5. Micro-structural issues

5.1. Algorithmic and high frequency trading (HFT)

Background/Mandate

Extract from the Commission's request for technical advice (mandate)

ESMA is invited to provide technical advice to further specify on the definition of what should be considered algorithmic trading as opposed to high frequency algorithmic trading technique to ensure a uniform application of the authorization requirement for persons that engage in high frequency algorithmic trading technique taking into account the need to capture all genuine high frequency traders.

1. The concepts of "algorithmic trading" and "high frequency algorithmic trading technique", as they appear in the Commission's mandate, are defined under Articles 4(1)(39) and (40) of MiFID II:

   i. Article 4(1)(39) of MiFID II defines algorithmic trading as "trading in financial instruments where a computer algorithm automatically determines individual parameters of orders such as whether to initiate the order, the timing, price or quantity of the order or how to manage the order after its submission, with limited or no human intervention, and does not include any system that is only used for the purpose of routing orders to one or more trading venues or for the processing of orders involving no determination of any trading parameters or for the confirmation of orders or the post-trade processing of executed transactions";

   ii. Similarly, Article 4(1)(40) of MiFID II defines high frequency algorithmic trading technique as "an algorithmic trading technique characterised by: (a) infrastructure intended to minimise network and other types of latencies, including at least one of the following facilities for algorithmic order entry: co-location, proximity hosting or high-speed direct electronic access; (b) system-determination of order initiation, generation, routing or execution without human intervention for individual trades or orders; and (c) high message intraday rates which constitute orders, quotes or cancellations".

2. Recital 61 states that high frequency trading (HFT) is a specific subset of algorithmic trading. Pursuant to Article 2(1)(d)(iii) of MiFID II any person that applies a high frequency algorithmic trading technique is required to be authorised as an investment firm. Therefore it is necessary to distinguish between these two concepts to ensure the uniform application of the authorisation requirement. Recital 63 further explains that it is desirable to ensure that all high frequency algorithmic trading firms be authorised to ensure they are subject to organisational requirements under the Directive and are properly supervised. Therefore any

further specification of the definition of “high frequency algorithmic trading technique” should be sufficiently broad to ensure that all genuine high frequency (HF) traders will be caught and dynamic enough to cope with market and technological developments.

3. Apart from what is described in the Commission’s mandate, it is relevant to note that using HFT techniques also entails other type of regulatory consequences under MiFID II. The last paragraph of Article 17(2) of MiFID II requires an investment firm that engages in a HFT technique to store, in an approved form, accurate and time sequenced records of all its placed orders, including cancellations of orders, executed orders and quotations on trading venues and to make them available to the NCA upon request.

Analysis following feedback from stakeholders

Original proposal by ESMA in the Consultation Paper

4. ESMA proposed two different approaches as regards the clarification of the HFT definition described below.

5. Under Option 1, a firm is deemed to be a HF trader if the following infrastructures designed to minimise latency and the capacity to transfer data to the venue are evidenced:

   i. the use of infrastructure designed to reduce latency such that the order messages are initiated, generated, routed, executed, amended or cancelled in proximity of the trading venue's matching engine; or

   ii. the use of infrastructure enabling a high volume of data to be transferred to the matching engine. Most markets offer higher bandwidths for latency-sensitive traders, because such enable them to achieve faster messaging or executions. On the basis of the information currently available, a bandwidth in the range of 10 Gigabit/second would be considered among the fastest provided. However, ESMA is conscious of the fact that the definition of “high bandwidth” is subject to technological change; and

   iii. the use of infrastructure resulting in a trading frequency of 2 messages per second on average should be considered as being generated by a machine/algorithm. The message volume should be monitor on a daily rolling basis based on the previous 12-month period.

   On that basis, in order to determine this threshold in absolute term (total number of messages per trading day), it would be necessary to multiply the amount of seconds available per trading day (which may vary from market to market) by 2.

   For each member, the sum of messages would then be calculated for each trading day and the moving average thereof calculated on a daily basis using the last 250 trading days. Days where a particular member/trader did not send messages at all would be

considered as having zero messages if the respective venue had been open for trading on that particular day.

6. ESMA proposed that the references to 'messages' above should be interpreted strictly, i.e. considering as one message each content that needs independent processing. On that basis, the messages to be counted for these purposes are each new order or quote, each successful change to an order or quote and each successful deletion of an order or quote. In cases of bulk transactions, every single message should be counted separately.

7. Under Option 2, each trading venue should periodically calculate the median daily lifetime of orders which have been modified or cancelled by all members/participants and the median daily lifetime of orders modified or cancelled by each individual member or participant. In cases where the median daily lifetime of the orders modified or cancelled by a members or participants falls below the median daily lifetime of orders modified or cancelled for the entire market, this member or participant would be considered as a HF trader. For this purpose 'Daily lifetime of orders' means that orders with a lifetime longer than one day should not be considered in the calculations.

8. ESMA's preliminary view was that the determination of the median daily lifetime of the orders submitted to the trading venue by all members/participants should only be made for liquid instruments, in which HFT is more frequent. Therefore, it was originally proposed that only orders regarding instruments considered as liquid following Article 2(1)(17) MiFIR should be considered for these purposes.

9. In order to calculate the median daily lifetime of the orders submitted by each member/participant it would be possible to consider either only those orders submitted for liquid instruments or all orders submitted to the trading venue (i.e. liquid and illiquid instruments, which might simplify the calculations because it would not be necessary to disentangle the activity of a member/participant relating to liquid instruments).

10. ESMA's preliminary view was that once a firm is deemed as a HF trader in one market, it should be considered as such for all trading venues in the EU.

11. Under Option 2, it would also be necessary to meet the MiFID II provisions, i.e. there has to be infrastructure to minimise latency (co-location, proximity hosting or high speed DEA) and system determination of order initiation, generation, routing or execution. Therefore, under this proposal, a trading venue that does not meet the Level 1 conditions would not be covered by either of the two options.

