

A complex network graph composed of numerous small, semi-transparent blue dots connected by thin white lines, forming a dense web-like pattern across the entire page.

THE

2021

ALGORITHMIC

TRADING

SURVEY

LONG-ONLY

With special
analysis from
Aite Group

Aite

Traders turn to tried and tested algo strategies in market volatility

As the percentage of funds trading via algos continued to rise, the long-only results of The TRADE's Algorithmic Trading Survey 2021 reveal that traders relied on tried and tested VWAP and TWAP strategies during the market uncertainty.

2020 was a wild year for global equity markets and that is putting it mildly. After investors watched on in horror last March as the dramatic sell-off in markets seemed to spell financial Armageddon, it did not take too long for central banks and governments to realise the seriousness of the situation. An enormous program of bond-buying and rate cuts set the stage for a series of record-breaking rallies and heightened equity market activity as companies looked for financing and restructuring solutions.

Despite an unprecedented year-long restriction in economic activity, markets are now poised for a global recovery with investors bullish on the prospect of strong growth in business confidence and corporate earnings globally. The investments in technology and software that the financial services sector has made largely paid off through the relative seamlessness with which the industry has handled the turmoil of the past year. Just as

the pandemic has underscored the centrality of large technology companies in the modern economy, it has been a reminder of the importance of sophisticated digital solutions for successful investment management strategies. In particular, the volatility best execution requirements and the working from home environment of the past 12 months has created a fertile environment for algorithmic trading.

In this year's survey of long-only funds the average score of respondents is 5.81 – an increase from both the 2020 score (5.71) and the 2019 score (5.74). In 2021, the most impactful features of algorithms are ease of use, customer support and services, dark pool access, execution consistency and increased trader productivity (Figure 1). Following from high scores of 5.96 and 5.92 respectively in the 2020 survey, support services and ease of use both scored 6.01 in this year's survey. It is interesting to see ease of use increase its score

year-on-year over the past four years, underlining the importance of usable and streamlined technology in the modern trading environment.

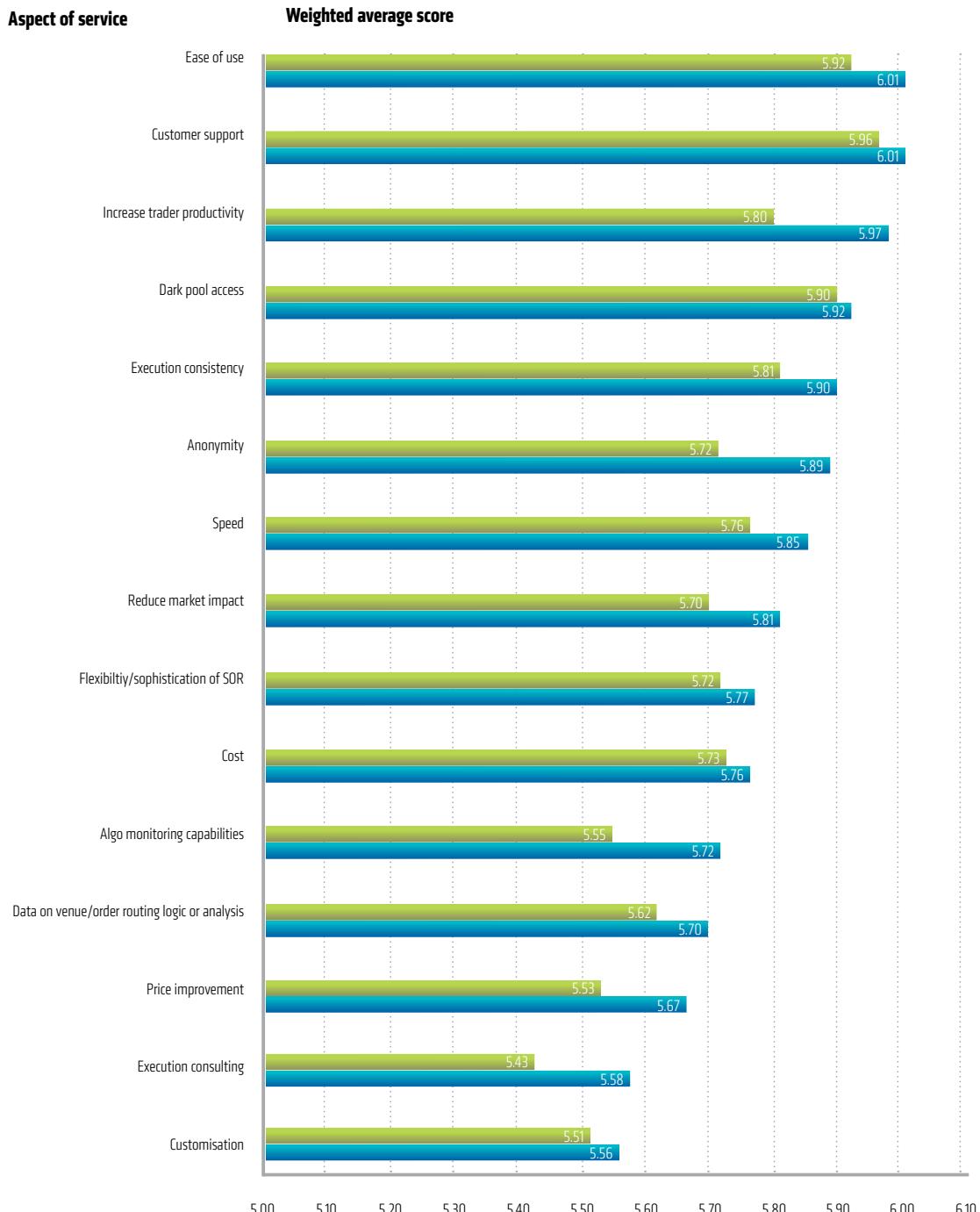
Two categories in this year's survey recorded the joint highest year-on-year increase in their score, anonymity and algo monitoring. Both categories received an increase of 0.17, putting anonymity at 5.89 and algo monitoring at 5.72.

