How Artificial Intelligence Will Shape Securities Regulation

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Introduction

How will the increasing prevalence and sophistication of artificial intelligence (AI) change the doctrine and practice of securities law? My main thesis is that it will push securities regulation toward a more systems-oriented approach. This approach will replace securities law's emphasis, in areas like manipulation, on forms of enforcement targeted at specific individuals and accompanied by punitive sanctions with a greater focus on ex ante rules designed to shape an ecology of actors and information.

I will motivate and illustrate this argument through two main areas of securities law: trading and content moderation. The former is clearly a core area of Securities and Exchange Commission (SEC) activity. The SEC closely supervises the national stock exchanges that compose the basic trading architecture for equity securities and is the principal regulator of the participants in those markets. The latter may seem like a rather odd characterization of the SEC's role. But the SEC is and always has been in the content moderation business. Indeed, from its early years onward, one of the SEC's core ambitions has been to tightly regulate the dissemination of information by public companies by mandating what they must say, proscribing much that they may not say, and closely regulating any other information disclosed by public issuers or their representatives.

I close by noting two more speculative possibilities for how AI could shape securities regulation. One is that AI will make securities law less important. Securities regulators have built a bright lamppost

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[*] Professor of Law, University of Michigan. My views on these subjects owe much to my collaborators, especially Michael Barr, Megan Shearer, and Michael Wellman, with whom I have been studying the behavior of algorithmic traders in financial markets, and Howell Jackson, with whom I have been presenting on social media and capital markets at PIFS-IOSCO's trainings for securities regulators. All errors are my own. Thanks to the participants at the University of Chicago's Symposium on "How AI Will Change the Law" for helpful comments, and to the editors of the *University of Chicago Law Review* for their helpful insights.

over the speech of public companies and the trading of their stock. Everything else that technically falls under the SEC's jurisdiction tends to be more dimly lit. That dark matter has grown enormously; AI will grow it larger still. The other possibility is that AI may play a more affirmative role in the securities ecology. One useful function that AI could serve is enabling personalized voting algorithms tailored to each individual shareholder. Currently, individual shareholders rarely vote, but by dramatically lowering the costs of voting, personalized algorithms might change the calculus of rational apathy and induce individual shareholders to actually vote their shares.

I. AI, Trading, and Securities Law

In this Section, I briefly report on a series of studies that coauthors and I conducted to explore whether artificially intelligent trading algorithms pose a problem for the law of manipulation, as securities law currently defines it. These studies suggest that the problem is serious and imminent and make a provisional case for legal reform. I then describe draft legislation, known as the Financial Artificial Intelligence Risk Reduction (FAIRR) Act, which is partly inspired by our research. I suggest that the FAIRR Act is part of a broader evolution that securities regulation may undergo due to AI.

Trading in financial markets is increasingly driven by algorithms. Market participants use algorithms to achieve traditional trading objectives of assimilating data, adjusting orders, and executing transactions, but at speeds spectacularly faster than are humanly possible. Millionths of a second, and perhaps soon billionths, can decide whether a strategy succeeds. The next frontier will be the incorporation of cutting-edge forms of artificial intelligence into the design of these algorithms.

For several years now, regulators and scholars of securities law have expressed concern that manipulation law may be a poor fit for regulating artificially intelligent trading algorithms.[1] This is because

[1] *See, e.g.*, Yesha Yadav, *The Failure of Liability in Modern Markets*, 102 VA. L. REV. 1031, 1073–86 (2016). *See generally, e.g.*, Gregory Scopino, *Do Automated Trading Systems Dream of Manipulating the Price of Futures Contracts? Policing Markets for Improper Trading Practices by Algorithmic Robots*, 67 FLA. L. REV. 221 (2015); Gina-Gail S. Fletcher & Michelle M. Le, *The Future of AI Accountability in the Financial Markets*, 24 VAND. J. ENT. &

the law prohibiting manipulation requires deliberate misconduct. As currently defined, manipulation's two principal requirements for both regulators and private plaintiffs are scienter (construed as intent) and a "manipulative act." Yet proving either of these elements for certain types of artificially intelligent algorithms may be difficult, both in theory and practice.

It has been unclear, however, whether these concerns are merely speculative or whether there is a practical, imminent threat. If imminent, then we must understand how autonomously manipulative algorithms work and how the legal system should adapt to them. Any potential legal reforms will benefit from a high-resolution grasp of the mechanics and effects of sophisticated algorithmic behavior.

To explore the question of what trading strategies algorithms may develop, we used an experimental approach, known as agent-based simulation, that studies the conduct of algorithmic trading agents trained using deep reinforcement learning techniques. This approach builds on prior work, while also providing a perspective that theoretical and observational work cannot.