Feedback received from stakeholders

12. The majority of respondents supported Option 1 as they considered this proposal was:

    i. more straightforward;

ii. similar to the rule implemented and proven feasible in Germany; and

iii. based on the activity of investment firms rather than being dependent on the activity of other market participants.

13. Nevertheless, many of these respondents also considered that the threshold proposed (2 messages per second) was too low and that many large firms that were non-HFT would be captured by this threshold. A significant number of respondents considered that the calculation should be made on a per instrument/symbol/contract basis rather than on a per venue basis, due to the wide range of products traded on a single venue and the risk of large non-HFT firms being caught by trading simultaneously on multiple products. This would be particularly significant for firms trading derivatives, given the characteristics of these products.

14. Criticisms of Option 1 were based on the following arguments:

i. It included a qualitative criterion (directly proximate), which is open to arbitrary interpretation;

ii. Its quantitative thresholds could become obsolete due to technological changes, and as a consequence, they would need to be revised frequently;

iii. The number of daily transactions could easily be circumvented;

iv. The reference to a high bandwidth should be substituted by a reference to the speed of the connection available as, according to these respondents, the key for HF traders is speed and not capacity.

15. The main arguments cited by the respondents supporting Option 2 were the following:

i. Focus on relative metrics (“median order duration”) which remain applicable as technology evolves;

ii. Could not be circumvented easily;

iii. Could be calculated by the trading venues without an input from the investment firms.

16. The criticisms of Option 2 brought forward by other respondents focused on:

i. The need for a “floor”, otherwise under Option 2 every trading venue would have HFT participants. This would lead to a situation where non-algorithmic participants with the lowest median daily lifetime of orders in non-algorithmic trading venues would be considered as HF traders;

ii. As it is based on a relative criterion, the calculation is strongly impacted by the speed and behaviour of other market participants trading on the same trading venue. It also

makes this criterion difficult to implement, maintain and administer because its parameters cannot be easily predicted;

iii. It would require firms to constantly assess their HFT status and result in a number of participants falling in and out of the HFT definition – this makes HFT obligations (e.g. maintenance of raw audit trail) very difficult to implement and makes it hard for firms to maintain awareness of their status during periods of growth and change;

iv. It would be easy to game by entering orders that stay longer in the book with the objective of increasing the median;

v. A consistent implementation in all trading venues might be complex and might require a harmonised technical implementation.

17. A significant number of respondents expressed strong reservations on both options in isolation. Some of these proposed combining the two options where both tests for high intraday message rates within Option 2 and Option 1 should be met.

18. Moreover, there were other technical comments with regards to the practical implementation of the above mentioned calculations:

    i. Some respondents noted that the calculation should be made on a per member/trading ID basis. However, other respondents also stress that ESMA should consider how the client is dealt with in the calculation (DEA or other client) and suggest to use the client ID and not the member/trader ID to perform the calculations. In particular, it was suggested considering separately the DEA flow of the member or participant of the trading venue.

    ii. Regarding the messages used for the calculations, it was indicated that:

        a. Only messages generated by the member or participant, not by the trading venue (internal system messages) should be taken into account. A particular case raised in this respect related to immediate or cancel (IOC), fill or kill (FOK) and book or cancel (BOC) orders where the cancellation message is generated by the trading venue, not the trading member. Respondents also suggested double counting of quotes on the other side and mass quotes.

        b. Only firm (directly executable) quotes should be considered for the calculations.

Algorithmic trading: further specification of the definition

19. When revising its proposals for the identification of HFT, a number of additional trading parameters were proposed by market participants:

i. Some respondents distinguished two types of processes that should be considered separately for the concept of “algorithmic trading” and HFT: automated trading decisions and optimisation of order-execution processes. These respondents noted that high frequency trading differs from algorithmic trading in that both processes are fully automated and synchronous;

ii. Adding a high order-to-trade ratio;

iii. Majority of aggressive orders;

iv. Turning inventory over frequently every day without holding a significant inventory at the end of the day;

v. Using advance technologies to manage latency such as GPUs and FPGAs or advanced coding techniques to avoid non-usable information in Java or C+.

20. ESMA agrees that there are two types of processes that should be considered separately for the clarification of “algorithmic trading” and HFT: automated trading decisions and optimisation of order-execution processes. In this respect, ESMA notes that:

i. Algorithmic trading refers not only to the generation of orders but also to the optimisation of order-execution processes by automated means once the buy-and-sell decisions have been made by automated means or not. Therefore, algorithmic trading may still take place when the trading decision has been made by a person. This is consistent with the wording of Article 4(1)(39) of MiFID II whereby a computer algorithm automatically determines “individual parameters of orders”, i.e. also once the investment decision has been made;

ii. There is limited or no human intervention (and therefore algorithmic trading) when the system at least makes independent decisions at any stage of order-execution processes, either on initiating, routing or executing orders. It is noted that the reference to “orders” encompasses “quotes” as well.

iii. In particular in the case of HFT, both processes (trading decisions and optimisation of order-execution) are fully automated and synchronous, as highlighted by some respondents to the consultation. This is consistent with the wording of Article 4(1)(40) of MiFID II where it indicates that HFT encompasses “system-determination of order initiation, generation, routing or execution without human intervention for individual trades or orders”;

21. The use of algorithms which only serve to draw the trader’s attention to a particular situation is not considered as algorithmic trading. Thus, for example, the use of chart software which is programmed to chime or deliver a pop-up message whenever the price of a certain trad-

ing instrument intersects with the rolling average, without then automatically making a decision on issuing, amending or cancelling orders, is not seen as algorithmic trading.

22. Reference was made to the use of smart order routers in the responses to the consultation. In this respect, ESMA considers necessary to clarify the different scope of the concepts of Automated Order Routing and Smart Order Routing and specify whether they should be considered within the concept of "algorithmic trading".

