exchanges; and, up to now, had not been able to influence practices. What did they want? Simply, more of what they always wanted: liquidity, speed, anonymity, price. Liquidity basically means the availability of shares for purchase, or a buyer for shares you want to sell. The more “depth” the market had the less effect your order would have on the price either way. Speed – how quickly can my order get done – is function of systems, structure and depth of markets. Anonymity – I don’t want the markets to know my order is out there. And, of course, the best possible price for the execution and reasonable trading fees.

All of these demands were considered within the current confines of the “market structure”. Market structures are the set of conditions – rules if you will – that govern how parties interact with each other in a given market. In this section, we’ll cover the basic definitions of market structures, describe the structures of each the NYSE and the



NASDAQ, discuss in some detail the regulatory changes inducing changes and introduce the “third market” dynamic.

It was generally the opinion of the buy side that the way the exchange did business was not conducive to delivering their needs at the levels they wanted. And as volume grew, the stakes went up. In the spirit of George Bernard Shaw quote – the “unreasonable” were about to exercise their power.

There were three events that were about to tip the balance of power and the inevitability of change at the NYSE:

- 1) the public offering of Labranche in 2000
- 2) the events of September 11, 2001, and
- 3) The regulatory and governance challenges in 2003 that lead to Dick Grasso’s removal as chairman.

### *Labranche*

Labranche and Company (LAB) is the oldest and largest specialist firm on the NYSE. We’ll cover a bit later on what specialists do in detail, as their role is important. Labranche, like the NYSE itself, has a long and proud history, a fixture of the Exchange landscape since 1924. The firm is run today by Michael Labranche, the great grandson of the firm’s founder. He joined the firm in 1977 becoming chairman in 1996. During his tenure he has engineered enormous growth in his firm; leading with the vision and understanding that scale and capital were going to be important to his firm’s survival.

Specialist firms were traditionally small operations. They were family run businesses with not a lot of capital providing good profitability for their owners. Michael Labranche recognized markets were becoming more sophisticated and there would be a need to scale to handle the challenges they would face. As the order flow increased, customers would become more demanding and his firm would need more order flow to mitigate risk. First order of business was to get a bigger capital base and get more order flow. To achieve this, he began executing a classic rollup strategy in the 1990s, purchasing and consolidating other specialist firms. As a result, Labranche grew from approximately 2% or order flow in the 1970s to 28% today. As of 2006, Labranche oversees 648 stocks, of which 104 are in the S & P 500. In addition, they act as an option and structured product specialists on other exchanges and have an institutional clearing, execution and settlement business.

To fund the expansion of his firm and to monetize value for future acquisitions, Labranche & Co. completed a public offering in the year 2000. Specialist books were opened to the buy side as part of the road show effectively revealing the profitability of the specialists for the first time. This is like your banker telling to you how much she is really charging you for everything you do – and you have limited opportunity to switch banks if you don’t like it

The buy side reactions at the time ranged from incredulous to mildly annoyed. Why most of the buy side would have thought the specialist business should not be profitable is not entirely clear. What is clear is that the level of profitability revealed at the time indicated this was a good business and - in the eyes of the buy side – good and at their expense. This added to the already strong desire to experiment with ECNs and alternative trading venues to make them into more viable alternatives to the NYSE.

The interviews conducted for this thesis included the head traders of a number of prominent firms. When the subject of the NYSE and the Specialist based trading system was discussed, there was a unanimous acrimony towards the system and participants – even when evidence of efficiency is presented. In the end – there is a strong desire from the buy-side to trade with as few human intermediaries as possible.

### *September 11<sup>th</sup>*

The events of September 11<sup>th</sup> were tragic for the entire country and especially vivid for those working in the southern tip of Manhattan. The emotional mark of being close to an event like that is something that will be ingrained in the memory of the financial district forever. Following the attacks the markets were closed for 4 days; but the closure was only part of the story. The strain on the infrastructure of the financial system was enormous. Trading and clearing systems were damaged, telecommunications pipelines were severed, and thousands of records were lost or damaged. Beyond the infrastructure damage, the question then became where to physically locate displaced workers – and how would they get transportation to work in the crowded tip of Southern Manhattan. Could you ever bring them back to the Wall Street area?

The notion of the exchange as a physical place has been debated for some time – the structure and rivalry of the NASDAQ had prompted this discussion although it was not seriously considered. For the NYSE, the trading floor and auction market never felt significantly threatened by the new electronic competitors around it. Now, the new reality of the terrorist events called into question one of the very basic tenants of markets and price discovery on the NYSE – the closeness or “propinquity” of the trading activity. The interaction of the floor traders and specialists was thought to be the best way to determine prices, facilitate trades. As noted in Section 2, stock exchanges originally formed as places to congregate liquidity and information flow – the culture and efficiency of the markets have depended on this for centuries.

While the physical nature of the market remains unresolved, what 9/11 did cause was a massive increase in the security necessary for the Exchange building on Wall and Broad – resulting in more fixed costs. It also focused the technology and infrastructure spending on redundancy and fail safe processing on the network – with the support and encouragement of the SEC – and without grounding systems decisions in the economic value of the systems. This would become an issue later as trading volume increased and the algorithms arrived on the scene.

## *Organization and Governance*

Finally, there were the governance issues that became evident by the disclosure and subsequent public furor over the compensation of the NYSE CEO Dick Grasso. Regardless of opinions on the suitability of Mr. Grasso's compensation, it became clear that there were significant governance issues at the exchange that would have to be addressed. The size, composition and focus of the board would have to change if the NYSE was to repair its image and credibility.

The transition to more comprehensive governance began by installing John Reed as a temporary chairman. Reed brought immediate credibility and authority to the post. Also, the temporary nature of his appointment and his standing on Wall Street provided Reed with the necessary mandate for a thoughtful restructuring of the NYSE's governance.

After considering the issues, the players, and what the leadership would need to look like, Reed installed a system where the board would be smaller, more focused and broadly accountable. Reed appointed Marsh Carter the prior chairman of State Street Bank as the non-executive chairman. The new president, John Thain, came from Goldman Sachs bringing a strong technology and financial background. Thain brought an understated credibility to the exchange, but more importantly, was someone who understood the customers. Given a deep background in technology, he also understood the opportunities and threats technology presented to the current structure.

Ultimately, a big part of the decision to become a public company was about governance. The owners of the exchange – the seat holders - had become disconnected with the daily operations and economics of the exchange. Many were merely extracting lease revenue from their seats and did not pay attention to decisions being made on a day to day basis. Thain knew that going public would induce transparency and accountability while creating the catalyst for the cultural change necessary for the NYSE to survive. Public companies demand value creation through responsible governance and resource decisions. Also, being public would provide the opportunity to acquire the technology and platform needed for the exchange's long term survival.

The ship had turned: the exchange was now on a path towards a public offering, a considerable investment in its infrastructure and technology and a rethinking of the basic functioning of the NYSE. A path, as we will see later, that has been traveled by non-US exchanges. The events reflect an underlying economic shift that mirrors other industries in transition and provides us with some clues as to what to expect here.

### ***3.1 Market Structures: Out of Chaos comes Order...***

Most people have heard of chaos theory (at least at MIT). It comes from the fact that the systems that the theory describes are apparently disordered, but chaos theory is really about finding the underlying order in a disordered space. "Chaos" was first discovered by a meteorologist named Edward Lorenz through a series of weather prediction experiments and the subsequent assertion that there is an underlying order to it.

Among the characteristics of chaotic systems is sensitivity to initial conditions, popularly referred to as the “butterfly effect.” Basically, the behavior of systems appears to be random even without random parameters. Or more simply, minor variations in a system’s conditions can create significant changes in the long-term behavior of the system. The difference in the starting points is so insignificant that it is comparable to a butterfly flapping its wings.

From these insights, Lorenz determined that it is impossible to predict the weather accurately. Taking this to the subject at hand, stock analysts and business executives should display the appropriate level of humility when predicting “sunshine” or “rain” in their respective domains...

Allowing some license on this analogy; the idea here as it applies to market structures is that they have an underlying set of rules that will govern conditions in the behavior of participants. Minor changes in the needs or behavior of any of the players can change the dynamic of the system. Intuitively, market structures should be deterministic of the outcome of market behavior (in how the market functions, not stock prices themselves). But as the markets parameters have changed, the behaviors will iterate and evolve faster and in a less unpredictable way. There are more players, more competition, wider regulatory latitude and more technology than the system has had in the past. Like in chaos theory, the smaller details can make all the difference in which exchanges grow and which ones will struggle.

Most people think a stock market is a “chaotic” place, with traders waving their hands and screaming at each other in an effort to trade for themselves or fill orders. The media hasn’t helped in this regard and we’ll dispel some of that later when we discuss the anatomy of trading. But what seems to be a confusing system actually has an underlying structure, rules and a method to the madness.

First let’s define what we mean by the term market structure. In the first section, I referenced the origins of the term “market structure” coming from the field of industrial organization. It’s only been in recent years that it has been commonly applied to stock markets or trading venues. In the context of this work, when we say market structure we are referring to the rules of engagement and infrastructure that govern a market for trading securities.

The term “micro-structure” is used to refer to the lower level details of how the market structure is implemented – how orders are placed, matched, cancelled, what information about orders is disseminated and the fee structures in any given trading venue. The rules get to the basic mechanisms for trading and price discovery, how you engage or why you choose that particular market or ECN. Increasingly, the choice of venues has to do with precisely this issue. The customer is making a decision balancing their needs for speed, depth, anonymity. In any given stock for any given trade, where do they obtain the optimal combination?

The fundamental difference between the two primary markets in the United States, the NYSE and the NASDAQ, is the way securities are traded. The NYSE is an auction market where buyers and sellers are negotiating a price and trading with each other. The highest bidding price matches with the lowest asking price and a trade happens for the amount offered by each side. The NASDAQ is a dealer market, where individuals are buying or selling securities from a dealer's inventory. Each dealer has a "bid" - the price they will buy from you - and an "ask" - the price they will sell to you. The NASDAQ bid ask is from their own inventory of that stock and the best bid and ask may not be from the same dealer. In the NASDAQ you may buy from one dealer and sell to another. The difference between the best prices on either side of the market is referred to as the inside spread.

Because of these differences, the NYSE has always been a physical place where the NASDAQ is a network of dealers represented by electronic quotes. Before the 1970s, the limiting factor in the efficiency and credibility of the OTC markets had been inconsistency in price and the need to shop a number of different dealers to affect a trade at the best price. Once the system went to an electronic platform in 1971 it was able to provide more consistency and transparency in its quotes. The electronic nature of the market has made it extremely scalable with no need for a physical location

### ***3.2 NYSE – Something Old, Something New, Something Borrowed and Something Blue...***

The marriage with Arca is the inspiration for the tag line of this chapter. The floor is old, the public ownership is new, the Arca platform is borrowed and their stocks are blue (chip that is...). The market structure of the NYSE is important to understand. We'll talk about the shift in governance and the specialist system which will help to understand the proposed changes and progression of the market structure.

The New York Stock exchange has historically been run as a non-profit, member owned institution. As we covered in Section 2, the origins and purpose of the organization was to provide traders with a central location and some structure in which to ply their trade. In time, rules got more sophisticated but the basic structure and trading rules have stayed largely the same. The profits the Exchange made were intended to support the infrastructure and regulatory frameworks necessary for the members to run their business.

The owners of the NYSE were the seat holders. Owning a "seat" made you a member of the exchange, subject to its rules and a beneficiary of its position as the worlds premiere securities exchange. The exchange has always had a president and a governing board of directors. It was not until the 1950s however, that the president's position became a full-time paid position. This gives you some idea of the stability of the organization – it basically ran itself for a long time.

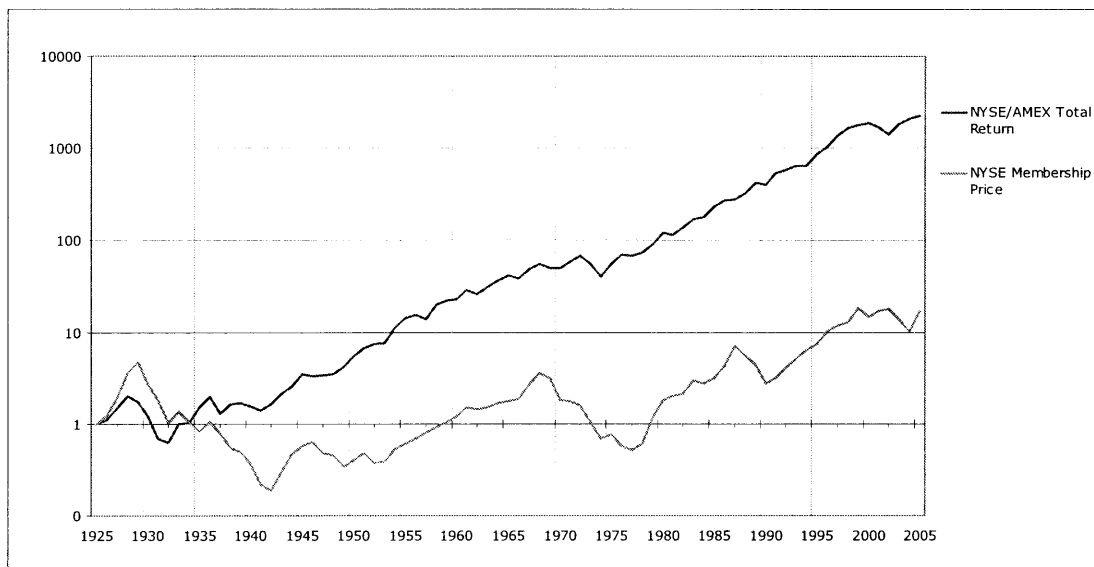
You can consider the growth of seat prices as a proxy for how attractive the business of trading was at any one time. You could lease a seat if you did not want to buy one, which allowed you access to the trading floor, but no voting or membership rights. In fact, leasing became increasingly prevalent in latter years with "absentee ownership" becoming an increasing concern. Seats could generally produce lease revenue of 10-12%

of their value. The income stream provided a tidy investment for their owners and not a lot of incentive to sell, a trend that accelerated in the 1990s.

Seat prices as you can expect, have generally traded “directionally” with the market but are not as highly correlated with the absolute return as you might think. Seat prices were influenced by the market but have not been a great investment for long term appreciation until recent years.

Chart 3.1 depicts seat prices on a relative basis to the NYSE/Amex Total Return index since 1926. As you can see, seat prices didn’t follow the big moves in the markets in the 1960s and 1980s. But as the seats were increasingly leased (at 10%+ “rents”), seat prices started to trade more directly with the markets.

**Chart 3.1**



*Source: NYSE Data for Seat Prices – prices reflect mid point of high and low sale price for each year  
Center for Securities Price Research Database, NYSE/AMEX composites*

One striking fact is that a seat in 1929 sold for as high as \$587,000 – it wouldn’t surpass that price again until 1987 the year of the next big crash! One of the insights you can derive from this is that seat ownership was a high beta investment – sensitive to exchange volume which in turn would determine the income an owner could derive from it. However, given the lower return on the value of the seat versus broader equity returns, it also infers that the value of the institution may not have been maximized. The broad indexes were a much better investment for the last 50 years than the seat value alone.

The comparison, however, does not take into account income derived from a seat (which is difficult to estimate). This brings us to an important insight on the decision to go public, combining the economic benefits under one entity to maximize value. By reclaiming some of the seat revenues - NYSE Group now controls the trading licenses - and the residual value of entry to the markets the public company returns should look more like the broader markets.

To get more value from the new entity, part of the strategy will be to diversify and smooth revenue streams. Otherwise the NYSE Group's stock may have similar characteristics to historical seat ownership. It seems they understand this well and are making moves to do just that. More on this point when we discuss exchange business strategy in Section 8.

### *Specialists and Market Makers*

In both the NYSE and the NASDAQ, there is a person that governs the trading flow – a traffic cop of sorts. The control of the trading flow is governed by a Specialist on the NYSE and by a market maker on the NASDAQ. The market maker on the NASDAQ literally “makes a market” by buying or selling stocks from his own account. The NYSE Specialist, on the other hand, facilitates trading in the “crowd” or buying and selling on his own to keep the market moving.

The NYSE Specialist has historically played an important role in the market. Part traffic cop, facilitator and stabilizer. The term “Specialist” is a bit antiseptic and not necessarily descriptive of the role and influence the position has held. Perhaps a more eloquent association can be drawn with the translation of the position title from the German and French equivalents of the position.

The Deutsche Borse referred to specialists as “Betreuer”: translating to care taker or personal agent with a connotation that the person is considered a responsible leader. On the Paris Bourse, the term was “animateur de marche” which has the colorful translation of bringing the market alive and also having a connotation of “leader”. Anyone who has been on the floor for an opening of a stock with a news event can appreciate the intent of these translations. While the translations are more descriptive of their roles, the fact is that these positions have been eliminated in both France (Euronext) and the Deutsche Borse as the exchanges moved to fully electronic trading platforms.

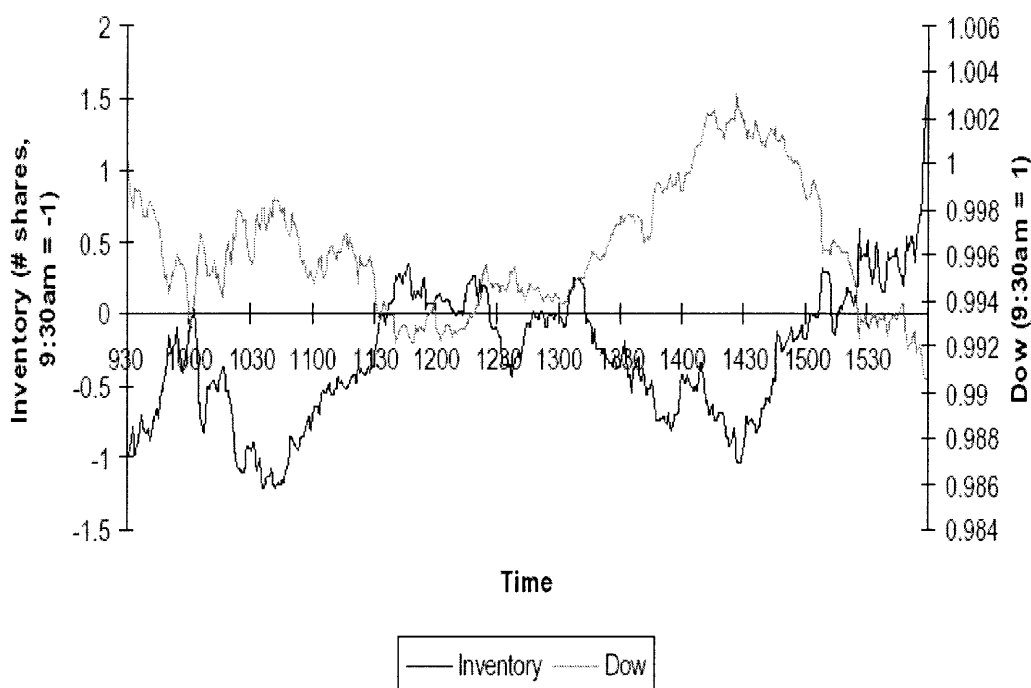
On the NYSE today, a specialist performs five essential functions:

- *Manage the Opening Process* – the specialist oversees setting of an opening price for the day
- *Execute Orders for Floor Brokers* – they can execute an order immediately or hold it for its limit price. As a dealer, the specialist will buy or sell stock from his own inventory to keep the market liquid.
- *Serve as Catalysts* – they are the point of contact between brokers with buy and sell orders. The specialist facilitates bringing buyers and sellers together to enable a transaction that would not otherwise have happened.
- *Provide Capital* – if orders on one side (buy or sell) of the market outpace the other side, the specialist is required to use his firm's capital to minimize the imbalance. Usually the public orders will clear each other out – specialists participate in less than 10% of all shares traded (see graphic)

- *Stabilize Prices* – to ensure price volatility is minimized, a specialist will step in against the market trend to cushion temporary imbalances.

While the value the Specialist provides is debated among the buy side for its legitimacy and necessity – there is evidence the system has a stabilizing effect on prices. One way to demonstrate how stabilization works is the inverse relationship between movements in the market and overall specialist inventory. The following chart shows movements during the day in average specialist inventory versus movements in the Dow.

**Chart 3.2**



Source: NYSE

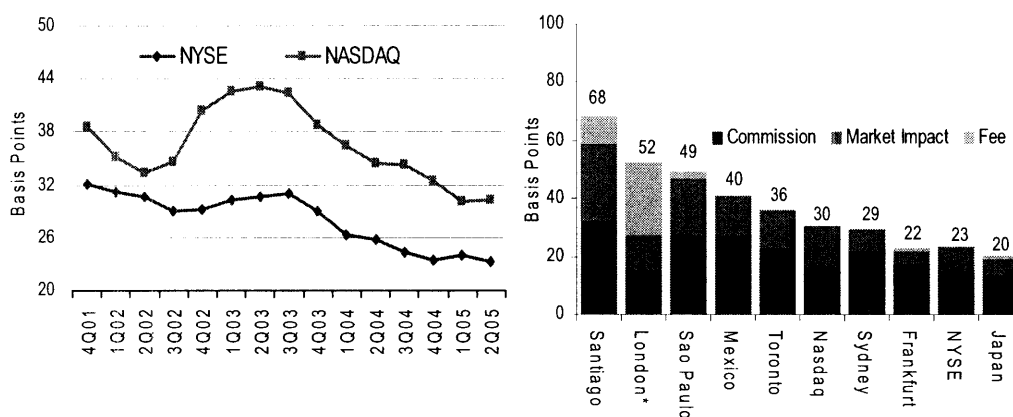
Specialists only participate in about 9% of the trading in the stocks they cover, but the evidence is that there is lower volatility and tighter spreads as a result. The issue then becomes speed of execution and the potentially conflicted role of a specialist. Since they hold a privileged position in the market, they have the opportunity to step in front of trades, potentially increasing the prices of stocks they trade.

The specialist and floor broker system is a legacy of the original tenants of price discovery. Congregation, a central place for the clearing of the volume, has historically provided an efficient market. The evidence is that on almost every aspect of trading the NYSE, spreads, price improvement, depth of market, the NYSE outperforms other markets. At any one time, however, an investor has to decide what combination of these attributes is most important to him/her and choose a venue accordingly. In research papers produced by the NYSE (Bacidore, Ross and Sofianos 2003) the choice of venue



and the concept of best execution can be very sensitive to calculation methodologies. When aggregating the available data it appears that the NYSE is still the lowest cost venue to execute on. This doesn't mean however, that it's always the best.

**Chart 3.3**  
**NYSE is consistently ranked among the very lowest cost venues globally**



Source: Q2 2005 Elkins/McSherry Global Universe  
 \* London figures represent average of buy and sell side costs.

So while we are considering the effectiveness of market structure here, it's also worth discussing the Auto Ex or Direct+ System of the NYSE. Today, the NYSE has a system that handles orders up to 1099 shares electronically. These orders are routed directly to the specialist's book and are executed automatically, quickly and anonymously. This system had been primarily intended to handle retail order flow, with block trading (10,000+ shares) being handled by floor personnel. As of Feb 2006, Direct+ trades represented 13.9% of average daily volume or 232 million shares. As we'll cover in Section 4, this system is currently what enables algorithmic trading on the NYSE.

The NYSE clearly recognizes that more volume will be traded electronically and having the systems to handle this efficiently will be a key to their success. That said there is a school of thought that dictates the "crowd" experience provides a better venue for execution. The Hybrid model proposed by the NYSE attempts to provide both an electronic trading platform as well as a robust floor experience, guided by customer choice. While the value proposition sounds logical, the implementation will be a challenging proposition especially when it comes to effecting behavior and preferences of customers.

### 3.3 The Hybrid Market – A Prius or an Edsel?

What is a "hybrid"? *Dictionary.com* tells us that hybrid means the following:

1. Genetics. The offspring of genetically dissimilar parents or stock, especially the offspring produced by breeding plants or animals of different varieties, species, or races.
2.
  - a. Something of mixed origin or composition.
  - b. Something, such as a computer or power plant, having two kinds of components that produce the same or similar results.
3. A word whose elements are derived from different languages.

When considering of the merging of a fully electronic market with a floor environment – the definition seems to fit. They are two species to be sure, the traditional floor broker model along with a fast market electronic platform. Their origins are definitely mixed and the players on each side speak different languages.

Maybe one of the best ways to simplify an explanation of a hybrid trading market is with a comparison to the increasingly popular hybrid automobiles. The hybrid auto is a combination of traditional gas and electric technologies. The car is engineered to use whichever one best suits its needs at any one time; gasoline for acceleration and speed, electric for cruising and low power driving.

The concept behind the choice the NYSE is providing is basically the same. To guide investors where they want to go based on how they think their order will be best executed. The question that will be answered is: will the hybrid satisfy a real need (Prius), or become a redundant marketing effort (Edsel)? As we just discussed, there are a variety of tradeoffs an investor faces when looking where to trade. We'll expand on strategy in section 8 – for now it's enough to say that if the NYSE as a structure can satisfy multiple needs of its customers it will continue to draw liquidity.

The hybrid market will give investors choice between:

- Floor executions with the potential for price improvement – in some situations the investor may see conditions where the floor may be able to provide a better price
- Fully electronic executions without floor exposure – speed and confidence of the electronic orders through Direct+.

This will be achieved through a sophisticated new system being introduced by the NYSE called Auction Limit (AL). The system routes the AL order at the customer's request to the specialist. The specialist exposes the order to the floor for immediate price improvement. If he is not able to get it he will then quote the stock one cent from the best bid or offer. If the market doesn't move within a prescribed period of time, the specialist will then sweep the order against the book up to the limit prescribed by the customer or until the order is filled.

Basically, the translation of what is happening here is the floor gets a look at the merchandise to see if they want to buy it at a better price. If not there are a set of rules that route the order for execution against the electronic bids. If it works, it is the best of both worlds...

To be clear, this example is simplified for purposes of the explanation. The supplemental filings with the SEC on Hybrid and Auto Ex provided examples of how 27 different transaction types would be executed in a hybrid environment. All transaction types have essentially the same spirit, choice for the investor in venue based on their needs and assessment of market conditions. However, like any change of this magnitude changing the behaviors of the participants is likely to be the greatest challenge. The floor brokers, specialists and customers all have to be educated on the benefits and taught how to navigate an inherently complex system. Don't look for complexity to be eradicated from the system any time soon.

There is a school of thought that hybrid is a noble experiment – a stop gap to satisfy the floor constituency as an interim step towards a fully electronic platform. Speculating on the intent won't be conclusive. It does appear to be a brilliant first move by the NYSE to differentiate their trading platform from the NASDAQ. The benefit of competing exchange venues is choice, transparency and potentially innovative new methods. Like the hybrid car – it represents the best of what's available today while a more permanent solution develops. The market will eventually decide whether or not hybrid trading is a commercial success: a Prius or an Edsel.

#### ***3.4 NASDAQ – in this corner, the challenger. Weighing in with 3500 listings and \$8.7 Trillion in annual turnover....***

The NASDAQ has emerged as a formidable competitor to the NYSE. Like an up and coming boxer, they are in fighting shape and in position to compete for the title. The boxing analogy is fitting as the NASDAQ has established themselves as a scrappy and tenacious competitor for volume, listings and for potential acquisition candidates.

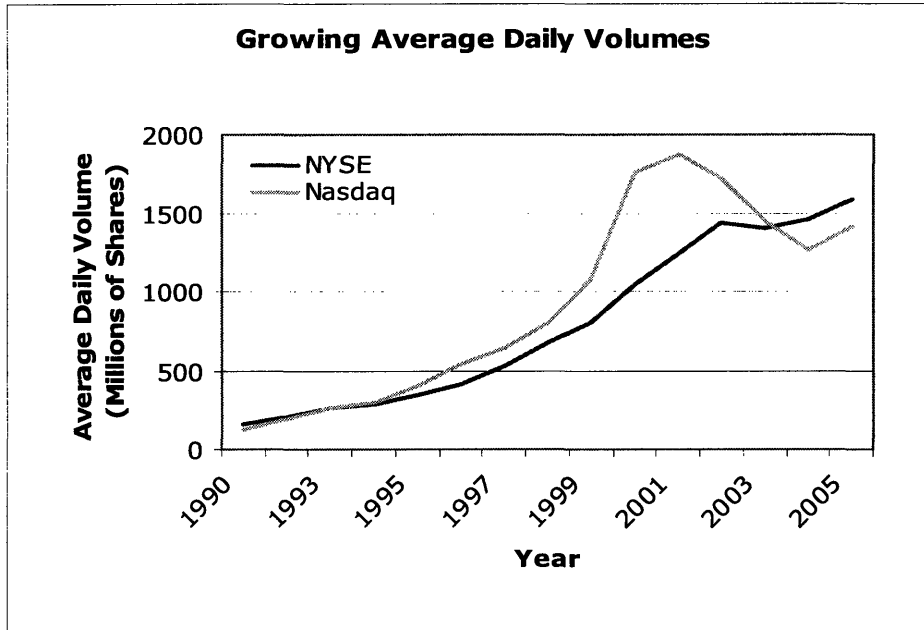
NYSE stocks trading on the NASDAQ is not new, but has become more prevalent in recent years. Brokers can trade in NYSE stocks and “print” or record that trade on the NASDAQ or any other NSM exchange. The move to open architecture as it relates to choice of venue has created the opportunity and challenges for the NASDAQ. They can make inroads on the NYSE volume, but with the new structure at the NYSE, there is competition for their stocks as well.

