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Dark Algorithms Solving Fragmentation Issues

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The reports are in: Buy-side firms have conquered their fear of the dark and are diving into dark pools of liquidity armed with a new battery of algorithms from their brokers.

Although there always has been some degree of hidden liquidity in the marketplace -- in the form of reserve or resting orders on ECNs, for example -- the phenomenon of tapping dark pools to try to find hidden order flow is now a major factor in decision-making on buy-side trading desks. A survey published in December 2006 by Financial Insights noted that in the space of a year, the percentage of firms using algorithms to access dark pools had risen to 60 percent, up from 32.5 percent the previous year.

Meanwhile, use of public exchanges, such as the New York Stock Exchange (NYSE) and Nasdaq, as well as traditional crossing networks, has declined. And while none of the dark networks has crossed the regulatory threshold requiring any trading environment accumulating more than 5 percent of U.S. equity volume to publish quotes to the public market, dark pools have become a significant enough destination that brokers now are investing considerable resources in either building their own, creating algorithms explicitly to reach multiple dark pools or both.

Goldman Sachs, for example, is in the process of reengineering its entire algorithmic suite to support dark-pool navigation. By the end of this summer, Goldman's volume-weighted average price (VWAP), participation, portfolio-trading and implementation-shortfall strategies will be dark-pool-compliant, along with Sonar, the liquidity-seeking algorithm that already accesses dark pools, according to Douglas Borden, head of the U.S. algorithmic trading desk and algorithm development at Goldman Sachs.

Accessing Dark Liquidity

"Clients are getting more comfortable with the liquidity that is available," says Borden. "The buy side's initial concerns about information leakage have been resolved, as most platforms have built in some sort of protection against gaming. The bigger question now is whether the dark liquidity is accessible."

Goldman's reengineering of its existing algorithms, as well as the deployment of Sonar, involves applying the methodology of a liquidity-seeking algorithm -- which is intended to mimic the investigative behavior of traders on the desk -- to the objectives of the existing strategies. For example, in a VWAP algorithm, the expected volume profile for a stock is assumed, given historical data, and a trading schedule is established. The order generally is traded in very small lots across multiple venues to sample the greatest range of offers, as well as to achieve greater anonymity.

If there is a need to use dark liquidity, the algorithm must collect statistics about how much liquidity is available in each dark book. Unlike in the public markets, real-time data and quote advertisements are not available, so a small, experimental trade must be conducted. If an execution occurs, it is usually safe to assume there may be more interest behind the trial order.

"You assume a certain number of executions in those venues and route some of your child orders to some of the dark pools," Borden explains. "As the trade goes on, you need to update how many fills you are getting to stay on the trading schedule."

To aid in the battle, and to enter the burgeoning market, Goldman Sachs has created SIGMA X, an internal dark pool, as a companion to Sonar. SIGMA X recently crossed 100 million shares in a day, says Borden.

Clients tend to enter SIGMA X in one of two ways: as a first stop on the way to the public market for market orders and marketable limit orders, and as a possible destination for limit orders, according to Borden.

For orders that require immediate execution, Goldman first passes the orders through SIGMA X and then on to the public markets if they cannot be filled completely in the dark pool. For limit orders -- whose limitation is a certain price and/or time threshold in the market beyond which trading is to be terminated -- the best price is sought methodically in all pools, dark and public, with no preference given to SIGMA X, says Borden. He estimates that about 10 percent of Goldman's total executions in U.S. equities occurs in dark pools.

The plan is similar at Banc of America Securities, which is planning the launch of FUSOR, an algorithm that searches all available venues for liquidity using a conceptually similar method to Goldman's: Dark venues are "pinged" with small experimental orders before the algorithm goes in for the kill. The idea is less to make a big noise about dark pools than it is to obfuscate the differences between liquidity pools and make the trading experience seamless, explains Bill Harts, managing director, Banc of America Securities (BAS).

"For the investor, it should not be about, 'I want to access Posit or Pipeline -- how do I achieve that?' It's about, 'Where can I find liquidity?'" says Harts. He notes that FUSOR stores the results of its pings in a real-time database so that comparisons among dark and public venues are correlated.

Not to be outdone, EdgeTrade's FAN algorithm aggressively looks for liquidity in public and dark markets simultaneously, which requires an acrobatic ability to instantly withdraw orders from one venue and send them to another, says Kyle Zasky, the agency broker's president. In a move that seems to be indicative of clients' interest in dark pools, the firm also has released Covert, a dark-only algorithm.