23. Automated Order Routers (AOR) encompass those functionalities that determine the trading venue/s where the order should be submitted without changing any other trading parameter of the order. These functionalities often use algorithms and could thus be considered as algorithmic trading. However, Article 4(1)(39) of MiFID II explicitly excludes them from the definition of algorithmic trading if they only decide about the venue to which the orders should be routed. AORs defined as such are out of the scope of "algorithmic trading".

24. Smart Order Routers (SORs) are algorithms used for optimisation of order execution processes that may also determine additional parameters of the order other than determining the venue/s where the order should be submitted. In particular, SORs are able to slice the original order into "child orders" or determine the time of submission of the order or the "child orders". Examples of SORs would be trigger-contingent or delayed start time for an order; a trailing stop-loss order; orders contingent upon entry based on other instrument data and iceberg functionalities. SORs fall within the definition of "algorithmic trading" and the relevant MiFID II articles should apply to them.

High Frequency Algorithmic Trading Technique: revision of the original proposals and testing of the different approaches

25. While acknowledging the value that the alternative proposals put forward by market participants may have, ESMA does not advise including these parameters as a proxy for the identification of high intra-day rates because they may represent challenges in terms of detection by trading venues (for instance, a trading venue cannot know whether the trading decision and the optimisation of order-execution are synchronous) or in terms of harmonisation (there is no harmonised order-to-trade ratio that could be used as a common reference across Europe) and they would not capture all HFT strategies.

26. ESMA also acknowledges that the Commission's mandate indicates that "any further specification of the definition of "high frequency algorithmic trading technique" should be sufficiently broad to ensure that all genuine HF traders will be caught and dynamic enough to cope with market and technological developments".

27. At the same time, ESMA has considered the technical arguments put forward by respondents. In particular, ESMA acknowledges:

i. The comments received from a number of respondents indicating that both approaches might lead to “false positive” (non-HFT firms considered as such) and “false negatives” (HFT firms not considered as such); and

ii. The comments received by opponents to both approaches in relation to the possibility of “gaming” any of them.

28. So as to address the concerns reflected in the responses to the consultation, ESMA has used the database collected for the identification of HFT[101] to test the validity of the approaches described above. It took into account ESMA’s research carried out with this database: A sample of 100 stocks traded in BE, DE, ES, FR, IE, IT, NL, PT and UK during May 2013. The high heterogeneity of stocks in the sample can be used to analyse to what extent HFT activity is correlated with market value, value traded and fragmentation. The data collected cover 12 trading venues.

29. It is noted that the dataset is not complete in terms of instruments covered and venues. Therefore, the final results may diverge in case of using a complete dataset.

30. In line with what is described in this research, ESMA notes that there is no generally agreed proxy of HFT that can be used operationally. As a consequence, several different approaches have been identified, that could be classified into three categories:

i. Direct approach, which relies on the identification of market participants based on their primary business (determined using the information available on the firms’ websites, business newspapers articles and industry events) or the use of co-location. The main drawback of this approach is that the dataset is not fully accurate: it does not include investment banks with HFT desks and in some cases the information about co-location is incomplete or inexistent (some trading venues did not have co-location facilities or these were outsourced to third parties and the data was not collected);

ii. Indirect approach, uses patterns in trading and quoting as a proxy for HFT; and

iii. Identification of strategies uses orders and trades to classify algorithms (market making, statistical arbitrage, momentum ignition, etc.)

31. On the basis of the responses received to the consultation ESMA has reworked the original proposals and tested them where possible against the identification of HFT using the direct approach.

[101] For further information about the data sample, see ESMA Economic Report “High frequency trading activity on EU equity markets”, December 2014, available in http://www.esma.europa.eu/page/CEMA-Documents.

32. This document explains the results of ESMA's analysis, without making a specific recommendation for one option or the other. Detailed results of this work will be also available in the ESMA Economic Report on High Frequency Trading activity on EU equity markets to be published by ESMA.

33. Taking the sample of data used for the ESMA survey, each market participant was flagged as "HFT", "investment bank" or "others" using a Direct Approach as described above. This means that for each of the stocks of the sample it was possible to identify the activity of different members/participants belonging to the categories referred above. Comparing HFT identification under Option 1 and Option 2 against the Direct Approach is useful, as the Direct Approach is likely to provide a lower bound for HFT activity[102].

Testing a modified version of Option 1 in the Consultation Paper [Absolute threshold per instrument]

34. ESMA has considered responses to the consultation which noted that making the calculations on a "per venue" basis would penalise big brokerage houses and firms trading multiple products on a venue while not capturing an investment firm effectively using a HFT strategy with a faster message rate per product if that firm's strategy is focused on a single product only.

35. Another issue worth mentioning is that setting a unique message threshold on a per venue basis will lead to more activity captured as HFT on large trading venues than on small trading venues, as it is easier to pass the message threshold on a large trading venue where a larger number of shares is traded than on a small trading venue.

36. Therefore, ESMA has considered a modified version of Option 1 [Absolute threshold per instrument] which considers that there is a "high message intra-day rate" where the market participant submits at least 2 messages per second with respect to any single instrument traded on a venue.

37. ESMA undertook the following analysis:

    i. Firstly, ESMA identified 1,211 members in different European trading venues[103] that were labelled as HF trader/Investment Bank/Other under the direct approach and were active at least once during the observation period (May 2013).

[102] The direct approach based on the identification of HFT firms according to their primary business provides a lower bound for HFT activity, as it does not capture HFT activity by investment banks.
[103] By construction, each member is different in each trading venue, including those venues that belong to the same holding.

Over the entire population of HFT, Investment Banks and Others, ESMA applied monthly the approach originally proposed in the Consultation (i.e. 2 messages per second in the ISINs covered by the sample), however on a stock-by-stock basis.

As being qualified as HFT affects the members' overall activity, and not only their activity in one particular instrument, ESMA determined which members fulfilled at least in one stock the abovementioned criterion. Those members meeting the proposed HFT identification criterion will be considered as HFT for their activity in all stocks (regardless of this member fulfilling the criterion in that particular stock).

