With special analysis from Aite Group

THE 2020 ALGORITHMIC TRADING SURVEY

HEDGE FUNDS

Hedge funds look to algo trading to reduce market impact in volatility

Results from The TRADE's 2020 Algorithmic Trading Survey reveal that hedge funds are increasingly using algos to reduce market impact, as the buy-side continues to focus on trade performance and price efficiency.

It is no secret that global equity markets had a good year in 2019. Global employment held up, the continual threat of trade (or actual) wars between major powers never quite materialised and the general election in the UK ended much of the political uncertainty that had been holding back investment. In the US, having led markets to believe that rates would be rising the Fed walked back its projections before then cutting rates three times before the end of the year, helping to fuel major gains in US stock markets. These robust market conditions, the drive for efficiency and the rapid digital transformation of the financial industry have all contributed to a favorable environment for algorithmic trading.

While the results of this year's algorithmic trading survey were collected before the COVID-19 pandemic struck the global economy, it is still worth reflecting on the survey's results in light of the disruption caused by the pandemic. Most notably, the top reason given in this year's survey for using algorithms is to reduce market impact. Given the increase in market volatility and trading volumes since March 2020, it is striking that the pandemic has led to a greater realisation of algorithmic trading in the industry.

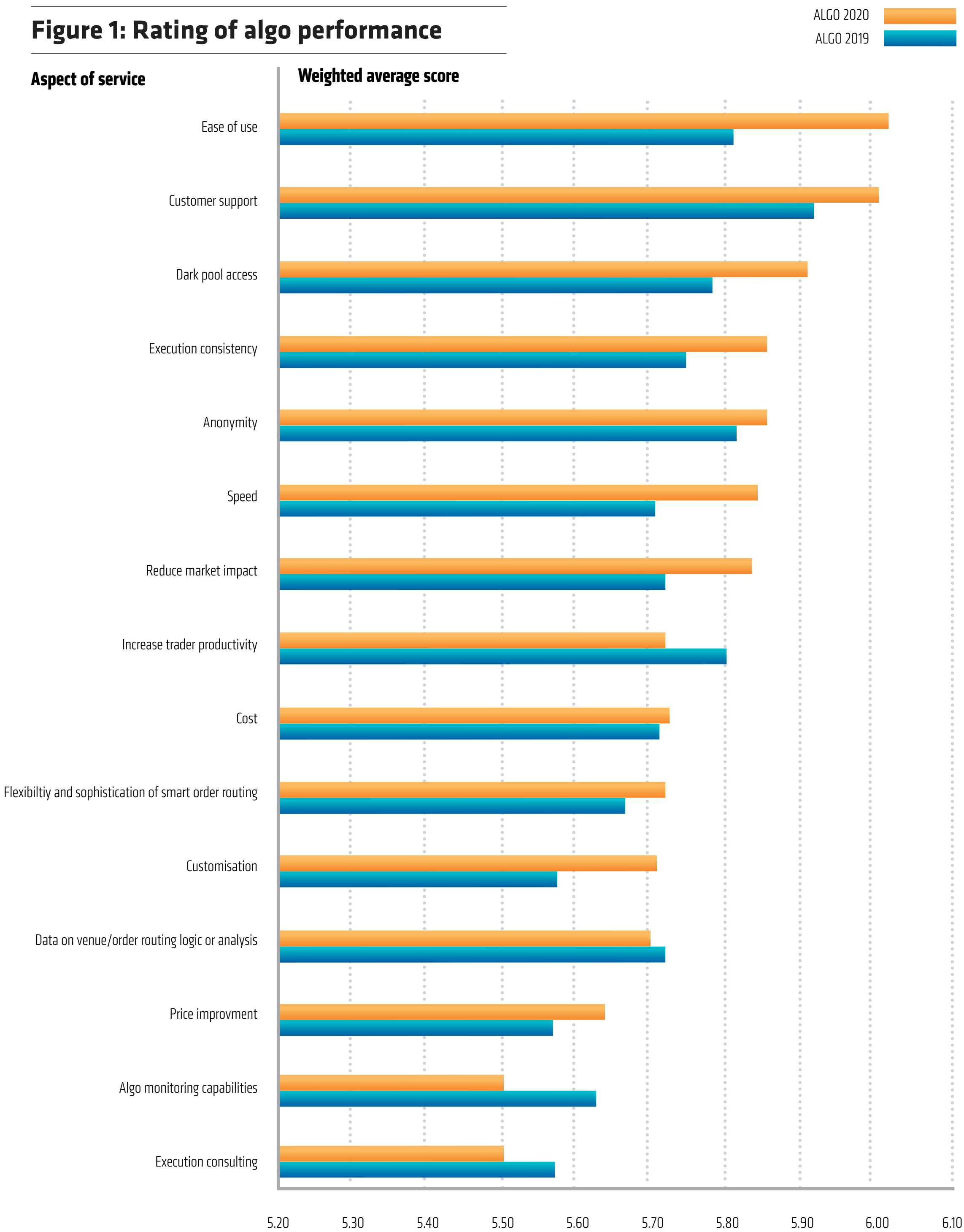
While progress has not been consistent across all areas of this year's survey with scores ranging from a minimum of 4.84 to a maximum of 6.64, the overall survey average across all algo providers of 5.77 was up slightly from the 2019 survey average of 5.72. This indicates that the industry has made positive steps toward beginning to refocus on the quality of execution and achieving better outcomes for the end investor, even though room for improvement remains. Initial concerns brought by The Markets in Financial Instruments Directive (MiFID II) have evolved from managing the compliance requirements particularly around best execution to fine-tuning algorithmic trading strategies as a major component of e-trading usage.

