

Technology

An Introduction to Quantitative Investing: Regulatory Action, Guidance and Risk (Part Two of Three)

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Global regulators seldom prescribe rules for, or offer guidance on, quantitative trading generally. Nevertheless, fund managers employing quantitative strategies can glean lessons from the literature that does exist, even if it may not strictly apply.

For instance, the SEC's Division of Investment Management published an IM Guidance Update on robo-advisers in 2017 that focuses on the disclosures that firms should make and policies and procedures that they should implement when providing digital financial advice. Although a quantitative manager will not likely be providing robo-advisory services, the document provides insight into how the SEC broadly scrutinizes managers' use of mathematical rules and algorithms.

This article, the second in a three-part series, analyzes regulatory actions and guidance applicable to quantitative managers, as well as the special regulatory risks that those managers may face. The [first article](#) provided an overview of quantitative investing and the ways it differs from fundamental investing; discussed the growth of quantitative investing; and evaluated the practical risks and misconceptions of quantitative investing. The [third article](#) will explore the heightened importance of cybersecurity and intellectual property protection for quantitative managers; negotiations with investors over capacity constraints; and methods for quantitative managers to attract and retain talent in the face of stiff competition.

See "[Will Inadequate Policies and Procedures Be the Next Major Focus for SEC Enforcement Actions?](#)" (Nov. 30, 2017).

Futures Regulation Outpacing Securities

"We see more regulation and enforcement on the futures side, given that it often involves traders with more latency sensitive strategies and thus a greater dependence on technology," said Lance Zinman, partner and global co-chair of Katten Muchin Rosenman's financial services practice.

For example, the CFTC has been active in punishing manipulative trading and spoofing. Although some government entities have released prescriptive rules on these types of trading, such as Europe's recast Markets in Financial Instruments Directive (MiFID II), Zinman opined that the

industry is ahead of the regulators. “It is inherently in the interests of firms that the algorithms be properly tested and deployed. If the algorithms do not work, then it leads to losses.”

“The SEC, in particular, has steered clear of prescriptive rules regarding spoofing. That agency has ample authority under Rule 10b-5 under the Securities Exchange Act of 1934, but it must prove more than mere negligence,” said Zinman. “Rather than using its rulemaking authority, the SEC tends to use its exam and enforcement powers when dealing with allegations of spoofing. Managers should be prepared to demonstrate that they have conducted the proper diligence and surveillance to proactively identify issues before they become problems.”

AXA Rosenberg Settlement Order

Underlying Compliance Failures

In 2011, the SEC **charged** “three AXA Rosenberg entities with securities fraud for concealing a significant error in the computer code of the quantitative investment model that they use to manage client assets.”

According to the settlement order, the model “capture[d] and process[ed] a substantial amount of publicly available information, such as financial data for particular companies, news, and industry information, . . . to make investment decisions largely without human interaction.” A “micro group” held primary responsibility for the model. Only members of that group had full access to the underlying code, and none of its members had any compliance-related responsibilities.

Although the model was tested, the entities did not “conduct independent quality control over the programmers’ work on the code.” Additionally, none of the simulations involving the model detected an error. Two years later, an employee – while working on updates to the model – discovered the error, which “effectively eliminated one of the [model’s] key components . . . for managing risk.”

The employee discussed his finding with senior management, but one official allegedly told him not to inform others about it and “directed that the error not be fixed. . . .” A few months later, the board of directors met to discuss the model’s performance because clients had expressed substantial concern about portfolio underperformance. Instead of informing clients about the error, the entities “misrepresented the [model’s] ability to control risk and ascribed underperformance to market volatility and factors having nothing to do with the error.” The senior official also informed the board that he was “not aware of significant” mistakes in the model. The CEO was informed only after the model had already been fixed. After conducting an internal investigation, the entities disclosed the error to the SEC and investors.

See “[SEC Emphasizes Investment Adviser Fiduciary Duty and Proposes Enhanced Adviser Regulation](#)” (May 10, 2018); and “[How Should Hedge Fund Managers Handle and Document Investor Complaints?](#)” (Sep. 20, 2012).

The SEC also alleged that the compliance program was not adequately tailored to ensure that the model worked as intended and that the firms’ compliance policies were not followed.