Technically, all of the stock on the NASDAQ is sold through the market makers. They buy or sell into their own account and will look to move the stock and earn the spread. This is why volume statistics on the NASDAQ are recorded differently than the NYSE. That is, 100 shares traded via NASDAQ it is recorded as 100 sold to the market maker and 100 he would then sell out to someone else. The same trade on the NYSE, regardless of whether the Specialist or a floor broker bought it would be recorded as 100 shares of volume versus 200 on the NASDAQ. Keep this in mind when comparing volume statistics on both exchanges.

That said NASDAQ has grown by almost 15 xs over the last decade. Volumes going from approximately 100 million shares per day in 1990 (50MM by NYSE accounting) to

1.5 Billion today. Chart 3.4 shows the parallel growth of volume on the NASDAQ and NYSE. By any accounting measures, both venues have experienced dramatic growth.

**Chart 3.4**

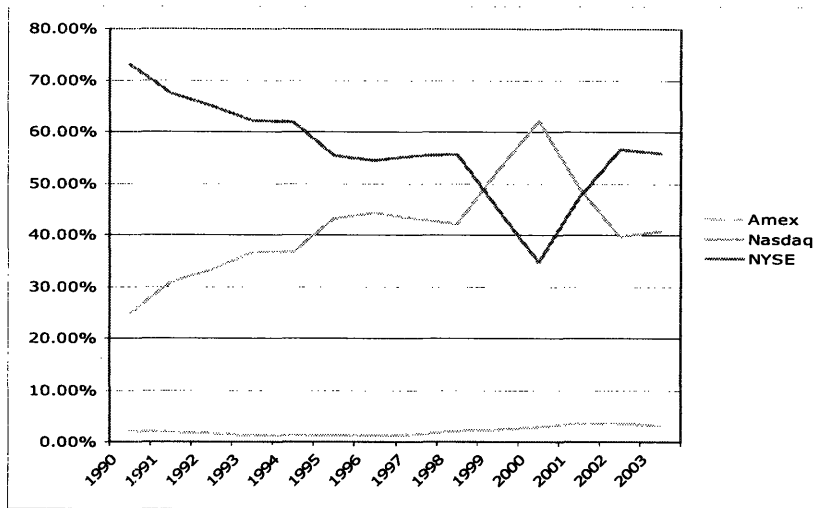


*Source: SIA Factbook*

NASDAQ is a faster and more scalable model than the current form of the NYSE. Since they are basically a network of dealers linked by computer systems, the market requires less human interaction and relies primarily on their technology. The NYSE is still clearly the larger market, making up the majority of trading volume and market capitalization.

When you consider trading volumes among the major exchanges, the NASDAQ has definitely closed the gap – even exceeding the NYSE during the Internet bubble. Chart 3.4 shows the relative market shares over the same period.

**Chart 3.4**



Source: SIA Factbook 2005

t's lower barriers to entry and more relaxed listing requirements also have made the NASDAQ an attractive place for younger growth companies. Historically, companies would list on the OTC or NASDAQ markets and then "trade-up" to the NYSE when grew in size. Today, many companies no longer feel it is necessary to move their listings to the NYSE once they become eligible. This became evident during the 1990s when Microsoft, Intel and Cisco became the darlings of the Street. They grew to become the companies with the largest market caps in the world. Despite the NYSE's best efforts to lure them away - even reserving coveted NYSE symbols for them - the companies decided to remain loyal to the NASDAQ.

In the last 5 years, only 35% of the IPOs have been eligible to list on the NYSE. However, of those 35%, 90% did choose to list on the NYSE. The battle for new listings is likely to heat up as there is a clear recognition by each competitor that once a company lists on a particular exchange, moving them is difficult. The battle is waged at the IPO.

The debate has raged for years, heating up considerably in the last decade, as to which of these "market structures" is superior. The dialogue spans issues from liquidity, costs, depth of market, speed of execution, anonymity. Each market feels strongly that their structure provides more value more than the other. The NYSE has had a "fortress" of liquidity - essentially the advantage of incumbency when it comes to price. But by virtue of their structure, a floor based model, the NYSE could not execute with the same speed as NASDAQ. Which structure offers better quality can be debated - for now you could probably sum it up as speed goes to the NASDAQ with spread going to the NYSE.

A notable development has been the increase of NASDAQ market share in NYSE listings. Most of the increase is through internalized trading at sell side firms. That is, a firm like Goldman Sachs or Merrill Lynch may have customers that are on either side of a trade, one wants to buy the other wants to sell. They can effectively trade this stock on their

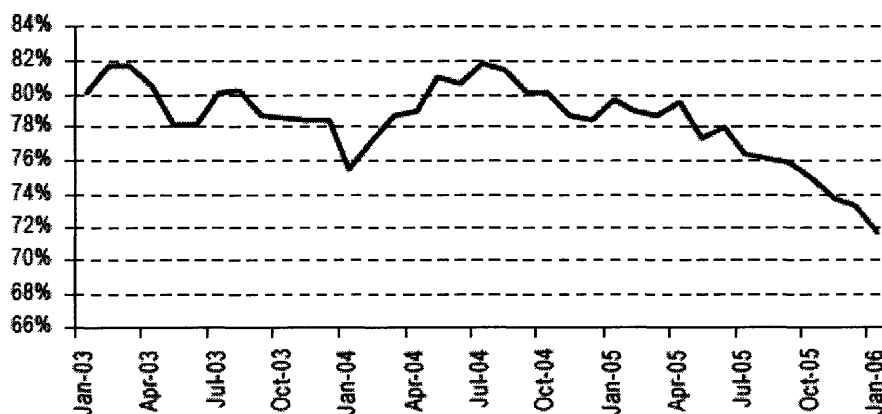
own, capturing the spread as well as commissions on both sides of the trade. The trade has to then be reported or “printed” on a major exchange. They can elect to report the trade on the NYSE, NASDAQ or any of the regional exchanges. As NASDAQ has made the cost and mechanics of completing trades away from the NYSE palatable for internalized order flow, they have captured market share.

Another look at market share may be more telling – that is a view of the last few years. This would reflect the “print” business that goes away from the NYSE, the third market activity as well as NASDAQ trading in NYSE stocks. Chart 3.5 shows the declining share of just the NYSE sine January of 2003.

The economic benefit of capturing “print” business is limited. The NASDAQ and Regional Exchanges are likely betting that by capturing this flow at very thin costs they can leverage it into order flow. Suffice to say that in any business where one competitor has 80% plus market share, it’s not a competitive business. The balancing of market share and open architecture for trading will ultimately benefit the customers and reward the most efficient provider of services.

### Chart 3.5

**Chart 15: NYSE Market Share, 1/2003 – 1/2006**



Source: NYSEData.com

In reality, both have some advantage and like many things in business and life, the answer lies somewhere in between. What is not debatable is that the NASDAQ market structure has become a considerable force in the financial markets. When you speak to buy-side traders, regardless of any evidence to the contrary, they almost unanimously prefer trading on the NASDAQ. Low touch and speed seem to be winning the day – for better or worse.

### ***3.5 Reg NMS and the Third Market – “I’m from the government and I am here to help”***

Our tag line here is one that most businesses know. When the government gets involved in any “helpful” way be sure that you are about to experience some change. Amendments in regulations – whether they get tighter or looser – stimulate developments in any industry.

The “Third market” refers collectively to venues other than the 2 primary markets (NYSE and NASDAQ) for trading equities. The third market consists of Electronic Communication/Crossing Networks (ECNs), or Alternative Trading Systems (ATS) are trading venues that connect brokerages and traders so they can trade directly between themselves without having to go through a middleman. The third markets have all been created by changes in regulation.

While the primary market listed companies make up essentially all of the publicly traded equities in the United States, it is not necessary to actually trade those securities on the markets where they maintain their listing. That is, if you can find a buyer or seller through another trading venue, you can complete your trade on that platform and record or “print” it on any of the major or regional exchanges – as we noted with NASDAQ. This is a relatively new phenomenon and is a major disruptive force in the world of exchange structures.

There were three major regulatory events that have enabled the “Third Market” platforms and will have a significant effect on all market structures in the future:

- The National Market System (NMS) rules,
- the Order Handling Rules in 1997 and
- Regulation NMS updates in 2005.

I recognize that any discussion on regulation or compliance is destined to frighten the reader – but trust that this is germane to the overall picture by introducing nomenclature and concepts that are relevant to later discussion. I promise to keep the regulatory points as painless as possible...

#### *National Market System (NMS)*

The Securities and Exchange Act of 1934 act grants the SEC rulemaking authority to assure equal regulation of all national markets – this was in response to the events of the 1929 crash and the formation of the SEC. So while the Exchanges are considered to be Self Regulatory Organizations (SROs), the SEC is the primary regulator for the exchanges.

The National Market System (NMS) was created in 1975 under the 1934 legislation. The goal of NMS was to take advantage of technology, and communication enhancements to

link markets trading securities and to promote efficient, fair and orderly markets. The NASDAQ was born out of these rules – linking together multiple dealers into one quote system. The basic goal of technological enablement of the markets has been fulfilled, with periodic updates and amendments to the rules. However, since the rules were created the market has seen a significant increase in volume and intense competition among new market centers and trading venues.

The increase in volume and competition is predictable, following one of the basic tenants we noted in Section 2. Market structures will respond to reductions in “friction”. Whenever you lower cost, increase visibility, and improve speed/efficiency – increased volume is bound to follow. The spirit of the National Market System (NMS) is to promote and regulate growth in exchanges across the US – and to update as conditions require.

#### *Order Handling Rules (1997)*

The Order Handling Rules, as the name suggests, govern the routing and execution of an order by an exchange venue. The rules as amended in 1997 require a market maker to display customer limit orders that are priced at or better than the market maker’s current quote if not immediately executed. This effectively means that an individual order can more directly influence the market as the market makers and specialists are required to either immediately execute the order or show it for other to take.

Alternatively, a market maker can place the order into an eligible ECN that displays the order to the market. By creating a system that induced choice and transparency, these rules enabled the creation of the ECNs. As a result, we saw a plethora of ECNs being created by this rule, which we will cover in the next chapter.

#### *Regulation NMS 2005 (“Reg NMS”)*

This is the mother lode of regulatory developments and has sent a wave of activity through the industry. The intent in updating the existing Regulation NMS rules is to encourage and regulate efficient competition in the equity markets. The SEC has proposed and will implement four substantive additions to NMS:

- An order protection rule with uniform “trade-through” rule for both exchange and NASDAQ listed securities
- A uniform market access rule with a de-minims fee standard
- Sub penny quoting rules prohibiting market participants from displaying sub penny quotes except for stocks trading under \$1.00
- A modified system for the dissemination and pricing of market data

We’ll take these one at a time and briefly state why they are important to the evolution of market structures, their economics and our discussion here.



### *Order Protection Rule*

This is more commonly known as the “trade-through” rule. Trade through is when a market such as the NYSE executes an order at a price that is inferior to the price of a protected quote displayed on another market. The protected quote is often a limit order, which typically establishes the best price for a stock.

Bids and Offers for NYSE-listed shares offered on the NYSE, NASDAQ, ECNs and Regional Exchanges are linked together and are visible to all market makers. The trade through rules are intended to promote competition among all markets to improve prices and protecting investor interests. The basic idea being to assure that investors receive the best price when trading regardless of where their order is routed.

Trade through rules require exchanges to execute these orders away from their market when a better price exists or amend their price to match the alternate quote – controlling the order does not permit the exchange to execute at an inferior price. The goal is to encourage greater use of limit orders and thereby increase market liquidity. The rhetoric on the issue is around the assurances that smaller, retail investors are treated fairly when participating in the market with larger orders. As a practical matter, exchanges will not be inclined to send their order flow elsewhere, so it is more likely they will improve their price rather than send the order away.

The SEC's new trade through rule in Reg NMS has three parts:

- **Opt Out:** It would allow investors, on an order by order basis, to opt-out of the trade through rule. Investors may prefer speed of execution over the distribution of their order to different market centers. A given market may offer the depth necessary to complete the trade. So basically, the investor can trade price improvement for other elements (speed or depth) that they may decide are important for that trade. This is an advantage for the NASDAQ in that they have been disadvantaged in competing for NYSE volume on the basis of best price alone as the NYSE maintains the largest pool of liquidity. NASDAQ will be able to use its speed to its advantage.
- **Fast Market:** It would allow traders on automated, “fast markets” to trade through the prices on non-automated markets provided no more than a .05 difference. Again, speed and turnaround is important – particularly in the algorithmic trading where executions are expected in sub second increments. This encourages non-automated markets (e.g. NYSE floor) to gain a “fast market” designation. While Opt Out is a customer’s choice to execute away from best price, Fast Market favors the exchange and disadvantages floor based trading.
- **NASDAQ:** It would apply the trade through rules for the first time to NASDAQ stocks, which had previously been exempt. This puts the NYSE and NASDAQ on equal footing, from a regulatory standpoint, to compete for volume in stocks listed on each exchange.

Each constituency clearly has strong opinions on these rules as proposed. As you can guess, the NYSE had some opposition to opt out and fast market and the NASDAQ was vocal on being included for trade-through.

Of all the Reg NMS rules, trade through will have the most significant impact on all the players. Clearly, exchanges would rather control their order flow. While there is some flexibility with this rule, what it underscores is the increased transparency, efficiency and competition among market centers. There will be no hiding or price advantages gained from incumbency. Order flow will follow liquidity, and depth. A market center will have no choice but to be competitive to gain liquidity and order flow – the life blood of an exchange.

#### *Access Rule*

ECNs have become more active in the equities markets and lack of a standard quoting convention has made it difficult to compare quotes across venues. Most ECNs impose a per-share access fee which are not reflected in these quotes – so they may be deceptively narrow in their spreads.

There is a view that the dramatic rise in locked and crossed markets in recent years can be attributed to the proliferation of access fees, charges and liquidity rebates. The latter will typically rebate the customer for placing a limit order while imposing access fees on orders that execute against them. Basically, you get paid for providing liquidity and you pay for taking it. The notion of locked market is when temporarily the bid and ask are equal, resulting in no spread. A crossed market is when a bid price exceeds the ask price resulting in a negative spread.

This happens because there is uneven access to ECN markets. The solution here is to make the quotes available to non-subscribers to even out the flow. ECNs typically share per share access fees to non-subscribers (members) for quotes on their markets. These fees are generally similar to fees that subscribers pay to trade with ECN orders. In the past, the ECNs could show quotes only to their subscribers if they wished. Since the ECNs are now *required* to display their quotes, the SEC is allowing them to charge market data and access fees.

Exchanges and ECNs price their services to attract activity and liquidity. Most pricing plans will charge the broker to take liquidity (sell) and rebate for providing liquidity (buying). The net relationship is usually 3/2 - .03 charge versus a .02 rebate. A skinny pricing mechanism to be sure and one that will vary greatly with volume. Having the ability to charge for quotes provides another source of revenue to ECNs and will likely encourage more investments in those venues.

This change does standardize and further legitimize the third market quotations. While some players commented on the issue of the regulators setting the market – for the most part this regulation will further enhance ECN volume.

*Market Data Dissemination*

The rules for disseminating market information to the public and the allocation of the revenue derived are being amended. Today, quotes are collected real time from market centers and then distributed to the public on a consolidated basis. Market data is a very real source of income for the exchanges. The theory being that one of their basic functions of the exchange is “price discovery” and that this data is theirs to benefit from. The data (prices mostly) is sold to market data providers and the revenue is then distributed to the providers based on a formula.

There are three basic types of data: Network A – NYSE, Network B – Amex and other National Securities Exchanges, Network C – NASDAQ. The allocation formulae today is based on the number or share volume of a market’s reported trades. Network A and B allocate net income based solely on number of trades – Network C allocates income based on an average of a participant’s number of trades and its share volume.

Each Network establishes fees for this data which must be approved by the SEC. The Networks collect these fees and, after deducting expenses, distribute the remaining revenue to their SRO participants. The basic purpose of the SRO participation is to fund regulation and oversight. As you can see from the following table (3.5), \$434 Million in revenues was collected for data of which \$393 Million was distributed to the participants. Not an insignificant amount of revenue for any of the exchanges – and one that is likely to continue growing.

**Chart 3.5**  
**2004 Financial Information for Networks A, B, and C**

	Network A	Network B	Network C	Total
Revenues	\$165,588,000	\$103,901,000	\$164,656,000	\$434,145,000
Expenses	10,317,000	3,921,000	26,196,000	40,434,000
Net Income	155,271,000	99,980,000	138,460,000	393,711,000
<b>Allocations:</b>				
NYSE	140,661,000	1,296,000	0	141,957,000
NASDAQ	8,296,000	8,360,000	61,672,000	78,328,000
PCX	2,091,000	43,276,000	30,804,000	76,171,000
NSX	694,000	14,498,000	36,717,000	51,909,000
Amex	0	28,301,000	30,000	28,331,000
BSE	1,345,000	850,000	8,757,000	10,952,000
CHX	1,995,000	2,946,000	480,000	5,421,000
PHLX	189,000	446,000		635,000
CBOE	0	7,000	0	7,000

Source : SEC Reg NMS Final Documents pp 238

Using formula based allocations whether for compensation, ratings or rankings or, as in this case, revenue allocation, give you a decent answer that reflects your intent *most* of

the time. As the environment changes, they also need to be revised as their original intent becomes frayed or participants stray from the spirit of the formula.

The current formula has several drawbacks. Some markets engage in the fraudulent practice of “shredding” the trades – the practice of taking large trades and parsing them into smaller trades resulting in an increase in the number of trades and hence the revenue. Also, the current formula considers only the number of trades and quotes reported by the SRO but not the quality (those that have the largest sizes and best prices).

The objective of the amendments is to preserve the current benefits while addressing problems with the current rules. The changes fall into three categories: 1) modifying the formulas for the data revenues to more appropriately reflect each SROs contribution to “price discovery”, 2) establishing non-voting advisory panels to broaden participation and 3) updating and streamlining exchange rules that govern distribution and display of the data.

The proposed new formula provides the SROs are entitles to receive annual payment equal to the sum of the SROs trading shares, quoting shares and NBBO improvement shares in each network security for the year. On the surface this seems like a good deal for the exchanges. However, looking at the erosion in pricing the exchanges have seen on their data over the last decade tells a story similar to commissions. The reduction in friction costs and pressures from the data distributors (like Reuters and Bloomberg) have placed pressure on the absolute levels of market data fees similar to what has happened with trading fees and commissions. Chart 3.6 details the erosion since 1994 and 1998 on each category of fee.

**Chart 3.6**

System and Type of Fee	1994	1998	Current	%reduction 1994- Current	%reduction 1998- current
Network A (NYSE-listed stocks), non-professional, monthly per subscriber	\$4.25	\$5.25	.50- \$1.00	76-88%	<b>81-90%</b>
NASDAQ, non-professional monthly per person	\$4.00	\$4.00	\$2.00	50%	<b>50%</b>
NASDAQ, per query	.015	.01	.005	67%	<b>50%</b>
Network B (Amex listed stocks), nonprofessional, monthly per person	\$3.25	\$3.25	\$1.00	69%	<b>69%</b>
OPRA (Options exchanges), non-professional, monthly per person	\$2.00	\$2.00	\$2.50	25% increase	<b>25% increase</b>
OPRA per query	.02	.01 .02	.01 - .02	0-50%	<b>0-50%</b>

*Source: George Mason University Mercatus Center on Governance-Regulatory Studies Program Release No. 34-42208, File No. S7-28-99*

The bottom line – market data is still a worth a fair amount of money and it's likely to continue to grow with volumes. It will heighten the competition for volume as any increase enhances both market data fees as well as trading fees. The new regulations provide a mechanism for ongoing review of the allocations and a transparent allocation methodology.

### *Prohibition of Sub Penny Quoting*

The equity markets moved from quoting in fractions to decimals, completing the process in April 2001. The major markets established a minimum quote of at least .01. In some cases, stocks are quoted on ECNs at increments of less than .01, but because of these rules they are effectively hidden from the public, creating 'hidden markets' not available to the general public.

Market participants have use sub penny quoting more as a means to 'step-ahead' of competing limit orders for an economically insignificant amount to gain priority in execution. As such, sub penny quoting could discourage the use of limit orders and work against overall liquidity. This is the least controversial of all of the Reg NMS amendments and seems to be accepted by all parties as proposed.

### *Summary observations on Reg NMS*

All of this discussion around trading through and opt outs for pennies may not seem like much money is at stake. To the contrary, on billions of shares a day it is a substantial amount of money.

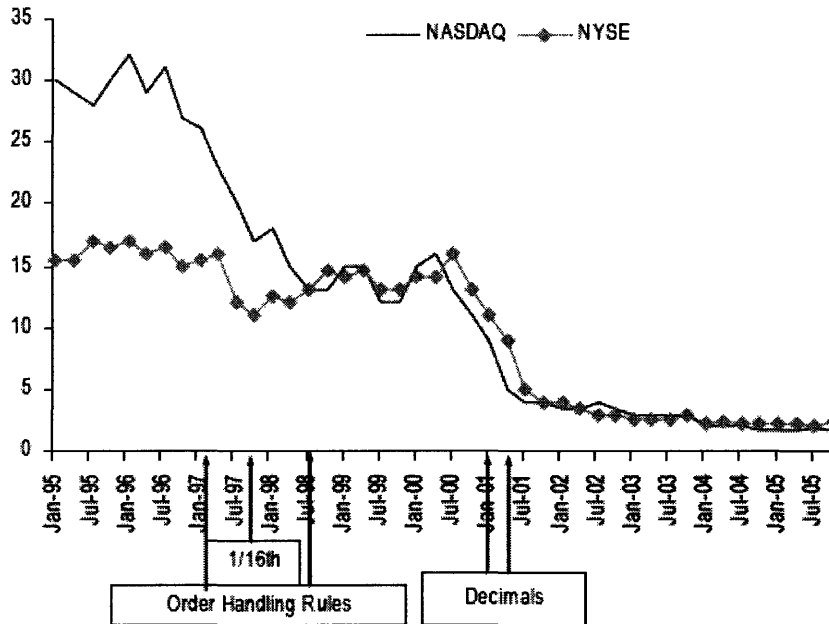
We have said on several occasions that changes in the conditions of the system can profoundly affect the economics and behavior of the participants. The intent of Reg NMS and the general mood of the regulators these days are to promote competition among venues, improve visibility, speed and create choices.

As the following chart depicts, changes in the rules have brought absolute spreads down dramatically. More to the point here is that by making the two major markets compete for volume the regulatory environment has improved efficiency for the customer.

Another major influence on spreads and potential issue in the current configuration of market structures has been the move to decimalization. Starting in the year 2000, the NYSE moved the minimum tick size to .01. While this had the effect of moving spreads down, it also had the effect of decreasing the depth of quoted markets. In other words, with spread profits down you have fewer arbitrageurs or speculators willing to show orders at minimum spreads. The drop in spreads over the last decade is illustrated in Chart 3.7.

**Chart 3.7**

**Chart 14: Spreads in NASDAQ and NYSE Securities (in cents), 1/95 – 10/05**



Source: NASDAQ, Market Systems, and Merrill Lynch

As we point out, spreads are lower but the depth of the market has been reduced with wider spreads. Consequently, costs to trade may be higher than meets the eye. There is some evidence that the minimum increments to trade may have, at least initially, overshot the mark. That is, with wider spreads and a deeper market there may be more depth and faster executions.

With the fast market provisions of the trade through rule, automated exchanges can execute at an inferior price versus non-automated exchanges. The difference between the best price and next best price can be more than 4 cents per share on even the most liquid S&P 500 stocks. From the NYSE perspective the difference between executing on the NYSE versus the next best quote on the (NBBO) is illustrated in the following table (3.8).

**Chart 3.8**

Stock	Bid (\$)	Offer (\$)	Spread (cents)	Best Offer (\$)	Best Spread (Cents)	Trade Through Rule (cents)
Average	39.88	39.89	1.83 (cents)	39.93	10.25	4.21 (cents)

Cost to shareholder of trading through NYSE-listed S&P 100 stocks (93 companies) average national best and second-best bid and offer prices. Based on Intraday price quotes for week of December 8-12, 2003  
 Source: Wipro, NYSE

The following chart (3.9) was produced by the NYSE to demonstrate the aggregate effect of eliminating trade through rules for off-exchange trading. The chart assumes 20% of their volume done away from the exchange and hypothetical additional spreads paid as a result. Indeed, pennies do add up and in this illustration, to about \$3.5 Billion.

**Chart 3.9**

**Additional cost to Investors from relaxing or eliminating the trade-through rules for NYSE-listed stocks traded off the NYSE\***

<b>Action on the Trade Through Rule</b>	<b>Cost to Investors</b>
1 cent exemption**	\$1,507,281,200
2 cent exemption**	\$2,299,369,458
3 cent exemption**	\$3,121,665,767
<b>Complete Opt-Out (4.21 cents/share)**</b>	<b>\$3,465,737,036</b>

\*Assumes 20 percent of volume trade off NYSE

\*\*2004 estimate of NYSE listed off-exchange consolidated share volume

Source: Wipro, NYSE

The Reg NMS guidelines provide a significant challenge for all market structures. The resulting competition will, in the long-run, likely make the market more liquid and efficient by reducing friction and costs. In one example, the NYSE will be relaxing its 30 second restrictions on AutoEx trades. The response of some of the algorithmic trading desks is that this may allow them to increase volume by 50%. Not all of this is easy or welcome to all players – but the “unreasonable” will likely win the day again.

**3.6 ECNs – “If you build it and they will come...”**

Our by-line for this section is a reference to the legendary line from the movie *Field of Dreams*. The supernatural forces inspired the central character, Ray Kinsella, to plow under his corn and build a baseball field. Ray put up stadium lights, built bleachers, and waited. Locals watching his folly muttered “damn fool” as they went by. The following year, ‘Shoeless’ Joe Jackson and other apparitions of deceased baseball legends showed up at his field for a casual game of baseball. Both the people and the ghosts were somewhat confused in this scenario, prompting the exchange: “Is this Heaven?...No, its Iowa...”

Before long, it took hold and people came from everywhere to watch the players on the legendary Field of Dreams. If only business were so easy. To be sure, start-up businesses are often inspired by a similar mystical calling. Optimism that the players will show up is often shared by investors so platforms and businesses get funded and built. But even in the movie, there were only enough players for one field of dreams.

We have referred to it several times – so, what precisely is an ECN? An Electronic Communications Network is simply a private trading system that is maintained separately from NASDAQ and NYSE. The stocks traded are the same as the major markets, but the liquidity can vary based on who else is trading within that ECN. Remember in our review of market history that the congregation of liquidity in one place was what made markets succeed and function. At any time, the inside market may be different on an ECN than on the public markets (or another ECN), creating arbitrage or acquisition opportunities. This can be for a variety of reasons, but suffice to say they have proved to be good clearing houses for liquidity but have not contributed as much to price discovery.

It may be worth mentioning at this juncture why the buy side is so amenable to continue experimenting with ECNs even with evidence of efficient pricing on the NYSE. The NYSE will lay rightful claim to being the best place for “price discovery” – determining an equilibrium price for a stock at any one time. There is ample evidence to support their contention of efficient price discovery.

However, part of the price discovery mechanism is the reading and inference of order flow. That is, if the Specialist thinks they see a big order coming in to buy they may buy or “go along” with the trade smoothing out the volatility and managing inventory. This will often have the effect of moving the price of the stock against the order. So when the exchange talks about price discovery – many on the buy side believe that only equals information leakage and therefore is not valuable to them. To this end, many would rather trade in a disaggregated fashion *anywhere but* the NYSE.

The ECNs, as we covered, were enabled by the order handling rules of 1997. This opened up the opportunity outside of the major exchanges for new entrants to the business. The first pioneer in the business was Instinet – dating back to the 1970s. They were active at the time primarily in facilitating institutional trades. When the Designated Order Turnaround (DOT) was implemented on the NYSE, Instinet’s link to the exchanges improved and their business grew. They remained alone as a trade aggregator and third market until the late 1990s.

At the peak there were eight legitimate ECNs in addition to Instinet, none with enough volume on their own to be viable long term.

ECNs Operating Circa 1999	
Archipelago	Island (Datek)
Attain	Market XT (Private)
B Trade (Bloomberg)	NexTrade
Brut	Ready Book (Spear Leeds, Fidelity, Pershing Schwab Consortium)

All have since been absorbed into other firms, mostly in the 2001-2003 time frame. The lesson was there was not enough liquidity in any one spot to support all of the separate platforms (fields of dreams) and at this point the aggregation technology (sweeping of orders from multiple venues) was not yet developed into a workable solution.



