

Trading Fast and Slow: Colocation and Liquidity

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We analyze how an optional speed upgrade at NASDAQ OMX Stockholm affects market liquidity. The analysis shows that liquidity improves for both fast and slow trading entities. We find that the upgrade is pursued mainly by participants who engage in market making. Those that upgrade use their enhanced speed to reduce their exposure to adverse selection and to relax their inventory constraints. In particular, the upgraded trading entities remain competitive at the best bid and offer prices even when their inventories are large. Our results suggest that increasing the speed of market making participants benefits market liquidity.

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Proximity to markets matters. Those closest to the trading venue are the first to observe market movements. In the past such proximity was purchased through acquiring a seat on the exchange. Today proximity involves colocating trading servers at the exchange and subscribing to direct data connections. Many exchanges provide degrees of proximity in terms of physical location and speed access, for a fee. Colocation services are a source of revenue to exchanges and reduce latency for subscribers, but it is unclear if they benefit the overall market.

Researchers, investors, and policy makers are interested in the relationship between speed and market quality. Increased trading speeds may reduce frictions and the costs of trading, but it may also increase the rents that fast traders extract by exploiting slower traders. Regulators have proposed market structure changes to slow down the market. For instance, minimum quote lives have been debated in some markets and implemented in others. Scheduled periodic auctions have also been discussed as an alternative to continuous trading.

We examine how speed affects market liquidity by studying an optional speed upgrade at the NASDAQ OMX Stockholm equity market. In September 2012, NASDAQ OMX Stockholm offered an upgrade of their existing colocation service, where subscribers could choose to pay an extra fee for a boost in speed. Through a proprietary data set we are able to observe the colocation service subscriptions of all trading entities, as well as their quoting and trading activities. Colocation status is a good proxy for fast trading as traders with latency-sensitive strategies are exposed by their revealed preference. In this way we avoid data-driven definitions of fast traders and classifications made at the discretion of exchanges.

Our analysis shows that the effective spread for equities falls by 2.0% after the event. For a trade worth SEK 500 000, this implies that the average bid-ask spread falls from SEK 420 to SEK 412. We also find that depth at the best bid and offer (BBO) prices increases by 8%. The increase in depth implies that the market can absorb larger trades without influencing the price. Before the colocation upgrade it would require a trade size of SEK 761,000 (on average) to influence the market price, whereas after the event a trade size of SEK 822,000 could be absorbed.

Previous work suggests that trading speed may improve liquidity by reducing the costs incurred by market makers (liquidity providers). Two key costs of market making are adverse selection cost and inventory costs. Adverse selection costs are due to the risk that market makers trade with informed counterparties, while their preference is to trade with uninformed counterparties. Fast market makers are better able to avoid trading with informed counterparties and can thus afford to increase their liquidity supply. Inventory costs are incurred to market makers when there are large waves of either buy orders or sell orders, where the market makers take the opposite side and bind capital in large positions. Market makers with a speed advantage are able to decrease their inventory costs and can thus offer their services at more competitive prices.

We find that it is primarily market makers who subscribe to the colocation upgrade. The fastest traders reduce both their adverse selection costs and their inventory costs. Consistent with lower adverse selection costs, after the upgrade the fastest traders are less likely to provide liquidity in the direction of new information. We also observe that the fastest traders turn over their inventory less frequently and increase their presence at the BBO prices after upgrading, consistent with the theoretical prediction of reduced

sensitivity to inventory positions for fast market makers. Our evidence shows that the refined inventory management is the main driver of the liquidity improvement.

Specifically, inventory-constrained market makers can unwind large inventory positions by quoting asymmetrically around the fundamental stock value. A trading entity with a large inventory position can quote less aggressively on the side of the order book that would increase inventory, and more aggressively on the side that would reduce inventory. After the colocation upgrade, we find that the fastest traders reduce their quote asymmetry relative to slower traders, meaning that they can stay competitive even when their inventory is large. The documented behavior is consistent with the fastest traders being better able to control their inventory, making large inventory positions less costly.