"We now connect to every dark pool that allows us to -- every three or four weeks a new one signs us up," Zasky relates. "Each one has a different business model; some use resting orders, some IOC [immediate-or-cancel], some use make-or-take rebates. Managing each of them is quite complicated." Another management issue that must be built into the logic of Covert is the billing scheme of each dark pool -- Zasky says EdgeTrade has at least four billing models to accommodate clients who would prefer a range of payment options, from a single flat rate to an itemized list of each venue the algorithm accessed.

Keeping Algos in the Family

Some firms prefer to play more conservatively in their exposure to dark pools. Rather than run an exploratory algorithm through the dark universe, Bank of New York's ConvergEx unit runs all dark-pool algorithmic interactions through its own dark pool, VortEx, rather than pass customer orders on to other venues.

"In VortEx, we have made a conscious decision not to pass orders out. So if anyone wants to participate, they are coming in because we are so concerned about information leakage," says Carey Pack, president of BNY Brokerage. Operators of other dark pools must send either an indication of interest (IOI) from vetted liquidity providers offering a firm quote or an IOC order that will expire if there is no fill on VortEx, he explains. Apparently, the "let them come to us" approach is working for ConvergEx, which handles about 30 percent of the firm's algorithmic order flow, or about 16 million to 17 million shares per day.

But EdgeTrade's Zasky, whose firm does not operate a dark pool, takes issue with any approach that channels client orders through an internal dark pool, whether the firm is acting as an agency brokerage or as a principal trading outfit. "Having your own dark pool removes the agnostic philosophy," Zasky contends. "Even if their algorithm does not find liquidity internally and they go out to another venue -- they will try to do it internally first -- it might seem benign, but it is an inherent conflict of interest." At the very least, even if nothing nefarious is happening in the dark pool, precious time is being lost in the search for the best price if by default an algorithm looks first at its creator's dark pool, Zasky stresses.

The other algorithm providers disagree. "The delay that comes from the policy of first sending orders to a firm's own dark pool and then on to the others is negligible," says BAS' Harts. "There are delays inherent in the trading software at any firm. If someone argues that you waste 5 milliseconds in your broker's dark pool by running through that first -- that same 5 milliseconds could also be eaten up by a FIX connection or something you don't have control over at all -- so I would minimize that argument. Why not at least try first?"

Goldman Sachs' Borden says his firm limits the number of venues it will attempt to access to those that are performing best according to the algorithm's logic, and users can manually opt out of accessing select platforms, including SIGMA X, thereby cutting into the argument that firms running algorithms through their own dark pools are disadvantaging customers.

An Open Universe

Instinet's Nighthawk has similar features, allowing customers to select or deselect certain venues. But the feature is not used frequently, according to Mike Plunkett, president of Instinet North America. "Some are concerned about the pools represented by brokers that can trade for their own account," he says. "But in the end most will take their chances anyway."

One of Nighthawk's users, Joe Gudorf, head trader at Principal Global Investors in Des Moines, Iowa, agrees with this point of view. "If there is reason to doubt the sanctity of your dark pool, your dark pool will dry up," he comments.

On the issue of brokers sending orders to their own pools first by default, Gudorf recognizes that being second in line at the next dark pool is "a cost of doing business." He points out that "if you are really finding value in that second or third dark pool, then you should really be dealing with that broker directly."

According to Gudorf, Principal has about $214 billion under management, with about $60 billion in equities, and sends between 10 percent and 20 percent of its U.S. equity flow through algorithms, which hit both dark and public venues. He says he uses Nighthawk in addition to UBS' TAP, ITG's Dark and Lehman Brothers' Hydra.

These algorithms in particular have what Gudorf calls a "fourth-generation" level of intelligence, meaning that they reflect a level of development that makes them competitive with human traders. They act with a certain intuition about the length of time that should be spent continuing to execute shares in a venue before the executions start tipping off competitors, he explains. There still are a number of "stupid" algorithms in the market that chase volume but get stuck in underperforming venues and give themselves away, Gudorf adds.

Active user management, Gudorf continues, ensures that the smarter algorithms do not overreact to the available liquidity in any one pool. "You tweak the settings to protect yourself from market movements outside your control," he says. "I want to blame it on the algorithm when I see things like that, because if it is a human trader doing that, I'd be really embarrassed for them."

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