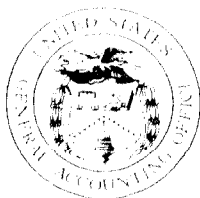


April 1991

**FINANCIAL
MARKETS**

**Active Oversight of
Market Automation by
SEC and CFTC Needed**



Information Management and
Technology Division

B-242802

April 2, 1991

The Honorable Patrick J. Leahy
Chairman, Committee on Agriculture,
Nutrition, and Forestry
United States Senate

The Honorable Donald W. Riegle, Jr.
Chairman, Committee on Banking,
Housing, and Urban Affairs
United States Senate

The Honorable E (Kika) de la Garza
Chairman, Committee on Agriculture
House of Representatives

The Honorable John D. Dingell
Chairman, Committee on Energy and
Commerce
House of Representatives

Automated systems are increasingly being used to support trading and post-trading operations on U.S. securities and futures markets.¹ Although such systems can provide benefits to enhance market operations, they also introduce risks that must be controlled to ensure that the markets provide efficient, fair, and equitable treatment to all participants. For example, during the October 1987 market crash, some automated securities trading systems could not effectively process the increased volumes, thereby contributing to disorderly markets.

Following the 1987 crash, we issued a series of reports on (1) security and other internal control weaknesses that needlessly expose the securities and futures markets to automation's risks and (2) the need for the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC)—the federal regulators that oversee our nation's securities and futures markets—to establish and maintain the technical capabilities to oversee the development and operation of market systems. This report recaps our past findings and recommendations to the commissions and assesses the steps taken by the commissions to oversee market automation. It is addressed to you because of its

¹The term securities encompasses a broad range of financial instruments, including stocks, corporate and treasury bonds, mutual funds, and stock options. The term futures encompasses futures contracts and options on futures contracts.

relevance to your SEC and CFTC oversight responsibilities. Appendix I provides details of our objectives, scope, and methodology.

Results in Brief

Lack of adequate security and other internal control weaknesses in automated trading and post-trading systems needlessly expose the securities and futures markets to various risks. Such risks can adversely affect responsive and secure operations, continuous service, and the correct processing of data. In past reports, we identified a need for SEC and CFTC to establish the technical capabilities to actively oversee market automation and ensure that automation's risks are adequately controlled.

SEC and CFTC have taken preliminary steps to oversee market systems but agree that they currently lack the technical capabilities that we believe are needed for them to control automation's risks. These capabilities should include the technical expertise to develop policies governing the development and operation of automated systems and to perform risk assessments of systems and review assessments conducted by others. SEC has decided that it is not cost-effective to establish this capability because the Commission believes it can rely on exchanges and other market entities to monitor themselves. Although CFTC is moving to establish the needed technical capability, it acknowledges that other priorities may impede its efforts. Until both regulators move to more aggressively establish the technical oversight capabilities to control automation's risks, they cannot ensure that our nation's markets will continue to provide efficient, fair, and equitable treatment to all participants. Because we consider SEC and CFTC oversight of the markets' automated systems to be a high priority area, both need to keep their congressional oversight committees apprised of their efforts in this area.

Background

The U.S. securities and futures markets are primarily governed by self-regulatory organizations (e.g., exchanges) which, in turn, are overseen by federal regulators that have statutory responsibilities to ensure the fair and equitable treatment of market participants. The securities market—along with other financial intermediaries such as commercial banks and insurance companies—is one mechanism for transferring funds from investors to borrowers to facilitate capital formation. The futures market functions to transfer the risk of price fluctuation to persons willing to assume such risks for a potential profit or as a hedge against loss of capital.

The increasing use of automation can provide the markets with opportunities to increase efficiencies and provide assurances that fair and equitable treatment is afforded to all market participants. Although exchanges and other market entities are responsible for maintaining smooth and dependable operations with their automated systems, SEC and CFTC are responsible for overseeing overall market operations, including the systems used to support such operations.