Increase in trader productivity marks the second highest jump in score, having increased by 0.16 from 5.80 to 5.97. This jump shows the growing role that algos play in boosting the performance of traders. While all scores in 2021 were up from 2020, dark pool access recorded the smallest increase at only 0.02. While dark pool access remains a highly rated feature of algos, the push from European regulators to shift trading onto lit venues means that long-only firms are increasingly looking for other features in addition to dark pool access.

Respondents' reasons for using

Figure 1: Rating of algo performance

ALGO 2020
ALGO 2021



algos, presented in Figure 2 as a percentage of responses, differ between 2021 and 2020. Overall, increases can be seen in seven areas of algo trading versus last year: ease-of-use, reduce market impact, lower commission rates, better prices, higher speed, customisation and pre-trade estimates. At the same time, decreases are seen in six areas: consistency of execution, trader productivity, greater anonymity, smart order routing, algo monitoring, routing logic. The emphasis seems to be on working orders at speed and with ease, and in a way that is cost effective. There is less interest on information leakage, execution consistency and trader productivity.

It is clear that long-only funds of varying sizes are looking to at least two algo providers, with all AUM categories of long-only respondents reporting an average number of providers greater than two in the 2021 survey (Figure 3). From a diversification and business-continuity perspective, managers are seemingly unwilling to place all of their eggs in a single basket and risk a provider outage. The smallest firms managing US\$1 billion or less seem to be most comfortable with using approximately two providers, although the average number of providers is up in 2021 compared to 2020 for these smaller managers. Larger firms managing upward of US\$1 billion are more likely to rely on three providers, though the average number of providers is down in 2021 compared to 2020 for the largest managers in this year's survey.

Going further, long-only managers with US\$0.25 billion to US\$0.5 billion in AUM show a year-on-year increase in the number of algo providers, rising to an average of 2.5 in 2021 which is up from 1.83 in 2020. One explanation for this is that the unprecedented market volatility of the past 12 months compelled smaller managers with fewer resources to expand their range of partnerships. By contrast,

Figure 2: Reasons for using algos (% of respondents)

Feature	2021	2020
Ease of use	▲ 12.04	11.08
Consistency of execution performance	▼ 10.19	10.51
Increase trader productivity	▼ 10.32	10.45
Reduce market impact	▲ 10.45	10.29
Greater anonymity	▼ 8.96	9.93
Flexibility and sophistication of SOR	▼ 7.24	8.02
Algo monitoring capabilities	▼ 5.30	7.20
Lower commission rates	▲ 8.69	6.83
Better prices (price improvement)	▲ 6.68	6.65
Higher speed lower latency	▲ 7.64	6.56
Customisation capabilities	▲ 6.21	5.74
Data on venue/order routing logic or analysis	▼ 3.84	5.07
Results match pre-trade estimates	▲ 2.45	1.67

larger managers in all categories above US\$1 billion have reported declines in the average number of providers compared to 2020. Cost pressures have accelerated the move to consolidate relationships, with managers representing over US\$50 billion reporting using 3.89 providers (down from 4.02), managers representing between US\$10 billion and US\$50 billion reporting using 3.47 providers (down from 4.25), and managers representing between US\$1 billion and US\$10 billion reporting 2.94 providers (down from 3.33). While having a handful of providers continue to represent an important

diversification strategy for the largest long-only managers, downward pressure on research budgets across the industry have tapered enthusiasm over the past 12 months to add more and more providers.

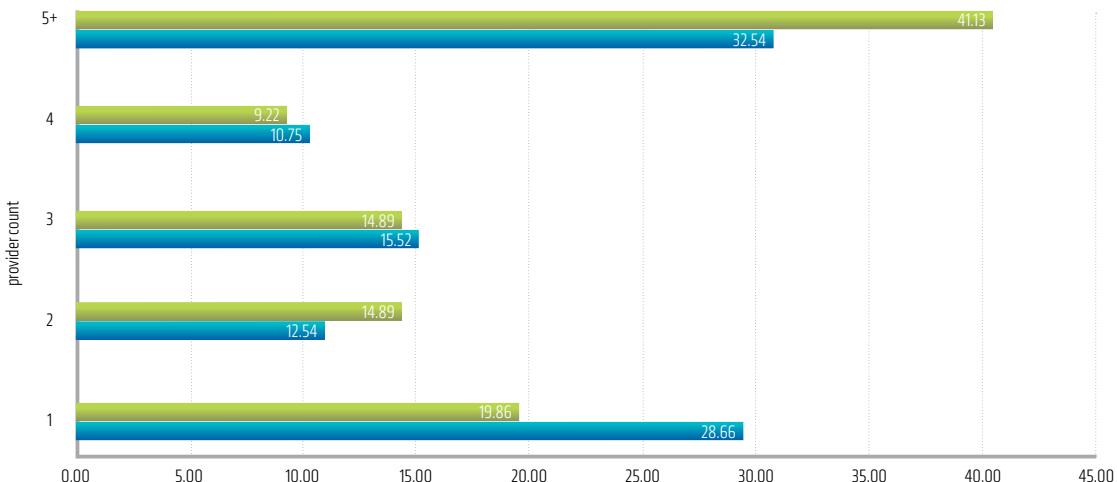
Nonetheless, despite the year-on-year direction of travel, larger managers are still associated with a higher number of providers than smaller managers. This is still down to the requirements associated with managing a larger multi-asset class portfolio. Looking beyond equity algorithms, the rise of algo use in the foreign exchange (FX) asset class has grown over the years for spot trading

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

	2021	2020
Up to 0.25	▼ 2.13	2.14
0.25-0.5	▲ 2.50	1.83
0.5-1	▲ 2.64	2.00
1 to 10	▼ 2.94	3.33
10 to 50	▼ 3.47	4.25
More than 50	▼ 3.89	4.02

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

ALGO 2020 ALGO 2021



and, recently, has begun to extend to FX derivatives such as non-deliverable forwards. New regulations, such as the uncleared margin rules, are driving FX derivatives into the clearinghouse and fostering more electronic trading. The development of new algos is a natural extension of this phenomenon. Thus, it may be that these managers are holding the number of algo providers somewhat consistent while diversifying the types of algos used by asset class and strategy.

