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The relative contribution of ask and bid quotes to price discovery ☆

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ABSTRACT

Using 2000–2010 data for 84 stocks listed in the Spanish Stock Exchange (SSE) and 2009–2010 data for 240 stocks listed in the New York Stock Exchange (NYSE), we provide robust evidence of daily asymmetries in the contribution of ask and bid quotes to price discovery. Asymmetries happen in 47.7% (62.8%) of the stock-day observations in our SSE (NYSE) sample, being larger in average among small cap stocks. These asymmetries are not driven by noise. Ask (bid) quotes lead in days with excessive buyer (seller) initiated trading, but the relationship weakened over time and with the advent of high-frequency trading.

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1. Introduction

It is common to find multiple prices for the same financial asset at the same point in time, such as ask and bid quotes, upstairs and downstairs prices, or prices at different trading places.[1] There has been a huge amount of research devoted to the measurement of the relative contribution to price discovery of quotes posted in multiple trading venues for the same asset (e.g., Hasbrouck, 1995, 2003; Booth et al., 2002; Harris, McInish, and Wood, 2002; Huang, 2002). Leadership in price discovery is attained when a market/quote is the first to incorporate new information more often than others. Since quotes are widely disseminated and they are the basis of investors' trading decisions, studying their relative informativeness arises as a crucial issue.

In multimarket trading and price discovery analyses, limit order book (LOB) information is usually summarized by the quote midpoint, that is, the average between the best ask and bid quotes. Empirical research (e.g., Cao, Hansch, and Wang, 2009; Pascual and Veredas, 2010) has already shown that ignoring the book beyond the best quotes results in a significant loss of information. In this paper, we show that modeling the quote midpoint instead of ask and bid quotes together, even just the inside quotes, may lead to imprecise analyses of price leadership or trade informativeness. We provide evidence that, over relatively short periods of time, such as a trading session, quotes on one side of the market are frequently more informative than quotes on the other side. In other words, we report differences in informativeness between ask and bid quotes in the short-run.

Over long periods of time, we should expect ask and bid quotes for common stocks to be equally informative, since no apparent reason exists for either side of the book to trace the efficient price closer than the other side in a systematic manner. Over short periods of time, however, any premise of equal informativeness relies on theoretical assumptions of symmetry in the dynamics of ask and bid quotes. Namely, assuming symmetric spreads around the efficient price and simultaneous adjustments after any informative shock, the quote midpoint would be a fairly unbiased estimator of the true value of the stock (e.g., Hasbrouck, 1991). We argue that these symmetry assumptions may not hold in the presence of substantial stock-specific order imbalances (excessive buyer- over seller-initiated trading activity).

Symmetric bid–ask spreads imply balanced market-making costs.[2] Researchers using inventory control models (e.g., Stoll, 1978; Ho and Stoll, 1981), however, predict that designated market makers facing unbalanced order flow will post asymmetric spreads. In theoretical models of the LOB (e.g., Glosten, 1994; Goettler, Parlour, and Rajan, 2009; Rosu, 2009), symmetric spreads imply balanced exposure risk.[3] This balance, however, depends on the distribution of expected efficient price changes, as perceived by uninformed traders. When symmetric, as in sequential trade models (e.g., Glosten and Milgrom, 1985; Easley and O'Hara, 1992), the quote midpoint equals the unconditional expectation of the true value (Hasbrouck, 2007). In adverse selection costs models (e.g., Kyle, 1985; Easley and O'Hara, 1987), however, order imbalances signal private information and move prices permanently.[4] Accordingly, order imbalances may cause skewness on the distribution of expected efficient price changes, unbalanced increases in the exposure risk, and, at last, asymmetric spreads.

Symmetric responses of ask and bid quotes after trade-related shocks might happen if the same quote-setters were active on both sides of the market. In modern electronic trading platforms, however, quotes usually represent the interest of several traders that selectively choose to provide liquidity to either side of the market. Even in markets with designed monopolistic market makers,

[1] For NYSE-listed stocks, for example, there are 13 exchanges and several trade reporting facilities (TRFs) sending quote, price, and trade data to the consolidated tape (e.g., Easley, López de Prado, and O'Hara, 2013).

[2] Market-making costs (O'Hara, 1995) include operative costs (the economic resources required to route, execute, and settle trades); inventory holding costs (the opportunity costs/risk of assuming undesired positions), and adverse selection costs (the risk of being picked off by better informed traders).

[3] Exposure risk (e.g., Liu, 2009) comprises adverse selection costs: free option risk (the arrival of adverse public information before a trade) and non-execution risk (the stock price moves away from the limit price).

[4] Empirical evidence is provided by Glosten and Harris (1988), Hasbrouck (1991), Easley et al. (1996), and Huang and Stoll (1997), among many others.