An edited version of this article appeared in the London Review of Books (www.lrb.co.uk), Vol. 37, No 11, 4 June 2015, pp. 29-32.

Dark Markets

Donald MacKenzie

'Dark pool' – the very name sometimes seems to suggest murkiness, perhaps nefariousness. For most of their history (they've been around for nearly thirty years), dark pools attracted little attention, but that has changed fast in the last couple of years. They are private, electronic share-trading venues in which a participant can bid to buy shares or offer to sell them, without those bids or offers being visible to the market at large.

Two things have thrust these normally low-profile trading venues into the public limelight. The first is simply the negative, even dramatic, connotations of the name, which resonate with a widespread sense that financial markets are opaque, at least to outsiders. Those connotations are why, for example, the *Wall Street Journal* reporter Scott Patterson called his recent book on automated trading *Dark Pools*, even though it isn't really about them.[1]

The second was the announcement on 25 June by Eric Schneiderman, Attorney General of New York state, that he was filing a securities fraud complaint against Barclays Bank. At his press conference, Schneiderman said that dark pools such as Barclays' purport to protect 'institutional investors such as mutual funds and pension funds holding the savings of millions of New Yorkers' from 'the

[1] *Dark Pools: High Speed Traders, A.I. Bandits, and the Threat to the Global Finance System*. Crown, 2012.

predatory high-frequency trading tactics that are seen on public exchanges'. (High-frequency trading, or HFT, is the fast, entirely automated trading of large numbers of shares or other financial instruments, and Schneiderman is an outspoken critic of it.) In actuality, Schneiderman alleged, there was 'no protection for any ordinary investor' in Barclays' dark pool, which was 'full of predators who were there at Barclays' invitation'. Schneiderman is said also to have launched investigations of the dark pools run by Credit Suisse, Deutsche Bank, Goldman Sachs, Morgan Stanley and UBS. (As noted below, Barclays denies any wrongdoing; the other banks have not been accused of any.)

There's something of a tradition of New York's Attorneys General not being content to leave the policing of financial markets to Federal bodies such as the SEC, the Securities and Exchange Commission. Schneiderman's most high-profile predecessor in this respect was Eliot Spitzer, who was elected Attorney General in 1998 and went on successfully to run for Governor of New York state in 2006. Spitzer was even being talked about as a future Democratic candidate for President before his political career was derailed in 2008 after the *New York Times* revealed his use of prostitutes.

As Attorney General, Spitzer deployed against Wall Street an old, largely forgotten, legal weapon, now being invoked against Barclays by Schneiderman: New York's 1921 securities fraud law, the Martin Act. Prosecutors in the UK, or in the other states of the US, could be forgiven for feeling envious: an article by Aaron Tidman in the *Syracuse Law Review* describes the Martin Act as giving New York's Attorney General 'awesome power'. It grants him or her wide-ranging authority to subpoena documents, does not require proof of scienter

(knowingly fraudulent intent), and it seems as if the Attorney General may not even need to show that losses were caused. Nicholas Thompson, writing in *Legal Affairs* in 2004, reported that those questioned under the Martin Act have no automatic right to have their lawyer present (one lawyer told him that the Attorney General's office made it clear 'that you don't have a right to be there and you were there at their pleasure') and lost the normal Fifth Amendment right not to incriminate themselves. In the years before Spitzer turned to the Martin Act, these draconian powers had mainly been used against small-time fraudsters. Indeed, there was, said Thompson, 'an unspoken gentleman's agreement' that it should not be used against major financial institutions, such as those that run dark pools.

To understand why dark pools were originally set up, in the US in the late 1980s, it's helpful to know a bit about the main trading venue to which they were an alternative, the New York Stock Exchange or NYSE. Its role as the US's prime stock exchange was signalled by its location in the heart of Manhattan's financial district, and by its main building, a New York landmark. Completed in 1903, the building is fronted by Corinthian columns topped by a huge sculpted pediment, 'Integrity Protecting the Works of Man', designed by John Quincy Adams Ward.