As a result, the SEC charged the AXA Rosenberg entities with violations of the anti-fraud provisions of the Securities Act of 1933 and the Investment Advisers Act of 1940. The SEC ordered the entities to pay over \$200 million to their clients for the harm caused; maintain a “global compliance and ethics oversight structure”; and retain an independent compliance consultant.

Implications for Quant Managers

In the [press release](#) about the order, Robert Khuzami, then-Director of the SEC's Division of Enforcement, said:

To protect trade secrets, quantitative investment managers often isolate their complex computer models from the firm's compliance and risk management functions and leave oversight to a few sophisticated programmers. The secretive structure and lack of oversight of quantitative investment models, as this case demonstrates, cannot be used to conceal errors and betray investors.

In addition, Bruce Karpati, then-Co-Chief of the Asset Management Unit in the SEC's Division of Enforcement, said, "Quant managers must be fully forthcoming about the risks of their model-driven strategies, especially when errors occur and the models don't work as predicted."

Finally, Rosalind R. Tyson, then-Director of the SEC's Los Angeles Regional Office, asserted, "Quant managers need to ensure that their compliance policies and procedures are tailored to the risks of their model's strategies, and that compliance personnel are integrated into the development and maintenance of their investment models."

See "[Steps an Exempt Reporting Adviser Must Take to Transition to SEC Registered Investment Adviser Status: Adopting Compliance Policies and Procedures \(Part Two of Three\)](#)" (Oct. 12, 2017).

Tyson's comments match the language of the settlement order, which explicitly mentions the lack of compliance-related responsibilities held by the "micro group." It is unclear, however, to what extent the SEC expects compliance personnel to be integrated into this process. After all, compliance personnel are unlikely to have the requisite training and experience in mathematics or computer programming to evaluate complex quantitative models.

The duties of the independent compliance consultant, however, hint at what the SEC expects. For example, the independent compliance consultant must review:

- "disclosures about the coding process, identify any weaknesses in that process, and make recommendations as to the appropriate disclosures relating to the coding of the [m]odel to investors";
- the "reporting of errors or other issues that arise after changes to the [m]odel go into production"; and
- the "approach to documenting errors in the [m]odel [and] the retention of versions of the computer code that animate the [m]odel."

Thus, although compliance personnel will likely need to be familiar with "the control and auditing environments applicable to quantitative investment computer programs," it does not follow that the SEC expects compliance to identify or fix weaknesses in the coding itself. Rather, compliance should be focused on reporting structures, recordkeeping and disclosure of the models. In short, compliance must develop policies and procedures governing the coding process much like they would with any other function.

Indeed, David Form, partner in Sidley Austin's investment funds group and former chief compliance officer of a quantitative-based asset manager, noted that the SEC has repeatedly emphasized, in appearances and speeches, that it expects legal and compliance personnel who oversee quantitative strategies to understand – in broad terms, or conceptually – how those strategies work.

“Although quantitative strategies may, to a certain extent, appear to be ‘black boxes’ to outside investors, this cannot be the case for compliance,” Form argued. Legal and compliance must not only understand the issues that come up in quantitative trading, but they must also have a handle on how those issues are being addressed by their firms. “They must be a part of the process,” he continued. “Algorithms are always changing and are very complex, however, so it’s a tall order to expect compliance to understand all of the details within a strategy.”

Involvement by compliance does not necessarily mean checking code, Form clarified. Instead, it means understanding general concepts and educating those who create and implement the code of certain compliance issues that can arise. “For example, legal and compliance should teach the programmers and portfolio managers about, among other things, the processes that should be followed before code is deployed, market manipulation concerns, fiduciary duties of care and the impact that a faulty algorithm may have on the market,” he added.

Quantitative managers have to think about the same compliance issues as fundamental managers, said Zinman. Compliance in a quant fund requires more coordination on the front end, however. “If the SEC or CFTC examines a quantitative manager, the code and logic is there in plain sight. The code is a footprint, showing exactly what the manager did or is doing.”

According to Form, coders and portfolio managers should be made aware of the level of regulatory scrutiny that exists. “In addition, if these individuals have concerns, they should understand that they should raise those concerns to compliance so that they can be dealt with in an appropriate fashion. This interaction must go both ways – compliance and legal personnel should ask questions and engage in a dialogue with the engineers as well.”

“Ultimately, legal and compliance personnel who oversee quantitative strategies must be familiar with, and comfortable using, the differences in language between quantitative trading strategies and fundamental trading strategies,” Form continued.

