THE 2021 ALGORITHMIC TRADING SURVEY

HEDGE FUNDS

With special analysis from Aite Group

Hedge funds rely on algos to trade majority of portfolios in market stress

Results from The TRADE's 2021 Algorithmic Trading Survey revealed that hedge funds are relying more on algorithms to trade the majority of their portfolios, with dark liquidity seeking strategies the most popular.

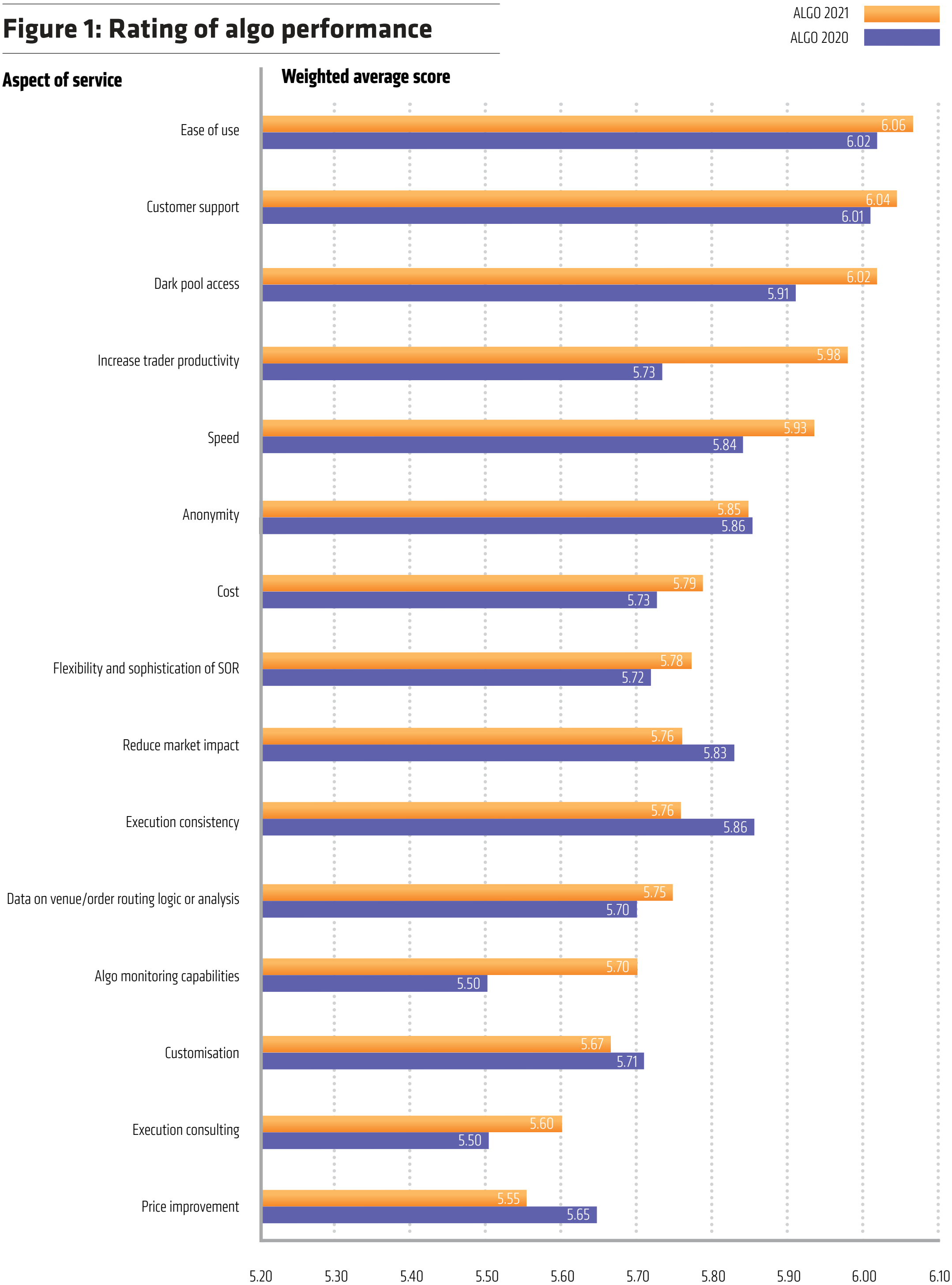
The global equity market went on an unprecedentedly wild roller-coaster ride in 2020. After a dramatic sell-off in March of last year, markets quickly recovered and major indices continued reaching record highs. The volatile market conditions, high trading volume and drive for rapid digital transformation to cope with the remote working environment have all contributed to the uptick in algorithmic trading.