Table 1 below show the results after applying the initial proposal of 2 messages per available second to an original population of 1,211 members in different venues (181 of them qualified as HFT under the direct approach) that met the criterion at least once for the stocks in the sample.

It was found that only 21 of those members had sent a number of orders that is at least higher than 2 times the available seconds in a particular stock. Of these 21 firms, 16 were classified in the Direct Approach as HFT firms, and 5 of them as Investments Banks.

ESMA tested again the threshold with less stringent time multipliers (1.5 per second, 1 per second and so forth) obtaining results that get closer to the number of combinations using the direct approach.

Table 1: Number of members[104] that fulfil the filter in at least one stock for different time multipliers

Message traffic approach. Number of firms classified as HFT under different thresholds C.1

Direct approach	Total Population	Threshold value						
		2	1.5	1	0.75	0.5	0.25	0.1
HFT	181	16	24	30	37	40	57	75
IB	319	5	7	16	20	30	59	96
Other	711	0	1	1	1	2	7	12
All	1211	21	32	47	58	72	123	183

Note: Total population column contains the number of firms in each of the available categories according to the Direct approach. Columns under "Threshold value" indicate the number of firms that are classified as HFT according to the message traffic approach.

Source: ESMA.

ii. Secondly, ESMA has identified the percentage of trading that corresponds to those firms considered as HFT after applying the 2-messages per second threshold (and subsequently, less demanding thresholds thereof). From that perspective, the identified 21 firms categorised as HFT account for 13% of trading volumes in the stocks of the sample during the analysed period (May 2013).

[104] By construction, each member is different in each venue. Thus, a company that was member in two venues would be considered twice in this table.

Table 2: Percentage of total value traded by members that have been classified as HFT using different time multipliers

Message traffic approach. Activity classified as HFT under different thresholds. Upgrade rule								C.1
		Threshold value						
Direct approach	Total Value Traded	2	1.5	1	0.75	0.5	0.25	0.1
HFT	24	9	11	13	16	16	18	20
IB	61	4	6	12	13	17	28	42
Other	15	0	0	0	0	0	1	2
All	100	13	18	25	30	33	47	63

Note: % of value traded to total value traded. Total value traded considers all the activity by members using only their classification by the Direct approach. Columns under "Threshold value" indicate the % of value traded to total value traded in the sample that is classified as HFT according to the message traffic approach after using the upgrade rule, i.e. considering as HFT any activity of a firm that was considered as such in at least a stock.

Source: ESMA.

iii. It is noted that a significant number of respondents supported a combination of Options 1 and 2 setting more demanding thresholds under Option 1. On the basis of the analysis undertaken, it is highlighted that:

   a. Any combination of those approaches will necessarily lead to a further reduction of the HFT identified increasing the difference between the number of HFT identified using the direct approach and the number of HFT identified using Option 1 and Option 2 cumulatively;

   b. Setting a more demanding threshold under Option 1 (e.g. 4 messages per second) will also decrease the population of HFT captured significantly.

38. As already mentioned, setting a unique message threshold on a per venue basis will lead to more activity captured as HFT on large trading venues than on small trading venues. Thus, if the Commission considers proceeding with a threshold of messages per venue, these thresholds may need to vary in accordance with the number of liquid instruments traded on various venues.

Alternative proposal based on Option 1 of the Consultation Paper [Absolute threshold per trading venue and per instrument]

39. One of the weaknesses of option 1 modified described above is that a firm may exhibit a high intra-day message rate, but just below the single instrument threshold, across a range of products and hence not be classified as HFT. Therefore, ESMA has also considered an alternative proposal based on Option 1, the absolute threshold per trading venue and per instrument, which considers that there is a "high message intra-day rate" where the market participant submits at least 4 messages per second with respect to all instruments across a venue or, where the market participant submits at least 2 messages per second with respect to any single instrument traded on a venue.

40. This approach looks to ensure that a greater proportion of firms exhibiting a "high message intra-day rate" are identified as such. The single instrument messaging calculation looks to identify firms that are extremely active in a single product. A number of respondents noted that they felt this was an important hallmark of HF traders. To address this concern, ESMA proposes a lower messaging threshold to be applied to messaging activity on a single instrument basis only. If, however, this approach is not combined with a higher threshold for messaging activity, aggregated at a trade venue level, the definition may be more easily circumvented. Following a single instrument approach leaves the potential scenario where a firm is extremely active, but just below the thresholds outlined, on all instruments across a venue, and is not identified as exhibiting a "high message intra-day rate". To mitigate this scenario ESMA has outlined a separate, and higher, messaging threshold for messaging activity to be aggregated at a trading venue level.

41. Investment firms would be defined as HFT firms on a rolling basis under this approach and the determination would be made using the preceding 12 months' trading data. Testing this approach has not been possible as it would require the trading data of all participants, across all venues, to identify firms as HFT. It is likely, however, to result in a higher proportion of firms being identified as HFT under option 1 as there is an additional threshold with which to capture HFT activity.

Testing Option 2 of the Consultation Paper [Relative threshold]

42. ESMA undertook the following analysis:

    i. Over the entire population of 1,211 members in different European trading venues that were labelled as HFT/Investment bank/Other under the direct approach and were active at least once during the observation period (May 2013), ESMA applied the criterion originally proposed in the Consultation Paper: the median daily lifetime of the orders submitted by one member fell below the median daily lifetime of all orders submitted. Again, it has to be noted that more inclusive filters increase as well the risk of having "false positives" (firms wrongly classified as HFTs) and less inclusive filters increase the risk of having "false negatives" (HFTs not captured as such).

As being qualified as HFT affects the members' overall activity, and not only its activity in one particular instrument, ESMA determined which members fulfilled at least in one stock the abovementioned criterion. Those members are considered as fulfilling the proposed HFT filter, and all their activity in different stocks (regardless of this member fulfilling the filter in that particular stock) will be considered as executed by a member with HFT capacities.

