

Policy Statement | PS12/18
Algorithmic trading

June 2018



BANK OF ENGLAND
PRUDENTIAL REGULATION
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1 Overview

1.1 This Prudential Regulation Authority (PRA) Policy Statement (PS) provides feedback to responses to Consultation Paper (CP) 5/18 'Algorithmic trading'.¹ It contains the final Supervisory Statement (SS) 5/18 'Algorithmic trading' (see Appendix).

1.2 This PS is relevant to firms that engage in algorithmic trading and that are subject to the rules in the Algorithmic Trading Part of the PRA Rulebook (the 'Algorithmic Trading Part') and Commission Delegated Regulation EU 2017/589.² The SS applies to all algorithmic trading activities of a firm including in respect of unregulated financial instruments such as spot foreign exchange (FX).

1.3 For non-EEA ('third-country') firms operating in the United Kingdom through a branch, the PRA will continue to follow the approach set out in SS1/18 'International banks: the Prudential Regulation Authority's approach to branch authorisation and supervision'³ and will continue to consider the home regulator's approach to internal governance and controls. Third country firms are asked to note the PRA's policy in this area, which will inform its risk appetite and assessment of critical functions performed, or intended to be performed, in the United Kingdom.

Background

1.4 In CP5/18, the PRA consulted on a new SS on algorithmic trading. The CP set out the PRA's proposed expectation in relation to firms' governance and risk management in respect of algorithmic trading activity, summarised as follows:

- **Governance** – A firm's governing body would be expected explicitly to approve the governance framework for algorithmic trading, and its management body should identify the relevant Senior Management Function(s) with responsibility for algorithmic trading.
- **Algorithm approval process** – Firms would be expected to have a robust algorithm approval process and a minimum set of risk controls.
- **Testing and deployment** – Algorithm testing would be expected to involve all relevant risk and control functions and be carried out at a frequency, and with a level of rigour, commensurate with the risks the firm could be exposed to.
- **Inventories and documentation** – Firms would have and maintain algorithm and risk control inventories.
- **Risk Management and Other Systems and Controls functions** – These functions would be expected to understand and have oversight of the risks of algorithmic trading. Risk Management would have the authority to challenge existing risk controls on algorithmic trading where appropriate.

1 February 2018: www.bankofengland.co.uk/prudential-regulation/publication/2018/algorithmic-trading.

2 Commission Delegated Regulation (EU) 2017/589 of 19 July 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council with regard to regulatory technical standards specifying the organisational requirements of investment firms engaged in algorithmic trading.

3 March 2018: www.bankofengland.co.uk/prudential-regulation/publication/2018/international-banks-pras-approach-to-branch-authorisation-and-supervision-ss.

Summary of responses

1.5 The PRA received five responses to CP5/18. Respondents were generally supportive of the proposals for the risk management and governance of algorithmic trading, and asked for clarification and alternative wording in some areas. The PRA's feedback to the responses, final decisions and rationale for related amendments to the SS are set out in Chapter 2.

Changes to draft policy

1.6 Following consideration of respondents' comments, the PRA has made the following changes to the SS:

- **Algorithm approval process** – paragraph 3.3(c) of the SS has been amended to make it clear that the PRA's expectation is that each function that has a role in the approval of algorithms (eg Front Office, Risk Management, and Other Systems and Controls functions) should sign off on the risks relevant to them. Some respondents had interpreted this paragraph to mean that each function should sign off on all risks that an algorithm could expose the firm to.
- **Testing and deployment** – paragraph 4.5(b) of the SS has been amended to clarify that, when testing algorithms, firms are only expected to document material differences between the test environment and production environment rather than all differences. Paragraph 4.3 has also been amended in a similar manner to paragraph 3.3(c) to clarify that functions signing off on risk controls are only expected to sign off on those which are within their remit.
- **Inventories and documentation** – in a change to paragraph 5.2(c) of the SS, the expectation is that inventories and documentation will be available, rather than 'immediately available', to all personnel who have responsibility for the oversight of algorithmic trading.

1.7 The PRA does not consider these changes to be significant and, as a result, its pre-consultation assessment of the impact on mutuals and its cost benefit analysis are unchanged.

Implementation

1.8 The expectations in SS5/18 will take effect from Saturday 30 June 2018.

1.9 Any remediation work required by firms to meet the expectations after Saturday 30 June 2018 will be taken forward through the PRA's normal supervisory activities.