Despite the initial shock, investors haven't shied away from the market; on the contrary, not only have institutional investors been actively engaging in the market, but the rising trading flow from retail investors has also created a notable impact on the total market. Under the current macro-economic environment, with historic low interest rates, government stimulation and the soon-to-be reopened economy, a higher adoption rate of algorithmic trading in the equity market is to be expected to help traders achieve best execution and optimal liquidity options.

In 2021, the average score of hedge fund respondents to the Algorithmic Trading Survey was 5.82—a consistent increase from the 2020 score of 5.77 and the 2019 score of 5.72. These scores provide an insight into the qualities that the industry values, such as usability, and reflect the confidence that the sell-side can provide relevant and high-quality liquidity, including access to dark pools, alternative trading systems and systematic internalisers in Europe and the US. The survey reveals that the most impactful features of algorithms are ease of use, customer support, dark pool access, increased trader productivity and speed (Figure 1).

Following 2020, when the category received the highest score of 6.02, "ease of use" again scored the highest of all categories at 6.06. "Customer support" follows at 6.04 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 user-friendly front ends and streamlined technology in the modern trading environment. Notably, "increased trader productivity" recorded

Figure 1: Rating of algo performance



the highest year-on-year score increase in this year's survey, up 25 basis points to 5.98. This jump shows the growing role that algos play in boosting the performance of traders and indicates the industry is becoming more comfortable with and proficient in its use of algorithms. "Algo monitoring capability" marks the second-highest jump in score, having boosted its score from 5.5 to 5.7. "Dark pool access" recorded an increase of 0.11 and remains among the top-rated categories despite the push from European regulators to shift trading onto lit venues.

Algo providers have done well in providing usable and efficient solutions. However, there is still progress to be made when it comes to other algo characteristics. While the average score and most individual scores in 2021 were up from 2020, some categories recorded a slight decrease. "Execution consistency" received a lower score of 5.76 in 2021, down 0.10 from 5.86 in 2020. "Price improvement" also experienced a decrease of 0.09 to arrive at 5.55 and emerged as the lowest scored category. "Execution consulting and pre-trade cost estimation" and "customisation" are among the lowest scores, with 5.60 and 5.67, respectively, reflecting concerns from hedge funds about how well the sell-side is able to provide feedback on the performance of algos.

While progress has not been consistent across all areas from all algo providers, the range of the average scores tightened from a minimum of 5.55 to a maximum of 6.06. This indicates that the industry is 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 revised 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.

Survey participants indicated that their reasons for using algorithms are primarily associated with "ease of use" (11.21%) and "reduction of market impact" (10.78%), followed by "increase of trader productivity" (10.29%), as shown in Figure 2. The fact that "ease of use" continues to place among the top reasons for using algos year after year emphasises the value that buy-side firms place on simplicity and reliability. Between 2020 and 2021, the top two reasons for using algorithms are increasingly motivating factors while some categories have switched places in their importance: "consistency of execution performance" has dropped from the top three to fifth place at 8.68% and "lower

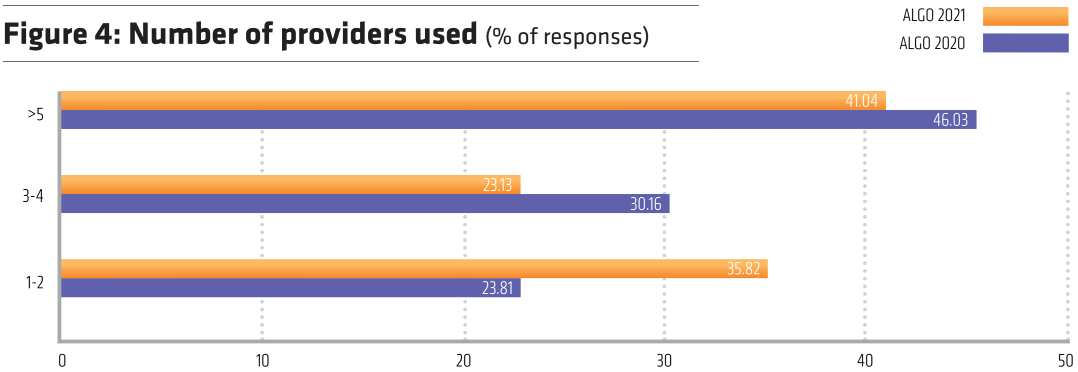
Figure 2: Reasons for using algorithms (% of responses)