Hedge funds value quick and easy

Figure 1 shows year-on-year increases in the scores for all but four of the 15 categories under

CORRECTION: In the long-only segment of The TRADE's Algorithmic Trading Survey 2020, we incorrecntly published the number of categories where Exane ranked first, this should have read Exane BNP Paribas has the highest average score of all providers profiled (6.17) and ranks first across ten categories in this year's survey. We apologise for any confusion this may have caused.

Figure 1: Rating of algo performance



evaluation. In the two categories introduced in 2019, algo monitoring capabilities and order routing analysis, scores marginally declined by 0.13 and 0.02 respectively. The highest score recorded in this year's hedge fund algo survey was the ease of use category (6.02), followed closely by customer support (6.01) and dark pool access (5.91).

These scores provide an insight into the qualities valued by the industry today such as usability and the confidence that the sell-side can provide relevant and high quality liquidity. This liquidity includes access to dark pools, alternative trading systems and systematic internalisers in Europe and the US. Meanwhile the lowest scores were recorded in the execution consulting and algo monitoring capabilities categories with both scoring 5.50, reflecting concerns from hedge funds about how well the sell-side is able to provide feedback on the performance of algos.

While the algorithm performance as rated by survey participants increased by an average of 0.05 between 2019 and 2020, this average increase was much more marginal compared to previous years. The highest recorded increases in performance were found in the ease of use (+0.21), speed (+0.14) and customisation (+0.13) categories, indicating that the industry is becoming more comfortable and proficient in its use of algorithms. However, performance ratings between 2019 and 2020 declined in a number of categories, including algo monitoring capabilities (down 0.13), execution consulting (down 0.07) and trader productivity (down 0.06). While algo providers have done well in providing usable and efficient solutions, there is still progress to be made when it comes to other algo characteristics.

Figure 2: Reasons for using algorithms (% of responses)

Feature	2020	2019
Results match pre-trade estimates	▲ 1.87	0.87
Data on venue/order routing logic or analysis	▲ 5.04	4.35
Customisation of capabilities	▼ 5.97	6.75
Higher speed, lower latency	▼ 6.47	7.33
Algo monitoring capabilities	▼ 7.09	7.19
Flexibility and sophistication of smart order routing	▲ 7.28	6.90
Better prices (price improvement)	▲ 7.96	7.62
Lower commission rates	▼ 8.27	8.56
Greater anonymity	▼ 9.33	9.36
Increase trader productivity	▼ 9.95	10.52
Consistency of execution performance	▲ 10.07	9.00
Ease of use	▼ 10.07	11.10
Reduce market impact	▲ 10.63	10.45