IM Guidance Update on Robo-Advisers

In February 2017, the SEC’s Division of Investment Management issued an [IM Guidance Update](#) on robo-advisers. Notably, the guidance update states that an investment adviser has a duty to “make full and fair disclosure of all material facts to, and to employ reasonable care to avoid misleading, clients. The information provided must be sufficiently specific so that a client is able to understand the investment adviser’s business practices. . . .”

For example, the staff suggested that disclosures include:

- a description of the algorithmic functions used;
- a description of the assumptions and limitations of the algorithm;
- a description of the particular risks inherent in the use of an algorithm;
- a description of any involvement by a third party in the development, management or ownership of the algorithm used; and
- an explanation of the degree of human involvement.

In addition, the guidance update states that, when developing and implementing written policies and procedures, a firm must “take into consideration the nature of [its] operations and the risk exposure created by such operations.” Thus, a quantitative firm’s policies and procedures may cover:

- the development, testing, and backtesting of the underlying code;

- post-implementation monitoring of the model's performance;
- oversight of any third party that develops, owns or manages the code; and
- cyber-threat prevention, detection and response, as well as "protection of client accounts and key advisory systems."

For more on the guidance update, see "[What Robo-Advisers Can Expect From SEC Examinations](#)" (Jun. 21, 2018).

FCA Report on Algorithmic Trading

In February 2018, the U.K. Financial Conduct Authority (FCA) published a report entitled "[Algorithmic Trading Compliance in Wholesale Markets](#)." Although the report is focused on algorithmic trading, much of the advice is broadly applicable to firms employing quantitative strategies. Indeed, the report states that "[i]nvestment decision algorithms that do not initiate orders or the timing, price or quantity of an order may not fall under the definition of MiFID II but examples of good practice we observed ensured these were subject to the same systems and controls as for algorithmic trading." The report further states that key oversight functions, such as compliance and risk management, must "keep pace with technological advancement."

For more on MiFID II, see "[ACA Panel Reviews Effects of Impending MiFID II on U.S. Advisers](#)" (Dec. 7, 2017); and "[Simmons & Simmons Briefing Covers Revisions to U.K. Fund Documents in Anticipation of MiFID II Deadline and the Potential Impact of Pending U.K. Partnership Taxation Rules](#)" (Nov. 2, 2017).

Nature and Description of Strategies

Firms should maintain written records describing the nature of their quantitative trading strategies. These records should include, among other things, the "technical details of the coding protocols used during the development process and the overall system architecture"; relevant regulatory and venue requirements; and "a comprehensive list of all risk controls . . . which apply to each strategy or system." In addition, firms should deploy "consistent and well understood methodology" to interpret when substantial or material changes have been made to the underlying code, and they should also train staff to ensure consistent application.

See "[High- and Low-Tech Innovations for Fund Managers to Overcome Compliance Training's Drawbacks](#)" (Feb. 1, 2018).

Development and Testing

A quantitative manager should also have "a robust and well understood development framework" that is consistent with its internal policies, risk appetite and behavioral expectations. The report notes that these frameworks are particularly important when firms use "innovative technology like machine learning." The framework should ensure that the code behaves as intended and is tested in an environment separate from the production environment.

A Senior Supervisors Group composed of financial supervisors from ten countries published an "[Algorithmic Trading Briefing Note](#)" in April 2015. The note states that testing should be done at all phases of a product's lifecycle. For example, firms deploying new or updated strategies should "conduct simulations and non-live testing within a trading venue testing environment." Strategy roll-out should be "controlled and cautious," and systems should be tested to "ensure that they

can withstand significant or elevated market volumes and external events that could exert stress” on them.

According to the FCA report, the testing and development process should be supported by a project lead who ensures consistency; a transparent and collaborative culture; a clear separation of roles; and independent reviews. This can be “achieved by having a separate [software development] team that verifies and checks the output and quality of code.” The process should also be challenged by “objective, competent and informed parties,” which may include an independent committee composed of risk, compliance, legal, business, technology, finance and operations personnel.

See “[FCA Chief Executive Touts Senior Managers Regime and Remuneration Restrictions As Important Incentives to Promote Good Culture at Fund Managers](#)” (Apr. 12, 2018).