Analysing the number of providers chosen by long-only managers without segmenting results into AUM categories reveals some curious findings (Figure 4). Like last year, 2021's survey suggests that long-only managers either go hard or go home when it comes to committing resources to providers. The proportion of participants indicating that one provider is sufficient has grown from around 19.86% in 2020 to just shy of 28.66% in 2021. This is in part driven by the growing familiarity and relationships between long-only managers and their providers.

The proportion of firms relying on

five or more algo providers has fallen from 41.13% in 2020 to 32.54% in this year's survey. The reason for this phenomenon is that cost pressures have pushed managers to consolidate and streamline their relationships, even though clearly a significant number of providers still see the diversification benefits of leveraging a handful of different algo providers.

The distribution of algo usage by value traded has changed considerably over the past year (Figure 5). The proportion of participants trading 80% or more of their portfolio via algo trading almost doubled from 10.98% in 2020 to 20.75% in 2021. At over a fifth of all long-only respondents to this year's survey, this group of managers trading 80% + of their portfolio algorithmically now represents the largest proportion of survey participants. Additionally, the year-on-year increase for this group is the largest of any bracket. Long-only funds allocating 20% to 30% of their portfolio value into algos grew to 12.19%, up from 7.65% in 2020 in the second largest increase of any bracket. At the lower end of the spectrum, 6.82% of participants trade between

5% and 10% of their portfolio's value using an algorithm (versus 8.43% a year ago). The most significant year-on-year decrease was seen in the 50% to 60% segment, which declined from 22.16% of long-only funds trading via algos last year to 9.65% in this year's survey.

At first glance it seems that more firms are pushing a larger proportion of their book into algorithms and this is partly a consequence of the developments in technology and software that has enabled algo trading in equities as well as other asset classes. The percentages of funds trading via algos have risen since last year in the three largest categories: 60% to 70%, 70% to 80% and above 80%. All the same, the fact remains that the percentage of respondents trading 50% or more of their portfolio algorithmically has remained essentially the same: 49.41% versus 49.22% last year. This is a reminder that for all the benefits of algorithmic trading, the industry still values the role of human discretion and it remains the case that many instruments and asset classes do not lend themselves easily to algo trading.

Long-only managers were asked

to select the types of algorithms they used from providers (Figure 6). Like last year, in 2021 the highest proportion of surveyed long-only funds chose dark liquidity seeking algos (59.78%). Further proposals by European regulators to further clamp-down on dark venue trading have led to resistance from many asset managers who have responded to public consultations to remind policymakers of the value that dark venue trading provides large buy-side managers. This is partly behind the continued high adoption of these kind of algos in recent years, though it is noticeable that the percentage choosing dark liquidity seeking algos has fallen by 13.16% from 72.94% in 2020. Clearly over the past year long-only firms have become mindful of a broader range of considerations when it comes to their choice of algo.

The percentage-of-participation algos rose to 56.96% from 49.02% last year, indicating strong preference for the ability to participate in volume at a user-defined rate. Two algos that have been in existence for years, volume weighted average price (VWAP) and time weighted average price (TWAP), both saw year-on-year increases in its adoption in this year's survey coming in at 59.51% and 25.75% respectively. At a time of extreme market uncertainty and

Figure 5: Algo usage by value trader (% of responses)

% of respondents	2021	2020
Not Answered	▲ 3.46	1.96
0-5%	▲ 5.19	4.71
5-10%	▼ 6.82	8.43
10-20%	▼ 4.55	6.08
20-30%	▲ 12.19	7.65
30-40%	▼ 6.64	9.22
40-50%	▼ 11.74	12.75
50-60%	▼ 9.65	22.16
60-70%	▲ 12.37	9.61
70-80%	▲ 6.64	6.47
80% and over	▲ 20.75	10.98

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

Algo type	2021	2020	2019
% Volume (Participation)	▲ 56.96	49.02	60.92
Dark Liquidity Seeking	▼ 59.78	72.94	59.11
Implementation Shortfall (Basket)	▲ 15.56	13.92	16.42
Implementation Shortfall (Single Stock)	▼ 46.22	53.14	45.32
Other	▼ 4.91	5.10	3.45
TWAP	▲ 25.75	24.71	21.51
VWAP	▲ 59.51	54.71	63.87

unpredictability, it is expected that participants turn to tried and tested

methods of algo trading to navigate execution venues.

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, a record number of 1,468 ratings were received across 36 algo providers, yielding thousands of data points for analysis. Only the evaluations from clients who indicated that they were engaged in managing long-only firms 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 in 2020, this year's survey analysis for the long-only results was carried out by Aite Group.



SAVE THE DATE

4 November, 2021

The Savoy, London

THE TRADE LEADERS IN TRADING 2021

Bank of America

Bank of America achieved an increase of 24 basis points in this year's survey, raising its average score from 5.43 in 2020 to 5.67 in 2021. Impressively, BofA has improved in all fifteen categories across the survey, with the highest increases seen in the data on venue/order routing logic or analysis (+0.41), reduction in market impact (+0.40) and customisation features (+0.39) categories, which indicates the strong direction of travel that the firm has undertaken over the past year.

Despite improvements however, the US bank underperforms the survey average by 0.14 points overall. Aspects of service such as ease of use (-0.26), access to dark pools (-0.26), increased trader productivity (-0.24) and reduced market impact (-0.24) are perhaps the most notable. Furthermore, BofA scored below the category average in all categories, with the exception of data on venue/order routing logic or analysis, where its score of 5.82 came in 12 basis points above the category average of 5.70.