Reducing market impact is a big deal

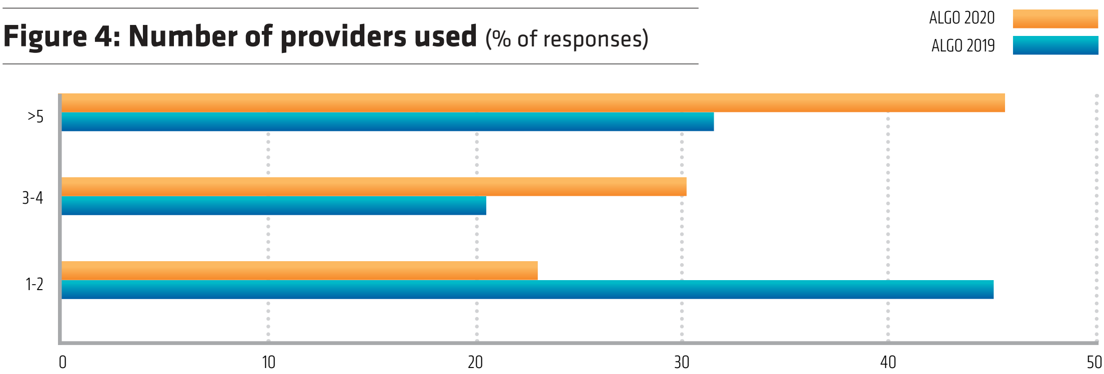
survey participants indicated reasons for using algorithms are primarily associated with the reduction of market impact and the ease of use, followed by the consistency of execution performance. Figure 2 shows little difference between 2019 and 2020 when it comes to the reasons for using algorithms. It is striking that the top four reasons given, all received such similar scores: reduce market impact (10.63%), consistency of execution performance (10.07%), ease of use (10.07%) and increase in trader productivity (9.95%). This indicates that hedge funds would be especially receptive to solutions that address these goals collectively. The fact that ease of use continues to place among the top reasons for using algos year after year underlines the value that buy-side firms place on simplicity and reliability.

The survey data also shows that price improvement is increasingly a motivating factor for hedge funds deciding to use algos, rising from

Figure 3: Average number of providers used by AuM (USD billions)

Feature	2020	2019
More than $50 billion	4.33	4.33
$10 - 50 billion	▼ 4.22	4.58
$1 - 10 billion	▲ 3.74	3.55
$0.5 - 1 billion	▲ 4.00	1.80
$.025- 0.5 billion	▼ 2.00	3.00
Up to $0.25 billion	▼ 1.67	2.00
Not answered	▲ 4.43	2.00

Figure 4: Number of providers used (% of responses)



7.62% in 2019 to 7.96% in 2020. Initially, algos were primarily used for keeping up with the speed of modern financial markets. Increasingly, however, the buy-side is more focused on performance and price efficiency when it comes to their algo usage. This is especially true as usage has become more harmonious across the industry.

2019 saw the inclusion of two new survey categories: data on venue/ order routing logic or analysis and algo monitoring capabilities, both of which declined slightly this year.

Hedge funds are partnering up more and more

The number of providers that hedge funds are selecting has become one of the most revealing trends produced by the 2020 survey. Historically there has been a clear preference from hedge funds to use multiple algo providers. Surveys from previous years have demonstrated that funds both big and small in terms of AuM have often reported using an average of more than four different algo providers. Yet figure 3 indicates that this appetite for multiple providers has begun to trail off in the last two years as only the hedge funds managing between US$0.5 and US$10 billion have reported an increase in their average number of providers since 2019. Hedge funds managing over US$10 billion and those managing less than US$500 million reported a decline in the average number of providers used.

It is curious that firms managing between US$500 million and US$1 billion reported an average of 1.8 providers in 2019 before substantially increasing to 4.0 providers in 2020. The 2020 data shows that larger and mid-sized hedge funds have cut back on the number of algo providers they engage with, though this trend of declining average provider numbers has been more marginal between 2019 and 2020. Perhaps the stickiness of the 2020 numbers compared to 2019 shows that the fall in the number of providers used by the hedge fund industry is beginning to level out even if these figures are expected to fall further as the industry moves beyond compliance-focused-objectives.

While the consolidation of algo providers in the hedge fund industry previously looked as though it was here to stay, figure 4 shows a decline in the proportion of funds reporting using 1-2 providers from 46% in 2019 to 24% in 2020. This would indicate that industry consolidation is not as settled as previously thought. Additionally, the percentage of funds using 5 or more providers jumped up from 33% in 2019 to over 46% in 2020 which takes us back into 2018 territory where half of all respondents used 5 or more providers. As firms incur more costs for research and other services, their broker lists become longer. Hedge funds like to work mainly with their prime brokers and will typically only use algos and commission dollars to pay for other services where necessary. The move away from prime brokers can also indicate concerns that those firms are not the best in class at providing e-trading services.

Hedge funds are finding their groove when it comes to algos

figure 5 shows that over half (56%) of respondents are using algos to trade the majority of their total value traded - as was the case in 2019. In 2020, however, the proportion of hedge funds using algos to trade more than 80% of value traded has fallen back from around 25% in 2019 to 10% in 2020. A comparable fall in the proportion of funds trading 70-80% of their value using algos has occurred since 2019. Yet, these results have been mostly offset by the big increases in the proportion of funds using algos to trade 50-70% of value traded, explaining the relative consistency in the proportion of funds using algos to trade more than half their value. These findings suggest that hedge funds are perhaps happy to use algorithms to trade the majority of their portfolio even though they seem to have found a comfort zone in the 50% - 70% region and are cutting back from trading more than 70% of their portfolio using algos.

