

Market Microstructure and High-Frequency Trading: Price Discovery and Liquidity

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ABSTRACT

Market microstructure—the study of the trading process by which investors’ latent demands are translated into transactions and prices—has grown from a specialized subfield into a central area of financial economics, driven by the profound transformation of securities markets from floor-based human trading to electronic continuous-time auctions dominated by algorithmic and high-frequency traders. Kyle’s (1985) foundational model in *Econometrica* established that informed traders strategically exploit private information through dynamic order placement, while Glosten and Milgrom’s (1985) adverse selection model showed that market makers widen bid-ask spreads to compensate for trading against better-informed counterparties. The rise of high-frequency trading (HFT)—algorithmic trading at microsecond timescales—has generated intense debate about whether HFT improves or harms market quality, with evidence on both sides of the liquidity provision and price discovery questions. This paper reviews market microstructure theory, empirical evidence on bid-ask spreads and their determinants, the welfare effects of HFT on price discovery and market quality, and regulatory responses to HFT’s market structure implications.

Keywords: Market Microstructure; High-Frequency Trading; Bid-Ask Spread; Price Discovery; Adverse Selection; Kyle Model; Glosten Milgrom; Liquidity.

1. INTRODUCTION

Securities markets transform investors’ heterogeneous beliefs about asset values into prices through a trading mechanism that aggregates information from diverse market participants. The efficiency of this price discovery process—how accurately and quickly prices incorporate available information—depends critically on the market microstructure: the rules, institutions, and trading mechanisms through which orders are submitted, matched, and executed. Demsetz (1968) first formalized the bid-ask spread as the price of market immediacy—the compensation that market makers require for providing liquidity to investors who demand immediate execution rather than waiting for a natural counterparty. The bid-ask spread became the primary observable measure of trading costs and market quality, and its determinants—inventory risk, adverse selection, and order processing costs—have been extensively modeled and estimated.

The transformation of U.S. equity markets from the NYSE’s specialist system to fully electronic continuous auctions following Regulation NMS (2005) dramatically reduced average bid-ask spreads—from approximately \$0.12 per share in 2000 to \$0.02 by 2010—while enabling the entry of HFT firms whose algorithms operate at microsecond timescales, submitting and canceling millions of orders per second. The Flash Crash of May 6, 2010—when the Dow Jones Industrial Average fell approximately 1,000 points and recovered within minutes—demonstrated the potential for algorithmic trading dynamics to produce severe market instability and galvanized regulatory and academic attention to HFT’s effects on market structure.

2. THEORETICAL FOUNDATIONS

2.1 Kyle’s (1985) Sequential Trade Model

Kyle’s (1985) landmark *Econometrica* paper (53(6): 1315–1335) models a market with three types of participants: an informed trader with private information, uninformed noise traders whose order flow provides cover for the informed trader, and a competitive market maker who observes aggregate order flow but not individual trader identity. The informed trader strategically submits orders to maximize profits by controlling the rate at which private information is revealed through prices—trading aggressively when the information advantage is large and the trading horizon is long, but more gradually as the information is incorporated into prices. The model generates the λ (market impact) coefficient—the

relationship between order imbalance and price change—which has become the dominant empirical measure of market depth and price impact.

2.2 Adverse Selection and Bid-Ask Spreads

Glosten and Milgrom (1985) in the *Journal of Financial Economics* (14(1): 71–100) model the bid-ask spread as arising from adverse selection: market makers who provide liquidity to uninformed traders also face the risk of trading against informed traders who know the asset’s true value. The market maker sets the ask price above and the bid price below the expected value to break even across all trades—with the spread covering the expected losses from trading against informed traders. This adverse selection model predicts that spreads will be wider when the fraction of informed traders is higher, when private information is more valuable, and when asset volatility makes private information more economically significant.

3. HIGH-FREQUENCY TRADING EVIDENCE

Table 1. HFT strategies, potential benefits, and potential harms.

HFT Activity	Potential Benefit	Potential Harm
Market making	Narrower bid-ask spreads; faster price discovery	Phantom liquidity that disappears in stressed markets
Statistical arbitrage	Faster cross-market price alignment; more efficient prices	Arms race in latency infrastructure; redistributes wealth to fastest
Order anticipation	No clear social benefit	Front-runs institutional orders; imposes cost on slower investors
Momentum ignition	No social benefit	Artificial price movements that harm other market participants

4. REGULATORY RESPONSES

Regulatory responses to HFT’s market structure implications have varied across jurisdictions. The SEC’s Market Access Rule (2010) requires firms to have risk management controls before providing market access. The European Union’s MiFID II (2018) introduced requirements for HFT firm registration, algorithmic trading controls, and market-making obligations. France and Italy introduced financial transaction taxes that reduced HFT activity, with evidence showing reduced trading volume and liquidity without clear price efficiency improvements. The Consolidated Audit Trail (CAT)—a comprehensive U.S. market surveillance system—provides regulators with the data needed to reconstruct market events like the Flash Crash and identify manipulative trading patterns. Biais, Foucault, and Moinas (2015) in the *Journal of Finance* develop a theoretical model showing that the social value of HFT is ambiguous: HFT improves price discovery but the arms race for speed imposes wasteful infrastructure investment costs that are privately motivated but socially duplicative.

5. CONCLUSION

Market microstructure research has established that trading mechanisms, information asymmetry, and investor heterogeneity determine the quality of price discovery and the cost of trading in financial markets. The adverse selection framework explains bid-ask spreads as compensation for informed trading risk, and Kyle’s λ provides the dominant empirical measure of market depth. HFT’s welfare effects remain genuinely contested: electronic market making has clearly reduced average bid-ask spreads, but phantom liquidity in stress events, order anticipation strategies, and the social waste of the latency arms race impose costs that partially or fully offset liquidity benefits. Future research should examine how the fragmentation of equity trading across dozens of venues—both lit and dark—creates new price discovery challenges and whether consolidated market mechanisms or regulatory intervention can improve outcomes.

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