

Price discovery and market liquidity at NASDAQ Nordic OMX exchanges

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We investigate the process of price discovery of several financial assets traded at the Nasdaq Nordic OMX exchange. Specifically, we empirically investigate the dynamics of the order book of financial assets belonging to the categories of stocks, warrants, equity warrants, and index fund units. By investigating the mean cancellation time of the limit orders submitted to the market we infer about the presence of high frequency trading for a specific financial asset traded in the market. We verify that the presence of high frequency order submission is not always associated with high frequency of transactions. We perform a cross sectional analysis of the order submission and cancellation procedure to detect characteristics of the multivariate nature of high frequency order submission. A discussion of the relationship between high frequency order submission activity and asset liquidity is provided for different categories of financial assets.

We perform a statistical test of the repeated market transactions occurring between different pairs of market members. With this approach we are able to detect over-expression and under-expression of high-frequency market transactions for different pairs of market members. These over-expressions and under-expressions are used to set up a statistically validated network [Tumminello et al 2011, Hatzopoulos et al 2015] describing the networked structure of the market with respect to high-frequency transactions. This investigation is done monthly for the time period covering the 2010 and 2011 calendar years. During this period, for each month we are able to obtain a network describing the high-frequency networked relationships observed in the market. The networked relationships are presenting both regularities and a dynamics that can be interpreted in terms of specialization of some market members allowing them to be active (and/or to sell services) in the field of high-frequency trading. The topological properties of the networks obtained are therefore informative with respect to the ability and infrastructures of different market members. The statistical robustness of our empirical results shows that the introduction of heterogeneity with respect to the ability to perform high-frequency algorithmic trading are making an anonymous market a networked market.

- [1] M. Tumminello et al, PloS one **6**, e17994 (2011).
- [2] V. Hatzopoulos et al, Quant. Fin. **15**, 693 (2015).
- [3] MX Li et al, Sc. Rep. **4**, 5132 (2014).