Table 3 below shows that from an original population of 1,211 members (181 of them qualified as HFT under the direct approach) that had traded at least once in one of the stocks in the sample, the population reduces to 565 if one considers those whose median lifetime of orders falls immediately below the median daily lifetime of the entire orders [<50 percentile] submitted to that particular stock (represented in the table as 50 percentile):

a. 153 correspond to firms identified as HFT using the Direct Approach;

b. 221 correspond to firms identified as Investment Bank using the Direct Approach; and

c. 191 correspond to firms identified as Others using the Direct Approach.

To calibrate this filter, alternative thresholds have been used and their results reported. Instead of using the median daily lifetime of orders in this particular stock, lower percentiles have been used (10^{th}, 20^{th}, 30^{th} and 40^{th}). These are stricter identification criteria, thus the number of identified HFT decreases.

Table 3: Number of members that fulfil the filter in at least one stock for different percentiles of lifetime (by stock)

Lifetime of orders relative approach. Number of firms classified as HFT under different thresholds						C.1
		Threshold value				
Direct approch	Total Population	10th Percentile	20th Percentile	30th Percentile	40th Percentile	50th Percentile
HFT	181	61	84	118	145	153
IB	319	40	75	123	162	221
Other	711	21	57	92	131	191
All	1211	122	216	333	438	565

Note: Total population column contains the number of firms in each of the available categories according to the Direct approach. Columns under "Threshold value" indicate the number of firms that are classified as HFT according to the relative lifetime approach.

Source: ESMA.

ii. Following on from this, ESMA has identified the percentage of trading that corresponds to those firms considered as HFT after applying the Option 2 approach (and subsequently, more demanding thresholds thereof). From that perspective, the identified 565 firms categorised as HFT account for 78% of value traded in the stocks of the sample during the analysed period (May 2013).

Table 4: Percentage of total value traded by members that has been classified as HFT using different percentiles of lifetime (by stock)

Lifetime of orders - relative approach. Activity classified as HFT under different thresholds. Upgrade rule						C.1
		Threshold value				
Direct approch	Total value traded	10th Percen-tile	20th Percen-tile	30th Percen-tile	40th Percen-tile	50th Percen-tile
HFT	24	9	13	18	21	22
IB	61	7	16	26	34	47
Other	15	0	2	3	4	8
All	100	16	31	47	59	78

Note: % of value traded to total value traded. Total value traded considers all the activity by members using only their classification by the Direct approach. Columns under "Threshold value" indicate the % of value traded to total value traded in the sample that is classified as HFT according to the relative lifetime approach after using the upgrade rule, i.e. considering as HFT any activity of a firm that was considered as such in at least a stock.

Source: ESMA.

43. On that basis, and provided that the Commission decides to follow this approach, it is recommended considering a member or participant in a trading venue having a "high message intraday rate" where the median daily lifetime of its modified or cancelled orders falls under a certain threshold to be set between the 40th and the 20th percentiles of the daily lifetime of modified or cancelled orders from all members or participants on that trading venue.

Other considerations

44. The mandate received by ESMA only refers to the provision of "technical advice to further specify on the definition of what should be considered algorithmic trading as opposed to high frequency algorithmic trading technique to ensure a uniform application of the authorisation requirement for persons that engage in high frequency algorithmic trading technique taking into account the need to capture all genuine high frequency traders".

45. However, from the responses received arises a number of issues worth considering in isolation: the limitation of the scope; timing of calculations; order flow to be considered for identifying HFT; whether a firm caught by the HFT definition for one instrument in one venue should be considered as such for other instruments or venues and how should firms cap-

tured under the concept of "market making strategy" under Article 17 of MiFID II be considered for these purposes.

Limitation of the scope

46. MiFID II does not contain any limitation in terms of scope for the determination of high frequency trading and the effects thereof. However, while acknowledging that high frequency trading strategies can be implemented in illiquid instruments, empirical evidence indicates that there is more HFT activity in very liquid stocks with high market values ("blue chips")[105].

47. When asked in the context of Option 2 about a limitation of the scope to liquid instruments, many respondents only took the opportunity of this question to reiterate their support for option 1. In their views, option 2 would:

    i. Allow participants to circumvent the rules (by ceasing to trade for a few days or slowing down trading when the median rises too high);

    ii. Enable big market participants to influence on the status of other trading participants; and,

    iii. Restrain the development of new (or existing low-volume) products for which they are only a few firms trading increasing the risk to qualify as an HFT for those products.

48. For those who effectively answered the question, 4 respondents agreed with taking into account only orders sent for liquid instruments while 4 others favoured the inclusion of all instruments which would, in their views, greatly simplify monitoring and compliance.

49. Lastly, it should be noted that for many respondents, should option 2 be preferred, the median should be calculated at market or even at instrument level.

50. Nevertheless and in case any of the options described above is preferred by the Commission, ESMA still recommends that at least in a first phase (considering as such until the assessment of the report foreseen in Article 90(1)(c) of MiFID II) the identification of HFT should be focused on liquid instruments. In this way, it is possible to address the concerns of those respondents that pointed out the need for a "floor", to avoid a situation where in non-algorithmic trading venues those non-algorithmic participants with the lowest median daily lifetime of orders would be considered as HFTs.

Timing of calculations to determine whether one firm should be considered as HFT

[105] See ESMA Economic Report indicated above.

51. Option 1 proposed a determination of the threshold on a rolling basis per trading day based on the previous 12-month period, whereas Option 2 did not propose a specific periodicity for the analysis of the median daily lifetime of the order.

52. One of the points raised by the responses received against Option 2 was the uncertainty that the calculation may raise to market participants, as they should keep control of their status as registered HFT in particular in a context where that registration would depend on the performance of the rest of the market. So as to address these concerns, it is recommended that in case option 2 is followed, the calculations should be made on an annual basis by the trading venues jointly with the annual transparency calculations.

