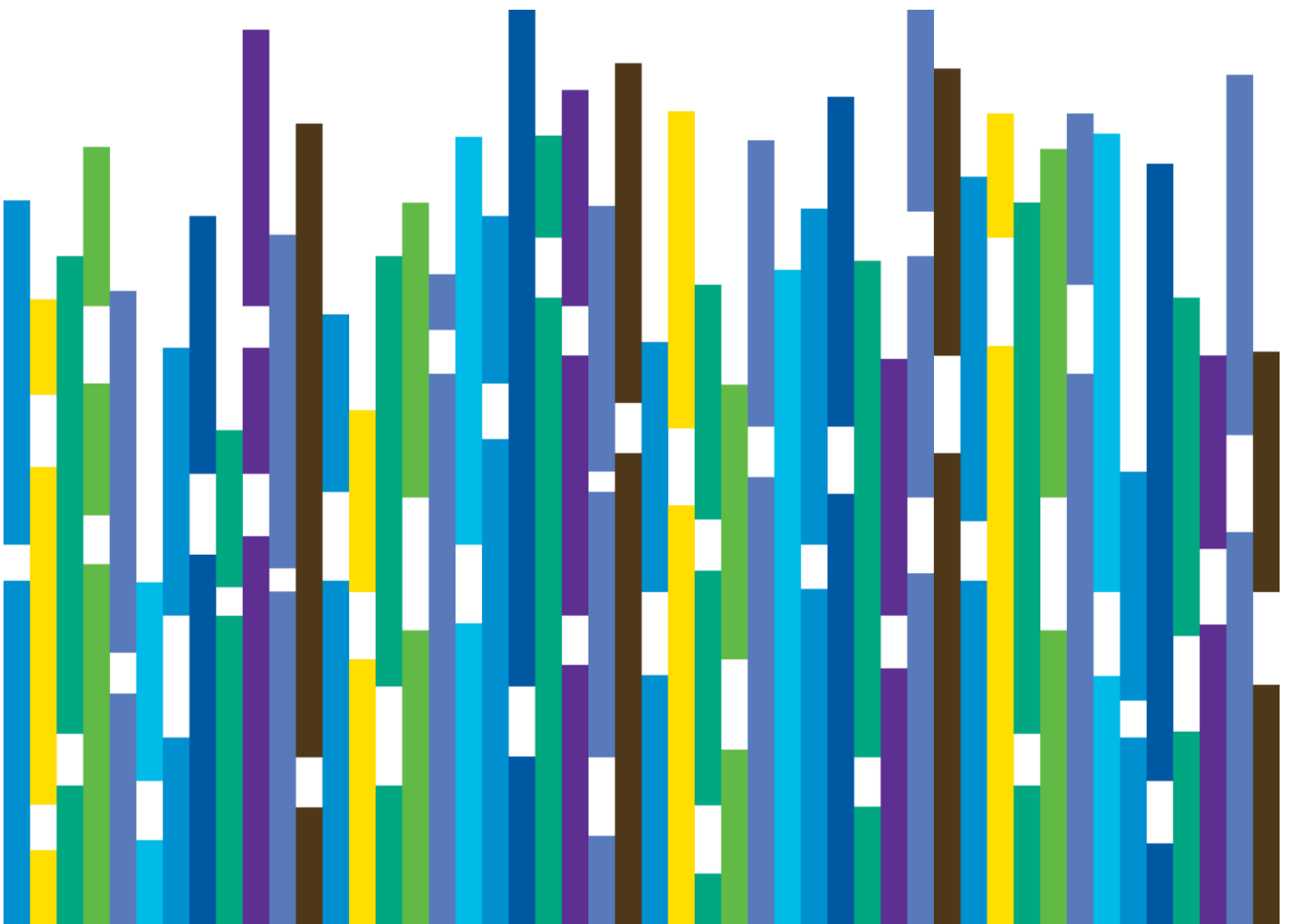


DARK POOLS, INTERNALIZATION, AND EQUITY MARKET QUALITY

Issue Brief



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Overview

Over the past decade, equity markets have been transformed by the forces of technology, regulation, and globalization. Today, the way in which investors, market participants, intermediaries, and trading venues interact is highly automated and critically dependent on speed. Significantly, the dominance of the incumbent exchanges has been eroded and liquidity has fragmented over numerous trading venues as competition has intensified.