Six GAO Reports Delineate a Need for SEC and CFTC to Oversee Market Automation

Our previous reviews of market systems identified various security and other internal control weaknesses and the need for regulators to establish and maintain the technical capabilities to oversee the development and operation of these systems. We pointed out that it would be prudent and consistent with the regulators' oversight responsibilities to include technical reviews of planned and operational market systems. In this regard, regulators' technical oversight capabilities should include the expertise to develop policies governing the development and operation of systems and to perform technical reviews and assess reviews conducted by others. For example, regulators need the technical capability to ensure that (1) systems have the capacity to support timely operations under normal and high-volume conditions; (2) controls are in place to prevent unauthorized access and the misuse of proprietary data; (3) systems are able to provide continuous service in the event of equipment and software failures, natural disasters, and intentional malicious acts; and (4) controls are established so that systems' hardware and software perform as intended.

Following is a chronological listing of the six reports resulting from our reviews, with brief synopses of our findings and recommendations.

1. Financial Markets: Preliminary Observations on the October 1987 Crash (GAO/GGD-88-38, Jan. 26, 1988).

In this report we noted that some automated systems used by securities markets had difficulty handling the extraordinary volume on October 19 and 20, 1987. These problems resulted in delayed trade executions and, in several instances, delayed availability of up-to-date pricing information. The problems added to market uncertainty about whether timely trades could be executed, at what price, and whether certain trading strategies could be used. Consequently, we reported that SEC needs to reassess its oversight role and capabilities for evaluating automated systems.

2. Futures Markets: Automation Can Enhance Detection of Trade Abuses But Introduces New Risks (GAO/IMTEC-89-68, Sept. 7, 1989).

Automated systems under development by two futures exchanges were the subject of this review. We found that the systems could help to better control trading abuses. However, such systems can also introduce risks that must be controlled to ensure correct processing of transactions, responsive operations, and secure and continuous service. Without such controls, systems can be unnecessarily vulnerable to such problems as users receiving privileged treatment; inadequate transmission, processing, and storage capacities; unauthorized access to systems' information; and disruptions in service. We recommended that the Chairman, CFTC, acquire the necessary expertise to technically assess the systems planned by futures exchanges.

3. Financial Markets: Tighter Computer Security Needed (GAO/IMTEC-90-15, Jan. 5, 1990).

Three automated systems that support securities trading at three major market entities had a number of internal control weaknesses. We reported that such weaknesses pose risks of an insider threatening the systems by introducing security intrusions—such as a virus—without detection, thus potentially threatening our nation's ability to conduct securities trading. We reported that given a continual threat of security intrusions, SEC needs to be more proactive in ensuring the integrity of the systems. We recommended that the Chairman, SEC, (1) immediately follow up on the security weaknesses we found to ensure that they are properly corrected, (2) oversee plans to expand information security administration programs at entities reviewed, (3) conduct and oversee independent reviews of information security programs, and (4) acquire the necessary technical expertise to carry out these activities.

4. Financial Markets: Oversight of Automation to Clear and Settle Trades Is Uneven (GAO/IMTEC-90-47, July 12, 1990).

In this report we pointed out that securities and futures clearinghouses were not doing all they could to detect and avoid security and other problems associated with operating post-trading systems. Neither these self-regulatory organizations nor the federal regulators were actively overseeing the operation of the systems. Consequently, serious problems with automated systems could go undetected and disrupt a clearinghouse's operations severely enough to threaten the integrity and stability of U.S. stock, options, and futures markets. Accordingly, we

recommended that the Chairmen of SEC and CFTC allocate the necessary resources to establish the capability to assess the efficient and safe use of automation in the clearance and settlement process.

5. Futures Markets: Use of Automation to Detect Trade Abuses (GAO/IMTEC-90-81, Aug. 24, 1990).

We reported that five futures exchanges were designing, developing, or implementing ten automated systems that could provide more accurate records to detect trading abuses. During our limited risk assessment of two planned after-hours trading systems, we identified a number of areas where the exchanges needed to ensure that internal controls were strengthened before they implemented such systems. The risks include weaknesses that could adversely affect the security of the systems. We recommended that the Chairman, CFTC, ensure that exchanges (1) maximize to the extent practicable the potential of automated systems to accurately record trade times and (2) strengthen the security and other internal controls before the two after-hours trading systems become operational.

