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Dark and Lit Markets: *A User's Guide*

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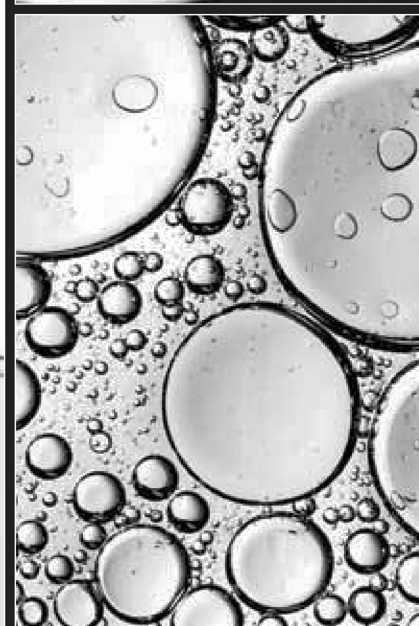

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This article provides a guide to dark and lit pools[1] for buy-side traders and portfolio managers. The goal is to understand how we got to where we are today, the basics of how to use these pools, and a look into the future. As we shall see, some of the conventional views—and original intentions—of these pools do not always match up with the reality of how they are used today.

The article begins with an overview of the salient characteristics of each market, along with the economic and regulatory impetuses that shaped the evolution of these markets. Following is a User's Guide that provides basic guidelines on using dark and lit pools. The last section takes a glimpse into the future, with a particular emphasis on proposed regulatory changes that could significantly alter the landscape of lit and dark markets.

WHAT ARE DARK AND LIT MARKETS, AND HOW DID WE GET HERE?

Intuitively, a market is lit if its orders and quotes are viewable by the general public and dark if they are not. As we shall see, though, there are shades of darkness. A dark pool may display information about its orders to selected participants but remain dark to the general public. And most lit markets offer some type of dark liquidity in the form of reserve or non-displayed order types.

By this definition, there have always been lit and dark markets in the United States. Floor traders holding customer orders represent dark liquidity, as do the not-held orders being handled by upstairs trading desks. Here we are interested in the more recent evolution characterized by the widespread deployment of electronic markets that match buy and sell orders anonymously. Most of the volume thus matched is from lit pools, but in terms of sheer numbers there are about three times as many dark as lit pools. In order to understand how this came about and define lit and dark pools precisely, we need to review U.S. equity market regulation.

A Rapid Regulatory Review

In this section we review the major regulatory acts that led to today's equity market structure.

Modern securities markets began with amendments that Congress passed in 1975 to the Securities Exchange Act of 1934. These amendments called upon the Securities and Exchange Commission to facilitate the development of a National Market System for equity securities traded within the United States. The idea was to create an environment that fostered competition and efficiency, yet also provided the means to link various markets so that customers could obtain the best execution for their equity orders. The creation of a National Market System has been the motivation for a number of important SEC actions over the years.

The important immediate outcome of the 1975 Act was the creation of the consolidated quote and tape system for distribution of last sales data and of the best bids and offers from each national securities exchange. The consolidated quote system contains the best bid and offer in each stock from each securities exchange[2] and selects from among them that quote with the highest-priced bid/lowest-priced offer in the largest size, received first, and broadcasts that quote as the National Best Bid and Offer (NBBO) or "inside market" in that stock.[3] The consolidated quote is public, repackaged, and widely available from a number of vendors.

Last sales data is distributed as the consolidated tape. All trades executed within normal trading hours, whether on a dark or lit market, are required to be posted to the consolidated tape within 90 seconds of execution. Effectively, the trades are reported with no delay, as markets post the orders to the tape immediately upon execution. Each trade reported to the tape consists of the stock, size of the print, time stamp of execution, and the identity of the market posting the print. There is a degree of opacity, however, between trades executed on exchanges and trades executed on other markets, whether that market is lit or dark. Trades executed on exchanges are uniquely identified by virtue of their exchange ID on the print. Trades completed on other markets, however, are submitted to a trade reporting facility (TRF), with the identity of the latter rather than the former appearing on the consolidated tape. As many markets report trades to a single TRF, the identity of the market executing the trade is lost on the consolidated tape.[4]

The consolidated quote and tape system form the backbone of public dissemination of equity market data within the United States.