But like in most booms, the overinvestment created platform technology that has outlasted the companies' independence. The technologies are delivering value to their new owners and current players. As an example, Island which was acquired by Instinet now finds themselves as part of NASDAQ. NASDAQ has announced their intention to use the Instinet technology to replace Super Montage – their electronic trading system.

Reg NMS has given a boost to this concept and has legitimized the multitude of trading platforms. More importantly, the algorithms have the ability to scan for liquidity on these venues in a low touch, high speed way. As we anticipate Reg NMS implementation for 2006/2007 time frame, we are seeing another proliferation of trading venues attempting to take advantage of the push to open architecture trading. Regional Exchanges now offer ECN-like service and the major Broker Dealers are forming Alternative Trading Systems (ATS) to take advantage of internal order flow at the brokers and to attract liquidity from other sources.

The conclusion here on ECN and ATS venues is that they are here to stay and will continue to evolve in an efficient and creative way to serve trading needs of the buy side. The regulatory environment will encourage their use and technology has made it easier to access liquidity in multiple venues.

Now that the NYSE and the NASDAQ are public, for-profit companies the customers of the exchange look at it as a potential competitor and one that will look to potentially profit at their expense. The ECNs provide a viable and now more accessible alternative to the traditional exchanges. Ultimately, the NYSE will have to respond to this challenge in some way.

#### *Liquid Net – A Better Mousetrap*

Its ironic how seemingly simple technologies have a way on converging to create new services. Liquid Net, according to the buy side traders that use it, has addressed the problem of finding natural liquidity (a buyer when you are selling and seller when you are buying) in size with minimal information leakage.

Liquid Net allows buy-side participants to enter their venue to search for the other side of their trade. If they find interest, they can enter into an anonymous IM dialogue with the other side to negotiate price. The two can agree on terms and complete the trade through Liquid Net. This system is particularly useful for less liquid stocks, where finding liquidity and getting a trade done in any size can take days through traditional channels

Liquid Net does maintain rules that preclude participants from just shopping and then not trading. If you shop too much and don't transact, you will be asked to leave. As one buy side trader put it: "It's like a country club for the buy-side. We get to decide who is there and how they behave."

### ***3.7 Archipelago and the NYSE – An Arranged Marriage?***

In the United States we always have the romantic version of marriage in mind: boy meets girl, falls in love, boy and girl get married. It's hard for most Westerners to understand arranged marriage and that it still exists in India. That said, my Indian colleagues tell me that it's a system that tends to works for all parties. Everyone understands the rules and

participates in the decision. Marriage is such an important decision that there has to be the appropriate amount of due diligence on each side and not left to the whimsical influence of emotion. And then there is the issue of dowry, a good bride always comes with the loot. The marriage transaction provides immediate financial benefit to the establishing of a household and long term security of the bride. Or, so the story goes...

Companies merge in much the same way. Indeed, if they were competitors previous to the marriage or merger they were far from "in love". Clearly there has to be some respect for the other party or why spend the money. In some cases it's from necessity, but in many cases it's a much more distanced view of how the two will benefit each other.

For the NYSE, Arca was the "Belle of the Ball" when it came to the dowry. They immediately bought the NYSE additions to their market structure that were critical given market pressures and the pending implementation of Reg NMS:

- *A "Fast Market" trading platform* – Arca clearly had one of the best trading platforms of any of the ECNs or electronic trading firms
- *Options Presence* – Arca's alliance with the Pacific Stock Exchange (PCX) brought with it a 10% share in options trading and a functioning options SRO
- *Volume* – Arca was trading about 600MM shares at the time of the merger – the extra volume brought with it almost a 25% share in NASDAQ names and a substantial presence in the growing ETF arena. NYSE share was about 3%
- *Currency* – since Arca was already a public company, the issuance of shares would be straightforward and would simplify the demutualization of the NYSE. Also, as the seat holders would have to approve the deal, a proxy for their buy out price and subsequent support in the value of Arca's shares. When seats got to \$4MM a piece pre-merger, it wasn't hard for the seat holders to see the value of the deal.

It was a brilliant move for the NYSE – both as a defensive and offensive measure. The deal was announced within days of the SEC's passage of Reg NMS. NASDAQ and other exchanges and ECNs had indicated through public comments that they saw the period of time that it would take the NYSE to implement a hybrid market as an opportunity to capture market share from them. With the Arca takeover, the NYSE trumped most of the arguments against it, most of which involved speed and certainty of execution. Bill Cline, Global Managing Partner for Accenture's Capital Markets Practice said, "To me it was a very clever and savvy deal by the NYSE. In one shot they got one of the best electronic platforms in the industry, a 25 percent share of NASDAQ trading, plus they get to demutualize and go public, and eliminate a competitor."

Trading in NASDAQ stocks has been fragmented since a series of reforms were enacted in 1999. A large portion of NASDAQ-listed stocks have been traded on regional exchanges and through ECNs like Arca since then. NASDAQ has been trying to consolidate that market by acquiring ECNs like Brut and Instinet. With the merger of the NYSE and Arca the near term liquidity in NASDAQ stocks is going to center on the two primary markets - NYSE and NASDAQ.

Prior to the merger discussions, Arca, like NASDAQ, was competing hard for NYSE volume. They were constantly challenging the efficiency and the inherent conflicts of the floor based model – in the media and in public testimony to the regulators. The Arca CEO Jerry Putnam in his “Role of a Specialist” testimony to the House Subcommittee (Capital Markets, Insurance and GSEs) stated: “our credo has been no special (ist) handshakes, no negative obligations, no jaywalking and no thirty second free options....all investors on a level playing field”. I won't explain all of his references – but he wasn't trying to complement the NYSE.

To his credit, after the merger announcement Putnam went down to the NYSE to speak to the floor traders he had been publicly maligning - taking it on the chin for a couple hours in an attempt to repair the relationship. Culture is a soft issue when it comes to mergers; financial types are quick to dismiss it but also one that is very real. Merging the cultures and preserving what makes each of the strong may turn out to be more challenging of all the market structure challenges. The leadership at both the NYSE and Arca seem to have a strong sense of the test they will be facing in this regard.

The market structure discussion in this section was on a macro level designed to provide the reader with a broad sense of the basic functions. As we move to the investment supply chain and the anatomy of trading in the next section we get into the details – in search of the devil...

## **Section 4 – The “Investment Supply Chain”**

“There are two types of investments: the ones where you sign the check on the front, and the ones where you sign the check on the back”

**Bruce Reading**, Private Investor and Entrepreneur

**There you have it.** In its simplest form this sums up the flow of capital and the investment process. Our opening quote is not from a noteworthy historical figure, fictional or movie character. In this case, our philosopher is a modern day private investor who has made himself a considerable fortune in understanding the basic premises of the investment supply chain: there are those who need money and those who provide money. Each part has a clear expectation as to what they want and how they will get it. The cycle begins when you provide money and ends when you get it back or write it off. Hence, either you are signing a check on the front to make an investment or you are signing it on the back to deposit money that has been given to you or back to you. As brevity is the soul of wit – I thought this would get us off to a focused start in this section.

Supply and demand for money are the bookends of the capital markets – with exchange structures living in between. In this section, we introduce the concept of an “investment supply chain”. Supply chain management is a discipline that refers to the logistics and construction of the network of suppliers who bring goods together for the manufacturing and delivery of a product or service. Think of the automobile business and the sourcing of their components to their ultimate assembly point. These systems have an inherent complexity to them which reflect a multitude of variables and timing. Without any effort to coordinate a supply chain, each entity will operate independent of each other to match its own agenda. Unmanaged, the supply chain will result in bottlenecks increasing costs and delays to all parties.

A problem frequently observed in unmanaged supply chains is the “bullwhip” effect. This is a fluctuation in supply chain performance due to demand variations. Like the name suggests, it has an increasing effect as it “whips” through the chain causing each party to overreact to a temporary changes in demand. A common manifestation in financial markets is bubbles or crashes – too many dollars chasing or leaving investments in one sector. In exchange structures, you see the phenomenon related to surges in volume in fast market conditions that trigger circuit breakers or create capacity issues with confirmations and trading.

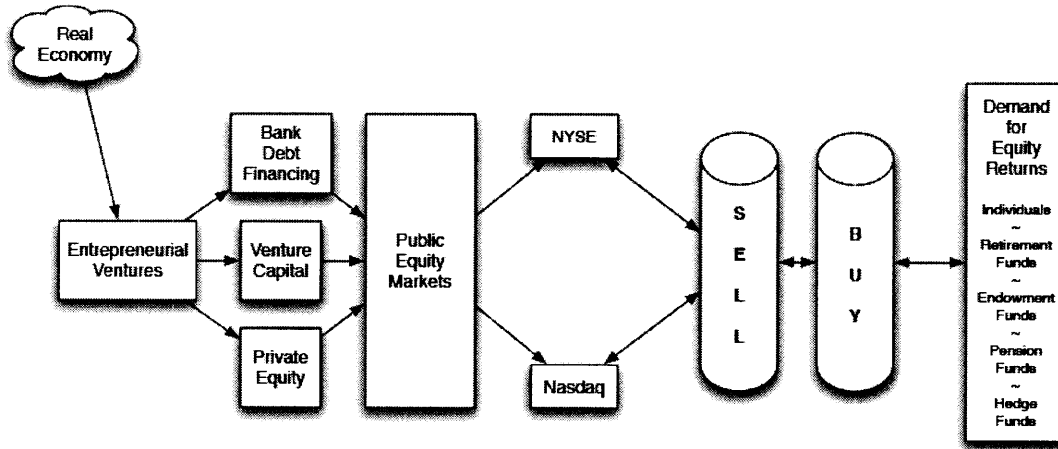
A supply chain by its nature causes costs or friction which the users on both sides will seek to reduce. As you can imagine, there is continuous pressure to reduce costs and cycle times in manufacturing supply chains. In this regard, investing is no different with each participant looking to maximize their returns at the minimal cost.

There are different intermediaries and institutions who handle each section of the supply chain. Capital is provided at the stage, risk and cost that match the provider’s expertise. The results at any one stage will have an effect throughout the chain. While there is a similar and well developed path for debt, our primary focus here will be on the equity markets.

The structure of the investment supply chain reflects the institutions involved, the regulators and technology available at any one time. The following graphic (4.1) is a representation of the supply chain as it had existed until about 1997. Reading from left to right, the need for capital is connected to the supply of capital by a number of intermediaries. The biggest need for equity securities comes from institutional investors like pension plans, asset managers or hedge funds on the far right. As capital progresses from left to right it transitions to reflect slightly different characteristics.

**Graph 4.1**

**Capital Markets Supply Chain circa 1997**



The graphic was drawn with the buy and sell side as “storage” icons – centers of activity and resources. Both have had, as respective groups, an ability to control access to part of the chain. The buy side exercises control through mandates from those that have hired them to manage funds. The sell side’s influence is through access to execution and distribution of products.

In its nascent form equity capital is demanded by entrepreneurs for the formation of new business ventures. Assuming they cannot fund their ventures on their own, funding these

ventures is done a few different ways; usually through bank debt, private equity (funds, angels, etc...) or venture capital depending on the type and risk profile of the business.

As businesses grow and need more capital they often find themselves going to the public markets. This provides an exit opportunity for the original investors, monetization for management and more capital to a now proven business. Public equity capital as an asset class represents reduced idiosyncratic risk as its liquid - so return expectations are slightly less than for the phase that preceded it. Once they are in the public markets, equity securities would be accessed by the public and institutions, finding their value through the price discovery mechanism of the public exchanges.

You could argue that the investment supply chain concept presented here is oversimplified. It probably is; but we are using it to demonstrate where exchange structures sit in the flow and the role that they play. The “effectiveness” of an exchange will translate into a few characteristics that are important to a public company. Leaving the efficient market theories aside, a market can influence the volatility of a company’s stock, trading volume and ultimately the accuracy of its value. The efficiency – or in our case “effectiveness” – of the process has an influence on the costs of capital and the flow of investment available to a specific company or industry. To the extent that price discovery is effective; it is a governor on the flow of capital.

We will reference the concept of effective exchange structures as we move through the thesis. Think of it as the mpg of a vehicle, are we getting good mileage for what we do and how much weight can it carry?

#### ***4.1 The Supply Chain evolves: Who moved my cheese?***

The book “Who Moved my Cheese?” by Spencer Johnson is a parable about changes in work and life. The story is told from the perspectives of four different participant mice moving through a Maze that is designed to represent the quest for what they want in life – in this case, the cheese. During the internet boom, as businesses had to adjust to some new realities and economics, the book became a prevalent method for relating of change. Since it has been on the NY Times bestseller list for 5 years – one could conclude the pace of change has not slowed...

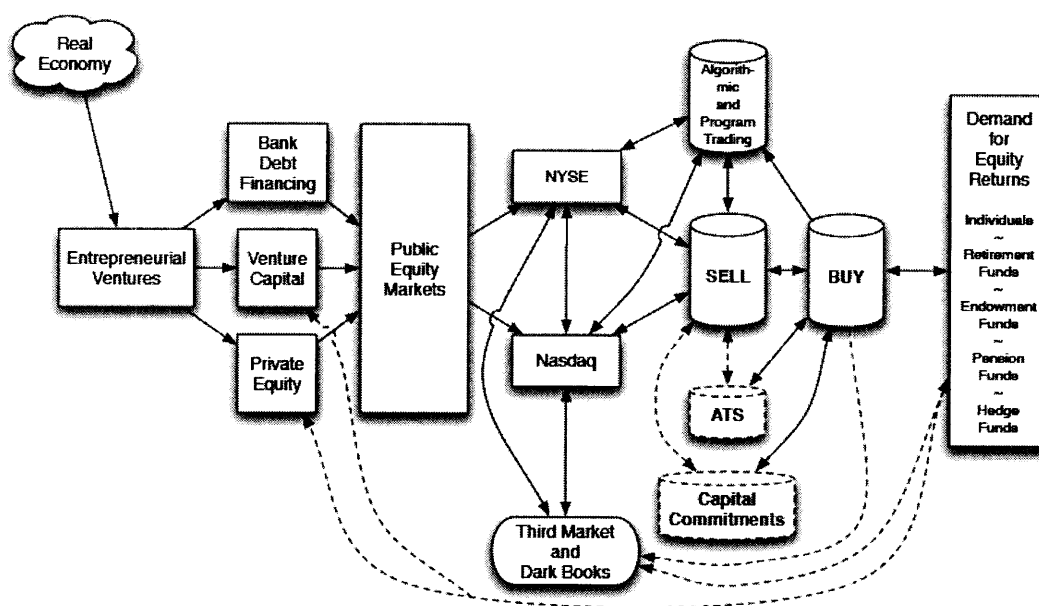
Lets go to 1997 and the years that followed. The ECNs were created by the order handling rules. Technology provides increased transparency and speed. Commissions are being compressed while the hedge fund industry grows to over \$1 Trillion in assets with enormous trading appetite. The buy side is increasingly interested in alternative ways to trade. For the traditional cash equities business in the last 10 years, the cheese hasn’t yet disappeared, but it has definitely shrunk. Like the parables in the book, whenever the cheese moved, there is a lot of angst as well as money to be made for those who know where to look for the cheese.

A “new supply chain has evolving with more choice and fewer barriers than in previous years. The buy and sell side still have a large relationship with each other, with the return

seekers and the traditional exchange venues. What's different now is direct access: multiple ways to access capital on both sides. The third market now provides a viable venue that can circumvent the NYSE and the sell side. This has a potentially enormous effect on price discovery in a traditional exchange structure which we will cover in the next chapter.

Graph 4.2

### Capital Markets Supply Chain circa 2006



The structure of the supply chain has responded to 2 things: 1) regulation – barriers to entry have been reduced; it's now possible for the players to assume new roles and, 2) technology – to satisfy the desire for increased speed and anonymity. Ultimately, volume will go where the liquidity is – if the buy side can get their trades done best on the NYSE or NASDAQ that's where they will go.

What's also happened here is that the system has increased its bandwidth and number of choices. Going left to right again, we see that early stage companies and equity return seekers can come together directly now. Not that it was impossible before, it's the flow of Alternative Investment (AI) vehicles into the pension and endowment funds that has caused direct access to be a much easier route than it was.

Next, the "Third Markets" and "Dark Books" make liquidity directly accessible to the buy-side companies. As a consequence, the agency or traditional institutional brokerage business the sell side had transacted is evaporating. It may not disappear in its entirety,

but pricing the business at a profitable level (given past staffing levels) will be difficult. Clients are increasingly unwilling to pay premium commissions for simple transactions to a risk free intermediary.

As a result, the sell side has had to develop more robust principal trading operations where they will commit capital on behalf of a client (The capital commitment silo in Graph 4.2). As an example, a client may wish to buy a stock where the available size wouldn't satisfy their order. The sell side firm may "short" the stock to sell it to them at a price above the market, but at a price superior to what the buyer may have gotten if they had shown the entire order. The sell side firm is now short the stock, with the anticipation that sellers will appear at the higher price and they will be able to buy the stock in to cover their short. The sell side can command some pricing and potentially trading profits on a transaction like this – the risk component and speed of execution making it valuable to the sell side.

The compression in agency profits has also incited the creation of Alternative Trading Systems (ATS) by the sell side – essentially large crossing networks. That is, match their customer's orders effectively becoming and exchange themselves. For the firms with sizable trading volumes, this works extremely well.

#### ***4.2 The Anatomy of a Trade...***

*Gray's Anatomy* is the definitive textbook on the human body. At last check, the current version of Gray's contains 700+ pages, nearly 2000 pictures and diagrams and still produces fear in the minds of first year medical students. Trading is not as complex as the human anatomy so the reader is spared the 2000 graphs – but the anatomy analogy is a good representation of the complexity of how trading happens. From the relationships that generate trades, to the venue and execution decisions that happen along the way - an investment idea can take a circuitous route before money actually changes hands and stock winds up going in or out of someone's account.

Given what we have said about the new supply chain it's helpful to follow how a trade might actually go through the system today and the critical information flows that may affect its execution venue. In effect, we'll "zoom in" on the middle of the supply chain.

The framework used here is a stock and flow chart which is typically used in the field of System Dynamics. System Dynamics is an approach to modeling the interaction of complex systems (e.g. population, ecological systems, and inventory). Stocks and flows are the basic building blocks of a System Dynamics model – they help describe how a system is connected by feedback loops and decisions which create non-linearity (translation – not in a straight line) found in many complex systems. This provides us with a construct to understand how equity order flows to completion and where it may reside at any one time. Again, some detail is sacrificed for purposes of illustration.

In our new supply chain, there are more choices for a trader. As we look closer at the microstructures of trading, it's helpful to explain some additional concerns of traders that

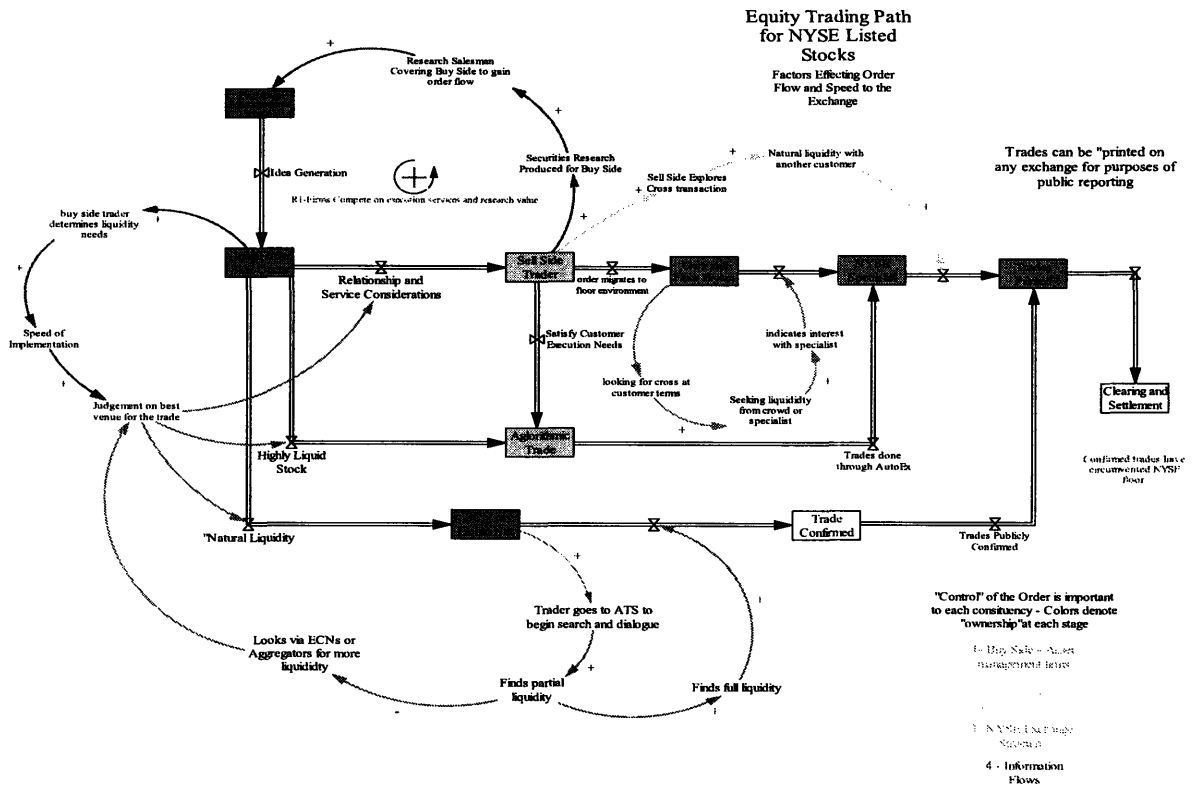


will influence how they decide where to place an order. The goals of speed, anonymity and price are influenced by a variety of factors, all of which involve tradeoffs.

The size of the trade relative to the liquidity is the first thing considered. For example, if the desired trade is for 100,000 shares of Exxon Mobil, the trade can likely be done without too much effect on the stock price as XOM trades millions of shares every day. Conversely, if you are trying to buy 100,000 shares of something that trades on 50,000 shares per day showing that order to the market will almost certainly affect the price.

So let's follow how a trade could evolve today. Graph 4.3 starts with idea generation in the upper left hand corner. The "Street" produces lots of research to aid in this process and hopes to be rewarded for its quality and their service with order flow. The information flow from the sell side to the buy side starts here.

**Graph 4.3**



The order goes from portfolio manager to a buy side trader who will weigh a series of considerations for its execution. The characteristics of the stock, its liquidity and activity will be the primary determinant as well as the buy side's assessment for the probability of information leakage. The more participants that are exposed to a trade, the more likely that trade may experience information leakage.

For highly liquid stocks, the trade is often run through an algorithm. We'll spend more time on algorithms in the next section but basically this is a way to carve a large order with a series of small, computer driven orders. For NYSE algorithms, they are designed to execute directly on the specialist through Auto Ex/Direct+ – a system that was designed to handle smaller orders (less than 1100 shares). Because most algorithms function with a high volume of trades, this technique generally works best with high volume stocks.

For less liquid stocks, the trader will often seek a natural liquidity first. “Natural liquidity” is a reference to someone who is interested in the other side of your trade at the same time. If you are a seller of a stock at a given time and someone else is a buyer of a similar amount, a trade can be done without effecting any order imbalance or effect on the share price. In our prior example, your 100,000 share trade against 50,000 in liquidity could be affected between buyer and seller and not influence a specialist or market maker's inventory or quoted price.

The ECNs also provide a venue to take inventory away from the exchange or to search for natural liquidity. One such venue is Liquid Net (see insert section 3) which allows buy side participants to search for natural liquidity with other buy side firms. They use an Instant Messaging utility to negotiate with the other side anonymously and to come to terms. The trade can be done right there, printed as a cross on a national market and has never seen the exchange floor or a market makers book.

The trader may also go through his sell side contacts to affect a trade. In many cases, who gets that order is a function of the relationship and the quality of the research provided to the buy side institution. The sell side can attempt to execute the trade through the floor or that may seek a cross. Crossing or internalizing trades by the sell side is another way of finding natural liquidity. The large trading firms will be able to see customer order flow and can propose swaps based on their knowledge of a customer's intent. While these trades are printed on a major exchange again they circumvent the NYSE trading floor or the NASDAQ's network. Since the sell side firm gets commissions on both sides and any spread, they are eager to look for these transactions and commit their own capital when necessary.

If the order goes to the floor of the NYSE it can get executed either through a specialist's post from his inventory or with another floor broker. The floor broker will generally have specific instructions as to the latitude on price they have and what they would show at any one time. The best brokers are adept at finding liquidity without showing their hand. The “crowd” experience of the floor refers to the congregation of brokers at a specialist's post. What this does is to bring together the interest in the stock on both sides and creates an environment for price discovery.

The crowd represents is the historical mechanism discussed in section 2 and 3 – and can still be argued as one of the most effective methods for price discovery. The outcome can be measured in the effective completion of the trade within the prescribed parameters.

For the trader, each decision along the way represents the requisite tradeoffs between speed, price and anonymity. The trader has to read the market conditions at the outset, understand the pluses and minuses of each venue’s microstructure and make a decision on which path (or combination) to send the trade. As the end of the day, with all of the uncertainties the new supply chain has imbedded into this decision, the control over the trade is what the buy side wanted and largely has now.

*Limit Order Book*

Our discussion of the anatomy of trading would not be complete without an explanation of a limit order book – the DNA of the market microstructure. The limit order book is a record of unexecuted orders held by a specialist. The specialist has an obligation to assure that the top priority orders are filled. You will hear the term “top-of-book” quoted with some frequency. What this refers to is the best bid or offer (National Best Bid Offer) in a given stock at a given time regardless of trading venue.

Let’s look at an example of a book. The following is an illustration of the book for Nokia from ArcaEx on a particular trading day:

**Graph 4.4**

Time	Bid Size	Bid	Ask	Ask Size
10:29:41			14.68	3,000
			14.67	3,000
			14.66	22,000
			14.65	10,000
			14.64	500
			14.62	2,000
	3,000	14.61		
	5,000	14.58		
	10,000	14.57		
	20,000	14.56		
	17,000	14.55		
	3,000	14.54		
	185	14.53		
	185	14.50		
	2,300	14.42		
	300	14.31		
	300	14.11		

What the table depicts are the prices offered to buy and sell stock and for what amounts. In this example, the inside spread is 14.62 offered, 14.61 bid. The specialist has the obligation to execute the best price first and then moving sequentially the remainder of the quotes. The Direct+ system of the NYSE displays this book and makes it available for automatic executions. Investors can see what is offered on either side of the market and place orders against those prices accordingly.

The book will sweep sequentially against displayed orders at any one time. For example, if an order came in to buy 10,000 shares at the market it would first take the 2,000 offered at 14.62, the 500 at 14.63 and finally 7,500 at 14.64 for an average price of 14.6355 on the transaction. After the stock is executed, 14.65 now becomes the “top of the book” or the best price where stock is offered unless another order is entered at a better price. As trading and prices move through the stock, the size of these quotes can change. As an example, if prices rise, you may see an increase in the amount of stock for sale as traders see opportunity to take profits; or vice versa...

There is a caveat, as this is one limit book from one exchange venue. NBBO and Trade-Through rules explained in the previous section are an attempt to better govern the technicalities of the specialist book and protect an investor’s interest. The Trade Through rule requires an exchange to offer the NBBO (the best price available in any market) at the “top of their book” or they must send that order to the other exchange. If they do not execute at the NBBO they have effectively “traded through” a superior execution. Once completed, they are able to execute starting from the top of their book again.

Another caveat is that this will work slightly different under the Hybrid system. Hybrid will allow a “reserve” function for the floor community only. The reserve allows the specialist to quote at a price but not display the full size of the trade. The idea being that the floor will have some advantage in improving the price and becoming the top of the book. While there is controversy on this proposal, the customer should generally experience price improvement as a result.

Now that we are dealing with multiple trading venues, there is an increase in “locked” and “crossed” markets. Locked markets are where the best bid and offer are the same, crossed is where the bid may temporarily be higher than the offer. This phenomenon is a result of fragmented liquidity and the fact that the limit order book is not centralized. This is a problem that the ECNs are seeking to resolve, but given the speed and fragmentations of trading it presents some technology challenges.

Many investors are not inclined to use limit orders. In fact, very few institutions will show any size orders in this fashion – the contention being the prices are not always reflective of a true market. All the trading venues are aware of this and are working to build interest and incentives for placing limit orders. Limit orders give a more visible sense of where the market is at any point and will attract liquidity as a result. Given the desire for anonymity and the desire to shop venues, this is still a significant challenge for all exchange structures in the new order.