Order flow to be considered for identifying HFT

53. A number of respondents were concerned that aggregating messaging activity at trading venue level would incorrectly identify firms acting on behalf of a large number of clients as high frequency traders.

54. Firms trading algorithmically must, under Article 25 of MiFIR, retain relevant data relating to all orders and all transactions in financial instruments which they have carried out, whether on own account or on behalf of a client.

55. In that context, and regardless of the approach followed by the Commission to identify high frequency trading, it is proposed that if an investment firm is classified as HFT, the firm may challenge this classification if it believes this is a direct result of its non-proprietary messaging flow.

56. Investment firms shall analyse the records above to determine the level of messaging activity which is attributable to the proprietary activity of the investment firm, and the level which is attributable to the clients of the investment firm. Under this approach, the investment firm should provide this summary to the relevant competent authority which would determine whether the firm has been incorrectly identified as exhibiting a “high intra-day message rate”.

57. One benefit of pursuing this approach is that it may identify clients that exhibit a high message intra-day rate that are not direct members of a venue.

Situation of market makers with respect to the identification of HFT

58. As indicated above, ESMA is recommending at a first stage limiting the identification of HFT to liquid instruments.

59. This temporary limitation would address, at least partially, one of the concerns expressed by a number of respondents which suggested excluding market makers who are subject to a Continuous Quoting Obligation by virtue of a binding written agreement. As a consequence,

firms engaged in market making obligations in illiquid instruments following an agreement signed with the issuer should be excluded from the eventual classification as HFTs.

60. However, the main concern of a significant number of responses to the CP was the situation of firms which run "market making strategies" as defined by Article 17(4) of MiFID II as this is one of the most typical HFT strategies (as indicated by Recital 61 of MiFID II).

61. Firms engaged into a "market making strategy" will have to sign a "market making agreement" following Articles 17(3) and (4) and Article 48(2) and (3) of MiFID II[106].

62. ESMA considers that extracting market makers under the provisions of Article 17 and 48 of MiFID II would limit excessively the scope of application of the relevant provisions because:

    i. The purpose of MiFID II is to impose additional controls on those firms which effectively exploit HFT techniques (and therefore, it addresses market participants which have not previously engaged in a market making or liquidity provision scheme with a trading venue); and

    ii. Market making strategies are just one of the typical strategies that HF traders exploit[107].

Consequences of being captured under the HFT definition

63. In the context of option 2 ESMA consulted about the proposal whereby a firm classified as HFT in one trading venue should be considered as such in all trading venues in the EU.

64. A majority of respondents were not in favour of the solution proposed by ESMA. Arguments they provided include:

    i. ESMA's proposal overlooks the complexity of firms: firm undertaking HFT often have alternative discretionary trading and low volume strategies. A HFT strategy pursued by a firm in relation to part of its business should not characterise the entire firm as a HFT firm (e.g. might use HFT in shares but not in bonds);

    ii. ESMA's proposal could lead to misleading information: respondents point out the risk to dilute the information available and, more generally, the regulatory focus which the definition of HFT is designed to bring about on HFT activities themselves;

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[106] ESMA notes that recital (60) of MiFID II considers that the definition of "market making strategy" is independent from the definition of "market making activity" in the context of Regulation (EU) No 236/2012 of the European Parliament and the Council (the Short Selling Regulation). MiFID II addresses differently high frequency traders and market makers (see for instance recital (18), (20), (23), (50)). In particular recital (112) refers to transactions concluded through the medium of designated market makers appointed by the regulated market which are undertaken under its systems and in accordance with the rules that govern those systems.

[107] See, for instance, Aldridge, I. "High Frequency Trading", pages 165 to 197.

iii. ESMA's proposal would impose additional costs on firms: investment firms considered as performing HFT activities would face additional recordkeeping and operational costs relating to compliance with MiFID II regardless of whether the trading in question is HFT;

iv. ESMA's proposal could have negative effect on non-HFT and small venues: some venues do not offer the necessary connectivity or technicality to perform HFT and, thus, their members should not categorize as HF traders. This might also dissuade firms from becoming members of smaller venues on which they will not trade with high frequency but will nevertheless face more onerous obligations than they should for the nature of the business they engage in on those venues (e.g. low volume trading);

v. ESMA's proposal could also have side-effects: some members stress that, in the future, other pieces of European legislation could refer to the MiFID II classification and, therefore, it is very important for ESMA to be as specific as possible when defining HFT; and

vi. With regard to the correct level of assessment, these respondents consider that a definition at venue level or even at instrument level would be more appropriate.

65. On the contrary, respondents supporting ESMA's proposal welcomed the simplicity of the proposed approach which would decrease the burden of having multiple classifications for the same entity. They also stressed that HF traders are generally implementing their strategies cross-venue, for instance using the information collected on one venue to trade on another venue.

66. ESMA considers relevant to note that the points described above belong to a Level 1 discussion, i.e. the interpretation of MiFID II. As described in the CP being classified as HFT entails two main types of regulatory consequences under MiFID II: authorisation as investment firms, as prescribed by Article 2(1)(d)(iii) of MiFID II and storage in an approved form accurate and time sequenced records of all its placed orders under Article 17(2) of MiFID II.

67. MiFID II provides for a binary outcome: either a firm is considered an HFT firm or not. If a firm meets the HFT definition, the requirement described above will apply across the firm regardless of the fact that HFT strategies are employed within a part of that firm, or that they are employed only on certain venues to which the firm has an access. Therefore, the consequence of being deemed HFT would not change whether such determination is made on a per instrument, per symbol or per contract basis rather than on a per venue basis.

