

NEW YORK STOCK EXCHANGE LLC

HEARING BOARD DECISION 09-NYSE-24
CREDIT SUISSE SECURITIES (USA) LLC.
MEMBER ORGANIZATION

November 27, 2009

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Violated NYSE Rule 342 by failing to adequately supervise development, deployment and operation of proprietary algorithm, including failure to implement procedures to monitor certain modifications made to algorithm; violated NYSE Rule 401 by failing to adhere to principles of good business practice in that: (i) Firm proprietary algorithm did not have appropriate checks designed to prevent submission of hundreds of thousands of erroneous messages or to alert Firm in event of rejected messages; (ii) Firm proprietary algorithm sent hundreds of thousands of cancel and replace requests for orders that had not been sent to NYSE; and/or (iii) Firm failed to detect hundreds of thousands of cancel and replace requests and reject messages – Consent to censure and \$150,000 fine.

Appearances:

For the Division of Enforcement
Steven Brostoff, Esq.
Lara Posner, Esq.
Joseph O. Okpaku, Esq.

For Respondent
Robert C. Mendelson, Esq.

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A Hearing Officer on behalf of the New York Stock Exchange LLC (“NYSE”) considered a Stipulation of Facts and Consent to Penalty entered into between NYSE Regulation, Inc.’s Division of Enforcement (“Enforcement”) and Credit Suisse Securities (USA) LLC (“Respondent,” “Credit Suisse,” or the “Firm”), an NYSE member organization. Without admitting or denying guilt, Respondent consented to a finding by a Hearing Officer that it:

- I. Violated NYSE Rule 342 by failing to reasonably supervise and implement adequate controls over certain of its business activities by failing to adequately supervise the development, deployment and operation of a proprietary algorithm, including a failure to implement procedures to monitor certain modifications made to the algorithm; and

- II. Violated NYSE Rule 401 by failing to adhere to the principles of good business practice in the conduct of its business affairs in that: (i) a Firm proprietary algorithm did not have appropriate checks designed to prevent the submission of hundreds of thousands of erroneous messages or to alert the Firm in the event of rejected messages; (ii) a Firm proprietary algorithm sent hundreds of thousands of cancel and replace requests for orders that had not been sent to the NYSE; and/or (iii) the Firm failed to detect the hundreds of thousands of cancel and replace requests, and the resulting hundreds of thousands of reject messages.

For the sole purpose of settling this disciplinary proceeding, without adjudication of any issues of law or fact, and without admitting or denying any allegations or findings referred to in the Stipulation of Facts and Consent to Penalty, Respondent stipulates to certain facts, the substance of which follows:*

Background and Jurisdiction

1. Credit Suisse, a member organization, is a wholly-owned subsidiary of Credit Suisse (USA) Inc. which, in turn, is a subsidiary of Credit Suisse Group. Credit Suisse is a global investment banking and multi-service brokerage firm that, among other things, trades securities for institutional and individual customers.
2. On January 31, 2008, the Member Trading/On Floor Surveillance Unit Department of NYSE Regulation's Division of Market Surveillance referred this matter to Enforcement. The referral stated that on November 14, 2007 the Firm sent, via a Firm proprietary algorithm, hundreds of thousands of cancel/replace messages for orders that could not be located in the Super Designated Order Turnaround ("SuperDOT") system. This contributed to several trading posts on the NYSE Floor becoming frozen or unable to effect trades due to the high amount of message traffic which, in turn, led to the late closing of trading in multiple securities at the posts.
3. By letter dated February 21, 2008, Enforcement notified the Firm that it was conducting a formal investigation into the allegations set forth in the referral.

Overview

4. The Firm failed to adhere to the principles of good business practice in that, as set forth below, on November 14, 2007, beginning at approximately 3:40 p.m., a Credit Suisse proprietary algorithm routed hundreds of thousands of cancel/replace requests to the NYSE for orders that had been previously generated by the algorithm, but, due to an unforeseen programming issue, were never sent by the algorithm. The unusually large amount of cancel/replace messages contributed to the over-queuing of message traffic in all of the securities, approximately 975 in total, traded at five posts on the NYSE Floor. Messages, including new orders, modifications of orders, and

* Hearing Officer Note: The facts, allegations, and conclusions contained in paragraphs 1 to 31 are taken from the executed Stipulation of Facts and Consent to Penalty between Enforcement and Respondent. No changes have been made to the stipulated paragraphs by the Hearing Officer.

cancellation requests were frozen in queue and could not be immediately processed. These five posts could not be closed on time, ultimately closing between 4:10 p.m. and 4:27 p.m.