### ***4.3 Trading Costs – the Devil is in the Details***

In *The Devil's Dictionary*, Ambrose Bierce defines the word plan as: “The best method of accomplishing an accidental result.” There may be some truth to this when it comes to trading. It is difficult to plan exactly how much you may “pay” for any given trade. There are a lot of common misconceptions when it comes to trading costs – most casual observers think in terms of brokerage commissions and the bid/ask spread. In reality, neither of these costs are major drivers today for the institutions. Cash equity commissions can range from less than .01 per share to maybe .05 per share. Most of the overseas exchanges charge on a “value traded” basis – which is where I would guess pricing, is eventually going in the US. This would have the effect of further compressing commission costs for the larger trades.

The bid/ask spread is also less relevant than commonly believed. If we believe that the majority of investors in our supply chain are serviced by buy institutions who are reasonably long term investors then the other side of the trade is only relevant if you are going to turn around and sell the same stock you just bought. That is a game that is played primarily by the Statistical Arbitrage (“stat arbs”) hedge funds who seek to take advantage of short term mis-pricings. What an investor should be primarily concerned with is the depth of the market. That is, the ability of your fund or representative to purchase the amount needed with minimal impact on the price.

The issue for the buy side relates primarily to the potential for leakage. That is, if their intent to purchase in any size is discovered then prices will respond. So when the NYSE talks about their mechanism for price discovery – an accurate determination of what will clear inventory today – the buy side often interprets the same circumstance as information leakage. Two opposite and equally valid perspectives on the same trading conditions but with each party seeking a different outcome.

The decision points on costs can be summarized as follows:

- *Best Price* – important but not sole criteria
- *Reduced market Impact* – this is preserving your anonymity, entering orders only against disclosed size and using technology to leverage access across electronic markets
- *Ability to Efficiently Trade “Size”* – speed of execution, crossing blocks and access to fragmented liquidity across venues

As we discussed, the minimum increment that any stock can be quoted in is one penny. The decision to go to pennies as part of decimalization was intended to reduce trading costs. The devil showed up here and may have created a slightly different result. In any market you need all of the participants – investors, traders, speculators – in order to create an effective inventory system. When there is little or no spread on a stock you have created a disincentive for traders to enter the market, at least with a limit order.

I want to go back to our distinction between *effective* versus *efficient* markets. It’s important to establish this as more than a semantic distinction. In the efficient market

hypothesis, the theory is that everything is priced right at all times. If the same concept is extended to market structures the inference is that there is a right answer for each type of trade when it comes to minimizing costs. It's my view that this is not the case and becoming even less so with the fragmentation of liquidity and an increase in the number of trading venues.

Assuming the market structures are effective, investors can evaluate their tradeoffs for any transaction. In an imperfect world, each trader must determine what is more important in driving trading costs: price, market impact or speed. It's almost impossible to know if another method would have been better – you make the venue choice with the information you have at the time. Best execution can be an elusive concept to define as you make decisions with imperfect information.

Alas, the quest to find or lay claim to best execution continues. The brokers are always vying for an edge or a way to demonstrate value to their customers. The front end of many of the order systems are now being designed to allow the customer or broker to assess the cost or risk of waiting on an execution to attempt to improve the price versus the potential impact cost. More on order management systems in the next section...

## **Section 5 – Technology – The Rise of the Machines**

*“The future has not been written. There is no fate but what we make for ourselves...”*

The character John Connor in *Terminator 3: Rise of the Machines*

**Man versus Machine:** Our opening quote from the movie trilogy the Terminator is selected to point out this fundamental conflict of the modern world. The movie is the end of a trilogy in which machines become self aware and subsequently go to war with their human creators. The humans in turn build machines to fight the machines which were originally built for as part of a defense project to fight other humans. The underlying premise is a never ending human conflict with machines we build; machines become a simultaneous symbol of human genius and frailty. If you are the last person in North America that hasn't seen the movie – I won't ruin it for you. Let's just say the plot follows a messy and violent process of machines and humans to finding their equilibrium.

Whenever technology advances threaten the livelihood of a class of trade or professions there is an inevitable backlash against the technology and rehash of this debate. The Luddites who smashed textile machinery in early 19<sup>th</sup> century Britain in protest of the non-apprenticed workmen and new machines are the most often referenced. Modern day industrial examples can be seen in the auto and steel businesses as workers seek to survive the onslaught of cost reductions and automations.

Maybe the debate resonates and disturbs us because of its inherent inevitability. Like our protagonist John Connor in the Terminator, we may only able to postpone the events technology stimulates, not stop them. Human beings have to keep moving up the value chain – or further to the rear of the battlefield - in order to remain relevant while the machines duke it out on the front lines. There's an unspoken apprehension that technology will ultimately replace or obsolete each one of us. The irony is that we build the technologies that create the disequilibrium and tension. This constant implies there must be an underlying motivation. To go back to our opening quote from Cicero: it's the money...

Technology on Wall Street has always played an important role in improving how the markets function. As we covered in section two, the telegraph, telephone, computers and the Internet all contributed to growth in trading volumes, transparency and speed. At each interval, technology provided opportunities for information asymmetry, increased speed, trading efficiencies and reduced costs. Each progression left an indelible thumbprint on the markets – but none really changed the basic desires of the participants. In fact, the speed at which each technology becomes adopted was always a function of the perceived advantage it could potentially bestow over the other participants. You had to adapt quickly or the technology advantages of your rivals would overwhelm you. More succinctly: you can't bring a knife to a gun fight...

Our opening vignette sets the tone for our section on technology. An understanding the human element also can provide some intuition to the rate of acceptance or any resistance. Any discussion of technology as an end state in and of itself - without larger context – usually misses the more meaningful points. That is, what is the technology replacing, why is it replacing it and what are the economics driving the change. New technologies require participants in the industry to change established behaviors and processes, which take time and money to accomplish. Without positive economics, even the most elegant technologies find it hard to gain acceptance.

We'll focus the discussion in this section in three areas that are contributing to the changes in market structures: algorithmic trading, ECNs and “dark books”, and Exchange Traded Funds. We'll close with comments on the current state and direction of trading infrastructure at the NYSE.

### ***5.1 Algorithmic Trading - An 800 lb. gorilla changes the game...***

Most readers would be familiar with the enormous development activity in RFID inventory technology. RFID got its big boost in a way many technologies do: from the desires of a big customer to have it implemented. Wal Mart has thrown down the gauntlet for the suppliers in its gulag to either invest in the technology or eventually be shut out.

The Wal Mart of the investment business is Fidelity Investments. With \$1 Trillion in managed assets they are the biggest buy side customer in the business and hold considerable sway over the practices of their sell-side counterparts. And when you buy in large quantities, whether you are Wal Mart or Fidelity, pennies count...

When evaluating executions of their brokers, Fidelity had sought to determine whether the execution or fill they received was a fair representation of the prices for that day. As a big buyer, they had control over commissions but not necessarily the interaction between the broker and specialists. To measure this they introduced a metric called Volume Weighted Average Price (VWAP). The VWAP (vee-whap) is calculated by adding the dollars traded for every transaction (price times shares traded) and then dividing by the total of shares traded for the day. The theory is that VWAP represents the benchmark for superior execution – if you beat it on any given trade you did well for your client. If you did not at least meet the VWAP price, you would have to make it up later or probably loose business.

Since the volume and price change during the day, VWAP is a moving target. As price and volume change, a trader can infer from a variety of metrics (beta, past trading patterns, volatility etc...) where to increase or decrease purchases/sales to meet the VWAP for the day. Given the number of calculations to do this, VWAP became the perfect catalyst for the growth of algorithm trading.



## Algorithms

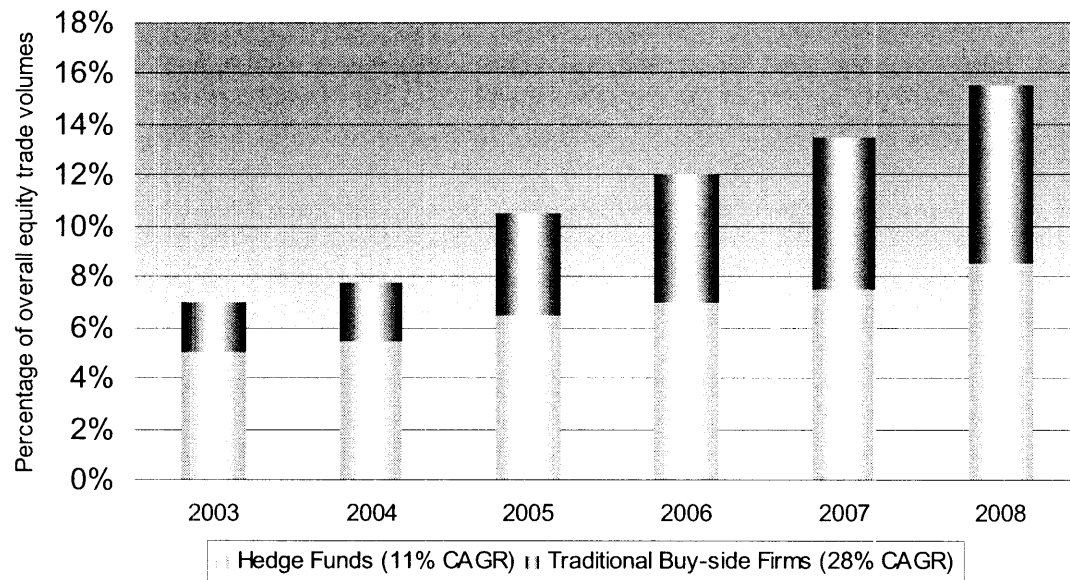
So what is an algorithm? A quick “academic” definition: a step by step problem solving procedure used specifically in an established computational procedure for solving a problem in a finite number of steps. Basically...a set of instructions.

Algorithms are central to the way computers process information. A computer program is essentially an algorithm that tells the computer what steps to perform and in what order. When it comes to trading, algorithms are the perfect instrument for “if-then” logic – they can be programmed to react instantaneously to instructions that mirrored a pre-designed execution.

In short order, VWAP and algorithms would become de-rigueur for the buy side. They became an efficient way to execute certain types of trades and the sell side could be reasonably assured of matching their customer’s expectation through the algorithm. To boot, since algorithmic trading desks could be run with relatively few people trades can be done at lower pricing levels (usually a penny per share or less) further compressing commissions.

Chart 5.1 shows the growth of algorithm trading from both the traditional buy side as well as hedge funds. Celent Group estimates that algorithmic trading will comprise 16% of overall volume by 2008.

**Chart 5.1**



Source: Celent analysis

Another advantage of carving up large trades into smaller ones is improved anonymity (at least initially). Trades could effectively be done automatically through Direct+ system in increments of less than 1100 shares. The smaller trades initially created anonymity and potentially improved execution as they were less visible to the floor community.

A caveat on algorithmic trading strategies is that they tend to work best for large cap, high volume stocks. In these stocks there is enough activity to get a large trade done in small increments over a short enough time frames to have less risk of information leakage. In smaller cap stocks or less active issues, the buy side believes they get better execution with traditional “high touch” methods.

Given the efficiency of algorithmic trading, particularly for large cap stocks its growth is predictable. In fact, there were 3 firms offering this service in 2003; as of May 2006 Bloomberg lists 36. This is a demonstration of technology adaptation we alluded to in the opening comments: if someone has a real advantage due to technology, others will move quickly to obtain or neutralize that advantage.

The results were predictable: when everyone seeks to attain the same thing there is a resulting cluster effect. Much like indexing in asset management, the incentive becomes taking less risk and cluster towards the benchmark. You could argue that VWAP didn't adequately measure service or execution – but it became the criteria the buy side used to measure sell side execution. Everyone had to play the same game.

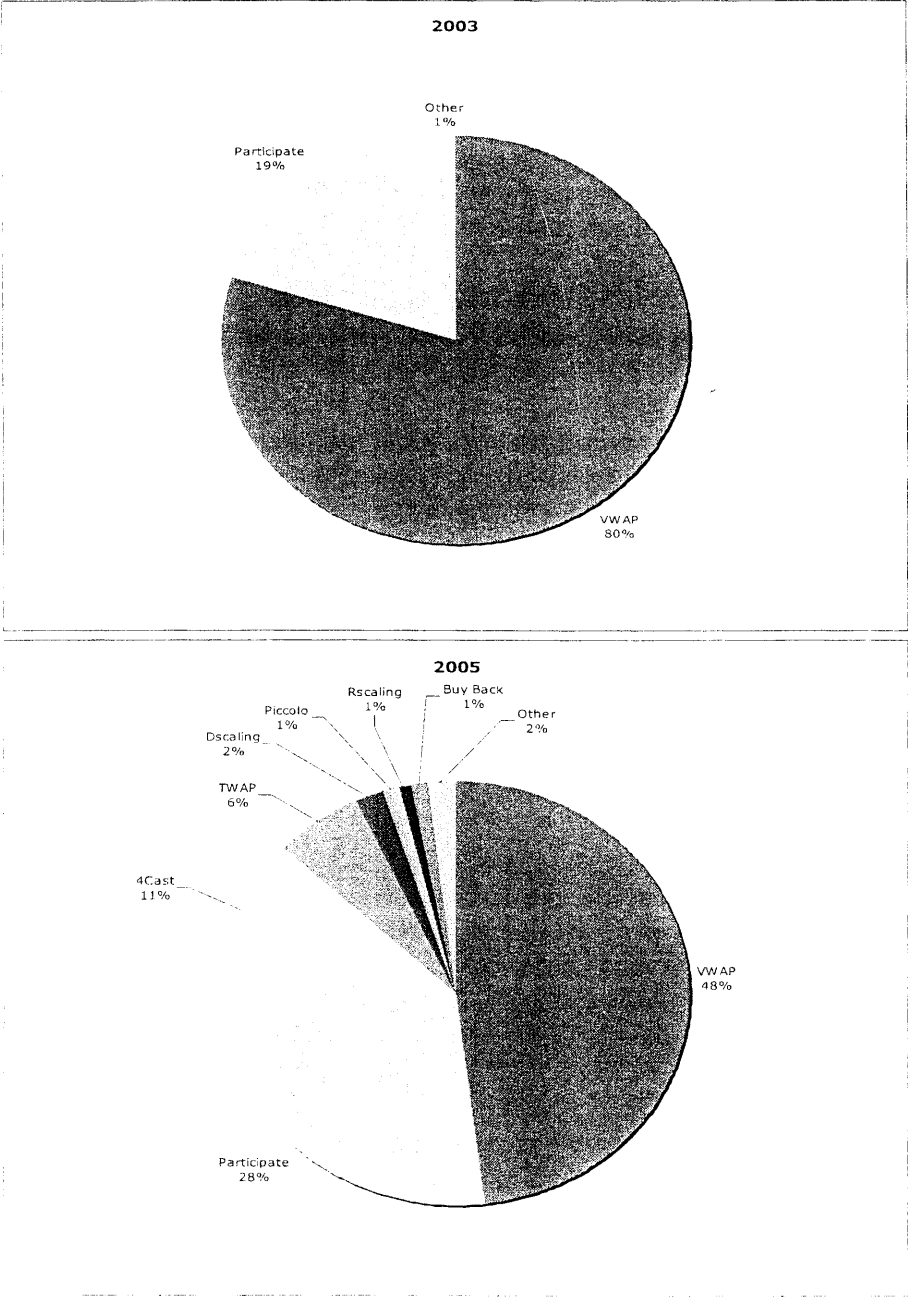
Interestingly enough, the VWAP trend that got it all started is now passé. Even more interesting is why: the emergence of algorithms that seek to find footprints or traces of other algorithms. Like the hedge fund or floor community seeking to recognize large trades so that they could profit from them – the electronic community is no different. As VWAPs grew in popularity, hedge funds and trading firms knew what to look for, so they built programs to get in front of the algorithms they saw. For example, if they saw a program “footprint” in a stock, they would take a large position in the stock that would potentially accelerate the algorithm, raise the price and allow them to profit from a move up in the stock. The algorithms only do what their programmers tell them to – so while the tools have changed, the behavior of market participants has not. The machine vs. machine scenario sounds much like the scenario faced by our fictional hero John Connor...

Chart 5.2 depicts the movement away from VWAP as the core deliverable in algorithmic trading. According to Goldman Sachs, VWAP represented 80 % of their algorithmic trading in 2003. Today, VWAP is down to 16% with the balance being made up of a variety of different strategies.

One way that Goldman and other firms are growing this business is by continuing to build more sophisticated capabilities on top of their core execution capabilities. That is, providing the customers with a pre-trade analytics and front end systems to assess and balance their needs for any given trade. New algorithms are constantly being created to serve different objectives and to increase randomization. Like computer viruses – once

they are detectable they have to be re-written. The sophistication is such that some algorithms are processing as much as 40,000 instructions per second in evaluating trading patterns and metering in trades.

**Chart 5.2**



Source: Goldman Sachs

As you can see, the participation trades and the trades that make use of pre and post trade analytics are growing. The learning point here reemphasizes our point from section four

on agency profits. The customer ceased to differentiate (and pay any premium) for the straight algorithm trades. Where they are seeing value is the analytics and sophistication of the execution. The pace of change in algorithmic and computer aided trading promises to be brisk for the foreseeable future.

### *Program and DMA Trading*

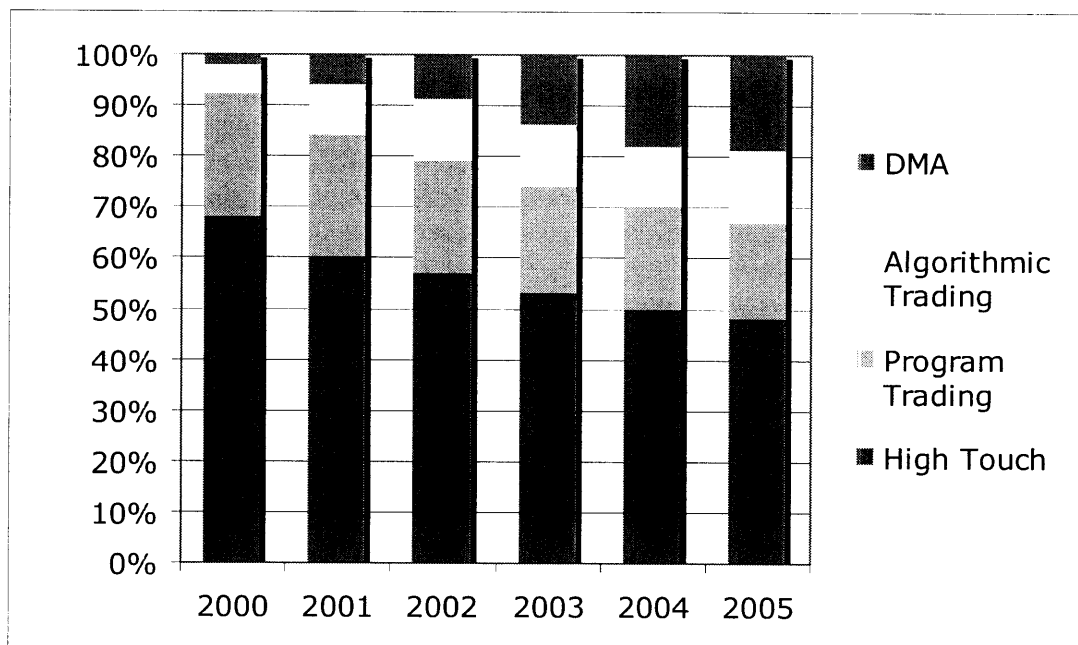
So how does algorithm trading differ from program trades? Program trades were not new, per se. In fact, they had been vilified in prior market crashes as contributors to the problems (e.g. 1987 and 1998). But at those junctures program trading was considered a more esoteric technique that didn't necessarily have a broad impact on the behavior of the buy and sell side and of the exchange structures themselves.

The NYSE defines program trades as any trade with a basket of 15 or more stocks. Tactically, program trades are technology driven trading strategies that attempt arbitrage between markets, asset classes or similar securities. Where the markets bear a real or statistical relationship to one and other, program trades will implement when those relationships indicate an opportunity for profits. A common example is differences between the S&P 500 futures contract and the prices of the underlying stocks. Because each security represents the same underlying value – a program trade can evaluate a small arbitrage opportunity and buy or sell one security against the other, profiting from the difference.

The following chart (5.3) illustrates the changing complexion of type of trading done on the exchanges in the last few years. “High touch” trading is the traditional floor based trading done through a specialist or through a buy side trader and the NASDAQ. Direct market Access or DMA represents orders routed directly to AutoEx (Direct+), Algorithmic trading is as we have just explained, program trading is multiple venue (futures, options and stocks).

Another statistic that vividly demonstrates the impact of electronic trading on market structures is the decline in block trading. Blocks, as defined by the NYSE, are trades of 10,000 shares or more. Block trading had been almost exclusively the purview of the traditional sell side firms and the floor community. Almost concurrent with the emergence of algorithmic trading the NYSE has seen a drop in block trading from 44% of trading in 2003 to approximately 25% today. Or illustrated another way, the average trade size on the exchange has gone from about 1800+ shares to less than 300 shares over the same period. By comparison, the average trade reported on LiquidNet is 35,000 shares.

**Chart 5.3**



Source: AITE Group

One of the governing factors on the growth of algorithms and program trades has been speed of the networks and the constraints the NYSE has placed on the use of Direct+. The NYSE currently has imposed a limit of 30 seconds between same-stock, same-side trades. That is, if you are buying GE through an algorithm you would have to space your purchases out by 30 seconds a piece. On its surface, that doesn't sound like a big obstacle. However, when you have hundreds of millions of shares to execute in a given day, it can create some delays.

Under the NYSE's hybrid system the restrictions will disappear, effectively greasing the skids for an enormous increase in algorithmic and program trading. The reduced friction will make a number of different methods of execution and trading strategies feasible. Some traders in the business estimates that trading volumes could increase as much as 50% after the governors are removed.

While the "future may not be written" for John Connor's Armageddon, it has clear momentum in electronic trading. The "fate" the NYSE has made for itself is rooted in the attitude of the customers. The increase in algorithm volume reflects a strong desire for a market with no one party holding a privileged position. The floor may not like the algorithms, but there is inevitability around technology driven trading – the game is volume and cost which means less people. More on that issue in Section 8...

### ***5.2 Technology lights up the Dark Books...***

It's telling that the third market trading has collectively become referenced as the "dark books." We introduced ECNs in Section 2 as a "new neighborhood". Like a new

neighborhood, you may not know all of the streets yet and getting around is difficult. To add to your anxiety, there are no street lights in this neighborhood....

What is really meant by the Dark Books are the ATS and ECN crossing systems that represent a pool of fragmented and somewhat invisible liquidity? Fragmented liquidity basically means multiple, smaller pools of stock trading away from the major exchanges. "Dark" is a reference to the fact that it's more difficult to see or infer how much liquidity there may be available through any one venue. The buy-side doesn't mind shopping there because they feel they have improved anonymity and they are willing to piece together trades to get it. In fact, a more sophisticated, multi-step trade - assuming it results in a better execution - helps the buy-side trader demonstrate their value to his or her own institution.

Technology has enabled the Dark Books on a number of levels. They are able to provide their subscribers with a view of liquidity as well as confirm and clear a trade. The trick now is to use technology to aggregate fragmented liquidity. That is, how to best search all possible venues for liquidity, while getting your trades done efficiently and anonymously.

Our theme here is that technology is only an extension of what we tell it to do. The Dark Books, like a bad neighborhood, has traders lurking in the shadows looking to mug unsuspecting buy side orders in search of liquidity. For example, a trader or market maker may "ping" for liquidity with smaller orders to try to find larger orders or algorithms. Based on the speed of the fills or displayed size, that market maker may then trade against that order. That is, short against a seller or buy against a buyer in an attempt to move the market against them.

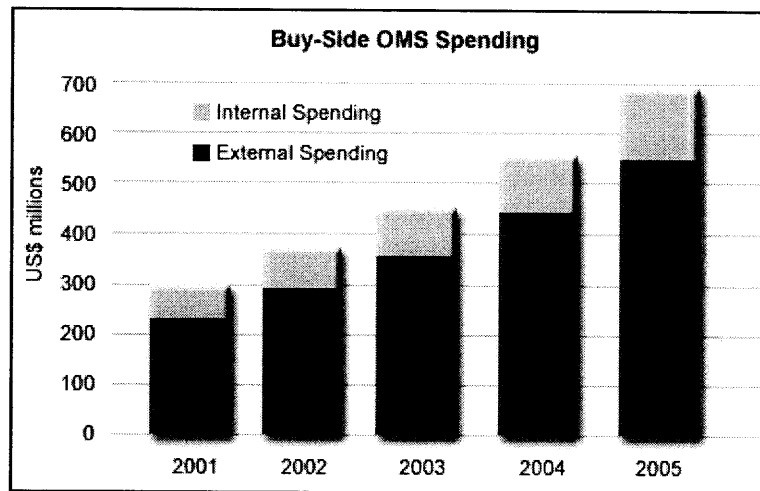
In response, the algorithmic trading shops have built sophisticated "anti-gaming" logic into their programs. The machines vs. machines battle here is no different than the "mano a mano" on the floor of the NYSE. The only difference is its execution is anonymous, separated by computer terminals. The take away here is that the basic nature of traders and speculation hasn't changed: I want to find out what cards you have before you figure out mine.

#### *The Arms Race is on: Order Management Systems*

Order management systems (OMS) spending has been growing to accommodate the desire for better analytics and, as we just described, efficient trading in all venues. Order management technology, on both the buy and sell side seeks to capture speed and efficient, error-free trading. OMS are essentially becoming the trader's cockpit, enabling them to see and evaluate trades.

As you can see in Chart 5.4, buy side order management spending is growing rapidly, both external purchases and proprietary spending. The presumption obviously is that there is more than the \$700Million in benefits or trading costs that can be eliminated over time or at least enough order flow from the sell side to capture this much value.

**Graph 5.4**



Source – Celent Communications

For the sell side, providing pre-trade analytics delivers value to the trader and helps to capture trades. For example, one of the more popular strategies at this time is “Implementation Shortfall”. Essentially, this is a measure of the stocks volatility versus the potential impact cost of executing a trade right away. The sell side trader can evaluate the potential cost of waiting versus the cost of doing the trade immediately – assess which risk he is more comfortable with – and enter the trade directly from his terminal. Building pre-trade analytics is a way for the sell-side firms to deliver value to the buy side in a low touch environment and capture order flow.

As we noted in the “Capital Markets Supply Chain” framework, agency trades – those done at an exchange on behalf of a client – will be under increasing margin pressure. With almost limitless access to market information and multiple trading venues, buy-side firms will perform more of the analytics themselves and place trades directly. The name of the game for the sell-side will be to deliver value through trading systems and technology.

### ***5.3 Exchange Traded Funds (ETFs)***

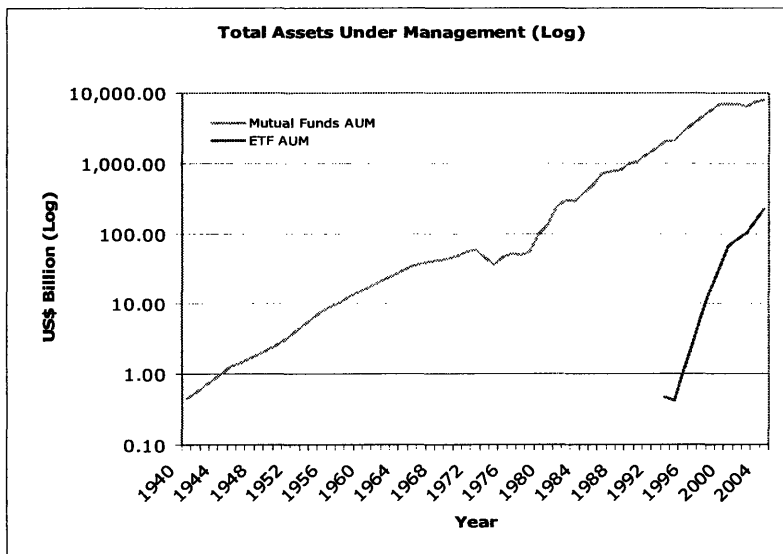
One interesting win for the NYSE/Arca over the last few years has been the growth of Exchange Traded Funds (ETFs). ETFs are a security that tracks a basket of stocks, an index or a commodity. They are much like index funds except that they trade during the course of the day so they do have an intraday price movement unlike mutual funds that are priced at the end of the day. ETFs are mostly static portfolios (at least now) so they are very inexpensive compared to traditional funds and because they trade intraday represent an accurate approximation of that particular asset.

ETFs as a vehicle represent product innovation more than a specific technology. I include ETFs as part of the discussion on technology because of their dramatic growth as a percentage of trading and the fact that this growth is driven by electronic trading and the reduction of “friction”. Their growth and the underlying mechanics of their construction are a contributor to the increased use of electronic trading.

Charts 5.3 and 5.4 tell an impressive growth story when comparing their emergence to the universe of traditional mutual funds. When considering the depictions of the two vehicles, consider that mutual funds are the ultimate in scalable financial products. As you take in money, you are issuing new shares to represent new investor’s ownership in the underlying holdings. This requires no new staff or resources. As a fund grows in size, say from \$100 Million to \$1 Billion, they may add additional investment or administrative support, but the income from that growth far outstrips and costs.