The most commonly used algorithms for BofA by long-only respondents were implementation shortfall (single stock), dark or alternative liquidity seeking algos and VWAP. In terms of how the firm might improve its algo offering, clients commented that they would like to see more "strategies for trading small-caps", whilst two UK-based large asset managers call for more "innovation". A handful of clients also suggested that they would like to see more customisation features to support passive trading and liquidity provision.

Seventy percent of the funds that rely on BofA for algo execution indicate they trade at least half of their portfolio value by algorithmic means. Just under half (46%) of participants manage over US\$50 billion in assets. For the most part the long-only respondents were from either European or North American markets, though there were also a small handful from Asian centers such as Singapore and Hong Kong.

BANK OF AMERICA RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.73	5.56	5.70	5.70	5.70	5.77	5.64	5.45
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.76	5.82	5.89	5.47	5.66	5.65	5.54	5.67

KEY STATS

5.89
Highest score
(customer support)



5.45
Lowest score
(customisation)

0.41
Most improved
(order routing logic/analysis)



0.03
Least improved
(ease of use)

Barclays

British bank Barclays gained an impressive 40 basis points in this year's survey, increasing its average score for long-only responses from 5.49 in 2020 up to 5.90 in 2021. In March of 2020, Barclays migrated its electronic coverage desk to working from home and reported that the stability of their platform during this period gave clients confidence in BARX Electronic Trading, increasing European market share by over 30% from Q1 to Q4 2020. Barclays achieved significant year-on-year increases in anonymity (+0.83), increased trader productivity (+0.71), reduced market impact (+0.59) and customer support (+0.55).

Barclays' continued investment in its algorithmic trading services is reflected in the bank's average score of 5.90, coming in at 9 basis points above the overall survey average and outperforming in 14 of the 15 categories under review. "Within equities, we have invested heavily in our statistical modelling and development team in order to focus and deliver performance based solutions for clients", Barclays notes in its provider submission to the survey. In addition, the bank continues to invest in their FX platform, providing "a wider scope of FX algos and are focusing on delivering new execution strategies including implementation shortfall". It would seem Barclays' efforts are being recognised by clients, as aspect of service such as customer

support, assess to dark pools and increased trader productivity scored particularly highly at +0.31, +0.17 and +0.17 points above the category average respectively.

BARX offers algorithmic trading services across all asset classes throughout Europe, North America and APAC. The platform supports a healthy range of core algorithms, including alternative liquidity seeking, iceberg, implementation shortfall, market on close, market at open, peg, percentage volume, TWAP, VWAP, target close, and pairs. To measure algo performance, long-only clients of Barclays responding to this year's survey used implementation shortfall TCA, VWAP TCA and liquidity capture.

Sixty-one percent of long-only respondents using Barclays trade at least 50% of their portfolio algorithmically. A quarter of the respondents represent managers with US\$50 billion or more in AUM. Additional features requested by clients include "more automated principal liquidity", "smart/auto auction engagement", "implementing existing algos with market conditions and IF scenarios" and "dynamic volume participation with opportunistic dark liquidity sourcing". As the firm continues to invest in its algorithmic trading service there is particular attention on enhancing Hydra, the firm's dark liquidity-seeking algorithm and increasing development in data products for rates and credit.

BARCLAYS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.14	5.82	5.91	5.78	5.90	6.00	5.71	5.72
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.09	5.71	6.32	5.61	6.09	5.92	5.71	5.90

KEY STATS

6.32
Highest score
(customer support)



5.61
Lowest score
(execution consulting)

0.83
Most improved
(anonymity)



0.10
Least improved
(customisation)

Berenberg

Berenberg is one of the world's oldest banks and is currently one of Europe's leading privately-owned banks. Its algorithmic offering is called BEAT and supports a range of core algorithms including alternative liquidity seeking, implementation shortfall, market on close and VWAP. In addition to its liquidity access offering, the Hamburg-based bank is a registered market marker and has direct memberships at a range of exchanges across Europe. The firm's algorithmic offering covers equities and ETFs in Asia-Pacific, Europe and North America.

In terms of number of responses, Berenberg received 74 responses from long-only managers in 2021, placing it fourth highest among its peers. The firm is a new entrant to the survey this year and has made a strong start with an average score of 5.98, that sits comfortably above the survey average of 5.81. The firm outperformed the category average across all 15 service areas under review with its strongest relative performance being its score of 6.41 in customer support, an impressive 40 basis points above the category average.

Berenberg also scored particularly well in execution consistency (+0.26), dark pool access (+0.22), execution consulting and pre-trade cost estimation (+0.21) and price improvement (+0.20). Its lowest score was for customisation features, which came in at 5.67. This chimes with comments on clients wish lists such as "the ability to move strategy easily, and to move from dark to lit venues when appropriate" and "greater flexibility to combine various algos to create custom usage on the fly". One respondent has called for "greater actionable TCA", highlighting the important role played by technological innovation in increasing transparency and shrinking costs.

Exactly half of all long-only respondents to Berenberg in this year's survey trade at least 50% of their portfolio algorithmically. The most commonly used algorithms were dark or alternative liquidity seeking algos and VWAP. Berenberg's long-only clients that responded to this year's survey were mostly from Europe with a handful from the US and just under a third (30%) managing more than US\$50 billion in assets.

BERENBERG RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.15	5.88	6.16	5.87	6.04	6.06	5.86	5.67
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.18	5.82	6.41	5.80	6.14	5.90	5.83	5.98

KEY STATS

6.41
Highest score
(customer support)



5.67
Lowest score
(customisation)

n/a



n/a

Bernstein

Bernstein scored an overall average of 6.00 (Very Good) in the 2021 survey, just up from its 2020 score and significantly above the survey average of 5.81. Year-on-year increases were observed in seven categories, most notably in algo monitoring capabilities (+0.43) and data on venue/order routing logic or analysis (+0.36). Decreases were observed in eight of the service areas under review, most of which were relatively marginal, except for customer support and services (-0.30) and the category of cost (-0.17), which drops down a range this year from Very Good to Good.