Managers should also maintain audit trails covering items such as type of input data; specific mathematical calculations; and code writing language and protocols.

Risk Controls, Governance Framework and Market Abuse

To mitigate risks associated with the use of mathematical models, the report suggests that firms maintain appropriate risk controls, which should be tailored to the particular trading strategies employed by the firm, as well as overseen and monitored by an independent risk function.

The report notes that a strong, formalized governance framework is fundamental for reducing risks. The governance structure should include clear lines of accountability; effective procedures for communicating information within the firm; and a separation of tasks and responsibilities. Key control functions (such as senior management, risk and compliance) should also have the “requisite skills, knowledge and expertise to provide suitable challenge to frontline functions.” The report stresses that compliance must be able to ask the right questions and assess outcomes, which can be enhanced by the use of “their own technology solutions.”

Finally, the FCA indicated that all investment firms must comply with the general requirements of the E.U. [Market Abuse Regulation](#), which include monitoring for market abuse and attempted market abuse. Firms should “consider the potential implications” of the developments in machine learning and artificial intelligence, which heighten risks, asserted the FCA.

For more on the report, see “[FCA Outlines U.K. and MiFID II Requirements for the Development, Testing and Operation of Algorithmic Trading Systems](#)” (Mar. 1, 2018).

Regulatory Risk: Source Code

Under the CFTC’s proposed [Regulation Automated Trading](#), “AT Persons”^[1] would have needed to develop certain written policies and procedures with respect to the “development, testing, monitoring, and compliance of [a]lgorithmic [t]rading” systems. For example, AT Persons would have been required to maintain a “source code repository to manage source code access, persistence, copies of all code used in the production environment, and changes to such code” (including an audit trail of material changes).

See our two-part series on how hedge fund managers can examine, document, monitor and review their automated trading strategies: [Part One](#) (Jan. 7, 2016); and [Part Two](#) (Jan. 14, 2016). See also “[Settlements With Three Major Banks and Five Individual Enforcement Actions Follow](#)”

CFTC Anti-Spoofing Initiative” (Feb. 15, 2018); and “Two Recent Settlements Demonstrate CFTC’s Continued Focus on Spoofing” (Oct. 12, 2017).

In an appendix to the proposed rulemaking, then-Commissioner and current CFTC Chair J. Christopher Giancarlo noted that “AT Persons would have to make their source code repository available for inspection to any representative of the CFTC, in addition to the U.S. Department of Justice.” In an October 4, 2017, [keynote remark](#), however, Commissioner Brian Quintenz derided the proposed regulation and stated that “the prior administration’s massively over-reaching and highly concerning ‘source code repository’ proposal is D-E-A-D.”

Although the source code repository proposal has been abandoned and would have only applied to certain firms engaging in algorithmic trading, the proposed regulation serves as a reminder of the special regulatory risks faced by managers who rely on computer code for quantitative investment models. Under a different political environment, regulators may choose to revive such a proposal, perhaps in a broadened form.

In addition, in its [semiannual report](#) to Congress from the period of October 1, 2015, through March 31, 2016, the SEC Office of Inspector General (OIG) discussed an investigation in which an SEC employee allegedly “unnecessarily requested proprietary trading code from registrants and downloaded this proprietary trading code onto a personal computer.” The investigation ultimately “found no evidence that the subject came into possession of proprietary trading code. On the contrary, the OIG learned that as a general practice, [the SEC’s Office of Compliance Inspections and Examinations] does not request or obtain proprietary trading code, and that if it does so, the data resides on a stand-alone computer.” Nevertheless, the investigation highlights the risk that employees at regulatory agencies may abuse their positions of authority and abscond with intellectual property.

See “[When Must a Hedge Fund Manager \(or Its Current or Former Employees\) Preserve Evidence in Litigation or Pending Litigation Involving High-Frequency Trading Code?](#)” (Apr. 25, 2014); and “[Trading Practices Session at SEC’s Compliance Outreach Program National Seminar Addresses Need for Holistic Compliance Procedures Dealing With Allocations, Best Execution and Cross Trades](#)” (Feb. 23, 2012).

[1] Defined as any person that engages in algorithmic trading “on or subject to the rules of a” designated market contract and who is “registered or required to be registered as” a futures commission merchant, floor broker, swap dealer, major swap participant, commodity pool operator, commodity trading advisor, introducing broker or floor trader

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