As you can see from the charts, from a standing start ETFs have grown rapidly both assets (5.5) in the number of listings (5.6) since their inception in 1994. While the growth has been dramatic, they don’t come even close to the number of mutual funds; still 100x their number in both assets.

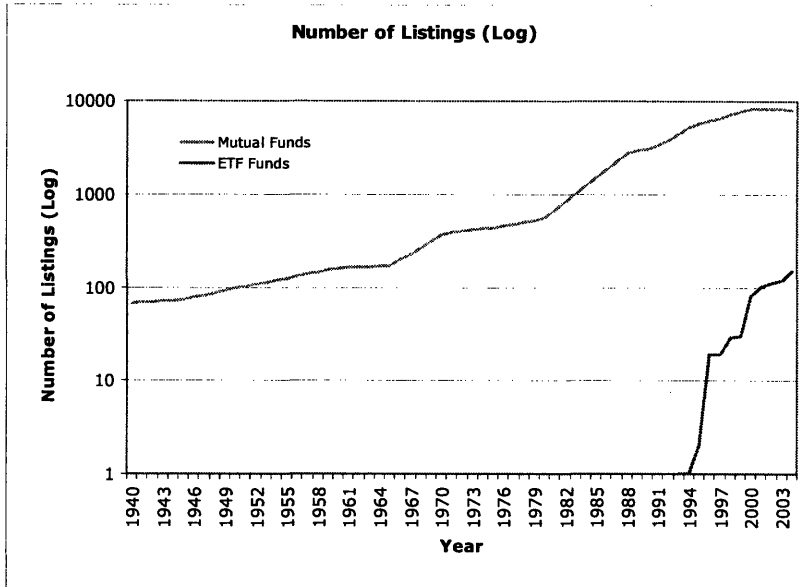
**Chart 5.5**



Source: ICI Data



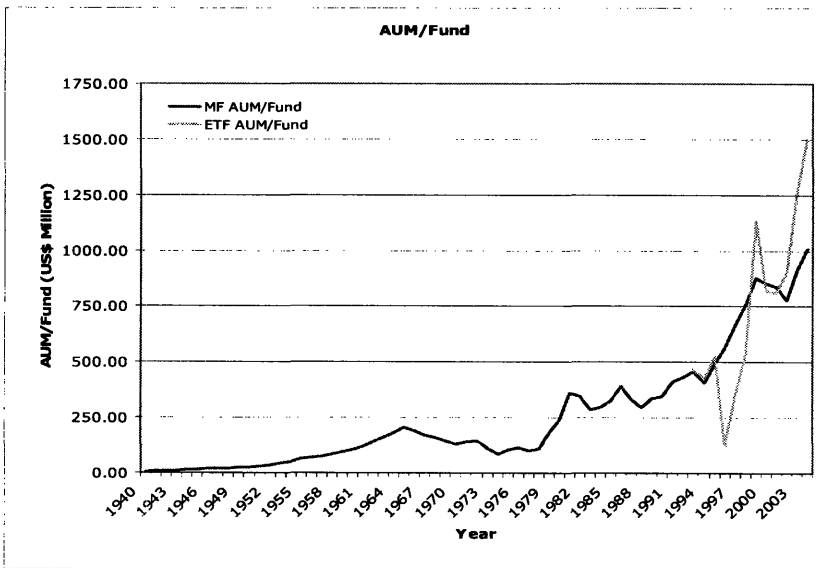
**Chart 5.6**



Source: ICI Data

Having noted the absolute size advantage of traditional funds, consider the scalability of ETFs from Chart 5.7. If we view ETFs on Assets Under management (AUM) per fund, they have already exceeded traditional mutual funds. If we assume this trend continues, this places escalating revenue and margin pressure on the buy side managing the traditional products and the sell side who distribute them while making ETFs an increasingly attractive business.

**Chart 5.7**



Source: ICI Data

ETFs have grown to around 17% of total NYSE volume. The QQQ ETF (traded primarily on NASDAQ) representing the proxy for the NASDAQ 100 is the most active equity security in the US markets, trading nearly 97 million shares per day.

The bigger picture the underlying ETF trend in asset management is the separation of Alpha (the search for above market returns), from Beta (broad market exposure). Actively managed funds have failed to deliver their promise of alpha making investors increasingly unwilling to pay the higher fees associated with this structure. Roughly 70% of worldwide assets are in the form of long only (non hedge fund) active management. ETFs are managed at a fraction of the cost of traditional active equity management – typically 10-20 Basis Points versus 150+ Basis points for traditional funds (non-index). Improved transparency by extension will increase accountability and performance pressures on active management.

Because of their liquidity and ease of trading through fast markets like NASDAQ and Arca, ETFs have appeal to both traders and investors. Both institutional and retail investors will have more choice and ease of execution when using passive strategies. They can effectively “unbundled” asset management services and reassemble passive strategies in a way that best suits their objectives.

A quick word on mechanics of ETFs: ETFs are a static portfolio usually designed to mirror an index. They trade intraday and the shares, or creation units, are redeemable for the physical underlying stocks. The flow through structure keeps the ETF from trading at meaningful premiums or discounts to its actual NAV making them highly liquid and an ideal vehicle to trade intraday. All of this translates into more basket trades – a boon to the brokers providing algorithmic trades. Like the “Wintel” franchise – growth in ETFs spills over into growth in program trades and algorithms. The trend has proved to be good deal for both the algorithmic brokers and the exchanges.

One example of how ETFs are used is to “proxy” into an idea while another trade is being executed. For instance, a portfolio manager may be interested in buying 500,000 shares of a stock that has an average daily volume of 50,000. Assuming there is no immediate natural liquidity, getting a trade done like this in one trading session is difficult without substantial price impact. The portfolio manager can implement a basket of ETFs with similar trading characteristics while she implements her single stock idea over several trading sessions.

ETFs have a large impact in that they have such broad appeal. Given their attractiveness, it’s likely that they will continue to grow as more flavors of ETFs are issued. Ironically, while ETF volume has been a benefit to all the exchange structures, they are creating a significant competitive challenge for traditional buy side firms - the same firms that have been seeking to source liquidity away for the exchange. The \$7 Trillion in long term mutual fund assets are under siege from hedge funds and ETFs.

What does this mean for exchange structures? Going back to our discussion on the evolution of the supply chain in Section 4 – technology will enable another shift in the

supply chain and resulting power structure. Assuming ETF volume continues to grow close to its current pace the incumbent exchange structures of NYSE/Arca and NASDAQ/Instinet have the opportunity to improve their position with the customers and win back more volume.

#### ***5.4 Revenge of the Nerds - Observations on Technology.***

The back office and technology have long been considered the less glamorous part of the business. Most business school hopefuls look for jobs in the customer facing, fast moving parts of the industry: analysts, brokers, investment bankers, traders, salesmen. Not surprisingly, as these are revenue generating positions they also generally pay more. The back office has always been, well, in the back.

Technology and supporting analytics (quants and algorithm traders) are emerging as some of the most sought after talents on the Street. Both buy and sell side firms are going to continue to spend on upgrading their legacy systems and building new front-end trading systems for them to interface with their clients. Traditionally, most large firms have bought applications to complement their existing systems, reserving the core work to be done internally. It was the building of these legacy systems over a period of time along with significant pressure to reduce costs that has accelerated the outsourcing of more new development work and the procurement of 3<sup>rd</sup> party systems.

One of the other legacy challenges worth noting is the architecture of the NYSE system versus electronic markets. Part of the NYSE and regulators response to September 11, 2001 was a focus on safety and redundancy in the financial markets. As such, the NYSE with the full encouragement and blessing of the SEC sought to build systems that would be redundant at multiple levels. The view was reliability and safety first, speed second. Systems and reporting were not necessarily focused on the economics to the exchange – just the end goal of safety.

One example of these differences is in the architecture of NYSE trade routing versus faster electronic markets like Arca Ex. As trades processed through the NYSE the system would recognize the trade, save the data and information and then forward to the system for execution. On faster markets the same sequence would forward the trade first and then save the data. This may sound like a mundane detail, but a minor architecture decision like this – influenced by different focus and priorities at each organization – causes a degree of latency in the NYSE system and subsequently a tactical disadvantage to their electronic rivals.

Markets and the systems that support them are interdependent – like an ecosystem and its climate, not distinguishable from each other. In the end the markets and its enabling technology will find a way to operate that balances the needs of the participants. A point that is often missed is technology development reflects the desires of the market participants – they are not an end in themselves. The technology development related to exchange structures has been primarily demand pull, not technology push. If new systems or increased speed do not convey an advantage to the users, no one will want to

pay for them. The moral of the story is trading technology has imbedded tradeoffs for all the participants that will determine how it develops. A point we will develop further as we go forward.

## **Section 6 – Lessons from Overseas**

*“I want to the whole of Europe to have one currency; it will make trading much easier. “*

Napoleon Bonaparte (Napoleon I) – letter to his brother Louis

*“The stock exchanges of the future will migrate away from the geographical bounds that the interest groups behind any potential European exchange seek to retain. Instead of a National view, a sector approach is emerging: for example, investors will not view the market in terms of say Germany or Sweden, or the UK. Instead their view will be in terms of pharmaceuticals, IT or forest products.”*

Per E Larsson, Former CEO, OM Group

**Most revolutionary ideas are not new.** The promise of common financial markets and interlinked trading has been around for hundreds of years. Making it happen in the face of entrenched interests and ways of conducting business has always been the challenge. However, it looks like the conditions and technologies necessary to make common financial markets a reality may have arrived.

Napoleon recognized the benefit of reduced friction in facilitating trade. While his motives may have not been purely commercial, the point resonates today. The fewer impediments to trade there are in any market, the better the flow of goods, services and investment. Going back to some of our basic premises in Section 2 – common currency, reduced friction, and interchangeability of goods are all in play in both Napoleon’s time and today.

The second quote is selected as much for what it says as the organization represented. Most Americans would be hard pressed to tell you who the OM Group is. The OM Group (OMX) was formed through the merger of the Swedish Stock and derivative exchanges in the 1990s. They became the world’s first for-profit exchange – the change in governance and focus foreshadowing many of the trends we see today: mono-line (stock or futures only) exchanges seeking to expand into derivatives, cross border boundaries to gain scale in volume, and significant IT investments to improve speed and reliability of systems. Today OMX is a pan-Scandinavian company that includes exchanges in Copenhagen, Stockholm, Helsinki, Tallinn, Riga and Vilnius. The vision for OMX as implied by the CEO’s statement is a borderless exchange structure which, in turn, becomes a seamless portal to liquidity in certain financial markets. Only slight variation in principal from Bonaparte’s quote...

You generally wouldn’t accuse most European financial institutions of being innovative and open. However, European and Asian financial markets have an advantage when it

comes to changing market structures. Because their markets handle a fraction of the volume of the US making changes to legacy systems and infrastructure were a less daunting task. Also, their ownership structures were less entrenched (1980s LSE excepted) and more amenable to changes that helped them stay relevant in world markets. Smaller scale allows for freedom to implement more change with less resistance.

We are adding “Lessons from Overseas” this to our discussion as the recent history and activity of exchanges outside the US provides some insight as to how things may evolve in the US. Non-US exchanges have already gone through a dramatic period of change: demutualization, regulatory reform, migration to electronic exchange formats and cross border alliances and their resulting political debates. All has not gone without controversy and the issues US exchanges are likely to face as they complete their transition to for profit exchange structures.

### ***6.1 Exchanges in the “Flat World”***

Thomas Friedman’s popularized “flat world” concept deals with the acceleration of globalization and the neutralizing of geographic competitive advantages. Technology and communications have reduced barriers to competition so investment can flow to the opportunities and access talent across national boundaries. Financial markets are a good illustration of the “flat world” phenomenon – investors can move money from Boston to Bangalore or from Seattle to Singapore with a few keystrokes of a trader. This state of play suggests an environment that will produce a host of challenges and opportunities for local and global exchange structures.

As the world has become less US-centric, opportunities for returns and diversification in foreign markets have been growing. You can see this playing out in the behavior of U.S. investors who have been increasing investments in non-US companies. In many cases these investments are made through American Depositary Receipts or ADRs which are a pass through vehicle to the shares on those exchanges. ADRs trading on US Exchanges are a receipt representing a defined number of shares of the underlying foreign stock. ADRs have served as the vehicle that allows US investors to trade in their own time zone in stocks from all over the world. Since they don’t trade in real time for the entire trading session (due to time zone differences) there can be some mispricing or illiquidity of some ADRs for larger positions. So for larger institutional investors it’s generally preferable to buy “ordinary” shares on the local exchanges.

Chart 6.1 shows us that U.S Investor Holdings of overseas equities continues to rise as a percentage of all holdings. As pension funds continue to seek diversification some observers believe that ultimately the US equity allocations of large US Based investors will approach relative market capitalizations. This would have the US at around 40% of global portfolios.

**Chart 6.1**

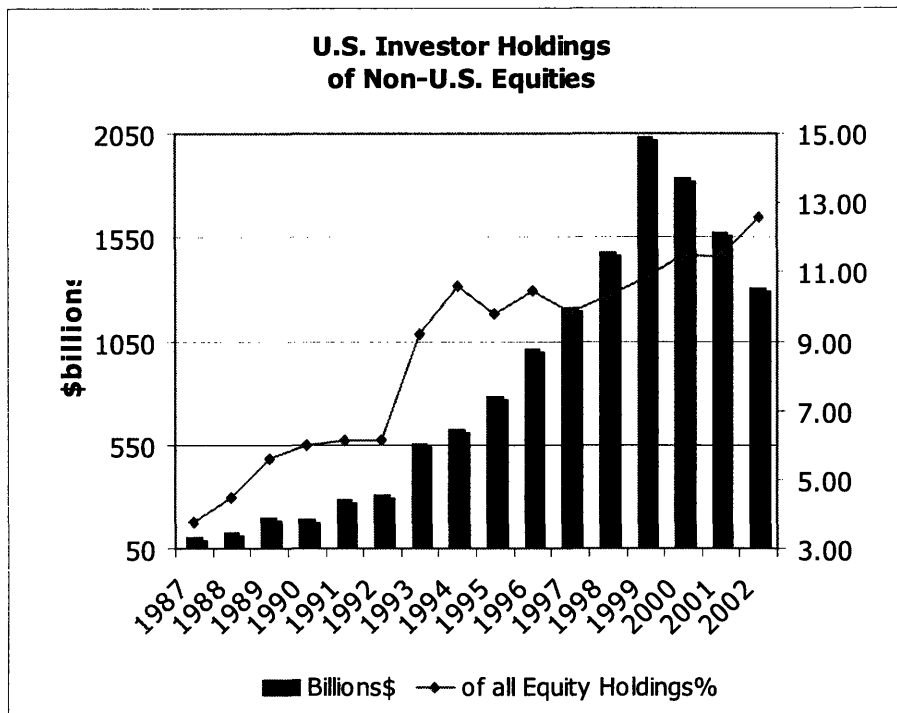


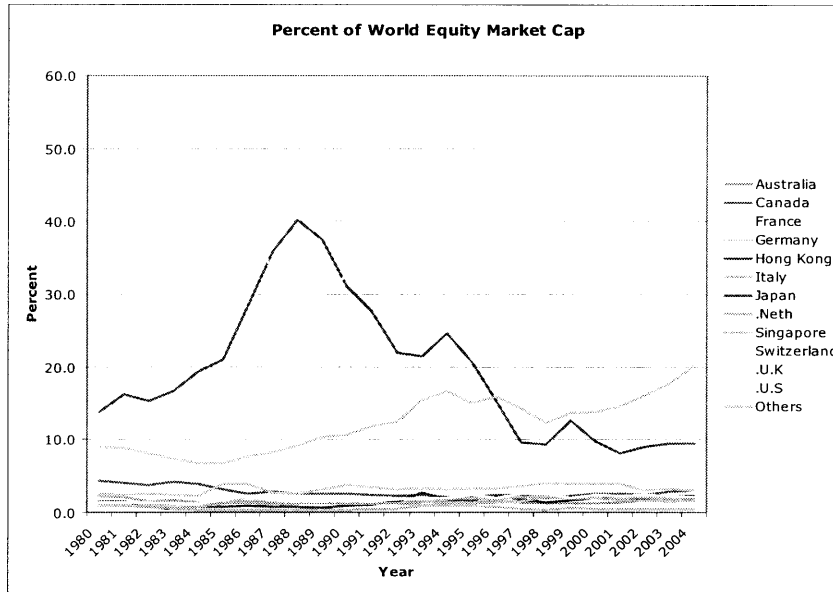
Chart 6.2 shows the markets expressed as a percentage of world market capitalization. This chart is particularly interesting as it shows the extent of the Japanese market bubble in the 1980s. For a brief period of time the Japanese market exceeded the US – the rate of change losing all connection with the actual size of the economy.

What may be most interesting in this chart as it relates to our discussion on exchange structures is the emergence of the category called “others”. This is an aggregation of emerging markets, one of the most interesting growth stories we will see in the coming decades. Even when you take out India and China, there is an increasing demand for capital from companies serving markets from Dubai to South Korea. The flattening of exchange structures will accelerate the ease in which companies from smaller economies can come to market – cheaper, faster, and more transparent. There is less of a need for a formal exchange in their country; access can be provided by a regional or global exchange structure. The recent hiring of Per Larsson from OMX to the Dubai International Financial Exchange (DIFX) underlies the move towards more sophisticated trading platforms for developing markets.

Whether or not that happens, it’s clear that the opportunities in other markets – and by extension other trading venues – are attractive enough for US based investors to pursue them. The interconnectedness of the capital markets is increasing. Correlations between the United States and International returns have gone from a low of .36 in 1986 to about .77 today in 2004(Siegel). This suggests the best opportunities for growth will

have more access to capital than ever before and exchanges, as an extension of their home market, are increasingly accessible to investors.

**Chart 6.2**



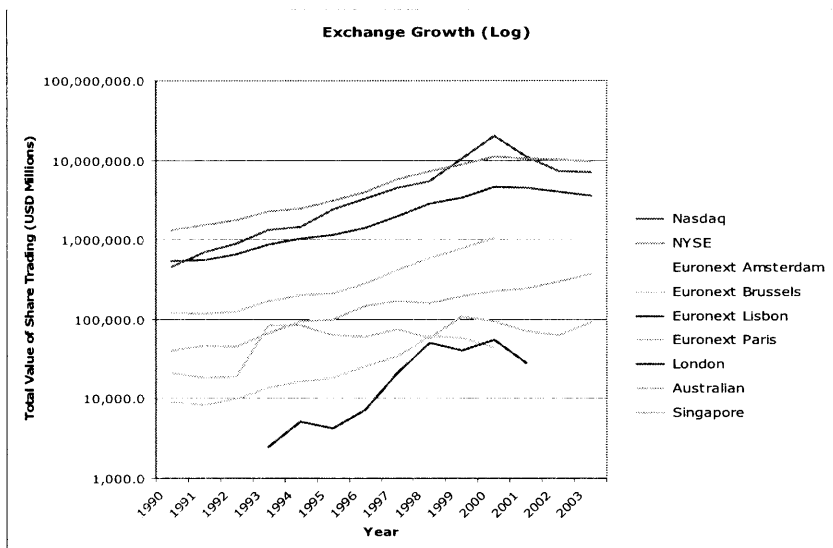
Source: World Federation of Exchanges

Taking the illustration a step further, if we look at value traded in the major exchanges you can see that while the US still dominates overall volume traded, the rate of change for the non-US exchanges has been consistent.

As the major global exchanges are now public companies, evaluating an investment in any one of the structures would prompt you to consider the same factors you would with any other investment. Current revenues, growth rates, and profit margins all will play a part in the ability of the investor to make a profit from owning a stock.



**Chart 6.3**



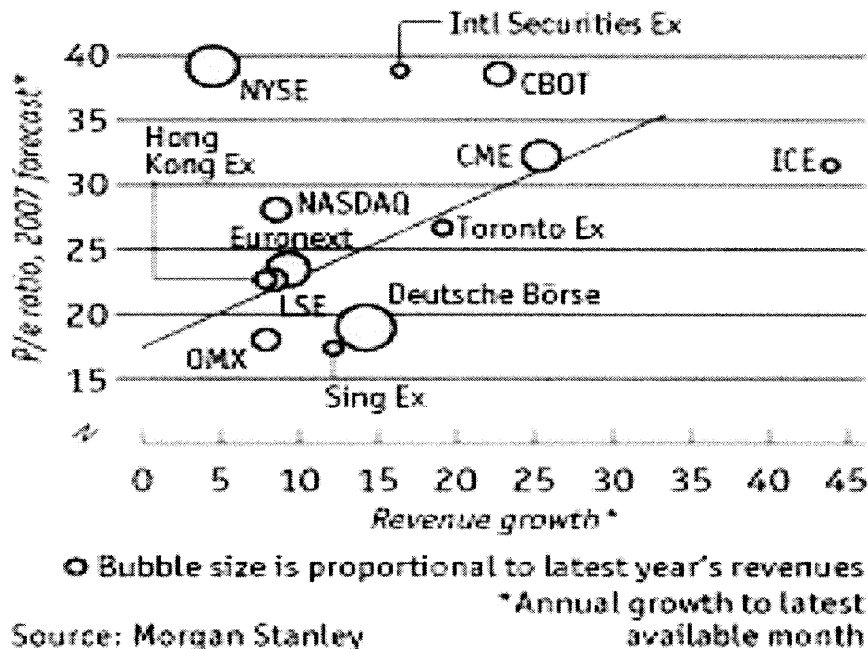
Source: World Federation of Exchanges

Chart 6.4, borrowed from the *Economist*, shows a comparison of the size, revenue growth and profit margins of some the world’s major exchanges. Those to the right of the plot line are likely to represent better growth stories while those to the left will have to create value and earnings other ways. What is striking in this comparison is the spread of P/E ratios relative to growth. The message is that the markets do not view exchange structures as homogenous from a valuation standpoint. Given that it’s early in the game for them as public companies, the market seems to be assessing their prospects on a bottom up basis (company level) rather than a top down (sector level) view.

The issue of relative size and market share in any business govern the behavior of the incumbents. The pace of change often dictates - organizational study shows behaviors replicate regardless of industries. What’s interesting about this chart is where the NYSE sits on the plot, largest in size, lowest in revenue growth and the highest P/E. Without much more information this tells you that the market anticipates a lot of cost to coming out of the NYSE Group (NYX). We will expand on these points in Section 8 in our discussion of exchanges as a business.

## Floating higher

Exchange valuations and growth



Source: Morgan Stanley, the Economist

### 6.2 “Houston... We have a problem...”- the learning curve with technology

The tag line for this chapter hails from the infamous Apollo 13 flight. Astronaut Jim Lovell and crew were on his way to the moon and during a routine operation experienced a malfunction that potentially could have led to the death of the crew. His call back to inform mission control in Houston was one of the great understatements in history.

At the time, the United States had conducted several successful moon flights and landing without incident. It seemed that what was a heroic event a few years prior had become a routine operation. So much so, that the media was barely covering the Apollo 13 mission. What's analogous to our topic on exchange structures and electronic trading is complacency in technologies capabilities and underestimation of its fallibility. Since stories are easier to remember, I'll go through a couple that illustrate the pitfalls of too much reliance on electronic trading systems.

First, let's review the notorious “fat finger” trades experienced by the Tokyo stock exchange during November, 2005. The month prior to the infamous trade, Tokyo had experienced a system glitch that shut down the exchange for almost an entire day. When

you are talking about the world's second largest securities exchange, this is not an insignificant event. The exchange explained it away and indicated the platform problem had been resolved.

A few weeks later, we saw that the exchange still had a few bugs to work out. A typographical error by a Mizuho Securities employee generated a loss of \$330 Million in a span of less than an hour. The mix up began with an initial public offering of J Com, a small recruiting company. An employee at Mizuho mistakenly typed an order to sell 610,000 shares at 1 yen, or less than a penny each, instead of an order to sell one share at 610,000 yen (\$5,057) as intended.

At that price, the sale would have been worth \$3.1 billion, far more than the company's actual value. Mizuho's computer failed to catch the error, but that wasn't all. As Mizuho tried frantically to cancel the order, the computer at the Tokyo Stock Exchange blocked its efforts for about 10 minutes. Mizuho finally managed to buy back most of the mistaken order before investors did.

During the fiasco, investors did buy about 100,000 shares. Mizuho originally said the typo would cost the firm 27 billion yen, or about \$230 million, to reimburse the buyers and cancel the order. The Tokyo stock exchange, however, raised the total loss to 40 billion yen, or \$330 million, ordering Mizuho to pay investors a premium of 300,000 yen, for a total payment of 910,000 yen for each share sold. The higher sum reflected an advisory group's calculation of where J-Com shares would have traded had the market not been flooded with the fictitious sell order.

The incident was embarrassing, especially by Japanese standards. It eventually cost the job of the chairman and two of senior directors who, in traditional Japanese fashion, resigned from their positions in the wake of the fallout. The computer system was designed by Fujitsu who cut the pay of its top executives as punishment for the company's role in the November failure.

Obviously credibility of the exchange was severely damaged. While the blame and punishment was doled out accordingly, it underscores a deeper problem with computer systems running exchanges with minimal human oversight: computers don't apply judgment – they only do what they are told. Sometimes you don't know what the system can and cannot do until you have a big problem...

Let's go back a few years to a similar story from the MATIF futures exchange in France. MATIF, which stands for Marche a Terme International de France, had been primarily a domestic futures exchange, trading mostly French bonds, interest rates and stock futures. MATIF knew the impact it could have if it became the leader in electronic trading as it was first being implemented for futures exchanges in the late 1990s. A switch from open outcry to a fully electronic platform would not only make a splash but would help them compete with their London rival exchange LIFFE. In their zeal to compete – the platform was implemented.

In July of 1998, during a relatively quiet trading session the MATIF received 100 fill-or-kill market orders for contracts of the “Notionnel” – the French government bond contract. As a result, 12,500 contracts were sold within a span of about two minutes, pushing the price of the bond down by 150 Bps - not an insignificant move in interest rates in a short period of time.

When the selling slowed, the markets went back to earlier levels – but the drama began as a culprit was sought. After an investigation of several months, the trail leads to a Salomon Smith Barney workstation. The guilty party turned out to be the F12 key on Workstation 201 which would, if double clicked, instantly enter an order regardless of magnitude. An inadvertent “leaning” on a key by an operator the terminal sent the flurry of orders to the floor with no person to check the validity of the orders. As it turns out, MATIF was supposed to have upgraded the system in the prior month with new software that would have avoided the problem.

Like the episode in Tokyo, this event not only cost the exchange and some of its members dearly, it also dented the creditability of MATIF. What was common in both situations is that the system took over at one point without human intervention; there was no “common sense” circuit breaker that would have stopped the trades. The systems are increasingly built for speed and “efficiency” which both emphasize fewer human touches to any transaction.

These incidents were particularly public at the time they happened, but are not as isolated as you would think. Because firms or the exchanges have to settle these trades with the counterparties, short term glitches or market errors can get very expensive very quickly. Both of these incidents highlight the importance of the reliability of an exchange’s systems and potentially the value of some human oversight.

It’s easy to disregard that fact that computers are not “intelligent” – they only do what people tell them to and people are prone to mistakes and oversights. This is not to say that electronic systems cannot work. To the contrary, they will be the enabler of the growth in volume. Unfortunately, one thing we have learned about systems is that they all have bugs that are usually not found until millions of users start using it. Like the bugs in MS Word or Windows we may never find all of them, but they usually are discovered by users of the system, not the designers. Microsoft ships products knowing there will be patches and fixes later. As we’ve seen in these two examples, with the amount of value at stake small bugs in exchange structure platforms can be very expensive....

### ***6.3 Merging of Exchange Structures- Gondwanaland Reunited?***

Gondwanaland – the prehistoric super continent – was comprised of what is now the southern hemisphere’s continents plus India. Geologist have shown how the continents have drifted apart and fragmented over the life of the earth. The original theory was postulated when scholars noted how the pieces of the continents seemed to fit together

like a puzzle. The force pushing them apart was the natural movement of the earth's tectonic plates over hundreds of millions of years.

There seems to be an equally potent, almost unstoppable force moving exchange structures back together again. Like the continental pieces of the puzzle, many of them are a natural fit with each other. The combinations bring stock and derivatives trading together (LIFFE), scale through regional alliances (Euronext), or technology upgrades (INET/NASDAQ). While it's doubtful that we will have just one massive stock exchange holding company, chances are we will have fewer. A reunited Gondwanaland may be good for some and not so good for others, but clearly presents some governance challenges.

Regional alliances with companies like OMX Group who we opened with in this chapter and Euronext – the holding company for the Paris, Brussels, Amsterdam and Lisbon exchanges – have been successful thus far. These were formed out of the need for trading volume and scale. Cultural and geographic proximity helped these alliances get past the national financial infrastructure debates and concerns of regulators.

