



The defensive use of IT in a newly vulnerable market: The New York Stock Exchange, 1980–2007

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ABSTRACT

New technologies enable entrants to create business models that threaten incumbents in a range of industries. This paper extends the framework of newly vulnerable markets to explore the dynamics of competition between entrants and an incumbent through a study of the New York Stock Exchange. For over 200 years, the NYSE has operated a physical market for trading securities. Beginning in the 1960s, it employed information technology to process increasing trading volumes and to disseminate data on stock prices and volumes. The Exchange invested heavily in IT for its trading floor, and defended it against electronic markets enabled by new technologies. In 2005 various pressures forced the NYSE into a merger with Archipelago, a leading electronic exchange. The NYSE's latest market system, Hybrid, launched in 2006, is the first at the NYSE that enables investors to bypass the trading floor completely. Despite the new technology, its share of trading volumes fell. This paper documents four eras of IT management at the exchange, presenting a detailed 27-year history. The evidence shows that while IT investments helped the Exchange defend floor trading and its market share for a number of years, it finally had to adopt the technology of all-electronic exchanges.

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1. Introduction

The development of a new, technologically-enabled business model can make an existing market newly vulnerable to competition. Clemons et al. (1996) present a framework for analyzing these newly vulnerable markets that arise under the following conditions:

- Contestable – a market in which new entrants can offer similar or superior services to the dominant, incumbent firm in the marketplace using innovative, new technology, especially information and communications technologies.
- The incumbent's profitable customers subsidize unprofitable ones – an opportunity exists for a new entrant to take advantage of average cost pricing, and target profitable customers in a market, leaving the incumbent with less profitable customers or those who require more complex products and services.
- Fixed investment and barriers to exit – earlier capacity investments, and exit barriers for incumbent firms can make it difficult or impossible for them to withdraw from unprofitable or more costly-to-serve market segments.

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Past studies have used the framework of newly vulnerable markets to examine the impact of information and communications technologies on online music and online news (Clemons et al., 2003), on electronic travel distribution (Granados et al., 2008) and on credit card issuance (Clemons and Thatcher, 2008).¹ In past research, new entrants were able to capture market share relatively quickly as incumbents failed to respond fast enough or appropriately to the new threat (Tushman and Anderson, 1986; Henderson and Clark, 1990; Chandy and Tellis, 2000).

The purpose of this paper is to extend the newly vulnerable markets framework with two propositions that address the dynamics of competition:

1. The speed with which the incumbent loses market share is inversely related to the extent that it applies information and communications technologies to defend its market position. In other words, the more IT is used in supporting an incumbent's newly vulnerable market position, the slower the entrants' inroads.
2. There may be a delay, but at some point the entrants' new business model and innovative use of technology will force the incumbent to radically modify its model, or to adopt the entrants' model in order to survive.

In this paper we examine how the New York Stock Exchange utilized information technology to defend its newly vulnerable business model of a physical floor for trading stock and an intermediated, "specialist" system against new entrants providing fully-electronic markets. The NYSE was able to defend this model for a number of years until a precipitous drop in market share and a change in management forced it to totally revise its business model. The case supports an extended, dynamic theory of newly vulnerable markets in which IT investments by the incumbent can slow the inroads new entrants make.

2. Background – IT and the NYSE

From the use of electromechanical ticker in the late 1800s to disseminate prices, to brokers' phone lines to market floors, the securities industry has been quick to use IT. The continuing growth of trading volumes and additional listings in the 1970s led the NYSE to consider its alternatives for expanding its trading capacity. Rather than undertake costly expansion of its physical floor, the NYSE chose to invest in IT to increase the capacity of the market. With no increase in floor space or headcount, the exchange's average daily trading volumes grew from 45 million shares in 1980 to 157 million in 1990, with further growth to 1.0 billion in 2000.

In 2007, the NYSE completed its \$20 billion "merger of equals" with Euronext, the operator of the Paris, Amsterdam, and Brussels stock exchanges and the LIFFE futures market, was completed in 2007. NYSE Euronext had revenue of \$4.2 billion in 2007, up from the \$2.4 billion in 2006.² It placed 542nd in the Fortune 1000 ranking of US firms by 2007 sales revenue.³

At year-end 2007, the NYSE-listed securities from 2384 US company issuers, up from 2313 in 2006. The market value of its US listings totaled \$15.7 trillion at year-end 2007, up from \$15.4 trillion a year earlier⁴ (see Fig. 1). In comparison, the market capitalizations of domestic listings for the next largest markets, the Tokyo Stock Exchange and Nasdaq Stock Market, were \$4.3 trillion and \$4.0 trillion respectively at year-end 2007. The NYSE's average daily trading volume in 2007 was 2.1 billion shares with a value of \$119.2 billion, compared to \$61.0 billion for Nasdaq and \$40.7 billion for the London Stock Exchange, its two closest exchange rivals in trading volume (www.world-exchanges.org).

Although an NYSE-listed stock may trade on other markets, until 2003 the NYSE market held a dominant position in trading, controlling 80% or more of total US trading volume in its listed stocks in the period 1982–2003. As Table 1 illustrates, in recent years the NYSE floor's market share has dropped to less than 50%, while Nasdaq has expanded its market share in the trading of NYSE-listed stocks, reaching 37% in 2007.

Prior to its initial public offering in March 2006, the Exchange was controlled by its 330 member firms which are the broker–dealer and specialist firms that own the NYSE's 1366 "seats." Access to the floor and participation in the NYSE market requires a seat to be owned or leased. A seat provided trading privileges and access to the trading floor, an iconic 37,000 square foot space on Wall Street that was built in 1903. On the floor in 2003 there were more than 3000 traders, 307 of whom were specialists working for one of seven specialist firms that use their own capital to trade and maintain a "fair and orderly" market.⁵

The NYSE's auction market structure ensures fair and competitive prices by matching the most aggressively priced orders together. Every NYSE stock is assigned to a single specialist, who works from one of the NYSE's 20 posts. A specialist is usually responsible for 5–10 individual stocks. The rest of the NYSE's floor population consists of brokers, handling orders for

¹ Please see these references for more details on the newly vulnerable markets framework. We do not repeat their discussion in order to provide more details about the NYSE and its responses to new entrants.

² The 2006 revenue figure is pre-merger and does not include Euronext. The five largest revenue sources for the NYSE in 2007 were Trading Fees (38%), Derivative trading (16%), Activity assessments (13%), Listing Fees (9%) paid by companies whose stocks are NYSE listed, Market Information Fees (9%) paid by traders and investors that receive real-time NYSE market data, and Data Processing Fees (8%) (NYSE, 2007 Annual Report).

³ Fortune, May 5, 2008 issue.

⁴ The total market value of NYSE listed companies was \$27.1 trillion at year-end 2007, which includes \$11.4 trillion in market capitalization for 421 non-US companies, whose primary listings are in their home countries.

⁵ As of December 2006, there were 307 specialists, 660 floor brokers and 1,753 clerks on the NYSE's trading floor (source: NYSE 2007 Annual Report).

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