68. The scope of the qualified record-keeping obligations of firms engaged in HFT techniques under Article 17(2) of MiFID II is not affected by the fact of being considered as HFT or not. In line with Article 25(1) MiFIR, the records to be kept by firms should permit NCAs to fulfil their supervisory tasks under MiFIR, MAD and MAR, leading to a situation where firms have to store all elements which are necessary to understand and monitor these firms' trading ac-

tivity[108]. The sole difference between a non-algorithmic investment firm and a HFT is the format that shall be prescribed for HFTs under Article 17(2)(d) MiFID II.

69. As a consequence, ESMA considers that the identification of one firm as HFT should not be limited neither in the scope of instruments nor in its consequences.

Technical advice

1. ESMA recommends the European Commission to adopt the following clarifications with regard to the definition of algorithmic trading:

   i. "where a computer algorithm automatically determines individual parameters of orders such as whether to initiate the order, the timing, the price or quantity of the order or how to manage the order after its submission" means that automated trading decisions and the optimisation of order execution processes by automated means are included in the definition of algorithmic trading;

   ii. "with limited or no human intervention" means that arrangements are considered as algorithmic trading if the system makes independent decisions at any stage of the processes on either initiating, generating, routing or executing orders. It is noted that the reference to "orders" encompasses "quotes" as well.

   iii. "does not include any system that is only used for the purpose of routing orders to one or more trading venues or for the processing of orders involving no determination of any trading parameters" excludes automated order routers that only determine the venue(s) where the order should be submitted without changing any other parameters of the order.

2. ESMA advises the European Commission to follow one of the three options described below as proxies for the identification of "high message intra-day rates":

   i. Absolute threshold per instrument: a participant/member would be deemed to have a "high message intraday rate" when the average number of messages sent per trading day to any single liquid instrument traded on a venue is above 2 messages per second.

   ii. Absolute threshold per trading venue and per instrument: a participant/member submitting on average at least 4 messages per second with respect to all instruments across a venue or 2 messages per second traded with respect to any single instrument traded on

[108] See Discussion Paper, pages 516 to 519.

a venue would be deemed to have a “high message intraday rate”.

iii. Relative threshold: a member or participant in a trading venue would be deemed to have a “high message intraday rate” where the median daily lifetime of its modified or cancelled orders falls under a threshold below the median daily lifetime of all the modified or cancelled orders submitted to a given trading venue. If the Commission decides to follow this approach, ESMA recommends setting that threshold between the 40th and the 20th percentiles of the daily lifetime of modified or cancelled orders from all members or participants on a trading venue.

3. Whichever option the European Commission adopts, it would be necessary to meet the requirements described in Article 4(1)(40) of MiFID II in terms of infrastructure intended to minimise network and other types of latencies.

4. In case any of the options described is preferred by the Commission, ESMA also recommends that:

   i. at least in a first phase (considering as such until the assessment of the report foreseen in Article 90(1)(c) of MiFID II), the identification of HFTs is focused on liquid instruments;

   ii. the calculations are made:

      a. For the absolute approach, on a rolling basis by the trading venue considering the preceding 12-months; or,

      b. For the relative approach, on an annual basis by the trading venues at the same time as the annual transparency calculations.

   iii. firms pursuing market making strategies, as described by Article 17(4) of MiFID II, are considered in the calculations.

5. For the identification of high frequency trading, ESMA is of the view that only proprietary order flow should be considered. Regardless of the approach followed by the Commission to identify high frequency trading, it is proposed that if an investment firm is classified as HFT, the firm may challenge this classification if they believe this is a direct result of their non-proprietary messaging flow. To that end, investment firms should analyse the records under Article 25 of MiFIR to determine the level of messaging activity which is attributable to the proprietary activities of the investment firm, and the level which is attributable to the clients of the investment firm and provide this summary to the relevant competent authority who would determine whether the firm has been incorrectly identified as exhibiting a “high intra-day message rate”.

5.2. Direct electronic access (DEA)

Background/Mandate

Extract from the Commission's request for technical advice (mandate)

ESMA is invited to provide technical advice to further specify the definition of Direct Electronic Access (DEA) to ensure a uniform application and encompasses all types of arrangements that meet this definition.

Article 4(1)(41), MiFID II

'direct electronic access' means an arrangement where a member or participant or client of a trading venue permits a person to use its trading code so the person can electronically transmit orders relating to a financial instrument directly to the trading venue and includes arrangements which involve the use by a person of the infrastructure of the member or participant or client, or any connecting system provided by the member or participant or client, to transmit the orders (direct market access [DMA]) and arrangements where such an infrastructure is not used by a person (sponsored access [SA]).

Analysis following feedback from stakeholders

Direct Electronic Access (DEA) and Automated Order Routers (AORs)

1. ESMA requested the views of market participants about how to further clarify the definition of DEA (and as a consequence, those of DMA and SA) to capture all types of arrangements that might meet this definition.

2. ESMA received 52 answers on the question on whether other activities should be covered by the term "DEA". There was wide disparity in the responses received, with the following as the main underlying topics:

    i. No identification of additional services that should be considered within the scope of the DEA definition;

    ii. Need for a clear differentiation between the activities of automated order routing (AOR), smart order routing (SOR) and DEA.

    iii. A significant number of respondents requested narrowing down the definition of DEA on the basis of the activity of the DEA user, not on the basis of the type of access to the market or the service provided when granting direct access to a trading venue. For these respondents the natural recipients of the DEA requirements are algorithmic and high frequency traders, and expanding the scope of the MiFID II requirements following

Article 2(1)(d)(ii) of MiFID II would trigger a number of consequences for those corporate end users , mainly:

a. Need for authorisation as investment firm and as a consequence falling under the requirements of MiFID II, MiFIR and Capital Requirements Regulation.

b. Following the previous argument, the DEA user would become a "financial counterparty" as defined for the purposes of EMIR. Therefore the DEA user would be subject to higher level obligations imposed by EMIR including mandatory clearing and collateralisation, making irrelevant the EMIR differentiation between OTC derivatives for hedging or speculative purposes.