Hedge funds turn to the dark side

in terms of the type of algos that hedge funds have been adopting for their trading strategies, figure 6 shows the year-on-year increase in the use of dark liquidity seeking and implementation shortfall (single stock) algos. Dark liquidity algo usage has increased by 7% since 2019 and implementation shortfall (single stock) usage has increased by almost 6% compared to 2019's results. The only algos to have recorded a fall in usage since 2019 are % volume and volume-weighted average price (VWAP), dropping by 10.58% and 0.86% respectively. The algo that recorded the largest increase in adoption was time-weighted average price (TWAP), rising by nearly 13% from its 2019 score.

Figure 5: Algorithm usage by value traded (% of responses)

Feature	2020	2019
Not answered	▼ 3.70	7.05
0 - 5%	▼ 3.29	6.17
5 - 10 %	▲ 6.17	2.64
10 - 20%	▼ 5.35	7.93
20 - 30%	▲ 4.94	0.00
30 - 40%	▲ 6.17	5.73
40 - 50%	▲ 13.99	12.33
50 - 60%	▲ 16.05	6.61
60 - 70%	▲ 21.40	8.37
70 - 80%	▼ 8.64	18.50
>80%	▼ 10.29	24.67

Figure 6: Types of algorithms used (% of responses)

Feature	2020	2019
Other	▲ 4.94	3.52
Implementation shortfall (basket)	▲ 15.64	6.61
TWAP	▲ 36.63	23.79
Implementation shortfall (single stock)	▲ 53.91	48.02
% Volume (participation)	▼ 56.38	66.96
VWAP	▼ 62.14	63.00
Dark liquidity seeking	▲ 69.96	62.56

Methodology

Buy-side survey respondents were asked to give a rating for each algorithm provider on a numerical scale from 1.0 (very weak) to 7.0 (excellent), covering 15 functional criteria. In general, 5.0 (good) is the 'default' score of respondents. In total, close to 700 ratings were received across 32 algo providers, yielding thousands of data points for analysis. Only the evaluations from clients who indicated that they were engaged in managing hedge fund firms or using hedge fund strategies have been used to compile the provider profiles and overall market review information.

Each evaluation was weighted according to three characteristics of each respondent: the value of assets under management; the proportion of business done using algorithms; and the number of different providers being used. In this way, the evaluations of the largest and broadest users of algorithms were weighted at up to three times the weight of the smallest and least experienced respondent. Finally, it should be noted that responses provided by affiliated entities are ignored. A few other responses where the respondent could not be properly verified were also excluded. We hope that readers find this approach both informative and useful as they assess different capabilities in the future. As with the 2020 long-only results, this year's survey analysis for the hedge fund respondents was carried out by Aite Group.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Bank of America

Hedge fund respondents to Bank of America were drawn from the larger cap range, with around half of respondents managing over US$10 billion. Bank of America experienced a small decline from its average score of 5.7 in 2019 to 5.57 in 2020. The largest increases in year-to-year improvements were less significant than last year with the highest increase being ease of use (up 0.31). Customer support remained the bank's highest rated area at 5.88 even though this is down from 6.15 last year, representing a fall of 0.27. There were similar significant declines from last year in the areas of trader productivity (down 0.5), anonymity (down 0.46) and algo monitoring capabilities (down 0.49).

Despite the slight drop in average score, all categories are still rated comfortably in the Good range (5.00-5.99) and the average itself equates to a percentage score of 80% – perhaps not stellar in US terms, but impressive in the popular UK imagination. The range between highest and lowest rated category is 0.58, relatively narrow in the scheme of things. This suggests a relatively consistent view of the various aspects of service taken as a whole, with no obvious outliers.

The survey also asks respondents what additional services they would like to see offered by any of their providers. Amongst the few such services for Bank of America listed by different clients were "Ability to visualise cost of execution", "Aggregation of order lines with same average price and live updates," and "Viewable live Smart Order Routing logic."