Scholars have employed historical data and theoretical models to analyze benchmark manipulation. The main limit of these approaches is that empirical work cannot directly observe the trading strategy underlying real-world transactions, while even leading theoretical models abstract away from much of the mechanics of real-world market structure. A simulated market enabled us to incorporate complicated details of market microstructure, more closely approximating the actual mechanics of trade, the interactions among market participants, and the structure of the market. We can also model the response of strategic agents to the presence of a manipulator. Ultimately, an experimental approach can also allow us to study a wide range of benchmark designs, market environments, and trading strategies.

TECH. L. 289 (2022); Gina-Gail S. Fletcher, *Deterring Algorithmic Manipulation*, 74 VAND. L. REV. 259 (2021); Samuel Keltner, *Supporting Retail Investors with AI Enhanced Disclosure*, 52 SEC. REGUL. L.J. 19 (2024); Alessio Azzutti, Wolf-Georg Ringe & H. Siegfried Stiehl, *Machine Learning, Market Manipulation, and Collusion on Capital Markets: Why the "Black Box" Matters*, 43 U. PA. J. INT'L L. 79 (2021).

We studied a market in which an algorithm trades directly in a market but also holds a contract with a price based on a benchmark calculated from market transactions (such as a contract to sell a large number of corporate shares to an acquirer at the stock's closing price on a specific day). This setting is economically and legally important, as trillions of dollars in real-world contracts are based on benchmarks calculated from real-world transactions.

We found that algorithms designed with a reward function to maximize profits—but with no other objective designed by humans—autonomously develop profitable trading strategies that would likely constitute manipulation if intentionally created by a human trader. In effect, they learn to "manipulate" without being given any direct instructions to do so. To simplify, the algorithms trade heavily and unprofitably to materially affect the benchmark's price. This produces a profit from their benchmarked contract position that exceeds their trading losses from market transactions.

We used "agent-based simulation"—an approach in which simulated agents directly interact. We modeled their interactions in a market in which the agents trade but also hold a portfolio of assets that is benchmarked to the transaction prices in the market. The simulated market is a limit order book, like contemporary stock markets, where traders interact through order submission. Aside from the manipulator, the other market participants are agents with private reasons to trade. There is also a market-making intermediary in a number of the modeled scenarios. The benchmark is calculated using the "volume weighted average price" (VWAP) of transactions. VWAP is a benchmark design, popular in real markets and with substantial merits explored in the theoretical finance literature. Because it is based on actual trades, VWAP can be affected by a market participant's trading behavior.

We developed our algorithms by training them independently using two qualitatively different deep reinforcement learning techniques. The first technique is known as a "deep Q-network" and involves the choice of discrete actions in a continuous environment, where a deep neural network develops a value function over state-action pairs. The second technique is "deep deterministic policy gradient," which also involves a continuous environment, but where actions are chosen from a continuous range. In this technique, an

actor-critic method is used where the "critic" learns a value function that then shapes the parameter selection of the actor.

These algorithms develop trading strategies that are plausibly manipulative. Their transactions affect the benchmark's price and produce a net profit across all positions. If an individual had engaged in such trading intentionally, she would have plausibly committed unlawful securities manipulation. As noted, however, the algorithm was not designed to artificially affect prices, only to maximize profits.

The research also measures the market welfare impact of manipulating the benchmarks. Trading participants' total surplus in the market actually increases with manipulation because the manipulator incurs trading losses to affect the benchmark. As a result, the other traders lack an incentive to report the manipulator (unless they happen to hold a contract position). The contract-related surplus of the manipulator significantly increases. The necessary correlate of this is that third parties invested in the benchmark are the principal losers from the manipulation.

Our experiments offer the first demonstration of an algorithm automatically learning to manipulate a financial benchmark. They provide evidence that trading algorithms can autonomously develop strategies that are plausibly manipulative. Moreover, because the algorithms trained using the deep-Q network and deep deterministic policy gradient were developed independently, they represent two distinct "proofs" of this possibility.

This problem—of a securities law that is arguably unworkable when applied to a large class of sophisticated, artificially intelligent grading programs—has prompted draft legislation from Congress. In December 2023, Senator Mark Warner introduced the FAIRR Act, a bill aimed at reforming law around artificial intelligence in the financial sector. This Act would mandate that the Financial Stability Oversight Council (FSOC) conduct a study to identify possible risks to financial stability posed by artificial intelligence and submit a report to Congress identifying actual risks and gaps in the regulatory environment that prevent FSOC member agencies from effectively responding to those threats.