6. Securities Industry: Additional Testing Needed to Ensure Efficient Post-Trade Processing of Stocks (GAO/IMTEC-90-83, Sept. 26, 1990).

Four post-trading systems used in the securities markets were the subject of this report, which noted that improvements had been made in the post-trade processing of stocks, but that obstacles remain to reducing the overall 5 days required to settle stock transactions. We also noted that the systems were not adequately stress-tested to assess their capability to process anticipated work loads. Without such tests, the securities industry and its participants could not be completely assured that these systems would be able to correct trades promptly and accurately during peak processing periods. Consequently, we recommended that the Chairman, SEC, ensure that (1) complete stress tests be conducted to demonstrate that trade comparison and correction systems can handle increased work loads anticipated during peak trading periods, and that (2) structured systems development practices be followed when developing automated systems.

SEC and CFTC Technical Capabilities to Oversee Automated Systems Remain Incomplete

As our previous reports noted, active federal oversight of market automation is critical to ensure that systems capabilities and controls provide fair and equitable treatment to all market participants. Both regulators agree that they lack the technical oversight capabilities that we believe are needed to oversee the development and use of automated systems. SEC disagrees with the need to establish such a technical capability, while CFTC generally agrees with the need, but has not yet established such a capability.

SEC Decides Not to Establish the Needed Technical Oversight Capability

In response to past recommendations that SEC establish the capability to assess the efficient and safe use of market automation, the Commission stated that it was not necessary or cost-effective to employ substantial staff resources to conduct independent technical assessments. Instead, SEC has tasked its Office of Automation and International Markets to oversee voluntary system reviews performed by self-regulatory organizations' internal or external auditors.

The head of the Office of Automation and International Markets said the office was established to administer SEC's automation review policy, oversee proprietary trading systems, and collect and analyze information on international markets. The office is staffed by four attorneys and has one vacant position, designated for a computer specialist. SEC officials said the technical position has not been filled because of recruiting difficulties and added that they are still trying to fill the position. Even if SEC fills the position, one technical specialist will only be able to provide limited assistance in establishing policies and overseeing the increasing number of systems being used for trading and post-trading activities. Currently, there are 19 securities exchanges and clearinghouses that use automated systems.

The Office of Automation and International Markets, however, has taken actions to oversee market automation without the technical position being filled. Specifically, the office has (1) issued an automation review policy statement that encourages self-regulatory organizations to establish planning and assessment programs to review systems; (2) started to develop guidance for voluntary independent system reviews and identify specific documentation needs for such reviews; (3) required self-regulatory organizations that are implementing or enhancing systems to report on the adequacy of system capacity, security, and contingency planning; and (4) started to work with independent audit firms and others to develop an audit process for self-regulatory organization

systems. It also has plans to observe testing procedures for systems under development as part of its oversight activities.

These are steps in the right direction. However, without the technical expertise to establish policies and oversee the steps taken by market entities to control automation's risks, the SEC will be unable to (1) assess the adequacy of independent audits and (2) provide needed assurances as to the integrity of automated systems used by our nation's securities markets.

CFTC Moves to Develop Technical Oversight Capability

CFTC agrees with the need to establish the technical capability to oversee market systems and has stated that establishing such a capability is a Commission priority. In this regard, it is defining the review roles of the self-regulatory organizations, independent reviewers, and the Commission. It has also (1) evaluated automated systems as part of its rule-enforcement reviews; (2) established a federal interagency task force to help it design a program for overseeing automated market systems; (3) taken steps to develop a formal policy for automated system assessments; (4) increased program staff's oversight of automation; (5) used senior technical staff—the director and two staff members of its Office of Information Resources Management on an as available basis—to conduct technical reviews of exchanges' automated systems; (6) issued guidance requiring self-regulatory organizations to retain documentation regarding the development, implementation, and operation of automated systems; and (7) adopted ten general principles—developed by an international organization of securities and futures regulators that was chaired by the director of CFTC's Division of Trading and Markets—to guide regulators in developing standards for automated trading systems.