Feature	2021	2020
Results match pre-trade estimates	▼ 1.85	1.87
Data on venue/order routing logic or analysis	▼ 4.16	5.04
Algo monitoring capabilities	▼ 5.91	7.09
Customisation capabilities	▲ 6.90	5.97
Higher speed, lower latency	▲ 7.02	6.47
Better prices (price improvement)	▼ 7.18	7.96
Greater anonymity	▼ 8.28	9.33
Flexibility and sophistication of SOR	▲ 8.47	7.28
Consistency of execution performance	▼ 8.68	10.07
Lower commission rates	▲ 9.27	8.27
Increased trader productivity	▲ 10.29	9.95
Reduced market impact	▲ 10.78	10.63
Ease of use	▲ 11.21	10.07

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

Feature	2021	2020
More than $50 billion	▼ 3.94	4.33
$10 - 50 billion	▼ 4.00	4.22
$1 - 10 billion	▲ 3.90	3.74
$0.5 - 1 billion	▼ 3.36	4.00
$.0.25- 0.5 billion	▲ 2.20	2.00
Up to $0.25 billion	▲ 1.80	1.67
Not answered	▼ 3.78	4.43

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



commission rates" moved up two spots at 9.27%.

"Flexibility and sophistication of smart order routing" and "customisation of capabilities" are increasingly important drivers when it comes to more algo usage. This is especially true as usage has become more harmonious across the industry. The buy-side is getting more sophisticated and requires more fine-tuning to meet very specific trading needs, such as customised closing auction strategies and enhanced liquidity-seeking options, particularly with strategy that looks to the rising retail flow.

The 2021 survey reveals an intriguing trend in the number of providers that hedge funds are selecting. Historically, hedge funds have shown a clear preference to use multiple algo providers. Figure 3 demonstrates that funds both big and small in terms of assets under management (AUM) have often reported using an average of two or more different algo providers. However, the survey results indicate that only the hedge funds managing less than US$500 million and funds with US$1 billion to US$10 billion have reported an increase in their average number of providers from 2020 to 2021. Hedge funds managing over US$10 billion reported a decline in the average number of providers used.

The 2021 data shows that, on average, hedge funds have cut back on the number of algo providers they engage with, yet 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 and, recently, has begun to extend to FX derivatives such as non-deliverable forwards. As algo providers strive to provide comprehensive multi-asset solutions, hedge funds start to rely on certain types of providers more than ever. The relationship just got stickier.

Figure 4 further shows a clear trend that hedge funds are using fewer providers. Over 35% of the responses reported using one or two providers, a large increase from 23.8% in 2020. Additionally, the percentage of funds using five or more providers decreased from 46% in 2020 to 41% in 2021, and the percentage dropped from 30% to 23% for the those using three or four. Nonetheless, the largest group of the responses still reported using more than five providers, as the benefits of using a variety of algo providers still prevail—until next year's survey. It will be interesting to see if further consolidation happens and more buy-side firms use only one or two providers.

In terms of the distribution of how much value of portfolio traded, the survey finds that over half (53%) of respondents are using algos to trade the majority of their total value traded; this was also the case in 2020 (Figure 5). Moreover, the proportion of hedge funds using algos to trade more than 80% of value traded has risen from around 10% in 2020 to 20% in 2021. A comparable decline in the proportion of funds trading 60% to 70% of their value using algos has occurred; falling from 21% to less than 13%. The proportion of funds using algos to trade 40% to 60% of value traded also declined, which offset the increase in the funds using algos to trade more than 70% of value traded. These findings suggest that hedge funds are increasingly relying on algorithms to trade the majority of their portfolio under market stress for all the reasons discussed previously. With more automation transforming trading desks across the industry, the buy-side prefers to trade consistently and efficiently.