The most interesting provision of the FAIRR Act by far, however, is a liability provision it would add to the federal securities

laws. Simply put, that section would eliminate any scienter requirement when an individual deploys an artificial intelligence. It would thus establish strict liability for violations of the securities laws by an artificial intelligence, unless, pursuant to a statutory exception, "such person took reasonable steps to prevent such acts, practices, conduct and outcome." Given this proviso, the provision would essentially replace any scienter requirement with a negligence standard when it comes to the use of artificial intelligence.

The FAIRR Act moves from manipulation law's traditional emphasis on causes of action that impose exacting sanctions with consequently high burdens of proof toward something closer to a negligence regime (or a strict liability regime with an affirmative defense of reasonable caution). This is in line with a generally favored policy approach among those studying the subject, which would shift regulators from an emphasis on ex post criminal and administrative enforcement toward a larger supervisory ecology that uses tools with lower sanctions to deter a range of undesirable trading strategies that fall short of displaying traditional indicia of malice and intent.

More broadly, new forms of machine learning call for changes to manipulation law at a conceptual level. In this area of law, as in many others, regulators lean heavily on a distinction between wrongful and legal, if undesirable, conduct. Certain trading algorithms pose such grave difficulties for the traditional indicia of wrongfulness (like intent and causal impact), even as they can otherwise mimic a deliberate manipulative trading strategy. Accordingly, these programs underline the extent to which secondary markets could benefit from a regulatory approach that is more agnostic to participants' intent and is more willing to directly pursue the promotion of market quality.

II. The SEC and Content Moderation

While not usually put this way, federal securities regulators have always been in the content moderation business. Moderating the content provided by issuers concerning their securities is a central component of the SEC's role. The SEC extensively regulates how the issuers of securities may speak, mandating that public issuers publicly disclose a wealth of material information and determining what constitutes a misstatement. The mandatory disclosure system imposed by the securities laws on public issuers is the centerpiece of its content

moderation regime. It mandates the disclosure of large quantities of material information in a registration statement accompanying an issuer's registered securities filing, but also annual and quarterly disclosures, the disclosure of ad hoc material events, and proxy statements. Regulation Fair Disclosure regulates the disclosure of material information by public issuers or their representatives. In brief, it prohibits the selective disclosure of material information to shareholders or market participants if they are likely to trade on that information.

This focus on disclosure is understandable given the fundamental social functions served by securities markets. Securities markets serve to connect households and institutions with savings to firms with financing needs. Well-functioning markets intelligently channel savings at low cost, enabling capital to be directed at lower cost toward issuers with more promising projects. At the same time, they provide signals to decisionmakers in the real economy regarding the use of existing resources through prices in trading markets. As a result, the informational environment around companies is a fundamental concern of securities law.

The major issue raised by AI for securities law is a special case of the more general challenge that AI and social media pose for society. Unlike with trading, the artificially intelligent future is only hazily visible on the horizon. Artificial intelligence will almost certainly reshape the informational environment for companies and funds. It may make generating news about private companies significantly easier. If it does, the adverse selection issues that fundamentally impede liquid trading of private issuers' shares may diminish. Artificially intelligent content creators may also generate large amounts of misleading, noisy, or manipulative information about issuers. This set of issues is wedded to a broader set of issues, touched on by the literature, regarding how securities regulation should adapt to the increasing role of social media in capital markets.

Young traders get most of their financial news from social media. Official channels, in other words, are increasingly (relatively) displaced, and it is in those non-official channels that artificially generated content is likely to play a major role. What should the SEC

do in response?[2] How can it best regulate the vast world of online speech about securities, issuers, and investing on which Americans increasingly rely?

Securities regulation could attempt to expand the reach of certain core regulated statuses to directly regulate creators of social media content about finance and issuers. This would use the existing apparatus of securities law and repurpose familiar tools to address new problems. The most obvious candidate is the "investment adviser" status, a capacious category that, in principle, encompasses any person providing advice about investing in securities for compensation as a business.[3] In a comment, Tamra Manfredo suggested directly regulating all "finfluencers"—social media influencers with significant

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[2] Current work on content moderation more broadly has explored the idea of such approaches. Professor Evelyn Douek has argued that models of content moderation based on First Amendment adjudication mistake the reality of how online speech occurs and can be plausibly regulated. The pace, quantity, and duration of online speech make a First Amendment–style model an implausible fit. Instead, Douek suggested, "Content moderation should . . . be understood as a project of mass speech administration," which, in light of online speech's dynamic and complex ecology, "needs a more proactive and continuous form of governance than the vehicle of individual error collection allows." Evelyn Douek, *Content Moderation as Systems Thinking*, 136 HARV. L. REV. 526, 528 (2022); *id.* (arguing for a "systems thinking approach . . . focuse[d] on the need to look to structural and procedural mechanisms that target the key ex ante and systemic decisionmaking that occurs upstream of any individual case"). The extent to which Douek's approach represents a departure from prior scholarship is controversial, but my point is simply that a systems approach to online speech about investing should prove valuable for securities regulators. *See generally* Kate Klonick, *Of Systems Thinking and Straw Men*, 136 HARV. L. REV. 339 (2023).

