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Impact of the introduction of call auction on price discovery: Evidence from the Indian stock market using high-frequency data☆

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ABSTRACT

Call markets are claimed to aggregate information and facilitate price discovery where continuous markets may fail. The impact of the introduction of call auction has not been found uniformly beneficial, possibly due to poor design or due to 'thick market externalities'. This paper examines the reintroduction of opening call auction at the National Stock Exchange of India in 2010. The results suggest that the auctions attract very little volume, the intraday pattern of volume and volatility in the continuous market remains unchanged and a large fraction of price discovery, measured by the Weighted Price Contribution, still takes place in the first 15 min of continuous market. However, the market synchronicity has improved after the introduction of the auction. Our findings suggest that the ability to attract volume in the call auction for effective price discovery depends on the institutional settings and the characteristics of liquidity supply in the market.

1. Introduction

Call auction as an alternative to continuous order-matching for price discovery in the financial markets has been advocated by many economists. It has been argued that call markets can aggregate information by pooling orders and thus facilitate price discovery even where continuous markets may fail due to high information asymmetry (for instance, Madhavan, 1992). Call market is claimed to lower execution and market impact costs, eliminate the risk of front-running and information disclosure, and lower price manipulations. Based on these arguments, Economides and Schwartz (1995) advocated the use of an electronic call market, integrated within a continuously trading system, for market opening, closing and also once during the trading hours. The case for call auction at market opening and closing is based on observed high volatility and volume, induced by the accumulation of public and private information around these points.

The National Stock Exchange of India (NSE) also reintroduced call auction for market opening on October 18, 2010. The use of call auction was, however, limited to the 50 most liquid stocks underlying its large-cap Nifty index. In this paper, we empirically examine the impact of the reintroduction of opening call auction on market quality. The introduction of call auction was mostly based on the evidence that it takes as long as half-an-hour for the high opening volatility to settle down in the Indian stock market (Thomas, 2010). This paper is motivated by the fact that despite the theoretical arguments and the increased use of call auctions, the impact of the introduction of call auction at the open and close has not been always found to be beneficial. Popular media reports on NSE call auction suggest that it has failed to attract volume. This may not be surprising given the observation of Getmansky, Jagannathan, Pelizzon, and Schaumburg (2014) that short-term traders, who carried little or no inventory, provided liquidity by absorbing 75% of volume on one side of the trades at the NSE. Call auctions may fail to attract short-term traders if their trades are primarily motivated by gains from the spread in a continuous market. Such short-traders also face trade discontinuity when they take position in call auctions. In any case, they cannot collect spread from the auction if that is their primary motive for supplying liquidity. In the absence of short-term traders, other traders — whether informed or uninformed, may also not participate in call auctions, leaving open the issue of the impact of

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call auctions on price discovery, synchronicity and intraday dynamics. Another distinctive feature of the Indian markets is the absence of alternative platforms during the non-trading hours, which is available in some of the other markets where call auctions are employed for market opening and closing. In markets like NASDAQ and Paris, non-binding quotes prior to market opening enable 'learning' as noted by Biais, Hillion, and Spatt (1999) and Cao, Ghysels, and Hatheway (2000). Similarly, the availability of Electronic Communication Networks (ECNs) and Broker Crossing Networks (BCNs) during non-trading hours or futures traded ahead of stock market opening in other developed markets may allow price discovery during non-trading hours albeit with lower volume and greater informed trading (Barclay & Hendershott, 2003). Unlike some developed markets, Indian markets do not have a window for posting the pre-open broker–dealer trades as in LSE or a limit-order book where limit-orders are accumulated and displayed (Openbook at NYSE) prior to market opening. Given the institutional setting in India, market opening through call auction may not be efficient unless the auctions attract large volumes.

We examine changes in intraday dynamics of volatility and volume, synchronicity of prices, and price discovery before and after the introduction of call auction for market opening. Our major results are as follows. We find that the volumes attracted by call auctions in India are abysmally low. Further, the intraday volatility and volume dynamics (high volatility at open) remain unaffected by the introduction of call auction and they are merely delayed due to the delayed normal (continuous) market opening. While these effects suggest a largely neutral impact of the call auction, the serial correlation in returns observed at opening indicates price reversal from the call auction to the normal continuous market. Despite not attracting significant volume and the worrisome sign of price reversal following call auction, we find that the market quality improved in terms of price synchronicity. However, given the relatively high liquidity of the stocks involved, the higher synchronicity may not be critical in the assessment of the efficiency of price discovery for highly liquid stocks. Further, the Weighted Price Contribution measure reveals that the first 15-minutes of trading in the continuous market continues to account for the maximum proportion contribution to the close-to-close returns even after the introduction of call auction. Overall our results tend to suggest that in a market where the short-term traders supply liquidity, the call auction may fail due to the lack of incentive (to collect spread) and increased risk/cost of adverse selection/discontinuity. The absence of alternative trading platforms and price signals during non-trading hours could also have contributed to the poor outcome from the opening call auction. This paper contributes to the debate on whether institutional settings matter in organizing call auctions for opening the trading in equity markets. Our findings suggest that attracting significant volume in a call auction is extremely critical for effective price discovery and that may depend upon how liquidity is supplied in a given market.