BANK OF AMERICA RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.30	5.37	5.65	5.42	5.67	5.63	5.53	5.41

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.76	5.77	5.88	5.53	5.48	5.53	5.56

KEY STATS

5.88
Highest score
(customer support)

5.30
Lowest score
(increase trader productivity)

0.31
Most improved
(ease of use)

-0.5
Least improved
(increase trader productivity)

Bernstein

Bernstein performed particularly well in 2020 with an average score across all 15 categories of 5.99, comfortably higher than the overall survey average of 5.77. The majority of hedge fund respondents to Bernstein were from the mid-cap AuM bracket US$1 billion – US$10 billion. Bernstein recorded a particularly high score of 6.38 in the ease of use category, where it saw a year-on-year increase of 0.45 from 5.94 in 2019. Additionally, the firm demonstrated consistent high performance by receiving a score of above 6.00 in eight different categories. Bernstein did however record year-on-year decreases in ten categories, pushing its average down from 6.08 in 2019.

Bernstein's average score of 5.99 represents 86% and is at the very top of the Good range (5.00-5.99). Meanwhile, the range from lowest to highest category rating was 1.01, largely as a result of the 0.49 drop in score for Execution Consulting – perhaps the only noteworthy category rating decline. While 'Data on venue/order routing logic or analysis' did fall by slightly more (0.54), the category score here remains close to the global average.

The survey question about additional services request attracted little comment. One client did, however, express an interest in the ability to "Customise to allow floating/relative limits to an index or sector."

BERNSTEIN RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.95	5.88	6.21	6.03	6.02	6.20	5.77	6.27

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.38	5.64	6.33	5.37	6.13	5.92	5.75

KEY STATS

6.38
Highest score
(ease of use)

5.37
Lowest score
(execution consulting)

0.45
Most improved
(ease of use)

-0.54
Least improved
(data on venue/order routing logic or analysis)

Citi

Around half of all hedge fund respondents to Citi were from the large-cap AuM bracket of over US$50 billion. Although Citi's average of 5.54 in 2020 is below the survey-wide average of 5.77 it is still up 0.3 from last year where it recorded a score of 5.24. Even though there is still much progress to be made by the bank, there are signs of improvement. Citi recorded positive year-on-year increases in its 2020 results in all categories except for three: customisation (down 0.13), execution consulting (down 0.22) and algo monitoring capabilities (down 0.13). Citi recorded its highest score in the customer support category with a score of 5.95, up 0.6 from 2019 and making it the category with the largest year-on-year increase.

While the bank's lowest score, 5.21, represents a decline from its 2019 result, it remains respectable in percentage terms (74%) and is still comfortably in Good range (5.00-5.99). At 0.74, the spread between lowest and highest category score is not too alarming and is more the result of perceived improvements in performance than concerns about falls.

Respondents rating Citi amongst other providers have a number of service enhancements on their wish list, including, in one case, "better TCA and alerting systems and if possible overview cross brokers of execution.," but with more improvements than falls, momentum for this algo provider appears to be heading in the right direction.

CITI RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.36	5.71	5.70	5.73	5.65	5.50	5.52	5.35

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.72	5.29	5.95	5.26	5.81	5.32	5.21

KEY STATS

5.95
Highest score
(customer support)

5.21
Lowest score
(algo monitoring capabilities)

0.60
Most improved
(customer support)

-0.22
Least improved
(execution consulting)

Credit Suisse

Credit Suisse recorded a marginal decrease in its performance in this year's survey with an average score of 5.47 compared to its average of 5.59 in 2019, placing it well below the survey-wide average of 5.77. Hedge fund respondents to Credit Suisse were fairly evenly split between the large-cap AuM bracket of over US$50 billion or the mid-cap AuM bracket of US$1 billion – US$10 billion. Of the 15 categories assessed by this survey, Credit Suisse recorded year-on-year decreases from 2019 in nine categories. The Swiss bank scored particularly poorly in the algo monitoring capabilities category with a result of 4.84, a decrease of 0.85 from last year. Despite these setbacks, Credit Suisse did pick up some significant increases in certain scores: reduce market impact (up 0.33), cost (up 0.32), speed (up 0.34) and anonymity (up 0.45).

In terms of requested service additions, one large client would like to see "global coverage - where you don't have to wait for the Asian or US guys to come in."

While the spread of category scores from lowest to highest is relatively wide at 1.08, there is a cluster of most categories around the mid-fives, comfortably within the Good range. The assessment of algo monitoring capabilities as merely Satisfactory (4.00-4.99) reinforces its outlier status. While none of the category averages reflect major client discontent, the bank may wish to review those that have recorded the largest falls. In addition to algo monitoring, this would include customer support and 'Data on venue/order routing logic or analysis'.