5. Credit Suisse violated NYSE Rule 342 by failing to properly supervise the development and implementation of the Firm's proprietary algorithm, particularly with respect to certain revisions to the algorithm that contributed to the November 14th incident. The Firm also failed to properly monitor the operation of the algorithm, as evidenced by the fact that the Firm was unaware that hundreds of thousands of messages sent by the algorithm were being rejected by NYSE systems until being notified of the issue by NYSE Regulation the following day. These failures by the Firm also constituted a bad business practice in violation of NYSE Rule 401.

Regulatory Framework

6. During the relevant period, NYSE Rule 342 stated that “[e]ach office, department or business activity of a member or member organization . . . shall be under the supervision and control of the member or member organization establishing it and of the personnel delegated such authority and responsibility. . . . The general partners or directors of each member organization shall provide for appropriate supervisory control and shall designate a general partner or principal executive officer to assume overall authority and responsibility for internal supervision and control of the organization and compliance with securities’ [*sic*] laws and regulations. This person shall . . . provide for appropriate procedures of supervision and control [and] establish a separate system of follow-up and review to determine that the delegated authority and responsibility is being properly exercised.”
7. During the relevant period, NYSE Rule 401(a) stated that “[e]very member, allied member and member organization shall at all times adhere to the principles of good business practice in the conduct of his or its business affairs.”
8. “Electronic Transmission of Orders,” NYSE Information Memo (“Info Memo”) 02-48 (November 7, 2002) notes that “increased market volatility and significant financial risk” can result from errors pertaining to electronic order entry systems. Info Memo 02-48 states that “all electronic order entry systems must have written internal control and supervisory procedures, regardless of whether the member or member organization is utilizing its own proprietary system or that of an outside vendor.” Info Memo 02-48 also states that electronic order entry systems “should, at a minimum, incorporate . . . checks for validation of order accuracy [and] controls that monitor for duplication/retransmission of orders previously transmitted for execution.”

Credit Suisse's Proprietary Algorithm

9. The algorithm at issue, known as the SmartWB, was implemented by Credit Suisse in 2007, although many aspects of the program were designed previously in connection

with other proprietary algorithms and were incorporated into the design of the SmartWB. The SmartWB was designed to examine the closing imbalances of various exchanges and to attempt to trade profitably based on the algorithm's assessment of the imbalances and other market data.

10. Prior to November 2007, the SmartWB was designed in a manner that did not permit its users to modify any order parameters, such as limit prices, while the algorithm was trading. To resolve this issue, shortly before November 14, 2007, the Firm trader/programmer who developed the SmartWB added a new feature to the SmartWB that allowed the user to manually modify the limit prices for unexecuted orders already sent to a market and for all future orders. This feature was designed so that the user could enter a desired number of "basis points" into a data field, and also allowed the user to click on an "up" or "down" arrow using a computer mouse. This would generate cancel/replace instructions for any orders that had not yet been filled. For example, if the user entered "2" into the "basis points" field, clicking the "up" arrow once would upwardly revise the limit price for all outstanding orders by two basis points using the cancel/replace process.
11. Significantly, the decision to modify the SmartWB was unilaterally made by the trader/programmer without any involvement or approval by an appropriate supervisor.
12. An unforeseen result of this revision to the SmartWB was that if the user clicked an up or down arrow more than once, each click would result in the generation of a separate set of cancel/replace orders for all unexecuted orders. Thus, if an arrow was double-clicked, each click would cause the SmartWB to send a set of cancel/replace orders, one more than was intended.

