Price rounding and bid–ask spreads before and after the decimalization

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Abstract

We investigate price rounding before and after the pilot decimalization on the NYSE. We find that although rounding exists in transaction, bid, and ask prices in both the pre- and postdecimalization periods, it becomes less salient after the decimalization. The cross-sectional relationship between rounding and trading variables is similar before and after the decimalization, and so is the relationship between execution costs and rounding when trading variables are held constant. More importantly, the quoted and effective bid–ask spreads decrease after decimal trading, and this decrease can be ascribed to the decrease in rounding frequency after controlling for the changes in trading variables.
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1. Introduction

In security trading, prices are often constrained to a limited set of observations by minimum tick size. Previous studies document that prices are frequently rounded to multiples of the minimum tick. Osborne (1962) first recognizes the tendency for transaction and quote prices to cluster on their fractions. Harris (1991) provides evidence on the rounding of quote and transaction prices for NYSE- and AMEX-listed equities. He reports that stock prices cluster on round fractions: integers are more common than halves; halves are more common than odd quarters; odd quarters are more common than odd eighths; and other

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fractions are rarely observed. Cooney, Van Ness, and Van Ness (2001) show that both individual and institutional investors exhibit a preference for even eighth prices when they submit limit orders to buy and sell NYSE stocks. In addition, Bessembinder (1994) presents evidence regarding the rounding of foreign exchange quotes. Ball, Torous, and Tshoegl (1985) document rounding in gold futures prices. Koch and Lazarov (2001) report that trades in DAX (the Deutscher Aktienindex) index options with identical maturities cluster around particular classes of strike prices.

According to market microstructure theory, rounding can be regarded as a byproduct of the price discovery process. Ball et al. (1985) hypothesize that clustering is positively related to the degree of uncertainty concerning the true price, conditional on the rules and regulations of the trading activity. Harris (1991) and Godek (1996) suggest that the uncertainty about the true price should be modeled using economic fundamentals (e.g., price level, price change volatility, firm size, and trading activity) as instrumental variables. They show that clustering increases with price level and volatility and decreases with capitalization and transaction frequency. Grossman, Miller, Cone, Fischel, and Ross (1997) provide a competitive theory of clustering that emphasizes the effect of price uncertainty, the size of transactions, volatility, and the informational and transactional roles of quotations on the degree of clustering.

Moreover, rounding can be viewed as a means to lower negotiation costs. Ball et al. (1985) introduce the "degree of price resolution" with the implication that rounding leads to coarse choices of prices and thus involves a low degree of resolution. Harris (1991) argues that clustering exists because traders use a discrete grid of prices to simplify their information set to lower negotiation costs. Specifically, a small set of choices limits the amount of information exchanged between negotiating traders and reduces the time it takes to strike a bargain. Angel (1997) indicates that this view is consistent with cognitive research by Miller (1956) and Simon (1974) that human short-term memory is capable of processing only a few bits of information concurrently.

While rounding may reduce negotiation costs in an imperfect information market, it increases the degree of price discreteness. Under fractional trading, the minimum tick size arbitrarily set by the regulator as well as the rounding to multiples of the minimum tick may lead to enlarged bid–ask spreads and thus inflate market makers' profits. As Harris (1994) points out, a high degree of price discreteness due to regulations widens bid–ask spreads. Bessembinder (1997) investigates the relationship between trade execution costs and price-rounding practices for NYSE- and Nasdaq-listed stocks. Execution costs on each exchange are found positively correlated with the proportion of transaction prices and quotations rounded to even eighths of a dollar. In addition, Chung and Chuwonganant (2001) present evidence that the minimum price variation imposes a binding constraint on bid–ask spreads.

The recent decimalization on the NYSE provides an excellent opportunity for us to revisit the issue of price rounding. Harris (1999) predicts that the conversion to decimal trading would lead to lower execution costs. Bessembinder (2003) shows that bid–ask spreads have declined after the decimalization. In this paper, we investigate the pattern of price rounding before and after decimal trading and its effect on bid–ask spreads for NYSE stocks. First, since decimal trading leads to a finer price grid or a set of less discrete prices, we expect to observe a decline in frequencies of rounding on integers, halves, and quarters. Second, although frequencies of rounding on integers, halves, and quarters may decline after decimalization, we expect that cross sectionally, the relationship between rounding and trading variables and the relationship between execution costs and rounding will stay the same. That is, the sensitivity of rounding to trading variables and the sensitivity of execution costs to rounding