So, what is a stock exchange in this new world? Is it merely computer system, a national heirloom (that's not for sale), an integral part of a nation's financial infrastructure, a public utility or doesn't it matter? This is a tricky issue and actually speaks to the much larger issue of globalization on two fronts. One is an acceleration of the Darwinism inherent in an open capitalist system; across national borders where the most efficient exchanges will survive. Second is: what kinds of control will the government regulators have and which government has jurisdiction?

The pure "capitalist" answer is that publicly traded exchange structures should be like any other company: thriving or failing on their own merits, markets assessing their prospects via the price of their stock. The public stock representing claims on assets and future earnings that, if some entity is capable of doing, can be bought in its entirety.

At least that how the theory goes. Mergers and acquisitions are about corporate control, which involves the egos of the participants, who gets what job after the deal is done and regulators all have a bearing on actual completion. The obstacles, as we'll discuss, are not insurmountable but they are formidable...

#### *Obstacles to Consolidation: Chinese Walls or Speed bumps?*

There are a few obstacles worth recognizing that have shown their face in consolidation activity in on-US exchanges. The question will be: are they "Chinese Walls" or just a speed bump? Chinese Walls – literally and figuratively – are a metaphor for strict segregation. Within financial institutions this refers to separations of functions designed to protect clients. Speed bumps, while they slow you down en route to your destination, are negotiable obstacles. Time will tell, but all of these have shown up in the debates thus far:

- *Political Obstacles* – the “heirloom effect”. The realities of cross border alliances and how those are viewed. Control of what is viewed as part of a nation’s financial infrastructure by a foreign entity will likely have some emotion and political grandstanding attached to it
- *Regulatory Frameworks* – who’s in charge? This is a significant issue as an exchange structure will have to determine which regulator or rules will apply. Do public exchanges remain as Self Regulatory Organizations (SROs)?
- *Platform Constraints* – the Holy Grail of exchange structures is a fully integrated stock, bond, futures and derivative platform. One push of a trader’s button to put on the entire trade. The idea being that there is fast execution and minimal floor staff – as personnel and support would only need to support one exchange.

### *Political Obstacles*

Old habits die hard. Politicians know that to maintain economic legitimacy in the eyes of their constituents there are certain symbols of its economic status: a national bank, a money-losing national airline, and a national stock exchange. All are an affirmation of a country’s status in the world community.

In the major developed markets (US, UK, and Japan) clearly the markets support an equity culture and the capital raising process. The market becomes the place to sell stock and raise capital, price the “currency” of a public company and reflect the general economic conditions of that economy. Each country typically has an index like the Dow Jones Industrial Average that reflects absolute levels and direction of stock prices for that country. Indexes like the CAC 40 for France, the DAX for Germany, the FTSE for the UK and the Hang Seng for Hong Kong are representations of their respective markets; reported to the world every day through the financial media. Since these baskets and averages can be created independent of the exchange structure, should it matter who owns the exchange structure itself?

Although we don’t always admit it publicly, cultures and history play a role. Recall the story in section 2 on the closure of the First Bank of the United States due to fear of British ownership. The struggle for ownership of the LSE is a case in point. After an attempt by the Swedes to buy the LSE in 2000 a subsequent offer came in from the Deutsche Borse. The logic was to merge Europe’s two largest and most important stock exchanges to gain scale to compete with the Americans for listings and derivatives. English feelings towards German control were decidedly mixed. The public debate was over the strategic nature of the alliance and the price. However, behind the scenes the objections were more rooted in the shared history and two world wars.

While Americans like to hold our version of capitalism out as being the most pure – true free trade and open markets promoting efficient markets and competition. Consider however, that around the time of the writing of this thesis a Chinese company had attempted to buy the US oil company Unocal. The public debate that ensued was not over the adequacy of the offer but national security. This for a fungible commodity like

oil. The resistance sufficiently discouraged the acquirers and they went away. If we don't want to sell Unocal to the Chinese, how will we feel if they want to buy the NYSE?

### *Regulatory Frameworks*

Regulatory structures can be either a positive or a negative, depending on your perspective. The issue with regulation has two forms: first, in cross border exchanges which regulator will take precedence and second, how will governments react when companies in their country shop for other regulatory venues?

In the United States, stock exchanges are regulated by the SEC as well as maintaining a status as a Self Regulatory Organization. Futures exchanges are regulated by the CFTC, a subsidiary of the Department of Agriculture. The securities industry itself is regulated by the SEC and the NASD (a self regulatory organization).

Competition between regulators is not necessarily bad. In fact, most compliance professionals in the United States will tell you that having the NASD for some things and the SEC for others strikes a healthy balance in both the focus and expertise of the regulators.

Since listing venue currently governs the regulatory framework, the decision a company faces on regulators should seem pretty straightforward. If you are listed on the NYSE or NASDAQ, you are subject to the securities laws of the US. The best way to think of this decision is like Delaware incorporation or Swiss banking custody. You choose a legal framework based on what you believe to be an advantageous and fair set of laws.

From a for-profit exchange's perspective, the regulatory environment can be viewed as an advantage or disadvantage when competing for listings. A recent example of success is the growth in listings on the Dublin Exchange. Given a transparent and respectable legal framework along with reasonable listing fees the exchange has won them a following among international hedge funds in search of a home. Dublin a few years ago was a sleepy exchange for a tiny market. The funds contend that listing in Dublin creates legitimacy for hedge funds that may not have attracted investors otherwise.

The reverse, regulatory disadvantage is also true and we see this playing out in the United States. Following the predictable regulatory cycle legislators and regulators seek to implement laws designed to avoid a repeat of the most recent crisis. Fighting the last war is effective in scoring political points and gaining valuable media exposure. Our most recent incarnation of this phenomenon is Sarbanes Oxley (SOX); the legislative response to the recent wave of corporate scandals. There are two tangible responses to SOX that are relevant to US based Exchange structures: 1) fewer companies electing to go public and 2) global companies electing to list on other venues.

While the US exchanges struggle under the burden of Sarbanes Oxley and an increasing glut of securities regulation, London is becoming the venue of choice for a number of international share listings. It is considerably cheaper to list in London than almost any

other financial center, witness London's growing success in attracting share listings from Russia. This state of play makes London a considerable competitor to New York for international capital. Given our point earlier in this section on the growth of emerging markets, capturing listings and activity from emerging markets will be an advantage to any exchange structure's business.

At the time of this writing, there is considerable debate in the US over a regulatory disadvantage. Section 404 of Sarbanes-Oxley requires companies to disclose more about their internal financial controls and their outside auditors' opinions on the adequacy of the controls. The rule, so far being applied only to the largest U.S.-listed companies, is enforced by the Securities and Exchange Commission and the Public Company Accounting Oversight Board. The PCAOB was also established by Sarbanes-Oxley, which has become a target for business complaints on regulation.

There is some early evidence of the validity of the claim of regulatory disadvantage: Only one of the largest 24 initial public stock offerings globally in 2005 was registered in the United States, according to a study by accounting firm Ernst & Young. Two of the world's biggest IPOs last year included China Construction Bank Corp. and China Shenhua Energy Co. Ltd. Both listed on the Hong Kong exchange. Two other large offerings were Electricité de France and Gaz de France, both French companies that listed on Euronext, which operates out of Paris. In past years many large global offerings companies would list in the US or seek a dual listing with their home exchanges.

Despite this concern, the E&Y study also showed the United States remained the world's top market in capital raised in IPOs, as well as world leader in the number of IPOs in 2005. For the NYSE and NASDAQ, having an alliance with the LSE or other non-US structures creates another outlet in the battle for listings and a way to address the regulatory framework issue.

Finally, the debate is white hot on whether a public, for-profit company, can continue to be its own regulator. The NYSE's supervision is now run through an entirely separate board with accountability independent of the NYSE Group. To be sure, there are strong opinions on both sides of the debate on whether or not this can work. However, if the European experience teaches us anything it's that US regulators will have to shelve political agendas while maintaining a strong regulatory framework or risk seeing business go to other exchanges.

### *Platform Constraints*

Combining exchange structure platforms, the technology, clearing data and communications networks, sounds feasible on the surface, but has proved difficult in practice. The challenges have a few sources: reluctance to make the necessary IT investments without immediate economic benefits to the exchange, different philosophies on back office control and local requirements that may not match.



Case in point is the clearing and settlement between European markets. One of the major goals of financial deregulation in the EU was to improve the flow of funds between markets by standardizing local requirements. The idea would manifest itself in the ability to trade France Telecom in the UK or British Air in Germany and settle the trade locally. It hasn't happened for a variety of reasons; mostly due to the local government's failure to come up with common standards for back office procedures or to shepherd the reform process forward.

There are meaningful differences in philosophy between exchanges on ownership, control and procedures of the back office. Most notable is the difference between the LSE and Deutsche Borse. The LSE does not own their own clearing operations, preferring to let multiple companies compete for the business. The Deutsche Borse on the other hand owns the entire process – making it more profitable for the exchange but also more expensive for clients to trade in their venue.

Anyone that has ever integrated two operating companies will attest to the difficulty of systems integrations. Technological compatibility is the home construction dilemma of mergers in any company – it never gets done when promised and always costs more than you thought. Exchanges don't have the luxury of stopping trading while they overhaul and test systems. The legacy trading systems for futures, options, fixed income and stocks are not compatible between exchanges today. That said exchange combinations may be more likely to gradually integrate, operating as separate entities within a holding company (e.g. OMX and Euronext). The Holy Grail may still be a few years off.

#### ***6.4 Conclusions and Observations***

The economic forces behind exchange consolidation are undeniable. All exchange structures need to grow volume, reduce costs and maintain a considerable investment in technology. Now that they have shareholders to boot, staying small may not be an option.

Determining whether the obstacles we enumerated are “Chinese Walls” or “Speed bumps” is a challenge but it's probable we will find out in the next few years. The tectonic forces are too strong for it to turn around now. Much trickier will be dealing with public sentiment and regulatory wrangling that will result from US alliances with overseas exchanges or any attempt by a non-US entity to buy as US Based exchange structure. I don't propose to have a specific solution for this issue. As then plates continue to move together, there will be more than just economic issues involved. The behavior and perspectives of participants in shifts like this are the subject of our next section.

## **Section 7 – Lessons from Parallel Industries**

*“History doesn’t repeat itself, but it rhymes “*

Quote attributed to: Mark Twain

**We are the sum total of our experience.** Every industry has a history, an accumulated knowledge and institutional memory. Unfortunately, perspective and learning usually stops at their industry’s border. It is human nature to be beholden to your own frame of reference. In that sense most industries and companies are like nations – learning perhaps from their own past but not from the past of others.

The financial services industry and exchanges are no different in this respect. In fact, it’s probably worse than most. What’s ironic is that financial institutions and markets are an extension of their connection to the business and political world at large. Because markets reflect events of the economy as a whole, you would think that financial institutions would internalize learning from these events. The paradox is that when a financial institution experiences a change – a bank, brokerage or in our case exchanges – they generally believe the events they experience are unique; unprecedented in history. More often than not, they may be making their own history but it’s usually not the first time in the history of business that a set of circumstances causing such a change has occurred.

To follow Mark Twain’s wisdom there are comparable business situations that can provide a framework for thinking about the current situation with exchange structures. In short, they rhyme. I’ll present two industries in particular that have elements of the changes in exchange structures and their potential futures: healthcare and telecomm. Each of these industries has experienced changes in their business model, technology, regulatory frameworks, the pricing of their services and attitudes of the participants. While their stories are still incomplete, the analogies can help us better understand the macro challenges the NYSE faces today and frame our conclusions in the final section.

We’ll close this section with a summary of insights from an acquisition player in exchange structures. Macquarie bank was a recent, albeit unsuccessful, bidder for the LSE. Their motivations for the acquisitions and view of its longer term value provide a unique insight on the where the value of the exchange structures may lie.

### ***7.1 Healthcare: Take your medicine***

Healthcare has gone through momentous changes in the last decade in how it is delivered in the United States. The crisis first arrived in the early to mid 1990s when companies saw their healthcare benefit costs rising at double digit rates. For a variety of reasons, costs had begun to escalate at a rate that was unacceptable to the end customers. As a result, delivery methods had to be challenged as the customers (purchasers of insurance) were pushing back hard for a better alternative. Our tagline is a reference to the taste of a

restructuring to most industries. Even when you know it's good for you, taking your dose of bitter tasting medicine prompts a visceral reaction...

The emergence of HMOs and the difficulty in changing how healthcare was delivered can be characterized by three macro trends – all of which “rhyme” with the current state of play at the NYSE:

- *Bandwidth* - more people trying to get through a system than it was designed to handle. The smaller practice, high-touch, office visit model could only handle so many patients. Consolidation, larger practices and HMOs were a response to the volume challenge.
- *Capitation in pricing* – induced by the insurance practices, there is only so much they are willing to pay for each type of service. The power of large buyers dictates pricing for an entire industry.
- *Practitioners resistant to change* – the doctors who had modeled their practices and livelihoods on old methods fought the change in the business model. They saw the changes in reimbursement and patient care as not only an economic threat but a reduction in the level of care they were able to provide.

To build the analogy on how these apply, we'll take them one at a time.

*Bandwidth.* A floor based system and the constraints of a specialist system have some governors on how much volume they can handle. On big volume days, the NYSE system still requires clerks to manually key in trades. If the exchange is to grow its profits in a capitated price world, volume is a big part of the game.

Like healthcare, a move to a lower touch environment is the only way that an increase in volume can match with acceptable economics to all the parties. The model will have to change to something that allows the customers more throughput at the same or lower prices – which for now appears to be the move to hybrid and the development of a fast electronic market. The jury is out as to what this means for the floor community and whether or not it's a better system – but it's the best system given what is currently available and the realities of points two and three in this analogy.

The volume game in HMOs was partially about subsidization. That is, HMOs sought to balance overall costs by balancing a healthy population with older patients. Essentially, one population balanced the costs through non-utilization.

Exchanges have a similar predicament with managing higher touch, lower profit business and the print trades. They are not as profitable as the lower touch or higher revenue trades, but maintaining overall market share is important in attracting the business they want. So, how to minimize the expense of the must-do with the volume of the want-to-do business was the problem to be solved.

*Capitation* in pricing is always difficult for practitioners to accept. On some level it feels like their knowledge and profession are being devalued. Emotions aside, pure supply and demand dictate pricing. How much the customer will pay for a service will determine its market price. So in our health care analogy the power resides with insurance companies. They can dictate the price they are willing to accept by reimbursement rates and that becomes the market price. Hospitals can charge whatever they like, but are often limited in to the reimbursement rates.

New solutions become a balance of interests. They may not be as good as what they were getting before but it's what the customer is willing to pay for. In the case of the exchange, customers would want everything if they could have it for the same price: fast market, price improvement from the crowd, best-execution prices and anonymity.

In this example, the health insurance companies are like the buy side. Big purchasers with a number of options on where they can place business. Its not that they don't value the service – or in the case of the NYSE the liquidity and execution - it's just that there is only so much they are willing to pay. They experience the same pressures from their customers: to do more with less. Pricing changes predictably prompt a business model shift. Business models are set up with a cost structure and delivery method dependent on current economics. If the pricing changes, something's got to give...

*Practitioners* are the third leg of the story. We have all heard over time how notoriously bad doctors as a group are with money and as businessmen. That issue aside, it's important to understand human nature when it comes to change. When someone has been successful economically in a business or trade and a major change is thrust upon them, they will fight the change and point out why/how the status quo serves their customer better.

Doctors, like brokers and floor traders, are generally conversant in the trade but not the business. In other words, they are focused on the craft of their profession; the customer/patient care aspect. They generally don't have a good understanding of the profit and loss aspect of the overall business as it's not as visible to them. It's the execution of the craft above all else with the assumption that acceptable finances are behind it.

This is not to say this emphasis is not well placed; a professional dedication to the craft is admirable. There has to more of an equilibrium solution – each party willing to get and give something in return for an acceptable midpoint. Practitioners will have to change as the business does and find new and different ways to add value. Either the occupants of the positions change their habits or the positions will change occupants...

The takeaway from this analogy is primarily people related. Customers and the practitioners need some time to adjust to the new realities. Some will adjust, some will not and new practitioners will enter the business as opportunity is created. It takes some years for this to play out. In the case of exchange structures and the NYSE, the changes may play out faster than health care but they will not be overnight.

**Chart 7.1**

Health Care – How did it play	Exchange Structures – Current State
<p><b>Bandwidth = HMOs and Managed Care</b></p> <ul style="list-style-type: none"> <li>➤ Business model changed followed the change in economics.</li> <li>➤ Public companies replaced smaller group practices</li> <li>➤ Trained the customer to accept different methods of delivery for new pricing.</li> <li>➤ Cost containment became a primary determinant in delivery of service with quality second</li> <li>➤ Reduced personalized or customized care</li> </ul>	<p><b>Bandwidth = Hybrid and Fast Market</b></p> <ul style="list-style-type: none"> <li>➤ Hybrid model is a bridge to the new economic and tech realities.</li> <li>➤ Public ownership of exchange structures changes priorities.</li> <li>➤ Price improvement and floor handling will have to demonstrate new value.</li> <li>➤ Reduced staff will be necessary to deliver margins – price competition heats up.</li> <li>➤ Increase in volume will be low touch, block trading may have to find a different venue (Liquid Net)</li> </ul>
<p><b>Pricing = New Delivery Methods</b></p> <ul style="list-style-type: none"> <li>➤ Reduced pricing established by the biggest buyers of service – insurance companies</li> <li>➤ The value of some positions and services changed with new pricing</li> <li>➤ Speed of service increases – as more patients need to be processed to cover overhead</li> <li>➤ New solutions are a balance of interests between doctors, patients and distribution companies</li> <li>➤ New services emerge for those willing to pay more</li> </ul>	<p><b>Pricing = Fee Pressure and New Services</b></p> <ul style="list-style-type: none"> <li>➤ Reduced pricing established by the biggest buyers of service – the buy side</li> <li>➤ New compensation levels for many positions. Specialist system may have been better, system is realigning economics</li> <li>➤ Cash equities sales will be run by fewer people on the sell side. More volume done at a lower per share costs</li> <li>➤ Price improvement, need for more complex transactions, use of sell side capital persists at a higher price point</li> <li>➤ Listing Fees may be under pressure. NASDAQ model of broader, incremental services may take hold.</li> </ul>
<p><b>Practitioners = New Model and New Skills</b></p> <ul style="list-style-type: none"> <li>➤ Practitioners took time to adjust to new realities</li> <li>➤ Senior physicians retired instead of retraining</li> <li>➤ New skills developed in diagnosis and balance of care between general providers and specialists</li> <li>➤ Innovation cycle rewards cost containment as much as efficacy in new products</li> <li>➤ New practitioners enter the business (Health Info Tech, Medical Devices, Wellness)</li> </ul>	<p><b>Practitioners = Adjustment and Opportunity</b></p> <ul style="list-style-type: none"> <li>➤ Specialists and Floor brokers will have to adjust to hybrid</li> <li>➤ Reduced need for floor personnel will cause retirements</li> <li>➤ New skills in additional lines of business to be added (options, fixed income)</li> <li>➤ New skills rewarded/needed in algorithmic and program trading – new innovation cycle emerges.</li> <li>➤ Innovation cycle rewarding efficiency – platform technologies,</li> <li>➤ ECNs and ATS formation accelerating – customers open to new ways to trade.</li> </ul>

At the time of this writing, healthcare economics are far from being solved. Many aspects of the system have been challenged with more to come. The insight as it relates to exchange structures is that the business model and practitioners are inextricably linked and will get to the new reality in an iterative fashion. Apologies to health care professionals for any oversimplifications – these macro trends help explain the business model evolution, internal resistance and time to implement:

## ***7.2 Telecom Industry – it's the value of the Network...***

Metcalf's law states that the "value" of a network increases in proportion to the square of the number of nodes (users) of the network. In other words, if you have four nodes, or computers, on a network, its "value" would be  $4^2$  or 16. If you added one additional node, or PC, then the value would increase to  $5^2$  or 25. The notional increases reflect the increase in possible uses with more users.

Metcalf's Law is the oft-cited axiom to explain the rapid growth of the Internet. Together, with Moore's Law - the rate which computer power is accelerating - Metcalfe's Law can be used to explain the rising wave of information technology and why networks become "valuable" to their users – often before any formal economic rent is extracted.

Telecom has been an area of constant change, innovation and turmoil for the last 25 years. The iterations of change, the responses of the participants and the trend of value creation provide us with insights as to what challenges the NYSE and exchange strategies may experience.

If you go back to the 1980s, ATT (Ma Bell) was a public monopoly. They had been a monopoly for most of their history due to the need to create common standards and infrastructure for telecommunications. The "public good" aspect of the monopoly was akin to the building of interstate highways. After the core infrastructure was built the institution became less efficient as a monopoly operator; its status as a monopoly utility had served its purpose and outlived its usefulness. Their monopoly status was eventually challenged in the courts – creating companies like MCI.

When ATT was first broken up, it was assumed that all the value was in long distance and that the local companies would not have much value beyond being a local utility. When you consider the economics of a telecomm companies today, long distance is almost a give away service. When we sign up for cell service, the phone is sold at a reduced rate with the idea that you will buy add-on services along with enough of the core service to make it worthwhile for the provider. They have a large network that requires constant technology investments and competitors that place limits on the pricing power of any one company. They send huge volumes of traffic over the network at very thin margins. However, owning that network gives them the opportunity to sell additional services through a fixed cost infrastructure.

How is this like the NYSE? There are three aspects of the story which "rhyme" with the current state of play for exchange structures: new governance and the end of the monopoly status, regulations enabling new competitors, and competition around the network effect. Like we did in the last chapter, lets take them one at a time.

*Governance and the end of monopoly status.* The NYSE functioned as a quasi "public utility" for its entire existence. A member owned structure allowed it to implement rules and apply controls to facilitate efficient trading – as discussed in Section 2 one of the main tenants of financial markets. The NYSE while not a true monopoly was as close as

you can get without a government sanction. Any entity that has more than 80% market share in anything is not in a truly competitive situation. Monopoly status breeds inefficiencies and moderates any sense of urgency for change. If there is no competition for business, the incentives to invest intelligently disappear.

The realities of becoming a public company will throw the light on the cost structure of the NYSE and create a new sense of urgency for changes. Like the change in priorities experienced by ATT in the 1980s, the new ownership structure creates pressure to deliver more with less

*Regulations enabling new competitors.* Just like the telecomm breakup created an entire range of new competitors it's doing the same for exchange structures. ECNs, ATS and crossing-systems, and "Dark Books" are all forming quickly enabled by new regulations and technologies. This will create a significant challenge for the NYSE as they have the effect of fragmenting liquidity. Dispersing trading volume is a challenge to the major competitive advantage the NYSE has today: its huge pool of liquidity.

Smaller competitors can quickly create value propositions and value added trading strategies the buy side is willing to try. Some have been very successful in a short period of time in capturing market share (e.g. LiquidNet) and training the buy side on new processes (algorithm interfaces). The new competitors will fuel our opening concept of creative destruction. The exchanges will have to concede market share, respond with competitive offerings or buy some their competition – like the NYSE did with the Arca deal.

*Network value.* Cash equities are the long distance of the exchange structures. Having an efficient economic "network" allows an exchange structure to draw the traffic needed to build out the rest of their business. The NYSE averages approximately 1.6 Billion shares a day at the time of this writing; they will try to get it to 3 Billion with the same or lower pricing to satisfy their shareholders. Meanwhile, to benefit from the value of their network they will work towards add-on services (compliance, network services) or other products (derivatives, fixed income) that will enhance the value of their network.

The residual value for an exchange structure is in the size of their network – as Metcalfe states. The NYSE needs to grow its network traffic (volume), cut delivery costs and offer new services to "network" users. Like the Baby Bells and ATT, they have the power of incumbency on their side – they are playing from a position of strength with a large and vibrant network. At the same time, the network effect works for competitors as well. In addition to LiquidNet's success, you can also point to the growth of algorithmic trading, the establishing of Dark Books (POSIT, Pipeline) and new trading systems like BATs.

On a visceral level the major exchanges understand the network effect which is why they compete fiercely for new listings and trading volume in each others stocks. To the extent that NASDAQ picks up "users" of the NYSE by printing trades in say GE, they are adding to the value of their network. If the NYSE convinces a NASDAQ listing to move to the NYSE, they will pick up market share and add to the value of their network. The

competition at the time of this writing for an alliance or purchase of the London Stock Exchange is along the same lines – volume and users. The zeal for landing a deal and expanding the network (NYSE or NASDAQ) will probably encourage the winner to overpay.

**Chart 7.2**

Telecom – How did it play	NYSE – Current State of Play
<p><b>End of Monopoly = New Companies</b></p> <ul style="list-style-type: none"> <li>➤ Breakup created a new set of companies focuses on local delivery versus long distance</li> <li>➤ New structure induces companies to become more efficient</li> </ul>	<p><b>End of Monopoly = Public Ownership</b></p> <ul style="list-style-type: none"> <li>➤ New governance changes priorities</li> <li>➤ Efficient use of resources will be emphasized with public ownership</li> </ul>
<p><b>Regulatory Changes = New Competitors</b></p> <ul style="list-style-type: none"> <li>➤ Regulation allowed for interchangeability of service from new competitors (MCI, Sprint)</li> <li>➤ New Competitors created more transparency in pricing (long distance vs. local)</li> <li>➤ Competition for the core business drove pricing down</li> </ul>	<p><b>New Regulations = Fragmented Liquidity</b></p> <ul style="list-style-type: none"> <li>➤ Exchanges can trade easily in each others listings (NYSE and NASDAQ)</li> <li>➤ New competitors fragment liquidity, technology needed to aggregate and take pricing advantages</li> </ul>
<p><b>Value of the Network = New Customers</b></p> <ul style="list-style-type: none"> <li>➤ Incumbency benefit to ATT and Baby Bells to sell new services to network users</li> <li>➤ Volume in network traffic drives unit costs down and allows</li> <li>➤ Network size dictates cost of adding new customers</li> </ul>	<p><b>Value of the Network = Volume and Listings</b></p> <ul style="list-style-type: none"> <li>➤ Incumbency advantage to existing exchanges (NYSE and NASDAQ) to leverage off existing volume</li> <li>➤ Need for volume growth induces exchange combinations</li> <li>➤ Listings tend to be “sticky” with not much movement between venues. Battle will be waged to attract new IPOs and create venues to incubate small companies.</li> </ul>

**7.3 Macquarie’s Equation: Demographics+ Income Streams+ Perpetuity Values = Toll roads?**

Its worth including Macquarie Bank of Australia in the discussion of parallel industries as they have some insights which supplement the arguments we just put forth. Most readers would probably not have heard of them other than their recent foray into the bidding for the LSE. Macquarie is an investment and commercial bank in Australia. They provide loans, advisory services, financing and manage assets.

Australia maintains a national savings program called “Superannuation Guarantee (SG)”. This is a compulsory program that requires all wage earners to put aside 9% of earnings on a tax deferred basis for retirement. This is in addition to a defined benefit retirement system like Social Security in the United States. The program has accumulated sizable investment sums and will grow over the coming decades – Australia having similar baby boom demographic to the United States.

A big business for Macquarie is assembling and advising investment funds that are designed specifically for SG pools of money. These funds are purchased for the purpose of secure growth and income in SG accounts. Their investment thesis is that the combination of demographics and growing balances would increase the demand for long



duration assets. Basically, long term, secure, growing sources of income would be the preferred way to invest these funds. Simultaneously, they recognized that China's economic boom would be producing a massive savings surplus that would have a dampening effect on bond yields.

With this backdrop, they looked for non-traditional assets with stable income characteristics and secure competitive positions. One of the first assets they pursued was toll roads. It's a relatively new concept, but many countries now allow private ownership of roads that connect major destinations; the owner can collect a toll for the upkeep and for profit. The logic is simple and understandable, if it's the most convenient route, you are likely to pay the few dollars it takes to use that route rather than go a free but longer route. The investment thesis of convenience and incumbent use has since been applied to parking lots and airports among other businesses with high revenue visibility and stability.

The logic was extended to exchange structures; particularly the larger incumbent structures for the same reasons we have just covered. In Macquarie's view, investors are far more likely to trade on the LSE or the Singapore Exchange for a few pennies than to save a few pennies for an unknown entity. The incumbency factor was in their favor as they already control large pools of liquidity. Competitive risks being recognized, the theory is that the absolute volumes will grow year/year regardless of relative market share.

The theory manifested itself in a £1.5 billion offer for the LSE which ultimately was rejected. The LSE knew they could fetch more once the American exchanges got into the fray. The Americans were liable to be thinking of the purchase along the lines of a network effect versus a bond surrogate. Without a yield requirement, the price would be higher for any proposed combination.