In terms of the types of algos that hedge funds have been adopting for their trading strategies, Figure 6 shows that the most popular algo strategies are "dark liquidity seeking," followed by "VWAP," even though the percentage of the responses for "dark liquidity seeking" slightly declined by two percentage points to 68%. Interestingly, the percentages for most algo usage have decreased, except for the "other" category. The only algo to have recorded the same percentage since 2020 is "percentage volume (participation)". The algos that recorded the largest decrease in adoption were "implementation shortfall (single stock)" and "TWAP" by dropping 10 percentage points each, to 44% and 27%, respectively, in 2021.

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

Feature	2021	2020
Not answered	▲ 5.14	3.70
0 - 5%	▲ 3.70	3.29
5 - 10 %	6.17	6.17
10 - 20%	▼ 4.73	5.35
20 - 30%	▲ 9.05	4.94
30 - 40%	▲ 8.85	6.17
40 - 50%	▼ 8.44	13.99
50 - 60%	▼ 7.82	16.05
60 - 70%	▼ 12.76	21.40
70 - 80%	▲ 12.96	8.64
>80%	▲ 20.37	10.29

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

Feature	2021	2020
Other	▲ 6.58	4.94
Implementation shortfall (basket)	▼ 10.91	15.64
TWAP	▼ 27.16	36.63
Implementation shortfall (single stock)	▼ 44.24	53.91
Percentage volume (participation)	56.38	56.38
VWAP	▼ 58.64	62.14
Dark liquidity seeking	▼ 67.49	69.96

Methodology

Buy-side survey respondents were asked to give a rating for each algorithm provider on a numerical scale from 1.0 (very weak) through 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 hedge funds 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 in 2020, this year's analysis for the Algorithmic Trading Survey was carried out by Aite Group.

Bank of America

Bank of America received 36 responses from hedge fund managers in this year's survey - which in terms of number of submissions, ranks the bank third amongst its peers - with a third of those managing over US$10 billion in AUM. BofA's average score has increased by over 27 basis points from 2020, raising its overall average up to 5.84 and placing the North Carolina-headquartered investment bank firmly in the upper end of the Good range. BofA's highest year-on-year increases were observed in the cost (+0.58), increase trader productivity (+0.47) and customisation (+0.39) categories. The only decrease recorded was in execution consistency (-0.03), which disappointingly ranks -0.14 below the category average in this year's survey. As in previous years, customer support remains the bank's highest rated service area under review, scoring an impressive 6.17 (Very Good), 12 basis points ahead of the benchmark.

The bank outperformed the category average across ten service areas under review, with its strongest relative performance being its score of 6.03 in data on venue, rating 27 basis points above the benchmark. Areas such as cost (+0.21), price improvement (+0.17) and customisation features (+0.13) also performed well. In contrast, Bank of America falls below the category average in five categories, most noticeably in increase trader productivity and breadth of dark or alternative liquidity sources, where it scores -0.20 and -0.19 points below the benchmarks respectively.

For the most part, the hedge fund respondents were from either European or North American markets, though there was also a small handful from Asian centers such as Hong Kong. The most commonly used measures for algo performance by hedge fund respondents were VWAP TCA and implementation shortfall TCA. When asked what additional features they wanted, a number of respondents commented that they would like more consistent consultation and algo customisation on the access of the liquidity providers, possible customisation for more passive trading for exchange-traded fund (ETF) business, and more automated auction engagement.

BANK OF AMERICA RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.78	5.67	5.62	6.00	5.96	5.96	5.72	5.80	5.93

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
6.03	6.17	5.60	5.83	5.86	5.75	5.84

KEY STATS **Overall Outperformer:** **Category Outperformer:** ★ **X9**

6.17
Highest score
(customer support)

5.60
Lowest score
(execution consulting)

0.58
Most improved
(cost)

-0.03
Least improved
(execution consistency)

Barclays

BARX is British bank Barclay's cross-asset electronic trading platform that covers bonds, equities, ETFs, fixed income, FX and listed derivatives in Europe, North America and the Asia-Pacific. The platform supports a full suit of core algorithms, including VWAP, TWAP, percentage volume (participation), peg, market at open, market on close, implementation shortfall, iceberg, alternative liquidity seeking, plus others such as pairs algos and Rapid (Smart DMA). BARX increased its European market share by more than 30% over the course of 2020 thanks to the firm's strong investments in algorithmic trading services to meet clients' execution needs.