The rest of the paper is organized as follows. Section 2 summarizes the literature on the call auction and its impact. Section 3 describes the institutional details of NSE and the trading protocol followed during the call auction and the subsequent continuous trading. Section 4 details the methodology and data used in this study. Section 5 discusses the results of our analysis and Section 6 concludes the paper.

2. Literature review

It has been argued that call auctions are ideal to aggregate diverse information across traders in order to minimize adverse selection at the opening (Domowitz, Glen, & Madhavan, 2001). The high volume[2] reported at the opening appears to support this view. As uninformed liquidity traders choose to trade when the transactions costs are low, high volume at the opening call may indicate lower transaction cost of trading. However, call auctions are not effective or efficient in all situations. Firstly, the advantage of call auction in pooling orders comes at the cost of immediacy and can lead to market failure when value-sensitive information arrives between the two passes of call auctions. This concern would be heightened when call auctions have low volume and/or when there is significant price reversal in the post-auction continuous market. Secondly, it has also been argued that the prices discovered in the call market may not be generally efficient. Using a price auction model, Madhavan and Panchapagesan (2000) showed that the dealer sets a more efficient opening price based on the information in the limit order book than the public in an auction. Ho, Schwartz, and Whitcomb (1985) showed that the prices in a call market, in general, are not equal to Walrasian Prices unless (a) there is 'symmetry in the distribution of individual buy/sell orders', and (b) 'investors' expectation about market clearing prices are accurate. The theoretical benefits of call markets are countered by the possibility of order flow imbalances (Ho et al., 1985); (Angel & Wu, 1995), the transparency of orders deterring traders from submitting orders, and the conditional provision of liquidity due to the opportunity to cancel orders (Angel & Wu, 1995). Thus, any failure to attract sufficient liquidity, possibly from uninformed traders, can substantially erode the well-cited advantages of call auctions. On the other hand, if uninformed liquidity traders choose to clump together to trade, driven by the lower execution costs (Admati & Pfleiderer, 1988) and lower risk from the informed traders, then call auctions may provide some of the advantages cited earlier. In short, the advantage of call market mechanism could be subject to thick market externalities (Diamond, 1982), wherein each trader's willingness to trade is contingent on others. As a consequence, call auctions are expected to attract volume when large uninformed liquidity traders on both sides of the trade come together to participate in call auctions. It has been pointed out that the call market design, trading rules and institutional settings can have a significant impact on its outcomes (for example, Comerton-Forde, Rydge, & Burridge, 2007; Ellul, Shin, & Tonks, 2005).

A number of papers examined the market quality impact of call auctions in empirical contexts. Pagano and Schwartz, (2003), using the market model similar to Cohen, Hawawini, Maier, Schwartz, and Whitcomb, (1983a, b), found that the introduction of closing call at Euronext Paris lowered execution costs and improved price discovery. Their event study examined the price synchronicity of stocks with the market. They found an increase in return synchronicity following the introduction of the call. As regards intraday volume, return volatility and spread (at hourly interval), they did not find any significant change during most of the day, except a decrease in the volume and spread during the last trading hour of the continuous market for the less liquid stocks. Chelley-Steeley (2009) also studied the impact of call introduction at the LSE. She found that all the measures indicated improvement in the market quality and the improvement was more at the open than at the close. She also found that stocks with the lowest pre-call liquidity experienced the greatest increase in market quality contrary to many other research findings. Comerton-Forde, Lau, and McInish (2007) also examined the same event with the methodology followed by Pagano and Schwartz (2003) and concluded that the market quality went up after the introduction of call markets at open and close. In Singapore Stock Exchange, where call auction was introduced at open and close, Chang, Rhee, Stone, and Tang (2008) found that the introduction of the call reduced market-adjusted return volatility and pricing errors. They found that the gains in pricing efficiency were much less for the less liquid stocks.[3]

On the other hand, Ellul et al. (2005) found that the call auctions at the London Stock Exchange (LSE) suffered a high failure rate, even

[2] Madhavan and Panchapagesan (2000) report that opening call auction accounts for 9.7% of daily trade at the NYSE. Kehr, Krahnen, and Theissen (2001) report that opening call accounts for 12.1% of daily volume at the Frankfurt Stock Exchange.

[3] They used market-adjusted return volatility. They also used the correlation between trading day returns and overnight returns as a measure of the trading noise and two-day volume-weighted prices as the benchmark for pricing errors.