The important insight here is not that the bid failed, rather the "toll road" concept and the idea of a stable earnings stream. While an exchange doesn't necessarily have the physical limitations of traveling in a car, known routes are likely to be more attractive versus the potential of "getting lost" on a back road ECN. Assuming the incumbent exchanges can grow their volumes (if not their market share), control their costs and add services, it looks a lot like the New Jersey Turnpike's ability to grow revenue slightly faster than the rate of inflation. It's not exciting, but it's a pretty good business...and will ultimately reflect in higher multiples for exchange structures if it proves to be true.

To summarize, three insights in this section take us to our discussion of exchanges as a business and our conclusions. Healthcare and the people effect, telecomm and the residual value of the network, and Macquarie on the value of incumbency and predictability.

## **Section 8 – The Business of Market Structures**

*“The new law of evolution in corporate America seems to be survival of the unfittest. Well, in my book you either do it right or you get eliminated! ...*

*The point is, ladies and gentleman, that greed -- for lack of a better word -- is good. Greed is right. Greed works. Greed clarifies, cuts through, and captures the essence of the evolutionary spirit. Greed, in all of its forms -- greed for life, for money, for love, knowledge -- has marked the upward surge of mankind. And greed -- you mark my words -- will not only save Teldar Paper, but that other malfunctioning corporation called the USA...”*

Quote from the character Gordon Gekko in the movie *Wall Street*

**Greed is good when it comes to incenting value creation.** Maybe this was the one enduring philosophical truth from the 1980s, its essence captured by the ethically challenged fictional corporate raider Gordon Gekko. Gekko’s motivations as a corporate raider were to unlock value in a business by gaining control of it. The dissolution or redeployment of corporate assets would have the stock market or private market recognize value that would not have otherwise manifested itself under prior control. Interestingly, despite the vilification of the junk bond financed raiders of that era, they actually did unlock considerable shareholder value.

Since most exchange structures have become publicly owned, for-profit enterprises, greed – or enlightened self interest – now plays a role. Markets work in the extreme on greed and its first cousin fear. They are the dominant emotions marking different points of the financial cycle. Each manifests itself in pressures on corporate management to deliver or protect value.

In this section we will discuss the combination of NYSE and Arca and the levers the exchange has to create value. To simplify, there are two basic types of M&A transactions: combinations designed for growth and those for value. Both are done with the idea they will create more shareholder value than if the two companies remained in their previous forms. I recognize this is a bit oversimplified – but the taxonomy helps to frame some of the decisions exchange structures will need to make.

“Growth” is the purchase of complementary assets to aid a company in furthering an established strategy. Bank of America’s purchase of MBNA or eBay’s purchase of Skype is examples of this genre. In the exchange structure space, the ECN consolidations were good examples of this – consolidating technologies and acquiring volume. Growth can also be created without a transaction, by investing capital to creating new services or technologies. In this section we will present an overview of case International Securities Exchange (ISE) as an example of very successful execution of this strategy.

“Value Creation” is adding size or scale to capabilities you have to create costs synergies. Basically, cut costs, send more through your pipes and bring more to the bottom line. Almost all bank mergers fall into this category. The recent merger of TD Waterhouse and Ameritrade is an example of a value creation strategy.

The incumbent exchange’s recent acquisitions have elements of both strategies. The NASDAQ/Instinet and NYSE/Arca combinations focused on rationalizing their cost structures, adding complementary technologies and getting each company ready to grow their top line. Initially, the market regards them primarily as value deals; as new competitors compete for volume and liquidity fragments the top line story is less clear than the cost story.

Consider the motivations of management at the exchanges and the new reality of public ownership: “greed is right, greed works, greed clarifies...”. The future competitive environment for exchanges promises to be fierce. Each exchange structure will be focused on its relative position in the trading ecosystem and how to prosper and survive, making the requisite resource and personnel decisions. There is a lot of money to be made by getting this right...and severe consequences for getting it wrong.

### ***8.1 Where’s the beef?! A search for value in the NYSE/Arca deal***

“Where’s the beef?” is the refrain from the classic 1980s TV commercial for the Wendy’s hamburger chain. It was a swipe at the substance of their competitor’s sandwich – or lack thereof. The refrain works for us here in that the markets will have to see some “beef” from the combination of NYSE and Arca. Financial markets are a good discounting mechanism – a vote on the future if you will. The “votes” for the combination thus far have been extremely positive not for strategic reasons, but for the more obvious financial benefits that should result. Our thread on the exchange structure story has been the NYSE/Arca merger – this chapter will clarify why there is so much opportunity for improvement of the business despite a competitive environment.

To this point we have talked about the macro, strategic and mechanical elements of exchange structures.

To be more specific about the NYSE/Arca combination as a business, we should consider what the two entities look like at the outset? The financials pre and post merger can give some sense of what the combined entity has to do. At the time of the announcement Arca’s stock was trading at \$17, rising to over \$30 after the announcement. The proxy for value of the NYSE was the price of seats. Seats had been trading for \$1.7 Million rising to as high as \$4MM after the deal was announced.

A contribution analysis can give us some insight as to where the value is likely to come from in the future. Since market share and revenue are a moving target, it’s best to start with a view from the inception. The numbers in Chart 8.1 are as of the announced transaction date (Q1 of 2005).

**Chart 8.1**

	NYSE	Arca	NYSE	Arca
<b>2004 (in MM)</b>				
Net Revenues <sup>1</sup>	\$1,076	\$343	76%	24%
Operating Income	37	76	33%	67%
Net Income	25	46	35%	65%
<b>Q1 2005 (in MM)</b>				
Net revenues <sup>1</sup>	\$264	\$83	76%	24%
Operating Income	18	22	45%	55%
Net Income	11	13	46%	54%
<b>Total Employees</b>	1572	241	87%	13%
<b>Market Share</b>				
Listed	80%	3%	96%	4%
OTC	0%	20%	0%	100%
<b>Ownership</b>			70%	30%

1) Less Section 31 fees (market data shared with SEC not effecting net income)

Source: NYSE Documents, Factset, SIA, Merrill Lynch

The revenue and employee numbers approximate the proposed ownership percentages of the combined entity: 70% NYSE seat holders, 30% Arca shareholders. What jumps out at you are the net income numbers, which show the extent that the NYSE as a non-profit entity was not maximizing its earnings potential. Arca was earning more net income than the NYSE on a third of the revenue and with 13% of the employee base.

At the time of the transaction, the implied value of the combined company could be calculated by multiplying the number of seats on the NYSE (1366) by the price of a seat and adding back in the value of Arca's current value. The values were representative of the 70/30 split for the resulting public stock.

**Chart 8.2**

	Before Announcement	5/24/05
70% of NYSE Group	\$1,980 <sup>1</sup>	\$3,647 <sup>2</sup>
Cash <sup>3</sup>	\$400	\$400
Total	\$2,380	\$4,047
Per Seat	\$1.742	\$2.963
Last Seat Price	\$1.620	\$2.1
<b>Premium</b>	<b>7.6%</b>	<b>41%</b>

1) Implied Value of NYSE Group assumes AX market cap of \$848M on date of announcement

2) Implied Value of the NYSE Group assumes AX market cap of \$1.563BB on 5/25/05. AX will hold 30% of the NYSE Group

3) NYSE seat holders proposed to receive a one-time dividend of \$300MM, regulation of NYSE Group will be conducted separately, remaining cash contributed to this entity.

Source: Merrill Lynch, NYSE Seat Prices-Documents

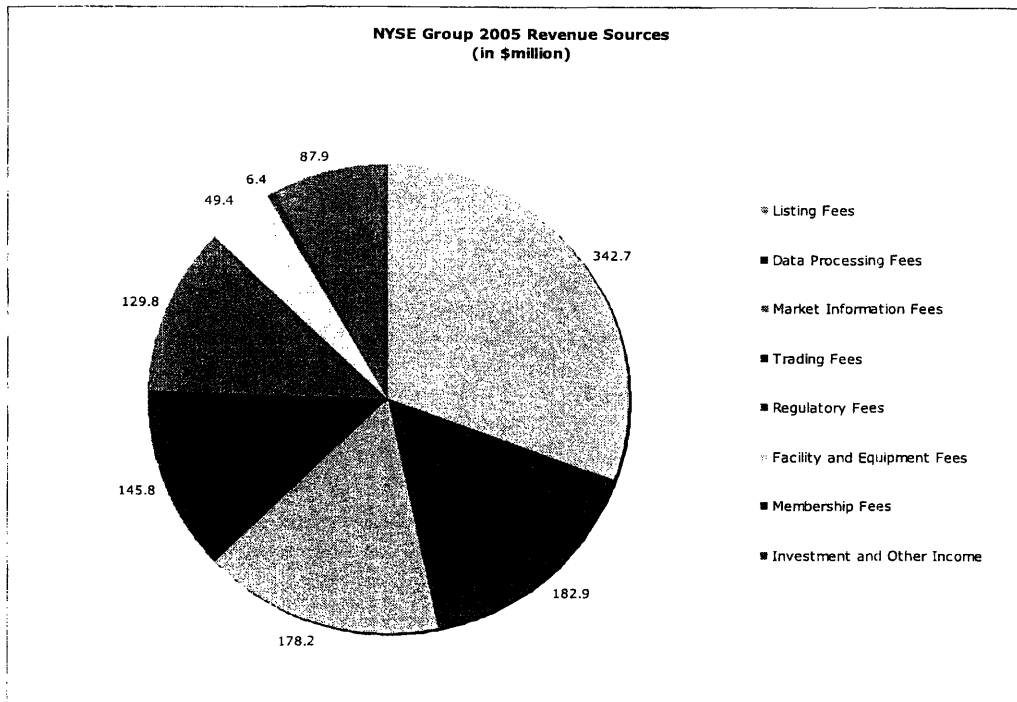
Chart 8.2 provides a good view of pre and post valuations on a per-seat basis. The value of Arca's stock provided an implied value for the seats of the exchange. One of the first challenges NYSE management had was to win the hearts, minds and votes of the existing seat holders who had to vote to approve the merger. No better way to do this than by creating premium value for them on their stake.

Why the big jump in Arca stock immediately after the deal was announced? The market is betting that there is enough low hanging fruit on the expense side alone that the combined entity will be worth much more in a few years. The estimates at the time of the deal were \$100 Million in savings in each 2006 and 2007, from the usual suspects (occupancy, headcount, and marketing). Assuming this all gets to the bottom line, and assuming no growth in revenue, the net income for the NYSE Group would triple to \$300MM in 2 years (\$96MM annualized for combined companies at the time of the deal).

So that takes care of the cost side; the opportunities are obvious, tangible and execution is reasonably certain. Revenue provides the other lever for value creation. While it's the more exciting part of the story – platform upgrades, increased algorithm flow and potential acquisitions – quantifying it requires you to make a number of assumptions.

At first glance, the exchange's revenue is pretty straightforward. Chart 8.3 provides the breakdown and percentages of revenue for the year 2005. Listing fees make up 30% of overall revenue with the most stability. This is the one line item that has grown every year in the last 5.

**Chart 8.3**



Listings are highly profitable and stable source of revenue. Predictably, listings will be a distinct battleground between the NASDAQ and the NYSE. Thus far, the NYSE has been able to maintain their premium pricing for listings over the NASDAQ; roughly \$500,000 versus \$75,000 at the top end. Of the listings that are eligible to go the NYSE (35% of offerings in the past 2 years) 90% of them have elected to list there. The NYSE also has won 135 converts versus a handful of listing losses. However, like we pointed out in Section Four, a number of large technology companies have elected to stay on NASDAQ once they are public. At the time of this writing, the NASDAQ had recently won another high profile listing with Google. Given the stickiness of the listings and the resulting network effect, new listings and conversions will bring increasingly fierce competition between the two incumbents for this part of the pie.

The other line items are volume sensitive which is an important point. With 70% of the revenues dependent on market activity and subject to continued price pressure, there are 3 options: grow volumes faster than fee compression, diversify revenue or both. A comparison of a broad set of competitors reveals where the NYSE is on a relative scale of pre-tax margins.

Volume growth over time has actually been pretty robust when you consider CAGRs for rolling periods over the last 5, 10 and 20 years (Chart 8.3). Most businesses do not see their unit volumes growing this quickly. Since trading revenues have not been anywhere near the CAGRs for volume, you can see the effects that pricing compression has had. The combination of technology reducing trading friction and an enormous increase in buy side assets (mutual funds and hedge funds) have been the catalysts for volume growth. Volume is one element of revenue growth, but it may prove to be a stay even game for the top-line. Benefits are going to be derived more from the network effect and revenue diversification than actual trading revenue for cash equities.

**Chart 8.3 - NYSE & NASDAQ Average Daily Volume Growth Rates**

		NASDAQ	NYSE
<b>20-Year CAGR</b>	1985-05	17%	14%
<b>10-Yr CAGR</b>	1995-05	16%	17%
<b>5-Yr CAGR</b>	2000-05	1%	9%
<b>1-Yr</b>	04-05	-1%	10%

*Source: NYSE, NASDAQ and Factset, Merrill Lynch*

However, despite the increasing volumes, you can see from Chart 8.4 that the mono-line (stock only) exchange structures have the lowest margins of the major publicly traded companies. Part of the reason, as we point out, is a cost story. The other side is growth and diversification of the source of revenues away from cash equities and listings, both of which will be under continued pricing pressure.

**Chart 8.4**

	Stocks	Equity Options	Futures	Futures Clearing	Equity Clearing	Securities Depository	Fixed Income	Operating Margin
<b>North America</b>								
Amex	X	X						N/A
Chicago Merc			X	X		X		54%
CBOE		X	X					N/A
CBOT			X					25.6%
ISE*		X						46.8%
NASDAQ	X							13.6%
NYSE	X	X					X	4.6%
<b>Europe</b>								
Deutsche Borse	X	X	X	X	X	X	X	40.3%
Euronext	X	X	X				X	37.9%
LSE	X	X					X	43.5%
<b>Asia</b>								
Hong Kong	X	X	X	X	X	X	X	61.5%
Singapore	X		X	X	X	X	X	50.6%
Tokyo	X	X	X				X	32.0%

Source: Merrill Lynch

Diversifying revenues not only satisfies the shareholders – stocks with higher revenue predictability command better multiples – but it moves the NYSE towards the “Holy-Grail platform” of consolidated stock, option, derivative and fixed income trading. The addition of options, through Arca’s ownership of PCX, is a step towards checking off one more of the boxes. The market understood the revenue diversification story when the deal was announced which helped with the premium the stock has received thus far.

Clearing and settlement represent a vertical integration of the trading portion of the supply chain. When you consider the margins in Hong Kong, Singapore and Germany it’s obviously a contributor to the margins. However, as we noted in Section 6, there are some philosophical differences in whether or not an exchange should own this function. Buy-side traders interviewed for this thesis consistently noted that the Deutsche Borse is a more expensive venue to trade on than the LSE because of their settlement and clearing costs.

The settlement and clearing debate aside, the expansion of exchange structures into derivative and fixed income products is important. As portfolio management gets increasingly sophisticated, investors have more appetite to hedge or create risks to suit their needs. As we’ll see in the next chapter, exchanges like ISE have done extremely well exploiting this growth.

Looking across different securities classes (Chart 8.5) you can see the last 5-year CAGRs for fixed income and derivatives. Volume growths here show why diversification of revenue streams away from cash equities is a big part of the story. For exchange structures as a business, this is no different than Proctor and Gamble finding new

growing consumer product categories or Motorola diversifying into new technologies. Again, the markets understand this when they are pricing shares of the NYSE group. Given their large pool of liquidity now and new public company currency, they have enough resources to either buy or build their revenue diversification.

**Chart 8.5**

Market	01	02	03	04	05	CAGRS '01-'05
<b>Cash Equities (Share volumes)</b>						
NASDAQ	9%	-7%	-1%	6%	0%	1%
Listed	15%	20%	0%	5%	14%	11%
<b>Fixed Income (\$ volumes)</b>						
US Treasuries	44%	23%	18%	15%	12%	22%
Agencies	24%	-9%	0%	-5%	0%	1%
Municipals	0%	22%	18%	17%	9%	13%
<b>Derivatives (contract volumes)</b>						
Global Interest Rates	44%	22%	27%	21%	12%	25%
Global Equity Index	34%	39%	24%	13%	18%	25%
Ag Commodities	-16%	-6%	76%	7%	4%	12%
Energy Products	8%	25%	4%	12%	16%	12%
Foreign Currency	5%	23%	29%	35%	59%	27%
US Equity Options	7%	-2%	17%	31%	26%	15%

Source: NYSEdata.com, NASDAQ, bond markets.com, OCC, futures industry association, Merrill Lynch

If the NYSE can grow top line, while rationalizing its cost structure, it becomes an attractive investment in both the value creation and growth categories. At the time of this writing (June 2006), the NYSE has a market capitalization of \$10.8 Billion – up from \$5.2 Billion at the time of the announcement in May of 2004. The “honeymoon” effect aside, the market values imply that there is a lot of “beef” to the deal and that the NYSE/Arca combination will be able to execute on both the cost and revenue front.

### **8.2 International Securities Exchange – The “Ice-breaker” of the options market**

The International Securities Exchanges (ISE or “ice”) is one of the best examples of the combination of the parallel industry stories of new business models and the network effect. ISE was started as an electronic options exchange to promote speed, efficiency and low cost trading. The genesis of the idea was in response to an unsuccessful attempt by the founders to extract better pricing and terms for their options trading from the established exchanges. The option exchanges (due to their ownership structures) were steadfastly committed to open outcry trading and the practice of exclusive listing of contracts on one exchange. This limited customer choice and prompted the need for brokerages to have staff on multiple exchanges.

ISE changed the basic nature of options trading within the United States in a very short time. The traditional exchanges had resisted the notion of multiple listings. That is,



having an option contract trade on more than one venue. This required brokerages to have multiple staff at each physical location to facilitate trading.

ISE started by listing only those options that represented 90% of industry volumes – leaving the less active names behind. This prompted multiple listings of the most liquid options classes, breaking the established options exchange monopoly and improving prices quickly. They announced an innovative ownership structure whereby they would sell access to different classes of members for desired access rights. Their structure and value proposition wound up attracting interest from all of the prominent sell side firms.

In 2001, its first year of trading, ISE traded 50 Million contracts becoming the third largest options exchange. By 2003, ISE was trading 250 Million contracts and had become the largest US options exchange in the contracts they trade. The company went public in March 2005 and today has about 27% of all options trading, 31% of the contracts they trade and has a market cap of about \$1.6 Billion. Charts 8.6 and 8.7 tell the market share story as it exists today.

**Chart 8.6**

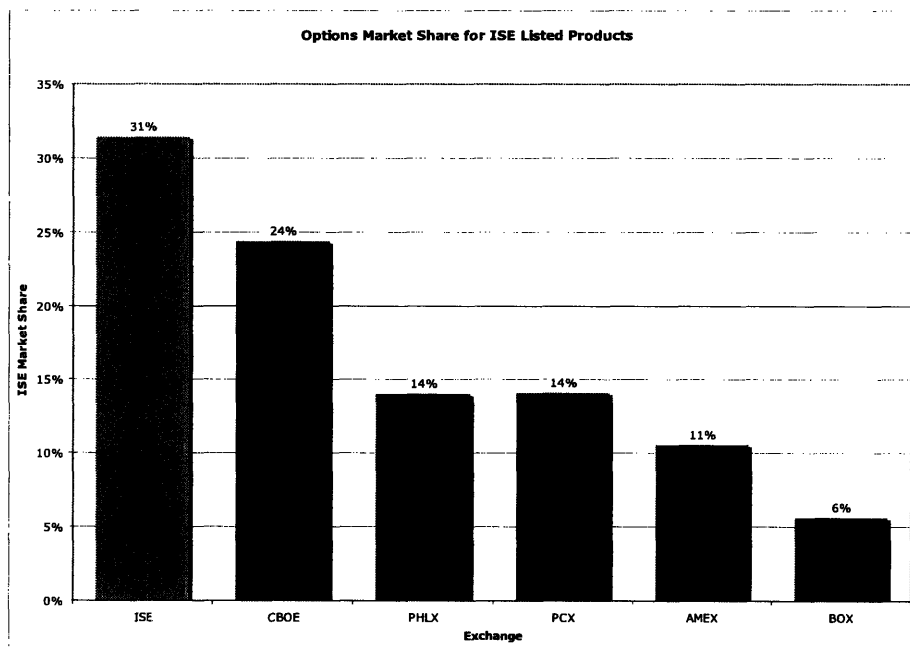
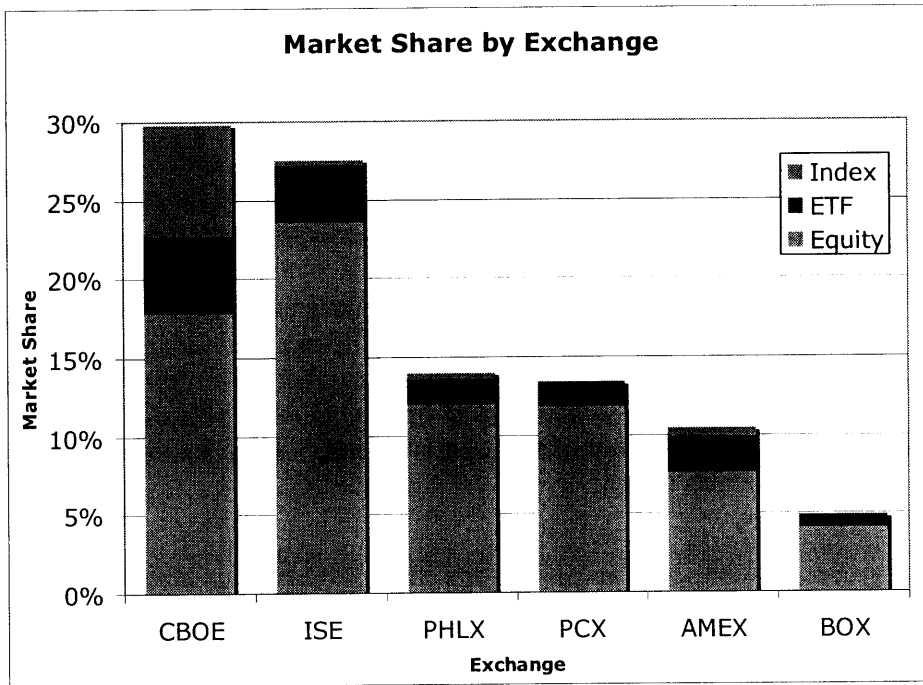


Chart 8.7



By any measures ISE is an amazing success story - the vision and execution of their founders and executives has been spot on. They have taken advantage of the three factors we discussed in the telecomm example: governance (new innovative structure), regulatory changes (1997 order handling rules), and the network effect (volume and participants fueled their growth). Most importantly they recognized how to serve customers better than the incumbents and captured a dominant market position within a very short period of time. Think of this scenario as analogous to what Amazon did to traditional booksellers. It didn't put them out of business per se, it just came to redefine the industry dynamics and they owned the segments where they decided to compete. Market share can be a fragile thing...

A takeaway here is that an exchange is likely to gain or lose value in a similar fashion to any other network. It took the telecomm industry a couple decades to evolve to their current business model. The exchange model will not be identical - only rhyming. The players however, are quite similar in their positions: the NYSE (Ma Bell) will have to find a balance between their position and economic and that of the NASDAQ (MCI) and the ECNs (start-ups). The changes will happen as a result of the interaction of the players, technology and the willingness of the customers to adapt to new systems.

Exchanges as a business will be a nuts and bolts story: more revenue, more products, less cost. If the NYSE Group can pull this combination off they should command a premium value to the rest of the sector. The "growth" story for exchange structures, new or established, is firmly in place: who will win it will be a matter of execution. Stay tuned...

## **Section 9 – Choices and Conclusions**

*“It is our choices, Harry, that show what we truly are, far more than our abilities.”  
Professor Dumbledore*

J.K. Rowling, Harry Potter and the Chamber of Secrets, pg 333.

**Life and business are full of choices.** The Harry Potter captures what I believe to be the essence of strategy: choices. At the end of the day, many of the products are ubiquitous, technology is available to most competitors, and most firms have access to adequate capital. The choices and tradeoffs made are the reason some competitors wind up in completely different places with access to similar resources.

The position of each exchange structure in the future in most respects will reflect the choices they make. Success will depend on an exchange’s view of their strategic resources: who they want to be (vision), where to spend (strategic budgeting and acquisitions), how they organize (strategic business units), net flow of talent (HR strategy) and their ability to execute.

Exchanges operate in a unique, interconnected business environment. Transparency, the volume of transactions, the pace of technology and competitive instincts of market participants create an environment where slight variations in competitive positions will show up quickly. With the regulatory and structural protections of the past fading into history – exchanges will have a series of choices ahead of them which will determine who survives, prospers or fails.

The thesis began with the tenant of creative destruction. The exchange institutions and structures have been largely immune from the basic forces of economics until recently. Releasing competitive forces on exchange structures, as with any business, will lead to making some better and others disappear.

In the second section we took a detour through the evolution of the markets and how market structures evolved. An understanding the origins and basic building blocks of markets informs opinions on the future of market structures. Certain practices can and will change in response to new regulation, technology and participant behaviors. Other practices are more likely part of human nature and interactions and will not change.

In section three we introduced the nomenclature of “market structures”, comparing and contrasting the primary structures in the US and the third market. We covered the catalysts and contemporary drivers behind the changes at the NYSE. A review of the rules, mechanics and limitations of each structure help to understand the regulatory changes that are driving the current activity and the recent rise of the ECNs and third market. This section was a “white-boarding” of who is who and how are they organized.

After the mechanics of market structure, we introduced the concept of the “investment supply chain”. The supply chain demonstrates where trading exists within the capital raising process for the economy as a whole. The framework helps to understand the roles of the players and how they are changing. We then “zoomed in” closer to examine the anatomy of trading with a stock and flow framework – showing the relative ease that the traditional exchanges can now be circumvented in the capital markets. Here we saw the complexity and interconnectivity of the players throughout the capital markets – a large and complex financial ecosystem.

Our fifth section took us through the enabler for change: technology. We reviewed the importance and growth of algorithmic and program trading and what technology will enable participants to do. ETFs as an innovation and the spending on Order Management systems are examples of how technology is an integral part of the future of exchange structures – changing the rules of engagement and creating new opportunities as capabilities improve. While technology will continue to be a catalyst, it’s only an extension of human behavior and desires. The arms race is on...

Our sixth section, “Lessons from Overseas”, took us through exchanges in the “flat world”. Many of the overseas structures have already been through demutualization, conversions to fully electronic platforms and cross border ownership. The relative size of US exchanges gives us a sense of the magnitude of US financial markets as well as their opportunity to enhance profitability and performance. Some of the experience shows us the learning curve technology presents. The very visible mishaps that demonstrate the vulnerabilities any systems will have with reduced human interaction or controls. Since most observers believe that more cross border exchange consolidation is inevitable, we included a discussion of the challenges it presents. The non-US experience on new models of exchange structures has been on balance positive – but by no means a smooth road.

The seventh section was included as an intuition builder, comparing exchange structures to analogous and equally sizable business shifts in other industries. Considering the behavior of the participants helps to demonstrate the underlying dynamics the exchanges are currently experiencing. Business model evolutions (health care), network effects (telecomm) and the desire to own the “toll road” (Macquarie) provide insights on what is happening in the sector and a sense on how it may play out.

Finally, in the section eight we looked at the exchanges as a business: a more tactical look at the NYSE/Arca combination as a “value creation” transaction. The NYSE/Arca value and financials pre-transaction give us a sense for the opportunity they have to improve performance as a business. We showed the growth of their core product to see why the diversification is an attractive proposition. Our discussion of the success of ISE as an organic growth story should leave the reader with the understanding that incumbents’ advantage is more fragile than many may believe. ISE is a classic case of choices made (or not made) by incumbents that allowed an opportunity for a new entrant. The growth and success of ISE underscores that there is plenty of opportunity to innovate

for new entrants and the willingness of market participants to switch trading venues when a better value exists.

At the outset, I asked the reader to avoid some of the foregone conclusions about where markets are heading. The commonly held points of view on the exchange structure environment include:

- the NASDAQ and NYSE have a duopoly,
- they will increase prices,
- the floor of the NYSE will be completely eliminated,
- smaller competitors will be eliminated through lack of scale or acquisition,
- We will go into a period of reduced innovation.

Lets consider each of these in the context of the storyline put forth in this thesis. Each represents strategic choices on the part of the exchange structures and involves tradeoffs between sometimes equally attractive but opposing positions.

### *Duopoly*

First, with the emergence of the third markets and the ease of selecting different trading venues I don't believe there is a duopoly. If there is one, it's not sustainable as the market participants don't have the market power to set pricing or terms to their liking. Clearly the incumbents have an advantage – but size confers both advantage and disadvantage in a competitive environment.

Competition between the NYSE and NASDAQ is already fierce and will increase over the coming years. The battle for volume and listings between the two main players will heat up on price and market quality. Witness the publicity around the moves of Charles Schwab and UAL to the NASDAQ. The movement isn't the story so much as the leverage and publicity that was sought as a result. If past relationships hold, the stickiness of initial listings is pretty high.