Suppose you were a portfolio manager at an institutional investment firm in the 1980s who wanted to buy a large block of the shares of a corporation traded on the NYSE. You, or (if the firm was a large one) a trader working on your behalf, would typically phone up an investment bank or other 'broker-dealer' firm that was a member of the NYSE. There were essentially three things that the broker-dealer could do with your order. First, so long as the order was not too big, it

could submit it electronically to the NYSE. It would then arrive at a trading post in one of the five large rooms that made up the NYSE trading floor. There, the order generally stopped being handled entirely automatically. Each stock traded on the NYSE had a 'specialist'. He (they were nearly all men) was both an auctioneer and a trader on his or his firm's own account. If his 'book' (his list of orders that had not yet been executed) contained offers to sell a corresponding number of shares at a price that matched that of the incoming buy order, he or his clerk could execute the latter against them, charging a commission for doing so. If that wasn't the case, the specialist could trade on his own account, himself selling the shares being bid for; or he could put the incoming order into the book for future execution. Only he and his clerks could see the full book, which was a valuable, private source of information.

The second thing that a broker-dealer firm could do with an institutional investor's order was to telephone its booth on the NYSE trading floor, whose staff would in their turn page a 'floor broker', usually one employed by the firm. After receiving the order via one of the many yellow telephones in the five trading rooms, the broker would then walk over to the specialist responsible for trading the shares in question.

If there already was a crowd of other brokers surrounding the specialist, bidding to buy shares and/or offering to sell them, the broker could join the action. If there wasn't, the broker could simply leave the order for the specialist to execute, but instead would often have a brief chat with him. Two sociologists of finance, Daniel Beunza and Yuval Millo, witnessed some of these conversations in 2003, at which point the way of life in the NYSE trading rooms had still not fully

succumbed to automation. In a paper posted on the website SSRN.com, they describe following a floor broker around, noticing 'how he addressed, backslapped and saluted with nicknames the people he met on his way. Everyone on the floor was Johnny, Jimmy or Bobby; there were no Johns, James or Roberts.' It wasn't just masculine clubbability: good personal relations mattered economically. Beunza and Millo watched another broker, who had an order to buy a large quantity of shares, ask the relevant specialist about the book. 'I think it's a little heavy', replied the specialist: there were lots of existing bids to buy, so the broker might do better by his firm's customer if he held on to his order until a little later.

The third thing that a broker-dealer firm could have done with a large order from an institutional investor was to pass it not to a floor broker but to one of its 'upstairs' brokers (they were called that because their offices were often on the higher floors of the NYSE's buildings). An upstairs broker's job was to keep in regular touch with institutional investors or other big market participants who might wish to buy or sell the shares for which he was responsible. When he received a customer buy order, he would then phone up his contacts in other firms, or use a private computer network, AutEx, and discreetly seek out an institutional investor or broker-dealer firm that might be prepared to sell the shares in question. If he successfully executed the order in this way, it would never circulate on the trading floor.

Given the vogue in the last couple of decades for automation, it's worth noting that the NYSE's interpersonal way of trading shares had its virtues. If a customer needed to sell a block of shares in difficult, volatile market conditions, a skilled

broker could reduce what's called 'market impact': the tendency to drive prices down while executing the sale. An experienced specialist could keep trading going in an orderly fashion through temporary panics or frenzies. One specialist told Beunza and Millo how he practised 'crowd control' when surrounded by floor brokers all frantically trying to sell shares on behalf of their customers, telling them 'okay, let's calm down, let's see if we can find some buyers, let's see what happens at various prices, let's talk this thing out, let's do business'.

Crucially, too, brokers on the NYSE trading floor could exercise human judgement in the face of bizarre price movements. On 6 May 2010, the new world of automated share trading suffered its first generalised crisis, the so-called 'flash crash'.[2] As prices fluctuated wildly, many electronic traders simply stopped trading, switching off their automated systems. The NYSE reverted to manual trading. Although the latter was in decline, and three of the five NYSE trading rooms had already shut, enough of the old way of life was left, Beunza and Millo report, to stop shares trading on the NYSE, as they did on exclusively electronic venues, at plainly absurd computer-generated prices of a single cent or $99,999.99.

