

Chapter 9

Decimalization of Stock Exchanges

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ABSTRACT

Technological innovation is propelling the move in financial markets away from fractional trading and towards decimal trading, as in the example of The New York Stock Exchange (NYSE) tick size changed from \$1/16 to \$0.01 on January 29, 2001. This chapter examines the impact of that trend as it relates to market quality and trading behaviour, and draws on comparisons between NYSE and NASDAQ, as well as evidence from other markets and market-traded securities, in demonstrating how decimalization leads to a decrease in the bid-ask spread and depth and an improvement in the probability of information-based trading, while having seemingly no effect on the frequency of limit orders. Our examination also demonstrates how the 1996 decimalization of the Toronto Stock Exchange (TSX, formerly TSE) has had little impact on its giant competitor, NYSE.

INTRODUCTION

Technological innovations have long shaped the business world, and financial markets have certainly been no exception to that shaping. Over the last two decades, new financial reporting requirements and standards, new security regulations, and new trading rules and patterns

have been accompanied by, and often arisen as a result of, new advances in technology. Even such traditional practices as equities trading and personal banking have been more or less replaced by online practices, and such advances show no signs of slowing as financial markets rely ever increasingly on electronic media and systems in carrying out relevant operations.

In this era of e-finance and e-governance, one of the most significant developments has been the

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introduction of 'decimal pricing' in stock markets. Up until the late 1990s, stock exchanges used 'fractional pricing' rules for trading stocks, trading in multiples of \$1/8, for instance. With the development of reliable and efficient electronic based trading systems, however, stock market regulators began to demand a more specific pricing method.

Beginning in the year 2000, fuelled by technological innovation, the New York Stock Exchange (NYSE) selected a limited number of stocks for a pilot project on decimal pricing. Bolstered by the results of the project, it decided to implement the changes market-wide on January 29, 2001. Shortly thereafter, after completing its own pilot project on the matter, NASDAQ moved to decimal pricing as well, and in a matter of a few months, the smallest tick size on both NASDAQ and NYSE went from \$1/16 to \$0.01.

Harris (1994, 1997, and 1999) makes several predictions regarding the impact on execution quality of reducing tick size, all of which have implications with regards to liquidity and volatility. For example, Harris predicts that reducing tick size would result in a decrease in the bid-ask spreads and depth, an increase in trading volume, a better-informed market of traders, a move from limit-order to market-order, an adoption of fast-execution computer systems, and a speedier quote adjustment.

This chapter is divided into two parts: the first part examines those predictions made by Harris about decimalization, and the second part examines the empirical evidence gathered *after* decimalization as it relates to those predictions.

In particular, we examine the impact of decimalization on various aspects of market quality, such as spreads, depths, return volatility, trading volume, quote clustering, and quote adjustment, and demonstrate whether Harris's predictions are confirmed to be accurate by several subsequent studies, including Bacidore, Battalio, & Jennings, 2003, Bessembinder, 2003c, Chakravarty, Wood, & Van Ness, 2004, Chung, Charoenwong, & Ding, 2004, Chung, Chuwonganant, & McCormick,

2004, Chung, Van Ness, & Van Ness, 2004, Gibson, Singh, & Yerramilli, 2003, and Goldstein & Kavajecz, 2000.

Furthermore, we perform an analysis of trading behaviour as evidenced by the frequency and order sizes of limit-orders versus market-orders, referencing the findings of Bacidor, Battalio, & Jennings (2003) on the subject, and utilize the work of Chakravarty, Van Ness, & Van Nexx (2005), Gibson, Singh, & Yerramilli (2003), and Zhao & Chung (2006) in analyzing Anshuman & Kalay's (1998) suggestion that a large tick size imposes large transaction costs on traders and thus reduces the value of private information.

In comparing the impact decimalization has had on NYSE and NASDAQ, respectively, we begin with the fact that NASDAQ spreads are greater than NYSE spreads prior to decimalization, and then examine bid-ask spreads and other market quality measures in NASDAQ in order to determine whether the pattern holds true following decimalization.

We also examine the effects of the switch to decimalization on the Toronto Stock Exchange (TSX), which occurred in 1996, well before NYSE made the move. In doing so, we determine whether or not an increase in order flow results, and reference Ahn, Cao, & Choe (1998) who find that order flows do not migrate from U.S. exchanges to TSX, thereby suggesting that the savings in transaction costs on TSX are not sufficient to offset the benefits of trading on NYSE.

This chapter is of interests from three perspectives. It is a costly move to decimalize an entire stock exchange, and thus the action is invariably undertaken with the expectation that great benefits will derive from doing so. Of course, whether or not those benefits outweigh the negatives of the move is an important question that should be asked, and this chapter seeks to answer that question. Harris (1994, 1997, and 1999) postulates that the move from fractional pricing to decimal pricing would result in lower bid-ask spreads, higher trading volume, greater liquidity, and more

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