[3] Securities laws already apply to many of the social media activities engaged in by regulated financial professionals, issuers, and issuers' representatives. An executive who commits securities fraud using Twitter poses no particularly difficult problems for the law. *See 2210. Communications with the Public*, FINRA, https://perma.cc/NT49-JJ32; Investment Advisers Act of 1940, ch. 686, tit. II, § 201, 54 Stat. 847 (codified as amended at 15 U.S.C. §§ 80b-1 to 80b-21). Professor Sue Guan was among the first to observe the importance of social media to how retail investors learn about finance and securities markets. Sue S. Guan, *The Rise of the Finfluencer*, 19 N.Y.U. J.L. & BUS. 489, 562 (2023) (considering, among other reforms, how finfluencers might be induced to provide higher-quality advice). *See generally* Sue S. Guan, *Finfluencers and the Reasonable Retail Investor*, 172 U. PA. L. REV. ONLINE 43 (2024).

followings who focus on financial topics—including mandating the disclosure of any qualifications and any conflicts of interest.

Elizabeth Anastasi suggested a more structural approach, arguing that the widespread use of social media in connection with securities investing provides new reason to reform Section 230 of the Communications Decency Act (CDA). Section 230 of the CDA establishes that the provider of an interactive computer service cannot "be treated as the publisher or speaker of any information provided by another information content provider." While the provision is complex and the subject of a large literature, influential case law has interpreted it to bar a wide variety of lawsuits "seeking to hold a service provider liable for its exercise of a publisher's traditional editorial functions—such as deciding whether to publish, withdraw, postpone or alter content." Anastasi suggests that significant reforms to the statute are necessary in order to hold social media platforms accountable for manipulative and other wrongful forms of content posted on them by users.

Stepping back, AI-generated content and increasing use of social media will change securities law. It has already changed the law by making the traditional channels for communicating market-moving information less important to a broad class of market participants. It not only means that retail investors get a large quantity of their information about securities markets from r/wallstreetbets, rather than EDGAR; it also means that there are entire asset classes, such as most crypto asset classes, in which traders get effectively none of their information from SEC-administered sources, even when the underlying assets may be securities.

Securities law is likely to adapt to the use of social media, and the prevalence of disinformation in it, by making use of a broader set of lighter-touch interventions to influence this new information ecology.

III. Conclusion

As I noted at the beginning, in their own way both AI-driven trading and AI-driven speech suggest that securities law will shift away from some of its traditional approaches toward something closer

to a systems-oriented approach.[4] Why? Across a wide range of domains, AI will operate on a scale and speed that is likely to make case-by-case regulation impracticable. Instead, regulators will need to turn to setting upstream incentives so as to reduce disruptive outcomes. This is likely to be far simpler in trading than content moderation. Trading on exchanges is subject to a system of multiple gatekeepers, with exchanges and brokers both acting as potential filters for disruptive trading.

In closing, I will note one place where AI might find an affirmative place within the governance ecology partly administered by the securities laws. Retail investors often do not vote their shares in corporate elections or on fundamental transactions; the retail investors who own "meme stocks" vote even less.

AI-driven voting technology may hold substantial promise for enabling more informed and personalized voting for individual shareholders. Imagine an AI that understands my preferences over a broad range of transactional, ESG, and governance issues. That AI may sufficiently optimize a voting strategy for most individuals that they would prefer to delegate their voting to that AI than to not vote. Likewise, mutual fund investors may prefer their personalized AI voting for them to their mutual fund voting their shares.[5]

In sum, AI is likely to shape securities regulation both by posing new problems and by potentially offering solutions to longstanding problems. It will shape the body of law primarily by offering market participants new avenues for trading their securities, voting their shares, and communicating about them.

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[4] It's worth emphasizing that the SEC is no stranger to systems-oriented approaches in other areas of securities regulation. For instance, the SEC's regulation of the securities-trading market structure clearly reflects something of a holistic vision for how exchanges should operate and interact with one another.

[5] As Professor Sean Griffith has noted, the Department of Labor, which regulates mutual funds when they manage retirement plan assets, and the SEC, differ in how they regulate mutual fund voting. Sean J. Griffith, *Opt-in Stewardship: Toward an Optimal Delegation of Mutual Fund Voting Authority*, 98 TEX. L. REV. 983, 997 n.80 (2020). On the conflicts that mutual funds face in voting investor shares, see Sean J. Griffith & Dorothy S. Lund, *Conflicted Mutual Fund Voting in Corporate Law*, 99 B.U. L. REV. 1151, 1151 (2019).

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