Set against these advantages of the way the NYSE traded shares were a number of disadvantages, especially from the viewpoint of an institutional investor who wanted to trade a large number of shares without making his or her intentions known. All this interpersonal interaction required skilled, experienced human beings, whose services were expensive, and some of those human beings had incentives to do things that hurt the institutional investor. A specialist might be

[2] John Lanchester wrote about the flash crash in the *LRB* of 23 May 2014.

tempted to 'front run' an incoming customer order (that is to profit from his knowledge of that order by trading ahead of it on his own account), or to 'interposition' himself, buying shares from one customer and selling them at a higher price to another, when he could and should simply have matched the two customer orders. Observing the NYSE trading floor in the early 1990s, an initially sceptical sociologist, Mitchel Abolafia, was eventually convinced that rules such as those against front running and interpositioning were generally abided by.[3] However, as commissions fell and the shift to pricing US shares in dollars and cents (rather than the traditional eighths of a dollar) reduced specialists' trading revenues, they increasingly turned opportunistic in the pursuit of profit. By 2003, there were only seven firms of specialists left on the NYSE, and in March 2004 five of those firms agreed to pay a total of $242 million to settle charges of front running and interpositioning.

Even in the late 1980s, institutional investors also worried about the 'upstairs' brokers. They handled very large orders, and the investment banks and other broker-dealer firms that employed them traded on their own account too. Stock market veteran Steve Wunsch reports that there were fears 'that the market was effectively rigged'. Upstairs brokers 'had more information' than their institutional-investor customers, says Wunsch, 'and were constantly accused of abuses of that privileged position'. They might, for example, curry favour with some customers by revealing others' trading intentions, and hope to be rewarded with future business. Even if there was no deliberate abuse, upstairs brokers' need to canvas other firms meant that buying or selling via them was

[3] *Making Markets: Opportunism and Restraint on Wall Street* (Harvard University Press, 1996).

'prone to information leakage', as an informant who had helped set up a dark pool put it to me.

It is not surprising, therefore, that there was interest in finding a way in which 'naturals' could trade directly with each other, rather than having to rely upon expensive and possibly self-interested intermediaries. (A 'natural' is the term for an institutional investor who wants to add a large block of shares to his or her portfolio or to sell a portion of that portfolio, in contrast to a professional trader who is looking simply to turn a short-term profit.) Sometimes a 'natural' who wanted to trade would simply telephone his or her counterparts in other institutional-investment firms, but you could do that only if you could trust those you spoke to not to take advantage of having learned that you were, for example, trying to buy a big block of IBM shares.

What is now regarded as the first dark pool was an anonymous service set up in the autumn of 1986 by Instinet, a firm that created computer-trading links among institutional investors. After the New York Stock Exchange and other public trading venues had closed, institutional-investor users of the new service, After Hours Cross, could submit anonymous bids to buy a corporation's shares or offers to sell them. The user simply entered the number of shares he or she wished to buy or sell: the price was always that day's closing price of the shares at the end of public trading. At 6.30 pm Eastern time, Instinet's computer systems would 'cross' those orders, matching as many bids and offers as possible.

A similar anonymous crossing service for 'naturals' called Posit (the 'Portfolio System for Institutional Trading') was launched in 1987 by the Investment Technology Group and a financial analysis company called Barra. Posit's four

daily crosses also matched buy and sell orders at the price that shares were trading at on the public markets, in its case at a randomly chosen moment during the seven-minute interval during which one could enter orders into its system. A later 'first generation' dark pool was Liquidnet, set up in 2001 by Seth Merrin, who was well known to US institutional investors because his original firm, Merrin Financial, had pioneered order management systems. These cut out the need to use the telephone to transmit orders, a process vulnerable to misunderstandings and mistakes. An investment manager would type into one of the new order management systems details of the shares he or she wanted to buy or sell, and the system would pass the order electronically to the firm's traders, who could then also use it to send orders on to the broker-dealer firms that executed those orders.