In terms of number of responses, Bernstein received 52 responses from long-only managers, placing it eleventh highest among its peers. The firm beat the category average across all aspects of service, with the exception of price improvement, where its score of 5.64 falls just two basis points less than the category average of 5.67, indicating that this is an area that Bernstein can work to make improvements. Services areas such as flexibility and sophistication of smart order routing, customisation features, algo monitoring and data on venue/order routing logic or analysis scored particularly strongly,

outperforming the category average by +0.38, +0.33, +0.28 and +0.22 points respectively.

The most commonly used algorithms from Bernstein in this year's survey were dark or alternative liquidity seeking algos, VWAP, %volume (participation) and implementation shortfall (single stock). In terms of how Bernstein can improve, respondents have suggested that the firm should think more about "relative limits vs sector/country benchmark", "pre-trade information" and developing better process for demonstrating best execution.

Just under three quarters (73%) of long-only respondents who rely on Bernstein trade at least 50% of their portfolio value through algorithms. In terms of the AUM profile, nearly a third (30%) of long-only respondents managed more than US\$50 billion. Most long-only respondents using Bernstein were from Europe and there were also several respondents from North America. Clients mainly use implementation shortfall TCA, VWAP TCA and liquidity capture to monitor algo performance.

BERNSTEIN RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.04	5.94	6.01	5.97	6.00	6.09	5.64	5.90
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.27	5.92	6.22	5.76	6.16	6.15	6.00	6.00

KEY STATS

6.27
Highest score
(ease of use)



5.64
Lowest score
(price improvement)

0.43
Most improved
(algo monitoring)



-0.30
Least improved
(customer support)

Citi

Citi achieved a small increase of 5 basis points in this year's survey, raising its average score for long-only responses from 5.42 in 2020 up to 5.48. In 2021 we see signs of improvement for the US bank, with year-on-year increases recorded across 10 categories, the most significant being for customer support and services (+0.49), increased trader productivity (+0.35) and flexibility and sophistication of smart order routing (+0.18). Citi's highest scoring category this year was ease of use, which came in at 5.85. Long-only respondents that use Citi reported to using VWAP TCA, implementation shortfall TCA, mean reversion and liquidity shortfall to measure algo performance. In January 2021, the firm rolled out a new trading platform with a suite of execution algorithms for global futures markets and will be available to Citi clients on major exchanges throughout North America, Europe and Asia.

Despite improvements observed in the majority of service areas and the positive direction of travel, Citi's

overall average score falls 0.33 points short of the survey average. In addition, the firm recorded scores lower than the category average in all 15 service areas under review. Most significantly, Citi's score for anonymity (5.40) and access to dark pools (5.48) were recorded at -0.49 and -0.44 below the category average respectively. The firm's lowest scoring categories were customisation (5.24) and execution consulting (5.22). Nonetheless, scores across all aspects of service for Citi fall comfortably within the Good range (5.00-5.99). Respondents commented that they would like to see better monitoring tools and more customisation opportunities through bespoke algos.

Over half (55%) of long-only respondents trade at least half of their portfolio using algorithms. A similar proportion (56%) of respondents represent managers with US\$50 billion or more in AUM. Long-only clients of Citi that responded to this year's survey were based mainly within the major markets of Europe.

CITI RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.62	5.40	5.47	5.63	5.55	5.40	5.37	5.24
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.85	5.35	5.61	5.22	5.48	5.47	5.46	5.48

KEY STATS

5.85
Highest score
(ease of use)



5.22
Lowest score
(execution consulting)

0.49
Most improved
(customer support)



-0.45
Least improved
(execution consulting)

Exane BNP Paribas

Exane BNP Paribas offers a full suite of algorithms, covering equity markets across EMEA. Impressively, Exane ranks first place overall among its profiled peers and rates highest in all categories except for dark pool access and order routing logic. Exane recorded year-on-year increases in nine categories across the survey, with the most significant being its score for anonymity (+0.44) and reduced market impact (+0.38). In contrast, the firm recorded year-on-year decreases in six categories, most notably dark pool access (-0.26), routing logic (-0.17) and customisation (-0.16), however Exane still remain top of the leaderboard for these key aspects of service. Despite significant investments into execution consulting to match client's increasing reliance on algo wheels, the firm's score of 5.99 represented a marginal fall (-0.10) from its high score of 6.09 in last year's survey.

In a particularly strong showing the firm received 85 responses from long-only managers in this year's survey. Unsurprisingly, Exane recorded higher-than-average scores in all categories to be surveyed this

year, including customisation features, reduced market impact and increased trader productivity, which outperform the category averages by 61, 52 and 46 basis points respectively. With a rapidly changing market structure landscape and the addition of new venues, the firm has focused on the efficiency of its European closing auction and trading for the benefit of clients. In the past year, the firm has seen significant growth in its US customer base and has deepened its relationships with index providers to shape its innovation strategies.

Fifty-one percent of the long-only funds captured in the survey results trade at least half of the value of their portfolio algorithmically. Thirty-nine percent of managers doing business with Exane indicate they have US\$50 billion or more in AUM. In terms of the geographic profile, almost all were from the major markets of continental Europe, with of a small handful of US respondents. A number of respondents to Exane expressed that they did not seek additional features, as they were happy with the level of service.

EXANE RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.42	6.33	6.33	6.08	6.28	6.35	6.08	6.18
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.32	6.02	6.46	5.99	6.06	6.22	6.13	6.22

KEY STATS

6.46
Highest score
(customer support)



5.99
Lowest score
(execution consulting)

0.44
Most improved
(anonymity)



-0.26
Least improved
(dark pool access)

Goldman Sachs

Goldman Sachs Electronic Trading (GSET) offers clients access to a suite of global liquidity pools, such as SIGMA X, which is enhanced by its algo execution capabilities. During the peak of market volatility in March and April 2020, GSET saw volumes 135% higher than the average trading day, with market data volumes processed by the platform almost tripling overnight. The firm currently has approximately 530 institutional clients on the buy-side that use its algorithms.