We are encouraged by the initial steps CFTC has taken in response to our recommendations. However, the Commission has noted that the technical capability it eventually establishes may fall short of that recommended because of limited resources and other Commission priorities. Should such constraints preclude CFTC from building on its initial steps and establishing an effective technical oversight capability, it could find that it is in no better position to oversee this important area than SEC.

Conclusions and Recommendations

As our nation's securities and futures markets increasingly rely on automated trading and post-trading systems, we continue to find inadequate security and other internal control weaknesses. Federal regulators need

to commit the resources to establish and maintain the technical capabilities to oversee the development and use of automated systems. While SEC has decided not to devote resources to establish such a capability, CFTC is taking steps to develop one. However, CFTC acknowledges that limited resources and other Commission priorities could impede further progress in this area. Without the needed technical capabilities, regulators cannot ensure that (1) systems have adequate capacity levels to support operations; (2) controls are in place to prevent unauthorized access and misuse; (3) systems are able to provide continuous service; and (4) controls are established so that systems perform as intended. SEC and CFTC oversight of market automation needs to be considered as a high priority area, and both need to work closely with their congressional oversight committees to address this area.

Accordingly, we recommend that the Chairmen of SEC and CFTC move to more aggressively establish the technical oversight capabilities to control the risks associated with automation. Such capabilities should include the needed technical expertise to establish policies governing the development and operation of market systems and perform and oversee technical reviews of automated trading and post-trading systems. We also recommend that the Chairmen of SEC and CFTC provide timetables for developing their technical capabilities to their agencies' congressional oversight committees.

Agency Comments and Our Evaluation

We discussed the contents of this report with senior officials of SEC and CFTC. We have incorporated their comments in the report as appropriate. Except as noted below, these officials generally agreed with the information presented.

SEC staff questioned the need for the Commission to use its limited resources to acquire the technical skills and capability to perform technical assessments when independent assessments and evaluations are performed by or on behalf of the different market entities. We continue to believe that, given the (1) increasingly important role that automation plays in the securities markets and (2) security and other internal control weaknesses identified in our reviews, SEC needs to have some technical capability. Otherwise, it cannot assess the adequacy of reviews performed by others.

We are providing copies of this report to other members of the Congress, executive branch agencies, and the public. We will also make copies available to others upon request.

This work was performed under the direction of Howard G. Rhile, Director, General Government Information Systems, who can be reached at (202) 275-3455. Major contributors are listed in appendix II.

A handwritten signature in black ink, appearing to read "Ralph V. Carlone". The signature is fluid and cursive, with a large initial "R" and "C".

Ralph V. Carlone
Assistant Comptroller General

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Abbreviations

CFTC	Commodity Futures Trading Commission
GAO	General Accounting Office
GGD	General Government Division
IMTEC	Information Management and Technology Division
SEC	Securities and Exchange Commission

Objectives, Scope, and Methodology

Our objectives were to (1) summarize our previously reported findings and recommendations detailing the need for SEC and CFTC to take a leadership role in ensuring that trading and post-trading systems are not unnecessarily vulnerable to the risks associated with automation and (2) assess the steps taken by SEC and CFTC to implement our recommendations.

We limited our summaries to our reports following the October 1987 market crash. We analyzed documents on the commissions' efforts to implement automation policies and procedures, oversee such policies and procedures, and acquire the technical expertise needed to oversee market automation initiatives. Specifically, we analyzed an automation review policy statement, applicable CFTC task force minutes, summaries of technical assessments, and employment notices for technical staff. We also interviewed senior SEC and CFTC officials to document their plans for oversight of systems.

Our work was performed from September through November 1990, in accordance with generally accepted government auditing standards.

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