Over 44% of hedge fund respondents to Barclays are managers with US$10 billion or more in AUM. In terms of geographical breakdown, 61% of respondents were based in the UK, 27% in Europe and the remainder from the U.S. More than 66% of the respondents using the British bank trade at least 50% of their portfolio algorithmically. The firm's overall average score of 5.93 comes in at 11 basis points above this year's survey average of 5.82. The bank's scores beat the benchmarks in 14 of the 15 categories under review in this year's survey. Barclays garnered too few responses to be included within the provider profiles published in 2020, however it remains noteworthy that year-on-year increases were observed across all categories. Significant improvements were recorded in increase trader productivity (+0.82), algo monitoring capabilities (+0.72), execution consulting (+0.69) and execution consistency (+0.62).

In terms of this year's results the bank's highest scores were recorded in the ease of use (6.19), customer support (6.17) and increase trader productivity (6.07) categories, which outperformed the survey benchmarks by +0.13, +0.13 and +0.09 points respectively. Barclays' score for algo monitoring capabilities outperformed the category average by 27 basis points, ranking the bank top in the category across all providers profiled from hedge fund managers in this year's survey. A few additional features that the respondents wanted are smart/auto auction engagement, a better automated feedback loop for TCA, more advice regarding habits or approaches to certain types of execution and better MOC trading functionality.

BARCLAYS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.07	5.75	5.84	5.85	5.98	6.05	5.57	5.99	6.19

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.78	6.17	5.73	6.06	5.96	5.97	5.93

KEY STATS Overall Outperformer: Category Outperformer: X14

6.19 Highest score (ease of use)

5.57 Lowest score (price improvement)

0.82 Most improved (increase trader productivity)

0.11 Least improved (reduce market impact)

Berenberg

Berenberg is one of the world's oldest banks and is currently one of Europe's leading privately owned banks. BEAT, Berenberg's algorithmic trading offering, covers equities and ETFs across Europe, North America and Asia Pacific. Berenberg supports a number of core algorithms, including alternative liquidity seeking, implementation shortfall, market on close and VWAP. Berenberg received 29 responses from hedge fund managers in this year's survey, half of which trade at least 50% of their portfolio algorithmically. Half of respondents to the Hamburg-based bank manage US$10 billion or more in AUM, and most of them are based in the UK and Europe, with a couple from the US. The firm is a new entrant to the algo survey this year, and it has made a strong start with an average score of 6.02 that sits comfortably above the survey average of 5.82.

The bank outperformed the benchmarks in 14 of the 15 service areas under review in this year's survey, with the strongest relative performance being its score of 6.53 in customer support, up 0.49 on the category average and ranking second across all providers profiled. Its score for access to dark or alternative liquidity and execution consulting and pre-trade cost estimates also performed well, both scoring 44 basis points above the category average. The latter in fact ranks Berenberg top in the category, across all providers profiled in this year's survey.

In terms of ease of use (6.30), hedge fund respondents seem more than happy, with all but one client rating the category as either Very good or Excellent, placing Berenberg second in comparison to the other providers profiled. In contrast when it comes to cost (5.70), the number of clients rating the category as Very good or Excellent lowers to around 62%. When asked what additional features they wanted, respondents made a number of comments calling for more automated principal liquidity, relative limits versus sector/country benchmark, the tendering of best available commission rates as provided by PT desks, the automation of non-standard settlement date requests, cash-neutral portfolio algos, and aggregation with live pro-rata fills for multiple swap and cash lines.