CREDIT SUISSE RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.25	5.55	5.49	5.81	5.62	5.71	5.49	5.76

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.92	5.20	5.28	5.18	5.52	5.42	4.84

KEY STATS

5.92
Highest score
(ease of use)

4.84
Lowest score
(algo monitoring capabilities)

0.45
Most improved
(anonymity)

-0.85
Least improved
(algo monitoring capabilities)

Exane BNP Paribas

Exane BNP Paribas kept up with its success from last year by averaging an impressive 6.04 in the 2020 survey, barely below their 2019 average of 6.06. Most hedge fund respondents to Exane BNP Paribas came from mid to large-cap AuM brackets, with only a handful of firms managing assets below US$1 billion. Exane recorded particularly high scores in a number of categories including customisation (6.28), ease of use (6.31), customer support (6.39) and flexibility and sophistication of smart order routing (6.24). Despite an impressive scorecard Exane did experience year-on-year declines in 9 areas which - while marginal - do indicate that the bank still has some work to do. The bank received its lowest year-on-year score in the algo monitoring capabilities, falling by 0.37 from 2019 to 5.57 in 2020.

Represented in percentage terms, Exane's average category score would be an impressive 86%. Despite a spread of 0.82 from lowest to highest across all category scores, none of the individual scores appear to be outliers and the bulk of such scores are clustered on the nursery slopes of the Very Good range (6.00 – 6.99). It is also worth pointing out that none of the year-on-year declines are precipitous, though, in common with a number of its rivals, Exane's score for algo monitoring capabilities is clearly heading in the wrong direction and the provider will no doubt want to do what is necessary to arrest that decline. It may also want to explore a request from one client to all its low-touch brokers: "The ability to seamlessly aggregate and prorate fills across CFD and CASH orders."

EXANE BNP PARIBAS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.04	6.04	6.06	5.89	6.13	5.91	5.77	6.28

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.31	6.00	6.39	5.78	6.12	6.24	5.57

KEY STATS

6.39
Highest score
(customer support)

5.57
Lowest score
(algo monitoring capabilities)

0.35
Most improved
(dark pool access)

-0.37
Least improved
(algo monitoring capabilities)

Goldman Sachs

Over two-thirds of hedge fund respondents to Goldman Sachs manage assets over US$1 billion with most of these from the mid-cap AuM bracket and only 12% managing over US$50 billion. Goldman increased its average score by 0.12 this year to 5.69, up from 5.57 in 2019. While positive, this yearly increase was not sufficient to push above the yearly average of 5.77. Overall, Goldman recorded year-on-year increases in eight areas with its highest increase being in the algo monitoring capabilities, up 0.5 from 2019 to a score of 5.58 in 2020. Other areas of improvement for Goldman include execution consistency (up 0.49) and reduction in market impact (up 0.32). Alongside this good news there were however various areas where the bank fell short, most notably in the increased trader productivity category where it recorded a fall of 0.18. However, it is important to note that the declines experienced in 2020 are far less steep than those seen in the 2019 survey.

The range of category scores from highest to lowest is 0.56, suggesting a relative consistency in client assessment across all areas of service with no obvious outliers. The majority of category scores are clustered at the upper end of Good range (5.00-5.99). The bank's average score across all categories of 5.69 equates to a percentage score of 81%, suggesting overall contentment with service performance within the bank's response pool.

Clients rating Goldman Sachs among other algo providers have expressed a generalised request across their provider universe for "pre trade analysis of all the strategies", customisation "to allow a floating limit/relative limits to an index or sector", and "viewable live Smart Order Routing logic".

GOLDMAN SACHS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.51	5.68	5.81	5.69	5.81	5.52	5.61	5.69

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.05	5.71	5.95	5.49	5.61	5.68	5.58

KEY STATS

6.05
Highest score
(ease of use)

5.49
Lowest score
(execution consulting)

0.50
Most improved
(algo monitoring capabilities)

-0.18
Least improved
(increase trader productivity)

Jefferies

Hedge fund respondents to Jefferies in this year's survey were mostly drawn from the larger-cap AuM brackets, with two-thirds of respondents managing over US$10 billion. Jefferies received insufficient response numbers to be profiled in the 2019 results. While not having garnered enough responses to carry a meaningful sample size, it's worth noting that the limited number of scores received were high. In 2020, Jefferies' average score of 5.92 is comfortably above the average of 5.77. In the ease of use category, Jefferies scored particularly highly with a result of 6.32. Jefferies also received significantly high scores in the trader productivity increase (6.09), speed (6.11) and customer support (6.12) categories. Jefferies' lowest score in 2020 was in the price improvement category, where it received a result of 5.44.

