**Academic Research**

**Price Discovery without Trading: Evidence from Limit Orders, Brogaard, Hendershott, Riordan, 2019**

* Analyze the contribution to price discovery of market and limit orders by HFT and non-HFT
  + Price Discovery – Traditional view: Trades reveal investors private info, market makers operate with public info
* Most exchanges evolved into limit order books where there are no designated market makers and limit order books where there are no DMMs and limit orders represent bulk of activity
* Market/Limit orders determine the nature of price discovery and adverse selection
  + Adverse selection when asymmetric info: then buyers and sellers have different information, it is known as a state of asymmetric information. Traders with better private information about the quality of a product will selectively participate in trades which benefit them the most, at the expense of the other trader.
* Use of VAR to quantify the contribution to price discovery
* HFTs limit order contribute more than twice as much to price discovery as their market orders, and their market orders play less of a role in price discovery than non-HFT’s market orders.
* Ranking of Impact: Market Orders -> Orders that change the NBBO -> orders at the NBBO -> orders below the NBBO
* Limit orders contribute to price discovery without trading
* Limit orders – if executes – impacts the opposite of the market order it transacts against
* Essentially need to capture effects of limit orders that do not execute.
* When volatility is high – fast traders increase their limit order submissions.
* Markets can fail when adverse selection is too high.
* When vol increases – hft switches to market orders – thus limiting their limit orders role in price discovery
* This market/limit order trade off between execution speed/certainty and price increases raises concerns that endogenous fragility in continuous limit order books.
* HFT reactis to public signals before non-HFTs are able to react. However, HFTs are the predominant channel of price discovery on each exchange though their limit orders