BERENBERG RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.06	5.94	6.03	5.70	6.04	6.05	5.76	5.75	6.30

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
6.00	6.53	6.04	6.46	5.88	5.80	6.02

KEY STATS | **Overall Outperformer:** | **Category Outperformer:** X14

6.53
Highest score
(customer support)

5.70
Lowest score
(cost)

n/a
Most improved

n/a
Least improved

Bernstein

Bernstein Trading, a wholly owned subsidiary of AllianceBernstein L.P., provides fundamental research and full-service execution services to institutional clients globally. Bernstein received 20 responses from hedge fund managers in this year's survey, placing the broker in twelfth place amongst its peers. Respondents were from a relatively even distribution of AUM brackets, from US$0.5 billion up to more than US$50 billion. Sixty percent of the hedge fund respondents who rely on Bernstein trade at least 50% of their portfolio value through algorithms. The vast majority of respondents using Bernstein were from Europe, and there were also several respondents from North America.

The firm beat the survey average by 26 basis points overall and scored highest in the category of speed (+0.40) across all the providers profiled. Bernstein outperformed the category average in 14 of 15 service areas under review and scored particularly strongly in areas such as reduce market impact (+0.54), customer support (+0.34) and customisation (+0.34). The firm failed to meet the benchmark in just one area, recording its lowest score in the price improvement category (5.53), which underperformed by just two basis points compared to the category average.

Year-on-year increases were observed across 10 of the 15 service areas under review, the most notable being data on venue/order routing logic or analysis (+0.45), reduce market impact (+0.42), execution consulting (+0.36) and increase trader productivity (+0.35). Declines were recorded in customisation (-0.27), price improvement (-0.24) and anonymity (-0.22), among others. The most commonly used measures for algo performance by hedge fund respondents were VWAP TCA, implementation shortfall TCA and liquidity capture. In terms of how the Bernstein can improve, respondents have suggested that the firm should add more customisation on liquidity providers, providing relative limits versus sector/country benchmark, and better MOC trading functionality.

BERNSTEIN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.30	6.30	6.08	6.05	6.33	5.98	5.53	6.01	6.19

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
6.09	6.38	5.73	6.24	6.10	5.94	6.08

KEY STATS **Overall Outperformer:** **Category Outperformer:** X14

6.38
Highest score
(customer support)

5.53
Lowest score
(price improvement)

0.45
Most improved
(order routing logic/analysis)

-0.27
Least improved
(customisation)

Citi

Citi received 23 responses from hedge fund managers in this year's survey, placing the bank in eleventh place amongst its peers. Citi's overall average score of 5.50 underperforms the survey average by 32 basis points and drops four basis points below the bank's 2020 score of 5.54. Disappointingly, the firm recorded scores lower than the benchmarks in all 15 categories under review. Most significantly, Citi's score in increase trader productivity (5.34) was 0.64 points below the category average (5.98). Client's perception of service areas such as reduce market impact (-0.41), execution consistency (-0.33), speed (-0.26), price improvement (-0,24), customer support (-0.46) and access to dark pools (-0.56) provides the bank with plenty of opportunity for improvement.

Even though Citi has much progress to make, there are signs of improvement. The bank increased its year-on-year score across seven service categories, including data on venue/order routing logic or analysis (+0.28), flexibility and sophistication of smart order routing (+0.23) and customisation (+0.20). Citi's highest-scoring category this year was for ease of use, which came in at 5.93, the upper end of the Good range (5.00 – 5.99).

Nearly half of the respondents to Citi represented hedge funds managing over US$10 billion in AUM. Respondents commented that they would like to see better automated feedback loops for TCA, more advice regarding habits or approaches to certain types of execution, the tendering of the best available commission rates as provided by PT desks, cash-neutral portfolio algos, aggregation with live pro-rata fills for multiple swap and cash lines, holistic venue overview performance data for the platform from the last five years, and the ability to monitor algo performance. Earlier this year, the firm rolled out a new trading platform with a suite of execution algorithms for futures markets, available across all major exchanges in the US, Europe and APAC. The platform includes benchmark algos such TWAP, VWAP and Close, as well as other strategies and smart order types.