While the Instinet and Posit 'crosses' relied on institutional investors taking an active decision to use them, Liquidnet enjoys continuous electronic access to the digital 'blotters' of institutional investors' order management systems: these blotters contain lists of the orders for shares have not yet been executed. As someone who witnessed the creation of Liquidnet put it to me, 'because [Merrin] invented [order management systems], he had recognition and credibility with the institutional investors', many of whom already used Merrin Financial's products. Merrin was thus able to persuade increasing numbers of them to grant Liquidnet's system access to the highly sensitive contents of the blotters.

Whenever Liquidnet's system discovers that one institutional investor's blotter contains an order to buy IBM shares, for instance, and another's blotter an order to sell them, it invites the two traders to begin an anonymous, computerised

negotiation over the price. (Each of those orders also has to meet the minimum size of trade that the other trader will countenance, but neither trader is told anything about the size of deal the other is seeking, other than that it is at least as large as his or her minimum.) A window opens on each of the two traders' computer screens, with a range of possible prices between the price of the highest bid on the public markets and that of the lowest offer. If, using these windows, the two traders reach agreement over the price, Liquidnet's system tells them how many shares they have bought and sold (that number is simply the smaller of the sizes of transaction each trader was seeking). If both parties are genuinely keen on a deal, no real haggling over price is usually required. 'Most veterans that have been on the system for a while don't even negotiate', I was told: 'they just offer the mid [the midpoint of the range of prices in window]', and typically that is accepted straight away.

Dark pools such as Posit and Liquidnet made it possible for institutional investors to trade more cheaply than by using an investment bank as a broker, and sometimes very large deals were and are done using them: a bugle sounds in Liquidnet's New York office when a deal for a million shares or more is consummated. In 1998, the SEC, created a regulatory niche for dark pools with its Regulation ATS (Alternative Trading System).

However, a number of factors limited the extent of the take up of these first-generation dark pools. As I've said, their rationale was to facilitate trading among 'naturals', and so professional traders weren't allowed to take part. Sometimes, though, you just couldn't find via these dark pools another 'natural' who wanted to buy when you wanted to sell, or vice versa.

Furthermore, the relationships between institutional investors and the investment banks went deeper than the latter simply acting as the former's brokers. They were also influenced by what are known as 'soft dollars'. In return for investors doing their trading via the bank (at a higher cost than via a system such as Posit or Liquidnet), the bank provided them with the results of its stock market research, and sometimes with other benefits too, such as the normally very expensive Bloomberg terminals via which they could most easily access market data. (The excess cost of trading was 'soft' from the viewpoint of a firm managing pension or other savings funds because trading costs are charged to those funds, while if research or Bloomberg terminals had to be paid for explicitly it would have to be by using the management firm's own money.) The bank might also reward an institution for trading with it by being more active in marketing the institution's savings products to its retail customers, or it might allow the institution to buy shares in the eagerly sought, profitable IPOs (Initial Public Offerings) of the booming dotcom companies of the late 1990s.

Eliot Spitzer disrupted these interwoven relationships between institutional investors and investment banks. After the dotcom and telecom bubble burst in 2000-1, Spitzer deployed the Martin Act against investment bank analysts who had issued research reports boosting the shares of companies from which their firms were earning investment-banking revenues, shares that they may privately have believed to be dubious or worthless. The settlement Spitzer and the SEC negotiated with the banks forced greater separation between the arrangements by which institutional investors paid for research and for the execution of their orders to buy or sell shares. This separation, and the development of 'transaction

cost analysis', which enabled institutional investors to measure more accurately how much buying and selling shares was really costing them, focused greater attention on the cost of trading.

Simultaneously, cheaper, automated forms of trading were becoming available to institutional investors. As stock markets became more entirely electronic from the mid 1990s onwards, 'algorithmic' trading began to be possible. This involves taking a big order from an institutional investor, splitting it up into small parts and computerising the execution of those small orders. Alongside what began to be called 'high-touch' execution of orders by brokers, investment banks started also to offer their institutional-investor customers less expensive, 'low-touch', algorithmic execution, for example via Credit Suisse's Advanced Execution Services department, set up in 2001. Credit Suisse's algorithms didn't demand any technical knowledge on the part of institutional investors, who were provided with a simple computer interface. You would select the shares you wanted to trade, 'just type in "buy 100,000" … and it all gets worked on by the computer behind the scenes. You don't need to be a programmer.'