Within this fragmented environment, off-exchange trading, including broker/dealer internalization and dark pools in which prices are not displayed prior to execution, has grown significantly. Undisplayed or “dark” trading away from public exchanges in the United States is estimated to account for approximately 31% of consolidated volume as of March 2012 — a growth of around 48% since the start of 2009.

From a market integrity perspective, the growth in dark trading raises various issues, ranging from concerns over transparency to considerations over fairness, particularly in relation to investors’ access to these undisplayed trading venues and the basis on which they compete with traditional exchanges. Moreover, members of the [CFA Institute Capital Markets Policy Council](#) have raised concerns that the incentive to display orders in public markets is being undermined by certain off-exchange trading practices, such as sub-penny trading in which over-the-counter market makers fill retail orders ahead of displayed limit orders by offering price improvement in fractions of a penny. In turn, these concerns have implications for public price discovery, liquidity, and the quality and integrity of markets.

Regulators around the world have also voiced concerns about dark trading, including the U.S. Securities and Exchange Commission (U.S. SEC) in its equity market structure concept release (2010), the European Commission in its review in 2011 of the Markets in Financial Instruments Directive, the International Organization of Securities Commissions (IOSCO) in its report on dark liquidity (2011), as well as regulators in Canada and Australia in their reviews of their respective market integrity rules. Certain regulatory proposals, including those of the U.S. SEC, remain under consideration.

The report [Dark Pools, Internalization, and Equity Market Quality](#) presents an examination of the relationship between dark trading and market quality in order to inform public policy issues related to undisplayed liquidity and to address the aforementioned market integrity concerns. Specifically, we examine the relationship between different types of undisplayed trading volumes and market quality measures, including bid–offer spreads and top-of-book market depth.

The results of our analysis show that increases in dark pool activity and internalization are associated with improvements in market quality, but these improvements persist only up to a certain threshold. When a majority of trading occurs in undisplayed venues, the benefits of competition are eroded and market quality will likely deteriorate.

To protect market integrity, we recommend that (1) internalization of retail orders be required to offer meaningful price improvement, (2) regulators monitor the growth in dark trading and take appropriate measures if it grows excessively, and (3) dark trading facilities improve reporting and disclosures around their operations to enable investors and regulators to make more informed decisions about their use.

Summary of Findings

Market Structure

- The U.S. equity market structure is fragmented. Today, equity trading is dispersed across 13 exchanges, at least one electronic communications network (ECN), approximately 16 reporting dark pools, and more than 200 broker/dealers who internalize order flow. Exchanges collectively account for approximately two-thirds of consolidated volume, and off-exchange transactions account for approximately one-third of total volume.
- Most exchanges are structured as electronic limit order book markets. Exchanges are generally both pre-trade and post-trade transparent: Prices and trading interest are displayed prior to execution, and transaction details are publicly disseminated in real time.
- ECNs operate similarly to exchanges in terms of secondary market trading of equity securities, generally being both pre-trade and post-trade transparent. There is only one significant ECN — LavaFlow — which accounts for approximately 1% of consolidated volume.
- Dark pools are systematized execution facilities that operate with limited pre-trade transparency. The prices of orders entered into the dark pool are not displayed to other market participants and are matched anonymously against contra-side orders.
- Several different types of dark pools operate in the United States, ranging from continuous-crossing systems operated by the large broker/dealers to independently operated block-cross platforms.
- In aggregate, dark pools have accounted for between 8% and 13% of consolidated volume over the past three years.
- Internalization involves broker/dealers internally executing client order flow against their own accounts on a systematic basis. Broker/dealer internalization is not subject to pre-trade transparency.
- Internalization and other over-the-counter (OTC) transactions represent approximately 18% of consolidated volume. Internalization is also thought to account for almost 100% of all retail marketable order flow.
- Retail internalization is driven by the purchase of order flow by wholesale OTC market makers from retail brokerage firms. This practice enables broker/dealers to “preference” those orders that are profitable to arbitrage and route unwanted orders to other market centers.
- Broker/dealer internalizers must match or beat the national best bid and offer (NBBO). Broker/dealers can provide price improvement to their customers in the form of sub-penny executions. Although this approach can provide savings to retail customers, it carries an opportunity cost to liquidity providers that post orders on public exchanges.
- Other OTC transactions include ad hoc, large, or irregular transactions between broker/dealers and other counterparties seeking to execute client order flow in the most efficient manner possible.