3. With respect to the differentiation between AOR and DEA, ESMA received 47 responses which did not show a clear majority supporting including or excluding AOR from the DEA scope. The core argument provided by those considering AOR within the concept of DEA was that those orders are not subject to the discretion of the AOR provider.

Conclusion

4. ESMA agrees with market participants on the need to differentiate between the different services provided. In particular, it notes that the use of the concepts of AOR and SOR have raised most of the attention in this respect.

5. ESMA notes that when defining "algorithmic trading", Article 4(1)(39) of MiFID II considers out of that scope systems which are "only used for the purpose of routing orders to one or more trading venues (…) involving no determination of any trading parameters…".

6. On the basis of the responses received to this section of the Consultation Paper (CP) and also the responses provided in relation to the questions about the identification of high frequency trading (HFT), ESMA considers that there are three different elements to consider:

i. SORs are algorithms used for optimisation of order execution processes and may determine parameters of the order other than the venue/s where the order should be submitted. In particular, SORs are able to slice the original order into "child orders" or determine the time of submission of the order or the "child orders". Examples of SORs falling under this category would be trigger-contingent or delayed start time for an order; a trailing stop-loss order; orders contingent upon entry based on other instrument data and iceberg functionalities. SORs fall within the definition of "algorithmic trading" and the relevant MiFID II articles should apply to them.

As long as those SORs are not embedded in the client's order generating system, but in the market member's/participant's own routing system, it is considered to be out of the scope of DEA, as the client of the market member has lost control over the time of submission of the order and its lifetime.

ii. AOR systems encompass those functionalities that determine the trading venue/s where the order should be submitted without changing any other trading parameters of the order (Article 4(1)(39) of MiFID II).

An AOR as described above does not qualify for or disqualify from the provision of DEA in case it is embedded in the routing systems of an investment firm. AOR in isolation without the rest of the elements of DEA as described in MiFID II (permission to use the DEA provider's trading code for submitting orders directly to the trading venue either through the infrastructure of the DEA provider or not) should not be considered as the provision of DEA.

DEA and other electronic order transmission systems

7. ESMA noted in its CP the proliferation of electronic order transmission systems provided to investors which have become more sophisticated over time. These systems permit clients to transmit orders to investment firms through those firms' web-based interfaces ("online brokerage").

8. ESMA considered that the key differentiating element between these web-based interfaces and DEA was the use of individual direct connectivity with separate access.

9. ESMA received 52 answers about using shared connectivity arrangements to qualify a connection to the market as DEA. The first conclusion to be drawn from the responses received was that the definition of "shared connectivity arrangement" was unclear for a significant number of respondents as almost all connectivity lines between investment firms and trading venues have some point of shared connectivity. On that basis, ESMA does not rely on the concept of "shared connectivity" as an indicator for "online brokerage".

10. Instead, ESMA considers that the key element to qualify as DEA is the type of control over order execution that each type of service provides to its users. In the case of orders submitted by DEA users the critical element is the ability of the DEA user to decide on the exact fraction of a second of order entry and lifetime of the orders within that timeframe.

11. ESMA considers systems that allow clients transmitting orders to an investment firm in an electronic format (on-line brokerage) to be outside of the scope of DEA as long as the client does not have the ability to determine the fraction of a second where the order should enter the order book or react to incoming market data within those timeframes.

12. ESMA considers that website-based trading systems fall outside the scope of the definition of DEA as long as they do not provide the user that type of control over order entry and order execution. This view corresponds with the IOSCO Consultation Report entitled 'Policies on Direct Electronic Access' (February 2009) which does not consider "trading models of a customer calling the intermediary or sending an internet order to the intermediary" as DEA because, as long as the customer's trading is intermediated, it is not 'direct access'.

Technical advice

1. The definition of DEA as appears in MiFID II does not encompass any other activity beyond the provision of Direct Market Access and Sponsored Access.

2. The critical element to qualify an activity as DEA, regardless of the technology used for those purposes, is the ability to exercise discretion regarding the exact fraction of a second of order entry and the lifetime of the orders within that timeframe.

3. Where a client order is effectively intermediated by the member or participant of the trading venue (and therefore the submitter of the order does not have control over those parameters), the arrangement would be out of the scope of DEA. ESMA considers systems that allow clients transmitting orders to an investment firm in an electronic format (on-line brokerage) to be outside the scope of DEA as long as the client does not have the ability to determine the fraction of a second where the order should enter the order book or react to incoming market data within those timeframes. Nevertheless, the investment firm would conduct algorithmic trading when submitting those client orders if it uses smart order routers and in that case, it should be compliant with Article 17 of MiFID II.

4. With respect to the differentiation between DEA and AOR and SOR, ESMA considers that:

    i. SOR systems are algorithms used for optimisation of order execution processes and may determine parameters of the order other than the venue(s) where the order should be submitted. In particular, SORs are able to slice the original order into "child orders" or determine the time of submission of the order or the "child orders". Examples of SORs falling under this category would be trigger-contingent or delayed start time for an order; a trailing stop-loss order; orders contingent upon entry based on other instrument data and iceberg functionalities.

    SORs fall within the definition of "algorithmic trading" and the relevant MiFID II articles should apply to them.

    If orders of clients are routed via a SOR of the market member/participant, this arrangement does not constitute DEA. SORs used by the client should be considered as DEA if the client has a permission to use the trading code of the market member/participant to directly access the market and the SOR is embedded into its systems, not into the DEA provider's.

    ii. AOR systems encompass those functionalities that determine the trading venue(s) where the order should be submitted without changing any other trading parameter of the order (Article 4(1)(39) of MiFID II).

    AOR as described above does by itself not qualify for or disqualify from the provision of

DEA in case it is embedded in the DEA systems. AOR in isolation without the rest of the elements of DEA as described in MiFID II (permission to use the DEA provider's trading code for submitting orders directly to the trading venue either through the infrastructure of the DEA provider or not) should not be considered as DEA.