2 Feedback to responses

2.1 The PRA is required by the Financial Services and Markets Act 2000 (FSMA) to have regard to any representations made to the proposals in a consultation, and to publish an account, in general terms, of those representations.

2.2 The sections below have been structured broadly along the same lines as the chapters of the CP as follows:

- Scope of rules and guidance covered by the expectations;
- Implementation date;
- Governance;
- Algorithm approval process;
- Testing and deployment;
- Inventories and documentation; and
- Risk Management and Other System and Controls functions.

Scope of rules and guidance covered by the expectations

2.3 A number of respondents were unclear on the range of rules and guidance that the proposed expectations in the draft SS related to. A number in particular focused solely on the interaction of the expectations with the Markets in Financial Instruments Directive 2014/64/EU ('the MiFID II Directive').

2.4 The SS does not relate solely to the MiFID II Directive. In addition to the Algorithmic Trading Part, it should be read alongside:

- Commission Delegated Regulation (EU) 2017/565 on organisational requirements and operating conditions for investment firms;¹
- The General Organisational Requirements Part and Risk Control Part of the PRA Rulebook;
- European Securities and Markets Authority (ESMA) Guidelines on systems and controls in automated trading environment trading platforms;²
- Joint ESMA and European Banking Authority (EBA) Guidelines on the assessment of suitability of members of the management body and key function holders;³ and
- EBA Guidelines on internal governance.⁴

Paragraph 1.1 of SS5/18 provides further clarification.

1 Commission Delegated Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive.

2 www.esma.europa.eu/sites/default/files/library/2015/11/esma_2012_122_en.pdf.

3 www.eba.europa.eu/documents/10180/1972984/Joint+ESMA+and+EBA+Guidelines+on+the+assessment+of+suitability+of+members+of+the+management+body+and+key+function+holders+%28EBA-GL-2017-12%29.pdf.

4 www.eba.europa.eu/documents/10180/1972987/Final+Guidelines+on+Internal+Governance+%28EBA-GL-2017-11%29.pdf/eb859955-614a-4afb-bdcd-aaa664994889.

Implementation date

2.5 Two respondents commented that it may not be possible for firms to meet all expectations in the SS by the proposed implementation date of Saturday 30 June 2018. As described above, if necessary, the PRA will take forward any remediation work with firms after this date as part of normal supervisory activities.

Governance

2.6 Two respondents argued that, due to the fact that algorithmic trading can be part of a range of individual businesses of varying size, with their own risk management frameworks appropriate to their business model, requiring a separate firm-wide algorithmic trading governance framework that does not include the context of each business in which it operates could mean business-specific risks are missed.

2.7 The PRA agrees that there are cases where governance frameworks should be tailored to business models. SS5/18 sets out high-level expectations for a firm-wide algorithmic trading governance framework. These are minimum expectations and therefore a firm can go beyond them where appropriate. For example, the expectations do not preclude the governance framework incorporating more detailed elements at individual business level in addition to the expectations outlined.

Algorithm approval process

2.8 Two respondents suggested that the proposal related to the algorithm approval process should only be applied for 'substantial updates' to algorithms rather than any customisation of, or amendment to, existing algorithms.

2.9 SS5/18 sets an expectation that approval processes are applied for any amendment or customisation of existing algorithms, but allows that the process be commensurate with the risks the firm could be exposed to via the algorithm. So a firm may choose to have different approval requirements depending on the algorithm's use, and where relevant the materiality of the customisation or amendment being made. A firm is therefore able to decide to have different requirements for a substantial compared to a non-substantial update of an algorithm. Given that this flexibility was already in the proposed the SS, the PRA has not made any changes in this regard.

2.10 One respondent had interpreted the proposal that relevant functions sign off on the risks that an algorithm exposes a firm to – set out in paragraph 3.3(c) of SS 5/18 – to mean that all relevant functions had to sign off all risks. The PRA has amended paragraph 3.3 (c) to make clear that each relevant function (eg Front Office, Risk Management, Other Systems and Controls functions) should sign off only on the risks relevant to them. A similar change has been made to paragraph 4.3 that relates to expectations on the sign-off of risk controls by relevant functions.