CITI RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.34	5.36	5.43	5.67	5.67	5.43	5.31	5.55	5.93

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.57	5.59	5.28	5.46	5.55	5.38	5.50

KEY STATS

5.93
Highest score
(ease of use)

5.28
Lowest score
(execution consulting)

0.28
Most improved
(order routing logic/analysis)

-0.37
Least improved
(customer support)

Exane BNP Paribas

Exane BNP Paribas offers a comprehensive range of core algorithms for market participation and price improvement strategies, across equity markets in Europe, the Middle East and Africa. Recently, the firm's attention has been on market structure innovation and adding additional venues, with particular focus on the European closing action, as well as extensive investment in execution consulting, in order to match clients increasing reliance on algo wheels. Exane received 27 responses from hedge fund managers in this year's survey, with one third managing more than US$10 billion AUM. The firm's overall average score of 6.07, ranks second highest of all providers profiled and lands around 26 basis points ahead of the survey average of 5.82. Half of the hedge funds captured in the survey results trade more than 60% of the value of their portfolio algorithmically. As for the additional features wanted by respondents, some of the comments are in favour of more consistent consultation, a better liquidity-seeking algo and innovation.

Exane recorded higher-than-average scores across all categories under review, with the exception of breadth of dark or alternative liquidity sources (-0.09). The firm scored highest among all providers profiled for increase trader productivity (+0.42), customisation features (+0.50) and customer support (+0.55), as well ranking highly in speed and execution consistency, which outperformed the survey benchmarks by 38 and 34 basis points respectively.

Year-on-year increases were achieved in nine of the 15 service areas covered by the survey, the most significant being in increase trader productivity (+0.37) and algo monitoring capabilities (+0.25). In contrast, the survey recorded year-on-year decreases across six categories, including dark pool access (-0.19), routing logic (-0.18) and flexibility and sophistication of smart order routing (-0.17), with its lowest score of 5.62 in price improvement. Overall Exane's 2021 average of 6.07 is up by over three basis points compared to last year and represented in percentage terms the firm scored an impressive 87%.

EXANE BNP PARIBAS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.41	6.21	6.10	5.91	6.32	6.10	5.62	6.17	6.25

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.82	6.59	5.78	5.93	6.07	5.82	6.07

KEY STATS Overall Outperformer: Category Outperformer: X14

6.59
Highest score
(customer support)

5.62
Lowest score
(price improvement)

0.37
Most improved
(increase trader productivity)

-0.19
Least improved
(dark pool access)

Goldman Sachs

Goldman Sachs Electronic Trading (GSET) offers benchmark strategies, including peg, TWAP and VWAP, plus portfolio algos (APEX), across global equities markets. The firm currently has an average of 530 institutional buy-side clients per week actively using its algorithms across EMEA. Goldman Sachs has recently expanded its offering to include its full algo suit for MENA markets, which are typically complex to trade. The New York-headquartered investment bank received 42 responses from hedge fund managers in this year's survey, 30% of which represent clients managing US$10 billion or more in AUM. Sixty percent of the hedge fund respondents indicate that they trade at least half of their portfolio value algorithmically.

Despite Goldman Sachs increasing its overall average score by four basis points this year to 5.73 - up from 5.69 in 2020 - it fell slightly short of the survey average by 0.09 points, underperforming in aspects of service such as anonymity (-0.29), customer support (-0.21) and reduce market impact (-0.20). Nevertheless, the bank outperformed the survey benchmarks across four key categories, including cost and customisation features.

Year-on-year score increases were achieved in eight categories, with the largest improvements recorded in increase trader productivity (+0.34) and breadth of dark or alternative liquidity sources (+0.26). Marginal declines were observed in a number of service areas, the most notable being reduced market impact and customer support, both scoring 12 basis points behind the category benchmarks and the latter representing the most significant year-on-year fall for the firm.

Moving forward, Goldman Sachs is building out its new strategic trading platform – Atlas - which serves as the backbone of GSET's trading infrastructure, providing flexible, modular architecture upon which products can drive consistent performance improvement across clients' execution benchmarks. AXIS – the first algo on the new platform – was launched at the end of 2020, with additional algorithms scheduled to go live this year.

GOLDMAN SACHS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.85	5.56	5.71	5.84	5.85	5.56	5.57	5.73	5.99

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.66	5.84	5.50	5.87	5.82	5.58	5.73

KEY STATS Category Outperformer: ★ X4

5.99 Highest score (ease of use)

5.50 Lowest score (execution consulting)

0.34 Most improved (increase trader productivity)

-0.12 Least improved (customer support)

Instinet

Instinet offers institutional clients a full range of core algorithms, covering equities, ETFs and listed derivatives markets, globally. The firm's longstanding investment in and commitment to technology has made the move to remote working a comparatively smooth transition, aiding growth over the past year in terms of volume traded, market share and new business. "Core institutional buy-side clients' market share is at an all-time high", states Instinet in its provider submission to the survey, with approximately 1,000 clients actively using the New York-headquartered agency broker's algorithms. Dramatic increases in growth of wallet share with the top 150 accounts (by AUM) have also been reported.