The second SEC act of interest is Regulation ATS (Reg ATS), promulgated in 1998. Reg ATS governs the regulation of non-exchange markets. It came about in response to the large number of lit electronic communication networks (ECNs) then springing up as a result of changes NASDAQ made in how its stocks were traded. Reg ATS provides the framework for new equity execution markets to begin operation without the overhead of becoming a national securities exchange.[5] ATSs are given considerable freedom to develop new equity markets. For instance, they are allowed to restrict membership to their markets (e.g., they may offer membership to only buy-side firms and not broker/dealers, or vice versa), and they may have different pricing plans for different groups of participants. Two rules within Reg ATS are of particular interest to us: the quote rule and the fair access rule. Both force an ATS to participate in the National Market System when its percentage of traded volume exceeds a threshold.

The quote rule requires that any ATS executing more than 5% of the volume in any stock must publish its best-priced orders in that stock to the consolidated quote system. However, there is an important caveat directly applicable to dark pools. The quote rule only applies if the ATS distributes its orders to more than one participant. Hence, if a dark pool does not provide information about its orders to any participant, then it is exempt from the quote rule, regardless of the volume it executes in any stock. As we shall see, the definition of "information about its orders" is about to undergo a change that will impact those dark pools that use a certain type of Indication of Interest (IOI).

The second element, the fair access rule, requires that any ATS achieving the same volume threshold as the quote rule (5% of traded volume) must provide fair access to its market for all participants. There are no exceptions to this rule. For example, an ATS that operates for the buy side only, if it surpasses the volume threshold, would then be required to provide fair access to its market to broker/dealers. The importance of Regulation ATS is that no ATS can get too big without becoming in some manner part of the National Market System.

The third and most recent SEC action is the most significant. It is the adoption of Regulation National Market System (Reg NMS) in the fall of 2007. Reg NMS established, for the first time, uniform execution rules applicable to all securities exchanges and ATSs. These uniform execution rules strongly favored markets operating computerized matching engines (as opposed to floor-based markets). It did so through the adoption of a limit order protection rule[6] stating that only those orders immediately and automatically accessible via an Immediate or Cancel (IOC) Order (without manual intervention) will be protected from being traded through. The limit order protection rule facilitated the initiation and development of new markets. One only needs to implement a computerized matching engine to open a new market. The rule provided the impetus for the technology arms race now under way in the world of equity executions. Markets strove to be the fastest in receiving and matching orders; participants strove to be the fastest at getting orders to markets. Together, Reg NMS and Reg ATS provided the framework within which dark pools have proliferated in the past few years.

The SEC uses three guiding principles in developing the National Market System. They are *fairness*, *efficiency*, and *transparency*. It is useful to keep these objectives in mind when evaluating rules proposed by the SEC. We shall have occasion to revisit these principles when we examine the SEC's proposed rules on dark pools in the final section of this article.

Lit Markets

A market is lit if it distributes its best-priced bid and offer (so-called top-of-book quote) to the consolidated tape and dark if it does not. By definition, all national securities exchanges are lit markets. All ATSs that are ECNs are lit markets, even though most do not exceed the 5% threshold defined by Reg ATS as the level at which they must publish their quotes to the consolidated quote system.

Note that even though lit markets distribute their top-of-book quote to the consolidated quote system, many of them have elements of dark liquidity. For example, many lit markets offer reserve or iceberg orders that do not display the hidden portion of the order to the consolidated quote. Lit markets also offer non-displayed order types in which no portion of the order is visible to members of their market or to the consolidated quote system. Estimates of the dark component of lit market liquidity are in the range of 5% of consolidated volume.