GSET's "core" algorithms include peg, TWAP, VWAP and portfolio algos (APEX) and these apply entirely to equities. Goldman Sachs attracts the third highest number of long-only fund responses (80) in this year's survey. Clients managing over US\$50 billion in assets represent 39% of respondents doing business with Goldman Sachs in the long-only 2021 survey. Sixty-eight percent of firms looking to the company for trading expertise indicate they trade at least half of their portfolio value algorithmically.

Goldman Sach's average of 5.72 is just up from its score last year but is nonetheless marginally below the survey average of 5.81. The firm recorded year-on-year increases in nine categories and outperformed the category average in two areas: execution consistency (5.92) and flexibility and sophistication of smart order routing (5.85). For the most part there was little change between its scores this year and last year, its most significant improvements were in service areas such as price improvement (+0.24) and market impact reduction (+0.20).

Goldman is moving ahead with the build of the new strategic trading platform 'Atlas', which provides flexible, modular architecture upon which products can drive improvement across clients' execution benchmarks. The first algo was launched at the end of 2020 and additional algos will be launched throughout 2021. In addition, the firm have expanded their offering to include a full algo suite for the complexed regions of MENA.

GOLDMAN SACHS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.90	5.61	5.92	5.75	5.78	5.63	5.53	5.50
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.91	5.64	5.75	5.52	5.92	5.85	5.65	5.72

KEY STATS

5.92

Highest score
(execution consistency)



5.50

Lowest score
(customisation)

Lowest score
(customisation)

0.24

Most improved
(price improvement)



-0.20

Least improved
(cost)

Instinet

Instinet is a New York-headquartered institutional, agency-model broker that also serves as the independent equity trading arm of its parent, Nomura Group. The firm's market share is at an all-time high, with approximately 1000 institutional clients on the buy-side actively using its algorithms. Instinet's investment in technology has enabled them to ride out much of the volatility and the firm has grown its buy-side institutional business, whilst developing its sell-side outsourced relationships as other brokers leverage Instinet's technology and global footprint. Instinet offers a full suite of algorithms, covering equities, ETFs and listed derivatives.

The team's work on its low latency algorithmic technology demonstrates how automation can improve support and this is reflected in a strong showing from this year's survey. Sixty-six percent of managers who selected Instinet as a provider execute at least half of their portfolio value algorithmically. Forty-one percent manage upwards of US\$50 billion in assets. Its average of 5.89 is up 6 basis points from last year and above this year's overall survey

average of 5.81. Respondents came from North America, Europe and the Asia-Pacific.

Instinet scored highly in a number of different categories including anonymity, execution consistency and access to dark or alternative sources of liquidity, outperforming the category average by 25, 18 and 18 basis points respectively. The firm saw year-on-year increases in nine categories, with the most pronounced improvements in customisation (+0.30), ease of use (+0.27), execution consistency (+0.26) and algo monitoring (+0.26). The firm received year-on-year decreases in six categories, with its score in increased trader productivity (5.96) falling most significantly (-0.19) and moving down a range from Very Good to Good.

In terms of additional features that respondents would like to see, better monitoring tools and more customisation featured among the comments left by long-only respondents. One trader calls for "ladder type algos, where one algo changes strategy based on px [price] level".

INSTINET RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.96	5.93	6.08	5.81	5.89	6.14	5.70	5.65
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.07	5.64	6.14	5.62	6.10	5.80	5.82	5.89

KEY STATS

6.14
Highest score
(customer support)



5.62
Lowest score
(execution consulting)

0.30
Most improved
(customisation)



-0.19
Least improved
(increased trader productivity)

JP Morgan

JP Morgan received 60 responses from long-only managers in this year's survey, placing it sixth highest amongst its peers. These respondents came exclusively from either Europe or North America. Nearly half (46%) of the participant funds using JP Morgan's algos manage over US\$50 billion in asset and 47% trade at least half of their portfolios' value algorithmically.

JP Morgan's average score of 5.62 marks a decline of 15 basis points from its provider average in last year's survey, as well as being 0.18 points beneath the overall survey average of 5.81. However, there are signs of hope for the New York-headquartered investment bank, with the firm increasing its scores year-on-year in three categories, namely increased trader productivity (+0.07), anonymity (+0.09) and execution consulting (+0.05). The firm's highest score was for ease of use, where it scored firmly in the Good range (5.82). Execution consulting and pre-trade cost estimation (5.68) was the sole service area in which JP Morgan outperformed the category average (5.58). Disappointingly, all other

aspects of service covered by the survey scored beneath the benchmarks, most notably customer support (-0.39) and reduced market impact (-0.36).

Long-only respondents to this year's survey reported to using implementation shortfall TCA, mean reversion, VWAP TCA, and liquidity capture to measure algo performance using a range of strategies including dark or alternative liquidity seeking, VWAP, implementation shortfall (single stock), %volume (participation), plus TWAP and implementation shortfall (basket).

One UK-based large asset manager commented that they would like to see the ability to select and deselect equity trading venues, though they recognise that the fragmented nature of equities relative to FX makes this a little difficult. Other managers suggested that they would want to see more analysis of liquidity-sourcing effectiveness as well as basket algos, more strategies for trading small-caps and more "opportunistic" dark liquidity sourcing.

JP MORGAN RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.75	5.45	5.55	5.59	5.77	5.81	5.43	5.40
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.82	5.67	5.62	5.68	5.74	5.58	5.53	5.62

KEY STATS

5.82
Highest score
(ease of use)



5.40
Lowest score
(customisation)

0.09
Most improved
(anonymity)



-0.48
Least improved
(customer support)

Kepler Cheuvreux

Kepler Cheuvreux is a leading, independent European financial services company that specialises in research, execution, fixed income and credit. The firm's algorithms cover both equities and ETFs in EMEA and North American markets. The agency broker saw a record year for volumes and revenues in 2020 while gaining significant market share. Despite the challenges brought about by the industry-wide shift to remote working conditions, Kepler Cheuvreux maintained strong communication channels with clients. The firm noted that sell-side liquidity access was a key driver for the buy-side when choosing an algo provider during the market tumult of 2020.