You are likely to see the NYSE move to create a second tier of listings with more relaxed criteria in an attempt to capture earlier stage companies and compete with NASDAQ. This is much like what the LSE has done this with the "AIM" market. By segregating listings, the exchange doesn't compromise the quality of their current markets and plants the seeds for future growth.

The emergence and success of Alternative Trading Systems, ECNs and other Third market venues indicate that fragmented liquidity is here for the foreseeable future. The NYSE's market share has dropped to around 70% at the time of this writing from well over 80% 3 years ago. This suggests that open architecture has taken hold and accelerated. There may be two dominant players – but the new entrants will keep them honest.

## *Price*

There are a number of “balancing loops” that will mitigate the ability of incumbents to raise prices – namely the third market competitors who will gladly keep prices down to draw liquidity. The pricing concern is not without precedent; in fact LSE did just this after becoming a public company. Unlike Europe, any decision to raise prices that is not followed by your competitors, will result in an immediate loss of market share. Because settlement and trading systems are not as integrated, customers have less choice in deciding where to trade.

There is an interesting dichotomy in the market share game as its playing out. You could almost characterize it as a simultaneous “race to the bottom” and “race to the top”. In their eagerness to win market share in an open architecture world, there is temptation to try to do this through price (the race to the bottom). While each exchange must be competitively priced, history has shown price alone to be a losing strategy. Market share and volume will be important in attracting new listings (the race to the top) and maintaining pricing. As the incumbent, this will prove to be a demanding balancing act for the NYSE.

A less verifiable point is the attitude of the two competitors, which leads to my second point on pricing: it may be a “scorched earth” battle for market share. Both incumbents want to win the market share game badly and do not want to cede any ground. The attitudes I got from my interviews suggest this may play out like the Hatfield’s and McCoy’s of exchange structures – a battle without any clear end in sight – which is OK if you are a customer...

## *The NYSE floor’s future*

One of the most commonly held beliefs is that the floor will not survive. I have to say this is the issue that I believe is the least clear in my mind. The arguments for elimination are cogent, sensible and make for nice sound bites. They include buy-side concerns of potential for information leakage, minimal value provided by Specialists, the costs to maintain floor personnel, the security of the building, and speed of execution.

At the same time, there is no disputing the success and market quality of the NYSE. The interaction of the floor participants in price discovery has been a contributor to the quality of the market. Spreads have been consistently the best and the leakage argument may have less validity today than it’s had in the past. When there is no natural liquidity in the third market – the best place to get a size trade done is still the NYSE floor.

I spent a day on the NYSE floor as part of the research for this thesis and had an opportunity to watch the specialist on Berkshire Hathaway work his craft. The same specialist trades all of the higher priced, lower volume stocks. The skill he displayed in managing an otherwise thin market – putting together trades and facilitating the volume – was impressive. He understood what the floor brokers wanted and who might, if shown liquidity, go back to their customer to gauge additional interest. Getting the same quality

interaction electronically to me seems unlikely. In this sense, the hybrid concept has more value than its critics may be giving it credit for. If you can preserve the floor experience for those that need it and have the electronic pipes for those that don't then you have an attractive and differentiated market structure.

While the jury is still out, there is considerable doubt from the buy-side perspective on the value of the floor structure as it exists today. Like the move to decimalization and penny increments it's unclear whether or not an "electronic only" system is an improvement. It may just be that there is so much momentum in this direction that it's inevitable. However, like the lessons learned from the mishaps in Tokyo or France – removing all human involvement and judgment may have some downside. The choice here for the NYSE in retaining the floor is how to differentiate – a big choice on a number of levels.

### *Competition*

Smaller competitors will clearly have a place. The lesson with the ECNs was that fragmented liquidity in closed systems won't work. Fragmented liquidity with open systems, enabled by algorithms not only works but is in some ways desirable to the buy side customer. The smaller competitors may not be able to take on the NYSE or NASDAQ directly, but it doesn't mean they won't try to compete in less direct ways. This is no different than technology start-ups, most don't try to go after Microsoft or IBM – but they are able to go after segments of what they do with a lot of success. The recent innovations brought to market by companies like LiquidNet and BATs show that there clearly is opportunity to innovate. There is also a willingness from the buy-side to try new ways of trading.

A big and still unresolved issue is the status of the exchange as an SRO and the effects of Sarbanes-Oxley on their competitive position. The need for volume and scale coupled with a perceived regulatory disadvantage will heat up the appetite to purchase or form an alliance with an overseas exchange structure. A purchase of another exchange structure may have some influence on pricing overall depending on its effect to gross margins.

Inevitably as exchange structures grow they will become more powerful, what opportunities this leaves for new competition will evolve in time. It's my view that competition will continue to increase around the margins – forcing a set of choices for the incumbents.

### *Innovation*

There is a school of thought that the public exchange structures will not innovate and just look to maximize net income. I believe the opposite will occur, and that we will be entering a "golden age" of innovation in exchange structures and trading. Innovation on Wall Street has usually been confined to the sell side firms and the creation of new products. Asset securitization, leveraged buyouts, derivatives and index funds were innovations that changed their respective categories. All were in response to

opportunities to win business from established competitors. In contrast, exchange structure innovation has been largely incremental until recently.

The closed architecture system of the NYSE is opening up to allow for more electronic trading. Algorithmic and program trading is becoming increasingly sophisticated which will create lots of opportunity for both buy and sell side firms. There will be more competitors building natural market venues and Alternative Trading or crossing systems with the sell side. All of which adds up to an increase in the rewards to firms that innovate. No one has a secure position anymore within the “investment supply chain”: from the VCs to the Buy-Side.

As public companies, exchanges will have to look for new sources of revenue beyond their traditional model. This is especially true if you believe that price competition continues and smaller competitors remain in the fray. The NASDAQ has been particularly forward thinking on this front, adding ancillary support services like D/O Insurance and regulatory filing assistance for the companies that list with them. The NYSE has launched their Ask Market Surveillance software – a search engine in the spirit of AskJeeves – to provide firms with compliance and rules guidance.

Innovation will be one of the primary means by which exchange structures will differentiate their trading venues to attract volume and protect pricing. Since it is likely that you will see a lot of innovation and its associated rewards with the smaller players, the choice will be to “build or buy” innovation. Not if you want to do it.

### *Closing Comments*

We are at a decisive moment in the history of the exchanges. The future can be created or ceded by the choices made by management at both the incumbents and the challengers. Creative destruction will reward the winners and eliminate the losers...

We covered a fair amount of ground in this thesis. Exchange structures are a rich and complex topic. Markets and their mechanisms to junkies like me can be an endless topic. In the interest of controlling the scope and keeping the messages simple, I may have left out some detail an industry reader would think is germane. Nonetheless, I hope the format, explanations, analogies and attempts at humor were useful in understanding the issues and potential outcomes.



## **Interviews and Acknowledgements**

I would like to acknowledge the following professionals who interviewed and or assisted me with the content of this thesis. Their wisdom and perspective is the basis for the thesis, without their help it could not have been completed. A special thanks to Goose Henderson and Mike Robbins for generously sharing their contacts in and around the New York Stock Exchange.

Chris Amorello – Investment Technology Group (ITG)

Susan Axelrod – New York Stock Exchange

Joan Bader – Credit Suisse – First Boston

John Bates – Progress Software

Bill Baxter – Fidelity Management and Research

Paul Bennett – New York Stock Exchange

Dr. Rolf Breuer – Deutsche Borse (retired)

Marianne Brown – New York Stock Exchange

Marshall S. Carter – New York Stock Exchange

Andy Chou – Goldman Sachs Algorithmic trading

Colin Clark – New York Stock Exchange

Chris Concannon – NASDAQ, Inc.

Mike Cormack – Archipelago Holdings (NYSE Group)

Manus Costello – Merrill Lynch

Luke Duggan – Gandhara Holdings, LLC

Jess Estella – Massachusetts Financial Services

Larry Fuller – Merrill Lynch

Goose Henderson – Robbins & Henderson, LLC

Peter Henderson – Bank of America Specialists, LLC

Doug Johnson – Calyx Financial

Roseanne Kelly – Irish Stock Exchange

David Krell – International Securities Exchange (ISE)

Jim Kwiatkowski – Future Trade

Michael Labranche – Labranche & Co.

Tim Mahoney - Merrill Lynch Investment Managers

Jimmy Maguire (a.k.a. Mr. Nickels) – Labranche & Co.

Ted Oberhaus – Lord Abbett

Siddhartha Oberoi – Calyx Financial

Mark Palmer – Progress Software

Mark Pennington – Lord Abbett

Patrick Pinschmidt – Merrill Lynch Research

Kevin Rendino – Merrill Lynch  
Mike Robbins – “Broker # 718”-Robbins and Henderson, LLC  
Pasha Roberts – LinePlot Inc.  
Andy Silverman – Goldman Sachs Algorithmic Trading  
George Sofianos – Goldman Sachs Research  
Jeff Shames – Massachusetts Financial Services (retired), MIT  
Marybeth Shay – Boston Stock Exchange  
Chuck Senatore – Fidelity Management and Research  
Chris Williams – UBS (Australia)  
Lisa Utasi – Citigroup/Legg Mason

## **Bibliography**

### **Bibliography - Books**

Schumpeter, Joseph. Capitalism, Socialism and Democracy Harper & Row Publishers (copy right 1942, 1947 – Schumpeter) 1950 Harper, 1976 George Allen & Urwin Publishers

Weatherford, Jack: The History of Money: From Sandstone to Cyberspace  
New York: Three Rivers Press, 1997

Kurtz, Howard. The Fortune Tellers: Inside Wall Street's Game of Money, Media and Manipulation. New York: Free Press, 2000

Kaliski, Burton, S. ed. Encyclopedia of Business and Finance  
New York: Macmillan Reference USA, 2001

Soros, George. The Alchemy of Finance: Reading the mind of the market  
New York: Simon and Schuster, 1987

Finch, Christopher. In the Market: The Illustrated History of Financial Markets  
Abbeville Press, 2000

Mackay, Charles Extraordinary Popular Delusions and Madness of Crowds  
Harriman House, 2003

Weiner, Eric What Goes Up: The Uncensored History of Modern Wall Street as told by the Bankers, Brokers, CEOs and Scoundrels? Little Brown and Company -Time Warner Book Group, 2005

Dunnigan, James and Masterson, Daniel. The Way of the Warrior: Business Tactics and Techniques from History's Twelve greatest Generals. Thomas Dunne Books, St. Martin's Press, 1997

Nocera, Joseph A Piece of the Action: How the Middle Class Joined the Money Class  
Simon and Schuster 1994

Sobel, Robert Inside Wall Street: Continuity and Change in the Financial District  
New York: W.W. Norton 1977

Sobel, Robert The Curbstone Brokers: The Origins of the American Stock Exchange  
New York: Stein and Day, 1984

Sobel, Robert The Big Board: A History of the New York Stock Market.  
New York: Weybright and Talley, 1975

Sobel, Robert Panic on Wall Street: A History of America's Financial Disasters  
Beard Books, 1999

Kurtz, Howard The Fortune Tellers: Inside Wall Street's Game of Money Media and Manipulation New York: Free Press, 2000

Young, Patrick and Theys, Thomas Capital Market Revolution: The Future of Markets in an Online World Pearson Education Limited, 1999

Ian Stewart, Does God Play Dice? The Mathematics of Chaos  
Blackwell Publishers, 1990 (reprint edition)

Siegel, Jeremy The Future for Investors: Why the Tried and True Triumph over the Bold and the New Random House, Inc. New York, 2005

Berlinski, David, The Advent of the Algorithm Harcourt New York 2000

Bernstein, Peter L., Against the Gods, John Wiley

Smith, B. Mark Toward Rational Exuberance: The Evolution of the Modern Stock Market Farrar Straus and Giroux, New York 2001

Smith, B. Mark A History of the Global Stock Market: From Ancient Rome to Silicon Valley, University of Chicago Press 2004

Kelly, Kevin, New Rules for the New Economy – 10 Ways the Network Economy is Changing Everything, Fourth Estate 1998

### **Bibliography – Thesis and Research Reports**

“The Economics of Stock Exchange Listing Fees and Listing Requirements”  
Journal of Financial Intermediation Volume 11, Issue 3 July, 2002  
Jonathan R. Macey and Maureen O’Hara - Cornell Graduate School of management

“The Battle of the Stock Exchanges: Are Companies worth More if they list on the NYSE?” Vandita Khullar Stanford University May 2004 (thesis - advisor John Shoven)

“Regulation NMS and Fast markets” - Wipro – White paper Ghiridhar Govardhan - March 2005

“Securities and Exchange Commission: Concept release on the regulation of market data”  
Jerry Ellig and Sharon Brown-Hruska – Mercatus Center at George Mason University  
Concept Release, pp29-31

Debunking the Myths of the Trade-Through Rule: A View from an Agent, Richard A. Rosenblatt, CEO and Joseph Gawronski, COO of Rosenblatt Securities

SEC Proposals: More than Chump Change to Investors Sam Ali and Susan Todd, 2004  
Newhouse News Service

Wall Street and Technology: Fast Market or No Market, March 2004, Larry Tabb CEO  
the Tabb Group

Reg NMS: Be Careful What You Wish For., January 2006, Larry Tabb CEO the Tabb  
Group

The Trade Through Rule: Protecting Investors, Helping Companies and Preserving the  
Integrity of the markets, NYSE Document (NYSE Website – [www.nyse.com](http://www.nyse.com) )

“Against the Duopoly: The New Economics for US Regional Stock Exchanges and  
Equity ECNs”, Josh Galper, Managing Principal, VodiaGroup LLC, February 2005

Market Microstructure and Price Formation, Ananth Madhavan – Marshall School of  
Business – University of Southern California January 18, 2000 (thesis)

Open Sesame: Alternative Opening Algorithms in Securities Markets – Ian Domowitz  
Ananth Madhavan version dated January 18, 2000 (Chapter 24 of Building a Better Stock  
Market: The Call Auction Alternative/Kluwer Academic Publishers)

Why did so many poor performing firms come to market in the late 1990s?: NASDAQ  
listing standards and the bubble, New York University Stern School of Business, April  
Klein and Partha S. Mohanram, April 2005

Transmission of Volatility between stock markets, Mervyn A. King, Sushil Wadhvani,  
London School of Economics, The Review of Financial Studies 1990 Volume 3, Number  
1, pp5-33 (Contagion)

Liquidity and Market Structure, Sanford J. Grossman; Merton H. Miller The Journal of  
Finance , Vol. 43, No. 3 papers and Proceedings of the 47<sup>th</sup> Annual Meeting of the  
American Finance Association, Chicago, Illinois, Dec 28-30, 1987, 617-633

The Trades of NYSE Floor Brokers, George Sofianos and Ingrid Werner, Journal of  
Financial Markets 3 (2000) 139-176

Quantifying Market Order Execution Quality at the NYSE, George Sofianos, Geoffrey  
Bacidore, Katherine Ross, Journal of Financial Markets 6 (2003) 281-307

Liquidity Provision and Specialist Trading in NYSE listed non-US Stocks, George  
Sofianos, Geoffrey Bacidore Journal of Financial Economics 63 (2002) 133-158

The Trades of Market Makers: An Empirical Analysis of NYSE Specialists, Joel Hasbrouck; George Sofianos *Journal of Finance*, Vol. 48, No. 5. (Dec. 1993), pp.1563-1593

Results from Survey of Vendors on Impact of Multiple Consolidators, Michael Atkin, Vice President, Financial Information Markets, Software & Information Industry Association

NASDAQ Stock Market: Scalable Platform with Top-Line Opportunity. Merrill Lynch Equity Research. Patrick Pinschmidt and Michael McGinnis - February 21, 2006

“Buy Side Order Management: Automating the Front Office” January 29<sup>th</sup> 2003, Celent Communications, Boston MA

“The Trader is Dead: Long Live the Trader! A Financial Markets Renaissance” IBM Institute for Business Value April 2006. Suzanne Dence, Daniel Latimore, John White IBM Business Consulting Services

The International Securities Exchange: New Ground in Options Markets. Harvard Business School Case, March 10, 2003: George Chacko and Eli Peter Strick Product# 9-203-063 (revision June 6, 2003)

Leadership and Liquidity: Innovation at the Financial Exchanges, IBM Executive Briefs copyright 2005 IBM Corporation

Building an Edge: Today’s Insights for tomorrow’s financial institutions Vol. 6, Number 9, October 18, 2005, IBM Corporation, Harrell Smith

Market Structure and the Intraday Pattern of Bid-Ask Spreads for NASDAQ Securities, K.C. Chan; William G. Christie; Paul H. Schultz, *The Journal of Business*, Vol. 68, No. 1 (Jan., 1995), 35-60

The Initiation and Withdrawal of odd-eight quotes among NASDAQ stocks: an empirical analysis\*, William G. Christie; Paul H. Schultz, *The Journal of Financial Economics* 52 (1999) 409-442, Received 31 march 1997, revised 15 June 1998

Policy Watch: Did NASDAQ Market Makers Implicitly Collude?, William G. Christie and Paul H. Schultz, *Journal of Economic Perspectives* – Volume 9, Number 3 – Summer 1995 – Pages 199-208

Trade Execution Costs on NASDAQ and the NTSE: A Post-Reform Comparison, Hendrik Bessembinder, *Journal of Financial and Quantitative Analysis*, Vol. 34, No. 3 (Sep., 1999) 387-407

Microstructure of the Pink Sheets Market, Nicholas PB Bollen, William G Christie, Owen School of Management Vanderbilt University, November 16, 2005

Decimals and Liquidity: A Study of the NYSE, Sugato Chakravarty, Robert A Wood, Robert A Van Ness, The Journal of Financial Research, Vol. XXVII, No. 1, Pages 75-94, Spring 2004

Payments for Order Flow on NASDAQ, Journal of Finance, Eugene Kandel; Leslie M. Marx, The Journal of Finance, Vol. 54, No. 1. (February 1999), 35-66

Affirmative Obligation of Market Makers: An Idea whose time has passed?, Owen School of Management Vanderbilt University, Hans R. Stoll (thesis), working paper 97-14, July 11, 1997

SIA Fact Book 2005 – Securities Industry Association

The Elements of Market Structure, William G. Shepherd, The Review of Economics and Statistics, Vol. 54, No. 1 (February, 1972), 25-37

White and Case, LLP, Broker-Dealer Update: SEC Adopts Regulation NMS, July 2005

Plexus Group, “Drifting Icebergs: Perceptions and Reality in Trading Costs”, Commentary 68, October 2001

Putnam Lovell Securities “ECNs-Next Generation Agency Brokerage”, J Cathleen Boucher, Richard Repetto, Todd Halky, March 2001

Bank of America Securities, “Chicago Mercantile Exchange – Q4 Expectations”, Michael Hecht, January 3, 2006

**Public Web Sites used for reference and research:**

NYSE - <http://www.nyse.com/>

NYSE/Arca - <http://www.tradearca.com/default.asp>

International Securities Exchange - <http://www.iseoptions.com/>

World Federation of Exchanges - <http://www.fibv.com/>

Labranche and Company - <http://www.labranche.com/>

NASDAQ - <http://www.nasdaq.com/>

LiquidNet - <http://www.liquidnet.com/>

Instinet - <http://www.instinet.com/>

Securities Industry Association - <http://www.sia.com/research/>

The Economist - <http://economist.com/index.html>

Investment Company Institute - <http://www.ici.org/>

Institutional Investor - <http://www.iinews.com/>

Macquarie Bank - <http://www.macquarie.com.au/>

Euronext - <http://www.euronext.com>

London Stock Exchange - <http://www.londonstockexchange.com>

Boston Stock Exchange - <http://www.bostonstock.com>

Philadelphia Stock Exchange - <http://www.phlx.com/>  
Deutsche Borse - <http://deutsche-boerse.com>  
The Red Herring - <http://www.redherring.com/>  
Wall Street and Technology - <http://www.wallstreetandtech.com/>

### **Articles- Periodicals**

Bogle, John C. "Specialist Man" *Wall Street Journal* September 19, 2003

John Hechinger, "Big Board under Fire" *Wall Street Journal* October 14, 2003

Calpers Sues the Big Board and Specialist Firms, *Wall Street Journal* December 17, 2003

"Can We Trade Through?" *Wall St. Journal.*, October 30, 2003;

"A Better Big Board." *Wall St. Journal.*, February 4, 2004.

Steil, Benn, "The 'Neanderfloor.'" *Wall St. Journal.*, October 31, 2003.

Greenberg, M. R., "Lose the Specialists." *Wall St. Journal.*, December 18, 2003.

Evans, Mary, "Percents and Sensibility: What did early 19<sup>th</sup> Century literary characters live on?" *The Economist*, December 20, 2005 (pp104-105)

The Role of Specialists in the NYSE Market (reformatted from Bloomberg Article and NYSE web page 1.9.06)

Moyer, Liz "A New Kind of Exchange" *Forbes* April 20, 2006

Moyer, Liz "It's Not the Pits" *Forbes* January 6, 2006

Moore, James, LSE names a Price for Macquarie, *Economist*, February 11, 2005

Lucchetti, Aaron, LSE and NASDAQ Plan New Talks; NYSE Mulls Bid, *Wall Street Journal*, March 13, 2006 (page C1)

Lucchetti, Aaron, London Call: Are LSE's Shares Undervalued?, *Wall Street Journal* March 16, 2006

Lucchetti, Aaron, Heard on the Street: What Kind of Stock will the NYSE Itself Be? *Wall Street Journal* December 6, 2005

Lucchetti, Aaron, Betting Big on Big Board's Seats: Investor Scoops Up memberships to prepare for pending merger; an under-understood business, *Wall Street Journal* December 30, 2005



Lucchetti, Aaron and Richardson, Karen, “Is Thain Sending Too Many Signs?: NYSE Deal Talks Amid Offering Make Investors Unsure of What They’re Getting, Fueling Shorts” *Wall Street Journal* April 20, 2006 (Page C1)

Lucchetti, Aaron, A Big Exchange: NYSE Members Approve Deal, *Wall Street Journal* December 7, 2005 (page C1)

Stock Exchange turns deaf ear to Russian listing flaws, November 27, 2005  
The Observer (UK)

McKay, Peter A. Taking Stock of Futures Markets: Shares of Major US Exchanges have leapt amid Business Boom, But Some Analysts Temper Views, *Wall Street Journal* February 6, 2006 (Page C3)

Financial News Fad: Is America really interested in business news or just buzz? Motley Fool – Slate Magazine January 9, 1998

Carey, Theresa W., Big Merger Turns NYSE from Prey to Predator *Ziff Davis Internet* April 22, 2005

Martinez, Michael J. Big Board must now heed profit-minded shareholders, *Associated Press*, March 1, 2006

Weber, Joseph, Bear This in Mind about the NYSE: Exchange Stocks loosing Ground of Late, *Forbes*, November 30, 2005

Starkman, Dean and White, Ben, NYSE Approves Archipelago Acquisition, *Washington Post*, December 7 2005 (Page D1)

Harding, David and Rouse, Ted, Wall Street Acquires Culture *Forbes* March 8, 2006

Landler, Mark and Timmons, Heather, U.S. Overture to London Exchange Stirs Talk of a Merger by European Rivals *New York Times*, March 16, 2006

NASDAQ, NYSE Group Losing market Share to Each Other, *Bloomberg* May 9, 2006

Schwab to Leave NYSE *Reuters* December 16, 2005

O’Donnell, Kathie, “Potential Problems in buying NYSE Stock?: Owning 5% or more could spur fund trading questions” *Market Watch*, March 8, 2006

Anderson, Jenny “NYSE’s Big Day: From Private Club to Public Company”, *New York Times*, March 8, 2006

Drawbaugh, Kevin, “NYSE Sounds Alarm on US Missing out on big IPOs”, *Reuters*, April 26, 2006

+++“America’s Stock Exchanges: Trading for Trouble – Controversy over the SEC’s Trade-Through Proposals”, *The Economist*, November 25, 2004

Wachman, Richard, “Now Stock Exchange seeks Scandinavian Alliance”, *The Observer*, November 27, 2005

Moyer, Liz, “NYSE Agrees to Hire Another Advisor For Sale”, *Fortune*. November, 15, 2005

The Passions of Spring: NASDAQ’s Surprise acquisition of 15% of LSE, *The Economist.com*, April 18, 2006

“London Stock Exchange – Clara’s difficult Christmases: Takeover bids do exchanges no harm: just look at the ones protected from them,” *The Economist*, December 14, 2005

“Good Times Rarely Last: Financial Exchanges are booming, but this is no time for complacency,” *The Economist*, December 1, 2005

“End of the Club”, *The Economist “Global Agenda”*, March 7<sup>th</sup> 2006

“In search of better SOX: What can be done to loosen America’s burdensome post-Enron rules,” *The Economist*, April 20<sup>th</sup>, 2006

“The Dow Puffs on: America’s most famous index is also it’s most peculiar”, *The Economist*, January 12, 2006

“Deutsche Borse: Always look on the bright side,” *The Economist*, April 20<sup>th</sup>, 2006

“Crossing the Pond: NASDAQ’s bid for the LSE has sparked a flurry of speculation about other tie-ups,” *The Economist*, March 16, 2006

O’Connor, Colleen Marie, “London’s AIM Calls to US VC Community”, *Investment Dealers Digest*, January 30, 2006

“Situation Normal: Not the first, and probably not the last, cock-up at the Tokyo Stock Exchange”, *The Economist*, January 19, 2006

Davey, Jenny “LSE Celebrates a record year for foreign recruits”, *The Times (London)*, December 21, 2005

“France sells toll roads to pay debt”, Reuters, Bloomberg News, December 12, 2005

Morrissey, Daniel, “Macquarie exports its funds model offshore”, *Reuters (Sydney)* January 6, 2006

“Macquarie seesaws after LSE bid’, *The Economist*, December 16, 2005

Fackler, Martin, "Tokyo Exchange Struggles with Snarls in Electronics", The New York Times, December 13, 2005

Costello, Miles, "Tokyo Boss Quits over 'fat finger'", Times Online, December 20, 2005

Hayashi, Yuka and Morse, Andrew, "Tokyo Exchange Made Botched Trade Worse", Wall Street Journal, December 12, 2005

### **Regulatory Documents-Testimony**

Securities and Exchange Commission – Regulation NMS

17 CFR Parts 200, 201, 230, 240, 242, 249 and 270

Release no. 34-51808; File No. S7-10-04

Regulation NMS – Action: Final rules and amendments to joint industry plans

The New York Stock Exchange Hybrid Market Example Diagrams

Refer to Amendment #2 to file number SR-NYSE-2004-5 Exhibit 3 Dated November 8, 2004.

S-1 – NYSE March 13, 2006 (Registration statement for face amount certificate companies)

10-K NYSE, Dated March 31, 2006 (annual report that provides comprehensive data from the prior year)

Statement of John C. Bogle Before the United States Senate Governmental Affairs Subcommittee on Financial Management, the Budget, and International Security, January 27, 2004

Public Interest Comment on the Securities and Exchange Commission's Concept Release on: Regulation of Market Information, Fees and Revenues, Release No. 34-42208, File No. S7-28-99

Testimony on SEC Reg NMS, John J. Wheeler, Vice President and Director of US Equity Trading, American Century Investments

NASDAQ Position Statement on Regulation NMS

Testimony of Mr. Thomas M. Joyce Chairman and CEO Knight Capital Group, Inc., Before the Committee on Banking, Housing and Urban Affairs, United States Senate,

“Hearing on “Regulation NMS and Recent Market Developments”, Wednesday May 18, 2005

Testimony before the Senate Banking Committee, Proposed Regulation NMS, New York Stock Exchange, Inc. John A. Thain, Chief Executive Officer, July 21, 2004

Public Interest Comments on the Securities and Exchange Commission’s Concept Release on Regulation of Market Information, Fees and Revenues, Release no. 34-42208, File No. S7-28-99

Archipelago Comments in Response to Re-proposed Regulation NMS Release No. 34-50870: File No. S7-10-04, January 26, 2005

Written Statement of Gerald D. Putnam, Chairman and CEO Archipelago Holdings LLC concerning Regulation NMS and recent Market Developments before the Committee on Banking, Housing and Urban Affairs, United States Senate, One Hundred Ninth Congress, May 18, 2005

Written Statement of Gerald D. Putnam, Chairman and CEO Archipelago Holdings, LLC concerning “Market Structure III: The Role of the Specialist in the Evolving Marketplace” before the Committee on Financial Services – Subcommittee on Capital markets, Insurance, and Government Sponsored Enterprises, United States House of Representatives One Hundred Eight Congress, February 20 2004

Written Statement of Gerald D. Putnam, Chairman and CEO Archipelago Holdings, LLC concerning “Regulation NMS and Developments in Market Structure” before Committee on Banking, Housing and Urban Affairs, United States Senate, One Hundred Eight Congress, July 21, 2004

Arca Ex Comments In Response to Proposed Regulation SHO Release No. 34-48709, File No. S7-23-03