



## Leveling the trading field

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### Abstract

We examine the impact on stock prices of a major upgrade to the New York Stock Exchange's trading environment. The upgrade improved information dissemination on the trading floor and reduced the latency in reporting trades and quotes. The portion of the upgrade that reduced latency for electronic orders had significant impacts on liquidity, turnover, and returns. A portfolio that is long stocks undergoing the upgrade in the first 20 days of the upgrade and short stocks receiving the upgrade later has a return of roughly 3% over the period. The abnormal return was a priced effect of the improved liquidity produced by the upgrade. © 2013 Elsevier B.V. All rights reserved.

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### 1. Introduction

Competition in financial markets is central to the fairness and efficiency of the markets (Macey and O'Hara, 1999). Since Congress's passage of the 1975 National Market System legislation the U.S. Securities and Exchange Commission has promoted competition and transparency in financial markets, often through encouraging technological innovation. However, the benefits of such innovations are difficult to measure. In this paper, we test the hypothesis that increasing competition among traders is accompanied by increased liquidity and price appreciations. Using

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a major change to trading technology by the New York Stock Exchange (NYSE) in 1980 we find significant effects on both liquidity and asset prices arising from a technological innovation that increased the ability of traders off the floor of the NYSE to compete on a more equal footing with traders on the NYSE floor.<sup>1</sup>

In 1980, the NYSE significantly upgraded its trading platform—specifically, the technology used at the posts at which trading occurred. The specific technological changes increased the ability of traders off the floor of the exchange [traders who used the designated order turnaround (DOT) and intermarket trading systems (ITS)] to compete with on-floor traders (the specialists and floor brokers) by providing off-floor traders faster execution and more up-to-date information on recent trades and quotes.<sup>2</sup> This increase in transparency and reduction in transaction latency—the time that elapses between an investor making a trading decision and the execution and confirmation of the desired trade—allowed off-floor traders to condition their orders on more up-to-date information and reduced the free trading option that their limit orders provide.<sup>3</sup> If off-floor traders required compensation for this risk of adverse selection in the form of a higher return premium, then reducing these costs should result in abnormal returns at the time of the technological change.

The event that we examine is well suited to examining the effects of a change in competition among traders for several reasons. First, most stock exchange innovations simultaneously affect all stocks traded on the exchange. This means that inferring the effects of the innovation cannot be done in the usual manner, for example by examining returns relative to the market. In contrast, the NYSE upgrade was implemented in a staggered fashion, allowing for better identification of its effects on liquidity and returns. The upgrade was done room-by-room on the exchange floor so there appears to be no bias in selecting which stocks were included in the first or second phase. Second, the change in latency was expected to be large: from two minutes pre-upgrade to less than 20 seconds post-upgrade. Third, the staggered implementation allows us to view the effects of two distinct types of changes to the trading environment. The first change that was implemented was what NYSE's internal documents referred to as “Phase I” of the upgrades. This phase improved the dissemination of information on the trading floor and reduced the latency of reporting quotes and floor transactions, but it did not directly affect the order matching process. The second change that was implemented, “Phase II,” was a superset of Phase I, with the addition of technology that significantly reduced transaction reporting and processing times for off-floor traders who used the designated order turnaround (DOT) system or intermarket trading system (ITS).<sup>4</sup> Both phases reduced latency and thus increased transparency, but the first one affected only orders originating on the floor of the exchange while the second one affected orders originating off the floor of the exchange. Phase I also improved the display of information

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<sup>1</sup>While technology has generally improved access to equity markets and fostered such competition, recent developments like high-frequency trading, market fragmentation, and dark pools have raised concerns about a level playing field for investors. Transparency and equal access continue to be problematic in most decentralized dealer and over-the-counter markets. For example, see Bessembinder, Maxwell, Venkataraman (2006) and Edwards, Harris, and Piwowar (2007) for corporate bonds and Green, Hollifield, and Schurhoff (2006) and Harris and Piwowar (2006) for municipal bonds.

<sup>2</sup>During this upgrade, the NYSE replaced the specialists' trading posts that had been in place since the 1920s with cogwheel-shaped trading posts employing newer technology. Section 2 and the Appendix describe the upgrade process in detail.

<sup>3</sup>Ready (1999) and Stoll and Schenzler (2006) discuss how slower traders' orders provide a free trading option for those traders with lower latency.

<sup>4</sup>The Appendix provides descriptions of how the market operated before the upgrade and how the upgrade affected its operation.

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