The score range across categories of 0.88 is populated throughout the spread with no obvious outliers. This suggests that clients do not have an overall view of service received, but rather distinguish at a category level. With no prior year scores to compare to, it is not possible to determine the direction to travel. Nevertheless, with no score lower than the middle of the Good range (5.00-5.99), it is safe to assume that on the whole clients are more than content with the levels of service received. The firm's average score across all categories equates to 85%.

In terms of services not yet provided, one head of equity trading at a large client makes a plea for "better dark".

JEFFERIES RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.09	5.97	6.06	5.90	6.11	5.86	5.44	5.68

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.32	5.71	6.12	5.71	6.01	5.97	5.86

KEY STATS

6.32
Highest score
(ease of use)

5.44
Lowest score
(price improvement)

n/a
Most improved

-1.04
Least improved
(data on venue/order routing logic or analysis)

JP Morgan

Hedge fund respondents to JP Morgan were almost all firms managing over US$1 billion with only one respondent managing less than this. JP Morgan increased its average of 5.61 in 2019 to 5.77 in 2020, equalling the survey-wide average this year. The bank showed that it is moving in the right direction through receiving year-on-year increases in 12 categories. It received notable increases from 2019 in customer support (up 0.53), price improvement (up 0.48) and cost (up 0.44). Scores declined in only three areas, with the 'increased trader productivity' category falling the most significantly by 0.41 to a score of 5.53.

JP Morgan's average score across all categories equates to 82%. The score range across all categories of 0.87 hides no obvious outliers. The lowest category score of 5.34 for reduction in market impact might be superficially concerning, given that this is a key reason why algorithms are deployed in the first place, but, in absolute terms, a rating of 5.34 suggests that clients are happy, if not bowled over, by the bank's performance in this area.

Most of the client wish-list for further service enhancements is shared with other providers and includes, inter alia, more trade analysis tools, viewable live Smart Order Routing logic, customisation to allow for floating and relative limits to an index or sector, and aggregation of order lines with the same average price.

JP MORGAN RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.53	5.34	5.80	5.97	5.78	5.85	5.78	5.69

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.96	5.93	6.21	5.42	5.84	5.78	5.64

KEY STATS

6.21
Highest score
(customer support)

5.34
Lowest score
(reduce market impact)

0.53
Most improved
(customer support)

-0.41
Least improved
(increase trader productivity)

Liquidnet

Liquidnet had a particularly good year when it came to its results in this year's survey. Scores increased from 2019 in every category with the single exception of cost, where Liquidnet recorded a marginal decrease of 0.05 and their lowest score of 5.13. The company excelled in the dark pool access category where it recorded a substantial increase of 1.2 from 2019, taking the score to 6.43. Significant year-on-year increases were also recorded in the algo monitoring capabilities (up 0.62), data on venue/order routing logic analysis (up 0.75) and speed (up 0.8). Liquidnet's overall average score of 5.84 was up a little over 0.5 from its 2019 average of 5.33, putting it just above the survey average of 5.77.

This equates to a percentage score of 83%. The category score range of 1.31 is wider than average even if one were to remove the cost category, which is otherwise an outlier, suggesting that while clients are impressed with overall levels of service, there is a sense that Liquidnet's service is relatively expensive (even if it offers value for money). By contrast, the firm will be pleased with its scores at the other end of the scale for reduced market impact and dark pool access, since allowing buy-side firms to engage in sizeable transactions without having the lit market move away from them was an important factor in Liquidnet's original raison d'être. There are no specific requests for service enhancements, with one head of international equities dealing at a large client declaring themselves "satisfied with the current offering."

LIQUIDNET RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.12	6.44	5.68	5.13	5.72	6.30	5.77	5.43

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.81	5.57	6.18	5.60	6.43	5.70	5.66

KEY STATS

6.44
Highest score
(reduce market impact)

5.13
Lowest score
(cost)

1.20
Most improved
(dark pool access)

-0.05
Least improved
(cost)

Morgan Stanley

Hedge fund respondents to Morgan Stanley were primarily drawn from the large-cap bracket of over US$50 billion or the mid-cap bracket of US$1 billion – US$10 billion in AuM. Morgan Stanley received mixed scores from hedge fund respondents in this year's survey as its 2020 average of 5.60 fell from its 2019 average of 5.75. This places the firm below the 2020 survey-wide average of 5.77. Significantly, Morgan Stanley only recorded year-on-year increases in two of the 15 categories: cost (up 0.31) and increased trader productivity (up 0.08). In all other categories Morgan Stanley saw year-on-year declines with the most significant decreases occurring in execution consulting (down 0.41), customisation (down 0.45) and flexibility and sophistication of smart order routing (down 0.32). These results stand in contrast to last year where the bank saw year-on-year decreases in only one area, underlining the scale of underperformance in 2020. On a more positive note, the bank did record a particularly high score in the cost category with a score of 6.19.