- The process by which orders are handled, routed, and executed can be very complex because of the fragmented nature of the equity market and the reliance on advanced technology and speed. Firms use algorithms to route different portions of an order to different venues in various sequences, taking into account such factors as minimization of market impact, minimization of information leakage, immediacy of execution versus cost of execution in various pools, and other factors to provide the most efficient executions possible.
- Once trades are executed, they are immediately reported to the consolidated tape — the mechanism for the provision of public post-trade transparency.
- Off-exchange transactions are reported to one of two main trade reporting facilities (TRFs) that are registered and overseen by the Financial Industry Regulatory Authority (FINRA). The largest TRF is operated by NASDAQ (the FINRA/NASDAQ TRF), and the other TRF is operated by the NYSE (the FINRA/NYSE TRF). Trades reported through the TRF are then printed on the consolidated tape.

Regulatory Framework

- The regulatory framework surrounding the operation of exchanges is the Regulation National Market System (Reg. NMS). The key aspects of Reg. NMS include the Access Rule, which ensures that market participants have fair and nondiscriminatory access to markets and prices; the order protection rule, which protects displayed quotations at the best bid or best offer from being traded through; the sub-penny rule, which prevents exchanges, broker/dealers, and other market centers from displaying, ranking, or accepting any orders that are priced in an increment of less than one cent for stocks priced above \$1 (although it allows broker/dealers to execute transactions in sub-penny increments); and market data rules, which govern the allocation of revenues to market centers that contribute data to the consolidated quote and tape.
- Non-exchange-trading modalities that include dark pools, ECNs, and certain other broker/dealer systems are captured under Regulation Alternative Trading System (Reg ATS). Alternative trading systems (ATSs) are not required to publicly display price quotations and are able to restrict access to their crossing systems and internalization pools.
- The issues associated with dark liquidity are prevalent internationally. A number of regulatory bodies in other jurisdictions have developed frameworks governing how dark pools and undisplayed orders are allowed to operate within their markets. Additionally, IOSCO has established a broad set of international best practices for regulatory treatment of dark pools and dark orders.

Literature Review

Overall, the academic literature related to fragmentation and off-exchange trading is at best mixed. Out of the studies reviewed, the most applicable are Weaver (2010, updated 2011); Degryse, de Jong, and van Kervel (2011); Buti, Rindi, and Werner (2010a); and O'Hara and Ye (2011). The first two support the notion that undisplayed trading harms market quality, whereas the latter two suggest undisplayed trading is associated with improvements in market quality. This division indicates that the relationship between undisplayed liquidity and market quality is complex.

Empirical Analysis

Data

- A sample of 450 stocks stratified across listing market and market capitalization was selected by CFA Institute. For each stock, data on bid–offer spreads, top-of-book depth, off-exchange volumes, and other variables were obtained for a selection of dates over the period from the first quarter of 2009 through the second quarter of 2011.
- Off-exchange trades reported to the NASDAQ TRF, which account for approximately 95% of all off-exchange trading in our sample, have been subcategorized by NASDAQ according to the type of trading modality used.

Descriptive Statistics

- The data show that relative bid–offer spreads have declined by approximately 50% over the review period of January 2009–May 2011. The decline in spreads is evident among large-capitalization, medium-capitalization, and small-capitalization stocks. The median quoted spread for large-cap stocks in our sample over the review period is one cent, or in relative terms, four basis points (bps). For medium-cap stocks, the median spread is two cents or nine bps, and for small–cap stocks, it is nine cents or 83 bps.
- Top-of-book depth, measured by the average size (in shares and in dollars) at the best bid or best offer across all markets displaying at the NBBO, is relatively flat over the review period. Median depth for large-cap stocks is 1,663 shares or \$66,905, compared with 454 shares or \$5,964 for small-cap stocks.
- The market shares of internalization and dark pools have trended upward over the review period for the total sample and for each of the large-, medium-, and small-cap subsamples, reflecting growth in undisplayed trading for all stocks. Internalization is higher among small-cap stocks relative to large- and medium-cap stocks, whereas dark pools are more active in large- and medium-cap stocks relative to small–cap stocks.