Another way of reducing the cost of trading was 'internalisation', in which an investment bank such as Credit Suisse matched buy and sell orders from its customers internally, without ever sending them out to the wider markets. This process was the antecedent of a second wave of dark pools set up by the big investment banks, many of which are now in Schneiderman's sights. As someone involved in creating one of these pools told me, internalisation 'had a nasty connotation in the US, because there was always a lot of gamesmanship … "did I get a fair price?", "did I not get a fair price?"' The process, however, could be

made more legitimate by turning the internal matching of orders into a dark pool governed by the SEC's Regulation ATS, even if initially little else changed: 'we could create an execution venue, a proper execution venue with a blessing of the SEC, and all of a sudden it wasn't internalisation anymore, it was crossing, right? It's identical process, identical flows; everything was the same except we had a machine do it instead of having people do it'.

Credit Suisse again took the lead, launching its Crossfinder dark pool in 2006. It was closely followed by Goldman Sachs's Sigma X and by similar offerings from other investment banks. Earlier dark pools usually didn't require users to enter a price; instead, they simply matched buy and sell orders in the middle of the price range prevailing on the public markets (as noted above, this was in practice what usually happened even on Liquidnet). The new wave of dark pools mimicked the electronic exchanges: you can enter into their order books bids to buy shares — or offers to sell them — at specific prices, and those orders are matched only when there's another order with a price that corresponds.

The new investment-bank dark pools also closely resemble electronic exchanges in their technology. There is no direct human involvement in the consummation of trades: bids to buy shares and offers to sell them are matched by a program running on a dark pool's computer systems. Although the pool's managers are in the investment bank's Manhattan headquarters, its computers are in one of the big data centres in northern New Jersey in which US shares are traded (or, in the case of European dark pools, in one of the data centres in and around London). Usually, the investment bank's algorithms executing its customers' orders run on servers in the same data centre as its pool, giving the algorithms fast access: 'my

smart order router can ping my own pool in sixty microseconds', one pool manager told me. (A microsecond is a millionth of a second.)

However, unlike on electronic exchanges (or 'lit' markets, as those exchanges are increasingly being called, to distinguish them from dark markets), the electronic order books of these dark pools are not visible to the traders and computerised trading systems that buy and sell shares on them. The new dark pools also differ from their predecessors in that they typically handle large numbers of small, algorithmically-generated orders, each for as few as a couple of hundred shares (or even fewer), while the original pools aimed to match much smaller numbers of far bigger, human-generated orders, for tens of thousands of shares or more. As I said above, those original pools typically excluded professional traders. In contrast, the new dark pools allow them to participate — including those who employ computerised high-frequency trading — and a bank's trading desks will also often trade in its own dark pool.

Volumes of trading on the new dark pools set up by investment banks quickly exceeded those on their predecessors. By the autumn of 2009, for example, Credit Suisse's Crossfinder was trading an average of over 140 million shares a day, and Goldman Sachs's Sigma X nearly 120 million, compared to around 30 million traded on Liquidnet. In 2008, only just over 4 percent of share trading in the US was in dark pools. By January 2014, that had climbed to nearly 15 percent.

There's a persistent fear, however, about dark pools, one that lies in the background of Schneiderman's allegations: that they aren't entirely dark. 'A lot of dark pools are different shades of grey' was how one trader for an institutional-investment firm put it to me: information leaks out of them. That information can

be used to infer one's future trading intentions, making that trading more difficult and more expensive. It's not a new issue. Even the early, simple 'crossing' systems could leak information. If, for example, you had submitted a buy order for IBM, and only a quarter of it had been 'crossed' with sell orders, you could infer that there was probably other unsatisfied interest in buying IBM, which could be useful information. If you knew the total volume of shares that had been crossed, you could easily work out just how big that unsatisfied interest was.