Dark Markets

A market is dark if it is not lit. While precise, this simple definition does not describe the wide range of today's dark pools. Some are block-oriented pools requiring a minimum trade size; some are for buy-side firms only; some use indications of interest (IOIs) to signal to select market participants (or other dark pools) that they have a live and actionable order in their system. If the IOI contains enough information for the recipient to deduce that he can execute an order in response to receipt of the IOI, then it is called an "actionable IOI." Actionable IOIs will play a role later when we review proposed SEC actions.

We now have a framework within which to analyze dark pools. They operate as ATSs, whether lit or dark, and face requirements to participate in the National Market System once their volume in any stock exceeds 5% of traded volume.

At the present time, there are about 30 dark pools in operation within the United States[7] executing in aggregate about 10% of consolidated volume. They are operated by broker/dealers, consortia, and independent firms. The number of lit exchanges and ECNs is about half that number, yet they account for 90% of traded volume. Why, one might ask, are there so many dark pools executing in aggregate so little volume? The answer to that lies in economics and sheds light into the business model of broker-sponsored dark pools.

Market Pricing and Economics

All lit equity markets now price on what is known as a "maker/taker" pricing model. Orders that rest upon a market's book constitute a firm bid to buy or offer to sell a stock. These resting, or posted orders, in aggregate across all markets, determine the inside market in a stock and make the liquidity in the stock. When these orders are removed from the market via an execution, the firm that placed the resting order is paid a rebate by the market as a reward for establishing liquidity on its market. The order that removes—or "takes"—the posted order pays a fee to the market for the right to do so. In general, the fee to take liquidity exceeds the rebate paid for making or posting liquidity, with the spread being the amount per share that the market earns for crossing buy and sell interests.[8]

Maker/taker rates vary across the exchanges and ECNs, with a significant number of venues paying in the area of $0.002/share (20 mils) for a rebate and charging in the area of $0.003/share (30 mils) for taking liquidity. Some markets offer volume discounts. The difference between taking liquidity and providing it amounts to roughly half a penny per share ($0.005/share), and therein lies a clue as to why there are so many broker-sponsored dark pools. Equity trading commissions have compressed over the years, while the percentage of traded volume that is handled by computerized trading algorithms has increased. Trading algorithms are competitively priced, with many now sold in the range of a half penny. Algorithms are priced, then, at a rate that approximately equals the difference between maker and taker fees on lit markets.

If an algorithm needs to remove liquidity, rather than post for it, the cost difference in doing so may equal the gross revenue on the trade. This creates an incentive to internalize flow arising from these low-priced trading algorithms, thereby avoiding the cost of a market execution and improving margins on the trade. A convenient way to internalize order flow is to run a dark pool.

Most dark pools do not operate on a maker/taker model but rather charge both sides of the trade a transaction fee, which may depend upon a number of factors (e.g., volume discounts) and on the nature of the customer. If the dark pool can attract outside flow, it achieves two goals: crossing the orders from its own trading algorithms, thereby avoiding lit market fees, and obtaining potentially fee-paying flow on the opposite side of the trade.

In addition to the revenue from executing trades, markets also receive revenue for quotes that establish the inside market in a stock and for transaction reports completed on their markets and reported to the consolidated tape. Dark pools do not provide quotes to the consolidated tape, so they do not participate in the revenue stream for quote data. However, most are paid some amount by the TRFs for the prints that they publish on the TRF. This represents an additional source of revenue from running a dark pool.

We now have explained why it is attractive, economically, for a broker with substantial order flow to operate a dark pool. With this information, let's now turn our attention to how to use these markets.

AN INTRODUCTORY USER GUIDE TO DARK AND LIT MARKETS

Given our understanding of the regulatory and economic basis of dark and lit markets, the issue at hand now is, "How does one use these markets in executing orders?" Let's start with the conventional notion of when to use lit vs. dark markets.