The firm ranked top in terms of the number of responses from long-only managers it received, with an impressive 94 responses in this year's survey. Its average score of 5.97 places the firm 16 basis points ahead of the survey average of 5.81 and falls just 4 basis points below its provider average of 2020. Kepler Cheuvreux outperformed the category average across 14 of the 15 service areas under review. Very Good scores (6 – 6.99) were recorded in seven categories, including reduced

market impact (6.10), cost (6.01) and execution consistency (6.14), where the firm outperformed the category average by 29, 25 and 24 basis points respectively. The firm's highest score this year is in customer support (6.23). Dark pool access (5.89) was the sole category where Kepler scored less than the benchmark (5.92), albeit marginally.

In terms of additional features respondents would like to see, many reported to being satisfied with current service levels, though the ability to find more liquidity at entry level and quicker execution was raised by more than one respondent. Over half (51%) of long-only respondents who use Kepler Cheuvreux traded at least 50% of their portfolio algorithmically. Managers with more than US\$50 billion in AUM represents 17% of all the firm's long-only respondents. Long-only clients of Kepler Cheuvreux that responded to this year's survey were drawn from Europe, North America, Middle East and Asia. Coming innovations will build on the firm's spread and volatility capture logic through a new quantitatively driven implementation shortfall, liquidity seeking and dynamic target close algorithm in 2021.

KEPLER CHEUVREUX RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.13	6.10	6.14	6.01	5.99	6.03	5.87	5.69
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.21	5.71	6.23	5.71	5.89	5.97	5.84	5.97

KEY STATS

6.23
Highest score
(customer support)



5.69
Lowest score
(customisation)

0.13
Most improved
(ease of use)

-0.28
Least improved
(anonymity)

Liquidnet

Liquidnet operates an institutional investment network, deploying financial technology solutions for institutional asset managers across a global equities and corporate bond network. The New York-based firm received 59 responses from long-only funds in this year's survey, scoring an average of 5.76 – up from 5.70 in last year's survey – yet a marginal 5 basis points below the survey average of 5.81 this year.

Year-on-year increases were observed across eight categories, with the most significant being recorded in algo monitoring (+0.52), increased trader productivity (+0.26), ease of use (+0.24) and speed (+0.23). The company saw a year-on-year decline in six categories, the most notable being access to dark pools, which dropped 20 basis points from an impressive 6.42 in last year's survey down to a very respectable 6.22.

Liquidnet outperformed the category average in eight areas under review, including reduced market impact (+0.43), breadth of dark or alternative liquidity sources that are accessed (+0.30) and anonymity (+0.21). The firm scored particularly well in the reduced market im-

pact category, coming second of all providers profiled in this year's long-only results. In contrast, the firm failed to meet the benchmark in seven categories, the most noteworthy perhaps being cost (-0.56) and customisation (-0.51), underscoring areas in which the company can improve.

43% of responses from long-only managers who use Liquidnet managed upward of US\$50 billion. Over a third (39%) of respondents trade at least half of their portfolio algorithmically. Long-only respondents using Liquidnet reported to measuring algo performance using implementation shortfall TCA, liquidity capture and VWAP TCA.

In terms of additional features that respondents would like to see from Liquidnet, one responded remarked that they would like to see "more sophisticated pair algos as well as basket algos". There was also mention made of block trading and on-trade AI as a potential features that long-only respondents might like to see in future.

LIQUIDNET RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.10	6.24	5.74	5.21	5.75	6.10	5.70	5.05
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.02	5.43	6.15	5.29	6.22	5.63	5.80	5.76

KEY STATS

6.24
Highest score
(reduced market impact)



5.05
Lowest score
(customisation)

0.52
Most improved
(algo monitoring)



-0.20
Least improved
(dark pool access)

Morgan Stanley

Morgan Stanley Electronic Trading (MSET) offers global electronic access across cash equities, options and futures. The firm's electronic trading tools include a broad suite of algorithms, smart order routing and DMA. By way of measuring algo performance, respondents use implementation shortfall TCA, mean reversion, VWAP TCA and liquidity capture.

Morgan Stanley received 60 responses from long-only funds in this year's survey, placing it joint sixth highest among its peers. The firm's average score of 5.67 is up a marginal 1 basis point from 2020, yet still falls 14 basis points short of this year's survey average of 5.81. Year-on-year increases were observed across seven categories, including execution consulting and pre-trade cost estimation (+0.34), customer support and services (+0.18) and increased trader productivity (+0.17). Year-on-year declines were marginal in most cases, which the exception of cost, ease of use and access to dark pools which fell by 37, 16 and 14 basis points respectively.

Disappointingly, the New York-headquartered invest-

ment bank ranked below the survey benchmarks across all categories under review. Aspects of service such as customer support (-0.36) anonymity (-0.28) and price improvement (-0.25) underscore keys areas in which Morgan Stanley can improve. The firm recorded its highest scores in increased trader productivity (5.83), execution consistency (5.83) and ease of use (5.82).

In terms of additional features that the long-only respondents relying on Morgan Stanley for algos would like to see, a number of respondents said they wanted to see more "strategies for trading small caps", "auto auction engagement", and the ability to access an "overview of venue performance data over the past five years".

Forty-seven percent of long-only participants doing business with Morgan Stanley indicate they trade at least half of the value of their portfolio algorithmically. Over one-third (38%) manage assets greater than US\$50 billion. Respondents are drawn from Europe, North America and Asia.