In the case of Liquidnet, the worry was that a participant might appear to be a 'natural', but might simply sit with apparent orders on his or her blotter, doing nothing in response to invitations from the system to negotiate, or else begin to negotiate but then 'fade', never agreeing a price. What you could learn by doing that wouldn't be entirely precise (the system blocks you from trying to find out the exact size of counterparties' orders by 'toggling' your minimum acceptable size up and down and discovering what happens when you do so), but again it could be exploitable information. In consequence, Liquidnet monitors the behaviour of firms that use it. As a source told me, it 'kick[s] members off the … network for using improper behaviour or not adhering to member community protocol. [O]ne thing that will kick you off is doing nothing … you're generating all these matches and you're not doing anything with them.' Another is repeatedly 'starting a negotiation but fading, not completing it.'

Fishing for information in this way is perfectly legal. An illegal form of market manipulation (if manipulative intent can be proved) relies on the fact that the price at which many dark pools cross bids to buys and offers to sell is tied to the prices prevailing in an underlying 'lit' market such as the NYSE or the London

Stock Exchange. What you can do is to enter bids or offers into the lit market that will temporarily change prices on it, and immediately enter an order into a dark pool that you hope will therefore transact at a favourable price. (The reason Posit and other dark pools that 'cross' orders at lit-market prices often randomise the exact time of the cross is to make this form of manipulation more difficult.)

There's something of a moral panic going on concerning high-frequency trading, fuelled in particular by Michael Lewis's *Flash Boys*, which leads critics to equate opportunistic behaviour in relation to dark pools with HFT. It's important to say, therefore, that HFT firms simply aren't allowed to join Liquidnet, and I would be surprised if a mainstream HFT firm practised market manipulation of the kind just described. Legally, it's far safer for a human being to manipulate a market (human intent is very hard to prove, unless someone has been stupid enough to describe their strategy in an email) than for a machine to do so. The problem with the latter is that you need to write a program to perform the manipulation, and that is dangerous evidence to have around.

Much of what the big HFTs actually do is 'market making': continually posting bids to buy shares and offers to sell them at a slightly higher price, hoping to earn the difference between the two prices. Those who run investment-bank dark pools – and indeed also those who run lit markets – love HFTs doing that. Dark pools and lit markets are all involved in a fierce competitive struggle with each other for market share (there's a 'market for markets'), and in recent years the pie has shrunk: overall volumes of stock trading in both the US and Europe

have been falling. So you badly want HFT market makers in your dark pool to help you in this struggle by providing keen prices.

Those who run dark pools are more ambivalent about 'aggressive' HFT. This isn't market making: it involves 'hitting' bids or 'lifting' offers that are already in the order book. An HFT system that does this may, for example, be closely monitoring conditions in the futures market, and inferring from these that share prices are about to rise or fall. Alternatively, a system may be receiving the fast datafeed direct from a lit market (perhaps one whose computers are in the same data centre), and be able to profit if the prices at which bids and offers are matched in a dark pool lag behind the fast feed.[4]

A practice that those who run dark pools often particularly dislike is an automated system continually 'pinging the book': endlessly sending in and then cancelling tiny bids and/or offers, in the hope of being able to infer potentially profitable information about the contents of the hidden order book. If, for example, your tiny offers of a particular stock suddenly begin always to be accepted straight away, it's a reasonable guess that there is a biggish buy order for that stock in the pool or an algorithm in the process of executing such an order. A broader rise in that stock's prices can then be anticipated. One dark pool manager described the process to me as follows:

> I ping it and send [a sell] order; I get a fill. There's something there. I do it a couple more times; there must be some size [a big buy order]. I take a guess: I don't know if it's ten thousand or a million shares. … [W]ith

[4] Donald MacKenzie wrote about HFTs' use of futures data and fast feeds in the LRB of 11 September.

> knowledge there's something there, I go into the public markets and I start lifting offers [i.e. buying shares]. Boom, boom, boom.

The more 'aggressive' forms of HFT create a dilemma for those who run the newer dark pools, most of whose business consists of achieving large numbers of matches between small bids and small offers. On the one hand, they can't realistically ban high-frequency trading completely (as the older pools are able to do). HFT market-makers are needed to ensure there are always orders in the order book for institutional investors' algorithms to execute against, and aggressive HFTs can help satisfy algorithms that seek to trade by placing their own orders into the book. On the other hand, dark pools also know that all their institutional-investor clients have concerns about information leakage, and even before the publication of *Flash Boys* many (though not all) of them worried that HFTs were predatory.