The original concept behind dark pools is that certain orders, oversized to average trading volume (ADV) or orders of any size in illiquid or smaller capitalization names, cannot be worked efficiently in the lit markets. The reasoning is a variant of the law of supply and demand. If you are trying to sell an unusually large amount of an illiquid stock, then buyers who are aware of your intent will lower their bids in recognition of the impact your large "supply" will have on the market for the stock. Hence, portfolio managers desire to mask or hide their interest in buying and selling illiquid stocks and in working oversized orders. Dark pools respond to this need by offering the ability to work orders without posting bids and offers, thereby hiding your intent from the broader trading world.

Let's look at this situation in more detail. Though your order may not be viewable to the outside world, the outside world does know that your order, if executable, is priced within the bounds defined by the NBBO. This is important: dark liquidity, if available, is at a price defined by the lit markets.

The fact that dark liquidity is priced off of lit liquidity does present a potential problem in using dark pools. If one places a buy order in a dark pool because the stock is illiquid, it follows that the consolidated quote will also be thin. That is, there will not be a large number of bids and offers from various markets at the inside; the spread between the bid and the offer is probably large; and there may not be many quotes in the market at prices away from the inside. Let's suppose, as is often the case, that the dark pool in which your order is placed executes orders at the midpoint of the spread. A predatory trader could detect the presence of your buy order by sending in a small sell order to the dark pool where your order lies. That small sell order executes against your standing buy order. Having determined the presence of your buy order in the dark pool, the predatory trader then turns about face and takes out the offer plus perhaps one or two price levels above the offer in the lit markets. This will not entail buying that much stock, as the lit market quotes are thin. At this point, the spread in the stock has widened considerably, and the predatory trader now returns to the dark pool and sells considerably more stock to you at the now-upwardly-displaced midpoint of the spread. This "gaming" scenario plays out daily in the markets. How does one protect against this?

Many pools provide anti-gaming logic, but the buy side can implement its own anti-gaming logic. One way is to specify a minimum fill size for your orders placed in a dark pool. This prevents many predatory traders from discovering your order, as they will not wish to sell a large quantity in order to detect the presence of your buy order. In addition, one can use an algorithm to control orders placed in a dark pool. This algorithm controls the limit price of your order and does not move it unless a certain amount of volume trades. This prevents you from moving your order up in response to a gaming technique such as described above, as the predatory trader will not execute in size to affect his scheme. Another technique uses relative movements. If your stock is a member of a sector for which there is an associated exchange-traded fund (ETF), then one can also anchor movements in your limit price to movements in the sector. This prevents your limit price from moving unless the movement in the stock is part of a broader, sector-wide movement. In any event, it should be apparent that working an order in an illiquid name is not as simple as just placing the order into a dark pool and forgetting about it.

Another item that needs to be taken into consideration when using dark pools is the average trade size. In the broker-sponsored pools, where most of the dark executions take place, the average trade size is approximately the same as for lit markets—a few hundred shares per execution.[9] This underscores that broker-sponsored dark pools are primarily used for internalization of order flow, most likely from the broker's own algorithms as noted above. If so, then the flow executed in these dark pools closely mirrors that executed in the lit markets.

If, in practice, most dark pools are akin to lit pools, then how does one use both? An advantageous way to use these pools is from the vantage point of market fragmentation. Both lit and dark pools represent markets from which to remove liquidity and to which to post liquidity. One adopts an agnostic point of view and simply removes liquidity wherever it can be found and posts it wherever one finds that it is being removed. This is best done on the liquidity-removing side with a smart order router (SOR) that simultaneously accesses both lit and dark pools. Most SORs now offer this capability, plus the ability to restrict searches to only one type of pool or the other.

When posting for liquidity, the challenge is always to have an order in the market where liquidity is currently being accessed. The trader must be prepared to post at multiple venues in order to have orders where liquidity is being accessed. Statistical techniques may be used to improve the placement of orders. Posted orders can also be shifted in real time from markets not being accessed to those that are. And to avoid signaling, the trader may always post non-displayed orders on lit markets.