The November 14, 2007 Incident

13. On November 14, 2007, the SmartWB examined over 800 securities and identified 129 securities that it wanted to trade based upon the algorithm's parameters. At 3:40:01 p.m., the SmartWB began trading and immediately began receiving executions. After approximately 45 seconds of trading, the Firm trader/programmer changed the trading parameters by entering "7" into the "basis points" data field. The trader/programmer then double-clicked the up arrow in an attempt to generate cancel/replace requests for all unexecuted orders with new limit prices that were 14 basis points higher than the original orders.
14. However, instead of replacing all unfilled orders with new orders with limit prices that were fourteen basis points higher, each click resulted in the generation of a separate set of cancel/replace requests. Below is an example of the double-clicking issue:
 - Original limit order in XYZ with a limit price of P is submitted (Order A)

- Click #1 results in a replacement order in XYZ with a limit price of $P + 7$ basis points (Order A2)
 - Click #2 results in another replacement order in XYZ with a limit price of $P + 14$ basis points (Order A3)
15. The change to the SmartWB's order parameters resulted in cancel/replace messages for 38 of the 129 total securities being targeted by the SmartWB on November 14th. The majority of these cancel/replace requests were processed without incident and were ultimately filled if they were marketable or canceled if they were not. However, for the last seven of the 38 securities included in the cancel/replace requests, the cancel/replace request resulted in "reject-unmatched cancel" messages from SuperDOT, signifying that SuperDOT could not locate the orders that the SmartWB was attempting to cancel and replace. Significantly, the seven securities were all at the end of the "list" of the 38 securities for which the double-clicking resulted in cancel/replace requests.
16. When the Firm trader/programmer double-clicked to change the order parameters, the first click generated new orders for the 38 securities almost instantaneously, and the second click did the same. Because the second click occurred a fraction of a second after the first click, the algorithm did not have sufficient time to send out all of the cancel/replace requests for all of the 38 securities resulting from the first click. Below is an example of how the double-clicking issue resulted in certain messages being skipped and therefore not being sent to SuperDOT:
- Click #1 generates cancel/replace requests for securities one through 38 of the list of 38 total securities. SmartWB is only able to send requests for securities one through 31 before Click #2 occurs.
 - Click #2 generates a second set of cancel/replace requests. The requests for securities 32 through 38 resulting from Click #1 remain unsent.
 - Both sets of cancel/replace requests for securities one through 31 are processed properly and without incident.
 - For the remaining seven securities (securities 32 through 38), SmartWB only sends the most recent requests and disregards the earlier requests resulting from Click #1.
17. Therefore, for every one of the final seven of the 38 securities impacted by the change to the algorithm's order parameters, the following occurred:
- Original limit order in XYZ with a limit price of P is submitted (Order A)
 - Click #1 results in a new limit order in XYZ with a limit price of $P+7$ (Order A2), which is intended to replace Order A
 - Click #2 results in a new limit order with a limit price of $P+14$ in XYZ (Order A3) and attempts to replace Order A2 with Order A3 before SmartWB is able to send the request to replace Order A with Order A2.
 - SuperDOT rejects the request to replace Order A2 with Order A3 because SuperDOT never received Order A2 and therefore cannot locate it.