The solution to this dilemma that the dark pools run by investment banks have reached for is electronically to monitor the behaviour of participants in their pools, and to assure their institutional-investor customer base that they are doing so. The monitoring is of course computerised, and different investment banks do it in slightly different ways. The frequency of 'pinging' is checked, as is the extent to which a participant's trading consists of adding bids and offers to the order book as distinct from taking up bids and offers that are already there. However, the most important variable that is measured is a participant's short-term profitability (its 'alpha'), where short-term is indeed very short-term: the measurement interval is typically one second. What's monitored is what happens to the price of a stock in the second following every transaction by every

participant. If a computer program has bought shares, and the price goes up, that is positive alpha; similarly, if the program sells shares and the price goes down.

Egregious behaviour (hugely excessive pinging, or blatant efforts at manipulation) can get you expelled from an investment bank's dark pool, but such expulsions are rare: they're always preceded by admonitory telephone calls. Persistently high alpha – especially along with consistently taking up existing bids and offers, rather than adding your own – gets you electronically stigmatised. Dark pools divide participants into a number of categories, and one or more of those categories is labelled 'opportunistic', 'aggressive' or sometimes even 'predatory'. Participants in the pool can then electronically select whether to let their algorithms trade with all other participants, or whether to stop the dark pool's programs allowing an 'opportunist' to hit any of their algorithms' bids or lift any of their offers. By no means everyone goes for the more restrictive option – one dark pool manager told me that 'we have a lot of traders who say "I'm smarter than anybody else, I'll take whoever wants to trade with me"' – but some participants do choose to steer clear of those labelled opportunistic, and sometimes a pool's manager will advise them to do this if their trading seems consistently to lose them money.

The core of Schneiderman's charges against Barclays is the allegation that in order to boost the volume of trading in its dark pool it overrode the results of its computerised monitoring, not assigning an 'opportunist' label to participants (including, allegedly, some of its own trading teams) who should have been given that label. Schneiderman also alleges that Barclays claimed 'not [to] favor its own dark pool when routing client orders to trading venues, while in fact doing just

that'. These allegations are vigorously contested by Barclays, which denies any wrongdoing, challenging both the factual accuracy of the allegations and the applicability of the Martin Act.

It's worth noting that Schneiderman is not alleging that institutional investors lost money because their orders were executed in Barclays' dark pool. That takes us to a core question from the viewpoint of those whose pension or savings funds are being managed by an institutional-investment firm. Is the way the firm is doing its trading imposing unnecessary costs on those funds? You can't really tell; nor, so it would appear, can Schneiderman's team. Indeed, I'm told there are limitations on the extent to which even the firm's managers can work this out. They can get transaction cost reports from their broker-dealers, but there's no fully adequate public database to which they can turn for verification or more complete analysis.

Just such a database has been proposed by a man called Stéphane Tyč, whose firm McKay Brothers supplies high-frequency traders with fast communications links. His suggestion is that a unique identifier number be assigned to the 'matching engine' of each stock exchange and dark pool (the matching engine is the program that consummates trades). Every night, each matching engine would have to report, in a publically-accessible file, anonymised details of each trade it consummated that day, along with the time of the trade, measured to within ten millionths of a second of the global time standard known as UTC (to know whether information leakages are being exploited by ultra-fast trading, you need to measure time very exactly).

A public database of this kind would greatly facilitate detailed, independent analysis of the new world of electronic exchanges, dark pools and automated trading. Institutional investors could also demand from each broker-dealer the equivalent data file for the trades it has done on their behalf. Reconciliation of that private file with the public database would then permit the systematic analysis of how and where trading costs are being incurred by the institutional investor, and one could even envisage such costs having to be reported to those whose savings are being managed. That would be an important step. It might, for example, trigger them to ask just why those who are managing their savings are doing quite so much trading.