Does it ever make sense to use only lit markets? Only dark markets? If one has a small order size in a heavily traded and thickly quoted stock, then there is minimal signaling created by posting one's order on a lit market. As noted above, it is more the case of carefully placing the order rather than any impact from signaling. If one has a large size order in an illiquid name, then it may be appropriate to place some liquidity in block-oriented systems and some in other systems. One can use dark liquidity to avoid the signaling created by displayed orders, but one then has the responsibility to monitor the lit markets to ensure your order is not being gamed.

In summary, the distinction between lit and dark markets is not as wide as their names suggest. Just as technology has made possible the proliferation of dark and lit pools, the buy side needs to respond with technology in order to effectively trade in this environment. That technology response includes systems that respond to market fragmentation and that protect orders in illiquid names from being gamed.

WHAT LIES AHEAD

Substantial changes have taken place in the U.S. equity markets over the past few years. Traders and markets immediately recognized the impact of the Limit Order Protection Rule, which initiated an arms race in execution technology. Markets worked to reduce the time it took to receive and match an order, aiming to attract increased business by processing orders faster. Traders worked to reduce the interval required to place orders at markets. Being faster than another participant could make the difference in accessing liquidity at a favorable price. It can also mean that one is the first to post a bid or an offer at a price, thereby making one's order the first accessed via a liquidity-removing order and first to be paid a rebate.

Brokers rolled out an ever-increasing number of dark pools, and the volume traded in dark pools grew significantly. The SEC has historically examined any phenomenon in the equity markets once that movement represents a significant percentage of trading volume. As it did with the proliferation of ECNs and Regulation ATS, the SEC recently proposed a number of rules and amendments intended to draw the world of dark pools into the National Market System. This section reviews these proposals.

In October of 2009, the SEC released for comment a series of changes aimed at "non-public trading interest in National Market System stocks."[10] These proposals, to varying degrees, would shed light on dark pools.

There are three major elements in the proposed rules. For one, the SEC takes aim at actionable IOIs, those messages that dark pools send to selected market participants and other dark pools that are an inducement to trade with the sending market. The SEC contends that these messages are tantamount to a transmittal of a quote, as they convey sufficient information for the recipient to trade based on the information sent.[11] The SEC proposes to augment the definition of bid and offer to include that of an actionable IOI. There is, however, an important exception. In deference to those customers who wish to execute large blocks anonymously, the SEC proposes to exempt from the quote rule those actionable IOIs that represent a dollar volume of stock exceeding $200,000. This exclusion only applies if the actionable IOI is sent to those participants who are "reasonably believed" to represent contra-side trading interest of at least $200,000. The motivation for extending the definition of bid and offer to encompass IOIs stems from the desire to avoid a two-tiered market in which selected market participants are provided with information about executable liquidity while others are not. Thus, from the SEC's point of view, the proposed rule directly addresses an issue of fairness and transparency in the National Market System.

The second proposed change modifies the quote rule of Regulation ATS. Recall from the regulatory discussion above that an ATS which executes 5% or more of the consolidated volume in a stock is required to submit its best-priced bids and offers to the consolidated tape—if that ATS distributes its quote to more than one market participant.[12] The SEC is proposing to reduce this percentage from 5% to 0.25%, a reduction of 95%. This rule appears to directly address the existence of a large group of dark pools, each executing a small percentage of volume but executing in aggregate approximately 10% of consolidated volume.

Those dark pools that do not use actionable IOIs or publish quotes are not affected by the first two proposals. This is not the case for the third proposal. The last proposal requires all ATSs to identify their transactions to the consolidated tape. Currently, ATSs report their trades to one of the TRFs. The TRFs report all transactions not executed on exchanges; hence, TRF prints come from lit ECNs, dark pools, upstairs trading desks, and privately negotiated transactions.[13] Use of the TRFs masks where trading activity takes place, as there are many sources submitting trades to one TRF. This proposed rule would provide real-time identification of all trades executed on exchanges *and* ATSs. Thus all ATSs, whether dark or lit, would provide real-time, post-trade reporting that identifies their market when submitting prints to the consolidated tape.

