Monsters in the Market

In today’s exchanges, strong programs prey on weak ones, humans are hard to find, and the SEC struggles to keep up.

By Timothy Lavin

ON THE THIRD FLOOR of Citigroup’s Manhattan headquarters, at the far end of a trading floor overlooking the Hudson River, Young Kang, Citi’s global head of algorithmic products, leans over a terminal and monitors the progress of a canny and powerful beast named Dagger. Bred and trained in secret by Citi’s financial engineers, Dagger can stalk through more than 20 markets, public and otherwise—hunting for anomalies, buying and selling, prowling through mountains of historical data—all at the behest of Citi’s clients. Amid the trading-floor din, Dagger fulfills its duties in flickering silence, with a speed and acuity no human can match.


And it makes a lot of money. Algorithms like Dagger can exploit the smallest inefficiencies in the market. They can parse trades in millionths of a second. Some species can detect other algos embarking on predictable trading strategies, and ruthlessly adjust their techniques. They’re growing ever more complex, subtle, and sophisticated. And as they become more popular, they’re creating some serious headaches for regulators.

By some estimates, algorithms now trigger 70 percent of all trades in U.S. equities. The speed and volume of everyday trading have propelled the market into a new and esoteric dimension,
and rendered traders in the pits largely obsolete. Average daily share volume on the New York Stock Exchange increased by 181 percent between 2005 and 2009, while the time required to execute a trade on its electronic systems dropped to 650 microseconds.

Such changes have a lot of people worried, including the Securities and Exchange Commission. It released a wide-ranging paper earlier this year seeking suggestions on how to restructure the entire equity market, and created a Division of Risk, Strategy, and Financial Innovation in part to help monitor new technologies. A market collapse in early May—in which automated-trading systems exacerbated a sell-off that drove the Dow down more than 900 points in less than an hour, before it quickly recovered—gave two worries new public salience: that the proprietors of these algos may not be in full control of their creations, and that the strategies they pursue are, in some cases, fundamentally warping the financial markets.

In January, the NYSE fined Credit Suisse $150,000 for “failing to adequately supervise the development, deployment, and operation of a proprietary algorithm.” The fine was a pittance, but more troubling was that the bank didn’t even know that its malfunctioning algo (which sent hundreds of thousands of cancel-and-replace requests for orders that hadn’t been made) had crippled some of the NYSE’s trading stations until regulators called them the next day. This spring, a newsletter from the Federal Reserve Bank of Chicago warned: “Although algorithmic trading errors have occurred, we likely have not yet seen the full breadth, magnitude, and speed with which they can be generated. Furthermore, many such errors may be hidden from public view.”

Bernard Donefer, a finance professor at Baruch College and the author of a study in the most recent Journal of Trading called “Algos Gone Wild,” contends that the speed of these equations, and their ability to reach so many markets simultaneously, could turn even a minor coding error into a spiraling disaster. “Another 1987,” he told me, referring to the epic crash caused in part by simpler automated-trading schemes. This view puts Donefer in the minority in the financial community, which tends to have more faith in firms’ internal risk controls. But he thinks that without better regulation, more algo-gone-wild scenarios are inevitable. He notes that while controls at big firms, like Citi, are generally exemplary, second- and third-tier firms present a graver risk.

The SEC wants to hire a lot more staffers, both for its new risk division and for its trading division, and it is considering new methods of tracking algorithmic trades; Donefer and others have suggested a tagging system for the biggest traders, which the SEC says is on the table. The commission also may soon outlaw a practice called “naked access,” in which some broker-dealers offer their clients direct access to exchanges—allowing them to potentially bypass risk controls—in pursuit of faster trading.

A more widespread worry, now getting increased attention from regulators and Congress, is a strategy known as high-frequency trading. Employers of this technique apply algorithms and other automated technology, along with real-time market data, to buy and sell so quickly (in microseconds) and in such quantities (millions of trades a day), that they engorge themselves on penny differentials in prices. These traders argue that they supply the market with needed liquidity and tighter spreads. Regulators tend to agree, for the most part; free markets have
always rewarded better information, speed, and creativity. But this technology unloads on such a massive scale, and so quickly, that they fear it could feed a dangerous and self-reinforcing volatility.

At least a few high-frequency traders have learned to make a killing by detecting the more simplistic algo strategies deployed by basic pension funds and mutual funds, buying the next stock the funds plan to buy, and then selling it to them at a higher price. This may not be illegal, but it’s almost certainly unfair to the funds’ investors. “It is increasingly clear that there are quite a number of high-frequency bandits in the high-frequency-trading community who pump up volume statistics, front-run investor orders, increase transaction costs, and hurt real liquidity,” David Weild, an adviser at Grant Thornton and a former vice president of NASDAQ, told me.

These changes in trading technology raise a more fundamental question: If the majority of trades racing back and forth are simply lines of code swapping with other lines of code, moved by indicators obscure to even the mortal authors of the algorithms themselves, what exactly is the financial market? “The market structure’s totally changed, and it’s distorted what we do,” says Joe Saluzzi, the co-head of equities trading at Themis Trading and a vocal opponent of some high-frequency strategies. “The machine thinks for itself.”