The firm need not be too downhearted, however, since its category average still equates to a percentage score of 80%. The category score range is admittedly wide at 1.08 with all but cost spread across the Good range (5.00-5.99). A high score for cost is in fact relatively unusual, given that clients are not usually forthcoming with praise in this area. Nor does any particular service stand out as particularly lacking in the eyes of respondents, with one client of multiple providers declaring themselves "satisfied with the current offering" from Morgan Stanley. Continuation along the current trajectory should keep the bank in clients' good books.

MORGAN STANLEY RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.83	5.47	5.76	6.19	5.76	5.64	5.42	5.11

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
5.67	5.74	5.44	5.13	5.73	5.54	5.50

KEY STATS

6.19
Highest score
(cost)

5.11
Lowest score
(customisation)

0.31
Most improved
(cost)

-0.45
Least improved
(customisation)

UBS

UBS received broadly positive feedback from its hedge fund respondents in this year's survey, with around half managing over US$10 billion in assets. While still below the survey average of 5.77 the firm's overall average of 5.72 was up from 5.59 last year and year-on-year increases were recorded in 10 of the 15 categories. The largest year-on-year increase was recorded in the data on venue/order routing logic or analysis category where UBS' score rose by 0.49 to reach 5.74 in 2020. The Swiss firm scored highest in the ease of use category with a result of 6.22. It was not however good news across the board as UBS did record year-on-year decreases in five categories. Often these decreases were marginal but in the case of algo monitoring capabilities UBS' score fell by 0.5 to 5.11.

With a category average equating to 82%, the bank has little to fret about in terms of client loyalty and the improved score for 'data on venue/order routing logic or analysis' already referred to coincides with an uptick in the importance of this category among the selection criteria of clients as a whole. On the other hand, the spread in category scores (1.11) is relatively wide though, and at 5.11, algo monitoring capabilities may be considered an outlier. In the 2020 survey, this category appears at the lower end for a number of providers, but UBS will want to ensure that this downward trend is arrested in the year ahead as it could well become a notable point of competitive differentiation among providers.

UBS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.90	5.65	5.99	5.72	5.82	5.95	5.55	5.95

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.22	5.74	5.54	5.43	5.63	5.62	5.11

KEY STATS

6.22
Highest score
(ease of use)

5.11
Lowest score
(algo monitoring capabilities)

0.49
Most improved
(data on venue/order routing logic or analysis)

-0.50
Least improved
(algo monitoring capabilities)

Virtu

Virtu's hedge fund respondents were relatively evenly split over the top three AuM brackets that range from US$1 billion to over US$50 billion. Virtu increased its average score from 5.71 received for ITG in 2019 to 6.08 in 2020. The area in which it recorded the largest year-on-year increase was anonymity with a recorded increase of 1.28 from 2019 to reach a score of 6.57 in 2020. Virtu recorded particularly high results in a number of other categories: increased trader productivity (6.19), execution consistency (6.3), speed (6.19), price improvement (6.17) and dark pool access (6.39). Its score of 6.64 for the reduced market impact category was the highest score recorded across all categories and all providers profiled in this year's survey. Virtu recorded its lowest year-on-year score in the algo monitoring capabilities category, where its 2020 score declined by 0.49 to reach 5.40. Overall, Virtu demonstrated very strong results for its algorithm performance in the 2020 survey data.

An overall percentage score of 87% will please both the provider and its clients. In the spread of 1.24 across category scores, algo monitoring capabilities may be considered an outlier with other individual category scores, apart from perhaps execution consulting, giving no indication of client concern. Even these bottom two scores would leave many other providers quite relieved.

Even with these impressive category scores, there remain enhancements on some client wish lists. Among these are greater efforts in ease of access to dark pool capabilities and greater "follow the clock" geographical coverage. These are balanced by declared satisfaction with the current offering by one head of

VIRTU RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.19	6.64	6.30	6.03	6.19	6.57	6.17	5.92

Ease of use	Data on venue/order routing logic or analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of smart order routing	Algo monitoring capabilities
6.06	5.98	6.09	5.47	6.39	5.79	5.40

KEY STATS

6.64
Highest score
(reduce market impact)

5.40
Lowest score
(algo monitoring capabilities)

1.28
Most improved
(anonymity)

-0.49
Least improved
(algo monitoring capabilities)