2.11 One respondent commented that the term 'periodically' in the requirement of paragraph 3.5 of the draft SS to 'periodically assess kill-switch controls to ensure they operate as intended' was unclear and that the assessment should be annual. The PRA considers that the appropriate frequency for assessing these controls will depend on their importance to the overall control framework. Therefore setting an annual frequency may not be appropriate, and a more flexible approach is required. The term 'periodically' has been retained in the SS to allow firms flexibility in determining the frequency of assessment.

Testing and deployment

2.12 One respondent suggested that the proposal that the testing of an algorithm include the impact of any differences between the test environment and production environment could be unduly onerous due to the potentially large number of minor differences between the environments. After consideration of this concern, the PRA has decided to alter the wording of paragraph 4.5(b) of SS 5/18 to refer to 'material differences' instead of 'all differences'.

2.13 A number of respondents commented that it could be difficult practically to meet the proposal that testing of algorithms be undertaken by a competent team that was not involved in the development (including implementation) of the code. SS5/18 does not require that the testing team be in a separate part of the firm to the developing team. For example both teams can be in the Front Office. The PRA therefore believes that there is sufficient flexibility in the SS to prevent this expectation being onerous on firms. The PRA believes it is important that the testing be undertaken by a team independent of those involved in the development of an algorithm.

2.14 Respondents also argued that regional variations in algorithms should not be considered as new algorithms in all cases and therefore subject to testing and approval - the regional changes to an algorithm may be minor. The PRA believes that minor changes, if incorrectly implemented, can still result in an algorithm performing in an unintended manner and potentially expose firms to material risks. Thus, testing of these variations is important and no amendment has been made for this feedback. The SS, however, allows flexibility to tailor the level of testing and approval process based on the materiality of the variation.

Inventories and documentation

2.15 Two respondents suggested that rather than expecting a single inventory of algorithms and risk controls at each firm, there should be flexibility to have multiple inventories, for example one for each business area. The PRA has observed that multiple standalone inventories can be challenging to maintain, and can mean they are less easily accessible to all relevant functions. A single inventory overcomes these issues, and allows for cross-referencing of the controls applied to similar algorithms across a firm. Therefore, the PRA has maintained this expectation in the final SS.

2.16 One respondent suggested that the wording of the expectation that firms update inventories and documentation annually should reflect the fact that changes may not be required every year. The PRA agrees that this should be clarified, and therefore the wording of this expectation in para 5.2(b) of the SS has been changed from 'updated at least annually' to 'reviewed at least annually and updated if necessary'.

2.17 Two respondents argued that the expectation in paragraph 5.2(c) of the proposed SS that inventories and documentation should be accessible immediately by the firm's personnel was unclear. The PRA agrees that 'immediately' could be misinterpreted, and has therefore removed this from the SS.

2.18 Respondents also commented that the proposed list of minimum attributes to be included in the inventory of risk controls – specified in paragraph 5.4 of the proposed SS – was too prescriptive and instead should be left to the discretion of firms. The PRA considers that having a common set of minimum attributes is important to ensure a consistent level of detail across firms, and that the attributes defined in the SS are necessary to allow an assessment of each risk control. No change has therefore been made to this part of the SS.

Risk Management and Other Systems and Controls functions

2.19 A number of respondents commented that it was not feasible to obtain details of competitors' algorithms in order to comply with the expectation in paragraph 6.6 of the proposed SS that the Risk Management function should manage the potential concentration of risk arising from counterparties using similar algorithmic trading strategies. The PRA notes that the expectation is not for a firm to obtain details of competitors' algorithms, but rather for Risk Management to consider the risks that could arise from similar strategies being employed by other firms, and to consider ways to mitigate them. We consider this sufficiently clear in the original text and the PRA has therefore made no change in the final SS.

2.20 One respondent commented that the Risk Management function may not have the expertise in order to meet the expectation in paragraph 6.10 of the proposed SS that Risk Management identify, assess, and report the risks from algorithmic trading system architecture. The same respondent highlighted that the mitigation plans developed in association with this assessment may be performed by other parts of the firm. In both regards, the PRA considers this is a misunderstanding of the expectations. Risk Management is free to utilise expertise in other areas if required in order to make an informed assessment of risks, and functions other than Risk Management can own mitigation plans. The PRA's expectation, however, is that the Risk Management function retains overall responsibility for these processes.

Appendix

**Supervisory Statement 5/18 'Algorithmic trading' available at:
www.bankofengland.co.uk/prudential-regulation/publication/2018/algorithmic-trading-ss.**