What is the likely impact of these proposed changes on the operation of the U.S. equity markets? Let's take up the last rule proposal first, as it affects all ATSs, whether dark or lit. Publishing the identity of where trades take place in real time for all markets aids smart-order routers in identifying where to route orders to access liquidity. It is likely to add fuel to the speed race under way in the equity execution market. The first two proposals may have limited impact. Markets that use actionable IOIs may cease to use them or direct them to only one participant at a time. Sidestepping actionable IOIs also removes the quoting responsibility of the second proposal.

Beyond these proposed rule changes, the SEC published a concept release in January 2010 addressing a broad swath of topics arising from the computerization of equity trading markets. High-frequency trading, for example, generates more press than dark pools, and some question whether the use of sophisticated technology, in effect, creates a two-tiered market between those participants that are able to commit the resources necessary to stay abreast of technology enhancements and those that are not. The concept release asks for comments on this issue along with a wide range of topics on equity market structure. The concept release is available at http://sec.gov/rules/concept/2010/34-61358.pdf.

CONCLUSION

Lit and dark markets share more characteristics than their names indicate. The computerization of the U.S. equity markets and the common regulatory umbrella provided by Reg ATS and Reg NMS create a situation in which both types of markets provide liquidity that is more alike than one would expect.

In both lit and dark markets, the technology arms race has created potential pitfalls for the buy-side trader. The emergence of predatory traders using high-speed trading technology has created an environment in which markets move quickly, trapping orders pegged to market movement in adverse executions. The buy side must respond in kind, using technology to more carefully manage the placement and adjustment of their orders. Just as technology has created this environment, the buy side must arm itself with technology in order to effectively trade in this evolving market.

ENDNOTES

[1]We use the term "pool" and "market" interchangeably. We refer to orders on dark and lit pools as representing dark and lit liquidity, respectively.

[2]National securities exchanges are required to submit their best bid and offer to the consolidated quote system. Subsequently, the consolidated quote system was augmented by the inclusion of FINRA's Alternative Display Facility (ADF), which ATSs may use to publish their quotes to the consolidated quote system. The ADF is a display-only facility and does not offer trade executions.

[3]The consolidated quote broadcasts not only the inside market as defined here but also the inside market quote from each exchange. Thus, embedded in the consolidated quote are all top-of-book quotes from each exchange.

[4]However, the SEC is proposing to change this. See the final section of this article.

[5]In particular, an ATS registers with the SEC as a broker/dealer rather than a national securities exchange.

[6]More commonly known as a trade-through rule.

[7]The SEC reported that there were 29 dark pools in operation in the second quarter of 2009, based on forms submitted to the agency.

[8]Some markets have inverted the maker/taker model as a means to generate market share gains. These have tended to be time-limited offerings or limited to stocks listed on markets that have low trading volume. There are also some markets where the maker rebate and the taker fee are the same amount.

[9]The block-oriented pools have a larger average execution size but represent a small percentage of overall consolidated volume. Some estimates place their share of volume at around 1%.

[10]These proposed changes are out for comment until February 22, 2010, at which time the SEC will incorporate appropriate changes and, if it decides to move ahead, announce a date at which the proposed regulations take effect.

[11]In particular, the SEC calls an IOI actionable if it conveys, implicitly or explicitly, the following information about the interest of the sender: symbol, side, price equal to or better than the inside market, and a size of at least one round lot.

[12]Note that by the first proposed rule change, this rule would also apply to those ATSs that distribute actionable IOIs to more than one participant.

[13]About 40% of consolidated volume is reported to TRFs.

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