MORGAN STANLEY RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.83	5.73	5.83	5.68	5.81	5.62	5.42	5.46
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.82	5.56	5.64	5.58	5.71	5.63	5.67	5.67

KEY STATS

5.83
Highest score
(increased trader productivity)



5.42
Lowest score
(price improvement)

0.34
Most improved
(execution consulting)



-0.37
Least improved
(cost)

Redburn

Redburn is Europe's largest independent equities broker that provides institutional investors with research and agency execution in equity markets. Redburn has responded to the past 12 months by continuing their investments into algo services having added new features and liquidity sources. This has enabled the firm to onboard multiple tier-one institutions over the past year. The firm prides itself on offering flexibility and control to outperform on automated algo wheels, as well as providing space for more hands-on trades. Redburn has invested heavily in their implementation shortfall and auction strategies as well as expanding their liquidity capture to remain ahead of the crowd.

The firm's algorithmic offering covers dark or alternative liquidity seeking, implementation shortfall, market on close, market at open, participation, TWAP and VWAP. The only asset class to be currently covered by Redburn's algorithms is equities. The firm's algorithmic trading services extend to markets in both Europe and North America.

Redburn records an overall average of 5.98 in this year's survey, scoring 17 basis points above the survey average of 5.81. Year-on-year increases were achieved in nine categories, including increased trader productivity (+0.33), data on venue/order routing logic or analysis (+0.28) and cost (+0.25). Redburn outperformed the category average in 12 of the 15 service areas under review, scoring particularly well in categories such as order routing logic or analysis (+0.35), which achieved the highest score of all profiled providers, as well as second highest score for dark pool access (+0.30). In addition, price improvement and customer support surpassed the benchmarks by +0.31 and +0.28 respectively.

Over a quarter (28%) of long-only respondents that rely on Redburn manage assets of over US\$50 billion. Over half (55%) of respondents using Redburn trade at least 50% of their book via algorithms. Most long-only respondents using Redburn in this year's survey were either from the UK, Canada, or France.

REDBURN RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.11	5.95	6.15	5.76	5.85	5.93	5.98	5.71
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.19	6.05	6.29	5.50	6.22	5.97	6.05	5.98

KEY STATS

6.29
Highest score
(customer support)



5.50
Lowest score
(execution consulting)

0.33
Most improved
(increased trader productivity)



-0.17
Least improved
(speed)

UBS

UBS provides access to unique liquidity, algorithms, execution consultancy, performance analysis and market structure expertise. Long-only clients of UBS that responded to this year's survey were for the most part from Europe, though there were also a handful from the US and Singapore.

UBS received 69 responses to its algorithmic trading solutions in this year's survey, placing it fifth highest among the other providers profiled in the long-only results. The company has an average ranking of 5.40, which falls significantly below the survey average of 5.81 and represents a decline of 0.06 versus last year's average score. Disappointingly, the firm underperforms across all categories surveyed, including flexibility and sophistication of smart order routing (-0.68), customer support (-0.66), anonymity (-0.50) and execution consulting and pre-trade cost estimation (-0.49).

Nevertheless, it was not all bad news, as UBS recorded year-on-year increases in five separate categories,

notably in algo monitoring (+0.18) and price improvement (+0.17). All scores across the board are positioned firmly in the Good range (5.00-5.99), the highest being its score of 5.71 in the ease of use category. Year-on-year declines were seen across ten aspects of service, with the firm seeing its score in the customisation category fall significantly by 0.34 points from 5.45 last year to 5.11 this year. Unsurprisingly, respondents commented that they would like to see more customisation and analysis that reveals the best trading times for certain sectors and stocks. More generally, one respondent from the US said that they just wanted "guidance on what is and is not working".

Forty-two percent of long-only funds turning to UBS for algorithmic trading expertise execute 50% or more of their portfolio value algorithmically. Nearly half (47%) of UBS' long-only clients participating in the survey this year have US\$50 billion or more in AUM.

UBS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.58	5.45	5.53	5.50	5.53	5.39	5.52	5.11
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.71	5.36	5.35	5.10	5.53	5.10	5.31	5.40

KEY STATS

5.71
Highest score
(ease of use)



5.10
Lowest score
(execution consistency)

0.18
Most improved
(algo monitoring)



-0.34
Least improved
(customisation)

Virtu Financial

Virtu Financial currently has over 500 institutional buy-side clients actively using its algorithms. The firm's algorithmic trading services, known as Virtu Frontier, covers equities and ETFs in APAC, Europe, LATAM and North America. Virtu's execution strategies are designed with simple principles in mind: trader intuition and transparency. "Unlike other broker algorithms that often outsource venue routing decisions to a SOR, Virtu algorithms combine the two seamlessly to give the strategy full control over how, where and when to trade", notes the firm in its provider submission to the survey.

Over the course of 2020 and in addition to the migration of former ITG execution clients on to Virtu's algos, the firm continued the expansion of its agency offering into Canada, LATAM and APAC. Clients benefit from multiple sources of liquidity provided from the firm's principal market making flow, institutional blocks and presence in the US retail marketplace. Virtu supports a wide range of core algorithms, including alternative liquidity seeking, iceberg, implementation shortfall,

market on close, market at open, peg, percentage volume, TWAP and VWAP.

With an average score of 5.89, Virtu outperformed the category benchmarks in 11 of the 15 service areas under review. Impressively, the firm's score for access to dark pools (6.24) ranks 31 basis points above the category average, rating it highest of all the providers profiled in the long-only results. Other high scores relative to the category average include speed (+0.23) and SOR (+0.23). Moreover, Virtu recorded year-on-year increases in all but one category, with its execution consulting score falling by 0.41 versus last year. Its most significant year-on-year increases were seen in customer support (+0.72), flexibility and sophistication of SOR (+0.59) and dark pool access (+0.57).

Just under half (49%) of long-only respondents to Virtu trade at least 50% of their portfolio using algorithms. Forty-three percent of long-only respondents represent managers with US\$50 billion or more in AUM. Clients to this year's survey were drawn from either North America or Europe.

VIRTU RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.05	5.89	5.97	5.79	6.08	5.99	5.65	5.44
Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.13	5.87	6.02	5.55	6.24	6.00	5.62	5.89

KEY STATS

6.24
Highest score
(dark pool access)



5.44
Lowest score
(customisation)

0.72
Most improved
(customer support)



-0.41
Least improved
(execution consulting)