Regression Analysis

- To analyze the relationship between dark trading and market quality, bid–offer spreads and depth (the dependent variables of interest), respectively, are regressed on internalization and dark pool volumes (the independent variables of interest) and other explanatory variables. We test the hypothesis that there is no relationship between the proportions of dark trading and market quality.
- The results for the total sample suggest that increases in dark trading are initially associated with improvements in market quality. Bid–offer spreads decrease and depth increases as internalization and dark pool activity increase. The regression results illustrate an association between dark trading and market quality, but they do not definitively prove the direction of the relationship.
- The relationship between dark trading and market quality is likely quadratic. That is, beyond a certain threshold, it reverses such that market quality initially improves but then declines as dark trading increases. Specifically, we estimate that when a majority of trading in a stock occurs in undisplayed venues, market quality will likely deteriorate.
- One possible explanation is as follows: Initially, competition for order flow among on- and off-exchange venues causes more aggressive quoting in the limit order book to obtain incoming order flow. When lit markets dominate (i.e., dark market share <50%), this competition helps to reduce bid–offer spreads. However, when most orders are filled away from lit markets, investors could withdraw displayed quotes because of the reduced likelihood of those orders being filled. As investors become disincentivized from displaying orders, bid–offer spreads are likely to widen.
- Therefore, competition among various types of trading venues should be maintained and a predominance of dark trading should be avoided.

Summary Policy Considerations

Although a wholesale revision of the market structure regulatory framework is not necessary, we believe certain improvements are needed to ensure a level playing field and to support competition, particularly given the current trajectory of growth in dark trading. To that end, we recommend the following considerations.

1. **Require internalization of retail orders to provide meaningful price improvement.**

Meaningful price improvement could be defined as the minimum price variation (MPV) or half the MPV if the displayed spread between the best bid and the best offer equates to the MPV.¹

This proposal would require broker/dealers to either internalize marketable retail order flow with significant price improvement, thereby generating economically meaningful savings for retail investors, or route the order flow to an exchange to execute against the displayed quotations in the order book. This approach would provide some protection to market participants posting limit orders by limiting the scope for OTC market makers to step in front of those orders by simply matching the best prices posted in displayed markets or by providing only nominal price improvement. It would thus minimize any disincentive to post displayed limit orders and would uphold market integrity.

2. **Monitor growth in the proportion of dark trading volume, and take appropriate measures.**

Regulators should monitor developments with respect to internalization and dark pool activity. Regulators should consider introducing measures to restrict the use of dark orders and dark trading facilities if such activity becomes excessive, such as if the share of dark trading exceeds 50%. One possible measure would be to lower the threshold at which ATSs must display orders and meet general access requirements from the current level of 5% of the trading volume in a given stock.

3. **Improve reporting and disclosure around the operations of dark trading facilities.**

Insufficient information about the operations of dark pools, internalization pools, the types of orders that are accepted within those systems, and the process by which orders are matched makes it difficult for investors to make informed decisions about whether or how to utilize dark trading facilities. It also makes it harder for regulators to monitor their growth (the second consideration) and to evaluate how dark pools affect price discovery and liquidity. Dark trading facilities should, therefore, voluntarily reveal greater information about their operating mechanics and report more information on the volumes they execute. Such disclosures would improve transparency and enable all stakeholders to better understand their relative benefits and drawbacks.

Implementation of these considerations would help protect displayed orders while offering meaningful savings to retail investors executing away from public markets, maintain competition, and improve transparency. More fundamentally, these measures would enhance market integrity and underpin investor confidence in the equity market structure.

¹ The MPV in U.S. markets is 1 cent for stocks priced above \$1 and 0.01 cent for stocks priced below \$1.