18. Because SuperDOT was unable to locate the subject of these cancel/replace requests, SuperDOT responded by issuing “reject-unmatched cancel” messages. However, the SmartWB was not programmed to properly respond to the “reject-unmatched cancel” message and therefore continued to repeatedly re-send the cancel/replace requests.
19. By the end of trading on November 14th, the SmartWB had sent approximately 600,000 cancel/replace messages. SuperDOT sent approximately 405,000 “reject-unmatched cancel” messages between 3:40 p.m. and 4:05 p.m. in response to cancel/replace requests generated by the SmartWB. The seven affected securities traded at five different trading posts on the NYSE Floor. Message traffic in all of the securities traded at these five Floor posts either slowed considerably or stopped completely.
20. Because of the high volume of unintended message traffic caused by the Firm’s SmartWB algorithm, the trading in all of the securities at these five posts was significantly disrupted, the trading for each of the securities at these posts could not be completed by their normal closing time of 4:00 p.m., and the trading in each security did not close until between 4:10 p.m. and 4:27 p.m.
21. In addition, although the messages stuck in queue for four of the five posts impacted by the increased message traffic were eventually able to be processed, for the remaining trading post, approximately 131,000 messages frozen in queue could not be processed and ultimately had to be deleted.
22. The SmartWB was not designed to generate an internal alert or error message in the event of rejected requests or unusually high message traffic. As a result, the Firm did not become aware of the rejected cancel/replace requests until the following day, when NYSE Regulation contacted the Firm.
23. The above-described activity violated NYSE Rule 401 in that Credit Suisse failed to adhere to the principles of good business practice in the conduct of its business affairs. Specifically, the Firm violated NYSE Rule 401 by implementing a proprietary algorithm that did not have appropriate checks designed to prevent the continuous submission of erroneous messages or to alert the Firm in the event of rejected messages. This allowed the algorithm to send hundreds of thousands of cancel and replace requests for orders that had not been sent to the NYSE, and resulted in the Firm failing to detect the excessive cancel/replace requests and the resulting hundreds of thousands of reject messages.

Credit Suisse’s Failure to Reasonably Supervise

24. Although Credit Suisse maintained policies and procedures that addressed issues relating to proprietary trading generally, these policies and procedures, prior to the November 14th incident, failed to specifically address the supervision of the development, testing and rollout of proprietary algorithms such as the SmartWB.

25. In addition, for the most part, the Firm trader/programmer developed, tested, and implemented the SmartWB with little supervisory oversight. Furthermore, the decision to re-program the SmartWB to allow manual changes of the limit prices was unilaterally made by the Firm trader/programmer, with no involvement or approval by an appropriate supervisor.
26. Furthermore, the Firm never implemented a “circuit breaker” or similar safeguard designed to ensure that events such as those that occurred on November 14, 2007 did not occur. For example, the hundreds of thousands of reject messages sent in response to the SmartWB’s cancel/replace requests did not generate any alert or error message within SmartWB or any other Firm system to inform the Firm that cancel/replace requests had been rejected.
27. These failures contradicted the mandates of Information Memo 02-48, which states that “all electronic order entry systems must have written internal control and supervisory procedures,” and that electronic order entry systems “should, at a minimum, incorporate . . . checks for validation of order accuracy [and] controls that monitor for duplication/retransmission of orders previously transmitted for execution.”
28. Accordingly, the Firm failed to adequately supervise, in violation of NYSE Rule 342, by failing to: (1) adequately supervise the development of the SmartWB; (2) supervise and/or test the addition of the “double-clicking” feature to the SmartWB; and (3) monitor the SmartWB for any potential issues, such as the generation of thousands of cancel and replace requests or the receipt of thousands of reject messages for orders submitted by the algorithm.

Other Factors Considered

29. The Firm, with input from the Legal and Compliance Department, has since made significant enhancements and revisions to its written supervisory policies and procedures regarding the development, testing, and operation of proprietary algorithms. These new policies and procedures address the need for supervisory and compliance involvement in the various stages of an algorithm’s development, testing, and rollout. In addition, the Firm has developed policies and procedures, including a detailed checklist, that specifically address “significant modifications” to a previously-implemented algorithm or program.
30. The Firm has also revised the SmartWB in a manner designed to prevent a recurrence of the events of November 14th. The SmartWB was reprogrammed so that manual changes to the limit prices of orders no longer require a “double click” and therefore do not result in the issuance of two cancel/replace requests for each pending order. In addition, programming has been added to the algorithm that will alert any SmartWB user if orders or messages sent by the SmartWB result in reject messages from the NYSE.

31. One other factor considered by Enforcement is that the Firm significantly aided Enforcement's investigation proactively by providing substantial technical assistance as well as data, which allowed Enforcement to expeditiously complete this investigation.

DECISION

The Hearing Officer, in accepting the Stipulation of Facts and Consent to Penalty, found that Respondent committed the offenses as set forth above.

PENALTY

In view of the above findings, the Hearing Officer, imposed the penalty consented to by Respondent of a censure and a \$150,000 fine.

For the Hearing Board

Peggy Kuo - Chief Hearing Officer