Instinet received an overall average score of 5.93, beating the survey average by 11 basis points. One-third of the hedge fund respondents manage upward of US$50 billion in assets. Respondents came from North America, Europe and the Asia-Pacific. Seventy-five percent of managers who selected Instinet as a provider execute at least half of their portfolio value algorithmically. Instinet outperformed the category average in 10 out of 15 service areas under review, most notably in customer support, with a score of 6.46 (+0.41) and cost, with 6.19 (+0.40). Instinet's score for cost, along with flexibility and sophistication of SOR (+0.39) and anonymity (+0.37) ranked highest of all providers profiled. In stark contrast however, the firm underperforms the survey benchmarks in five categories, most notably in execution consistency (-0.25), increase trader productivity (-0.18) and data on venue/order routing logic or analysis (-0.18).

Instinet garnered too few responses to be included within the provider profiles published in 2020, however it remains noteworthy that year-on-year increases were observed in five categories - including flexibility and sophistication of SOR (+0.28) - whilst notable declines were recorded across 10 aspects of service, in particular execution consistency (-0.98) and reduce market impact (-0.87). In terms of additional features that respondents would like to see, respondents commented on wanting on-trade AI and more consistent consultation.

INSTINET RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.80	5.90	5.51	6.19	6.11	6.23	5.38	5.82	5.95

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.57	6.46	5.88	6.21	6.18	5.83	5.93

KEY STATS **Overall Outperformer:** **Category Outperformer:** ★ **X10**

6.46
Highest score
(customer support)

5.38
Lowest score
(price improvement)

0.28
Most improved
(fexibiltiy and sophistication of SOR)

-0.98
Least improved
(execution consistency)

JP Morgan

JP Morgan offers clients a variety of equity algos, including Aqua for equities, Aqua Blocks for accessing block liquidity and JPM-X, a fully dark continuous crossing platform. In the first half of 2020, the bank's FX algos saw a 45% increase in transactions via Execute, JP Morgan's mobile channel. The New York-headquartered investment bank received 35 responses from hedge fund managers in this year's survey, ranking the bank fifth place amongst its peers. Respondents came from Europe, North America and the Asia-Pacific. Nearly half of the participant funds using JP Morgan's algos manage over US$10 billion in assets and two-thirds of them trade at least half of their portfolios' value algorithmically.

This year, JP Morgan's average score of 5.72 dropped by 0.05 compared with 2020 and underperforms the survey average by 10 basis points. Compared to category averages, the bank failed to meet the benchmarks in all but execution consulting (+0.16), algo monitoring capabilities and order routing logic or analysis, both of which score just four basis points above the category averages. The firm received its highest score of 5.99 in dark pool access, whereas price improvement scored lowest at 5.41.

Year-on-year comparisons were mixed, the bank recorded its highest year-on-year growth in increase trader productivity (+0.44) and execution consulting (+0.35), yet recorded declines across eight categories, including customer support (-0.56), price improvement (-0.37), and cost (-0.35). Despite this, scores across all categories remain in the Good range (5.00 – 5.99).

When asked what additional features are wanted, hedge fund clients commented that they are in need of a better automated feedback loop for TCA, more advice regarding habits or approaches to certain types of execution, global cash market access in lit and dark markets and the ability to trade single-name swaps in global markets. In addition, features such as smart/auto auction engagement are highly desired.

JP MORGAN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.97	5.46	5.57	5.62	5.82	5.78	5.41	5.64	5.98

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.80	5.65	5.76	5.99	5.62	5.74	5.72

KEY STATS Category Outperformer: ★ X3

5.99
Highest score
(dark pool access)

5.41
Lowest score
(price improvement)

0.44
Most improved
(increase trader productivity)

-0.56
Least improved
(customer support)

Kepler Cheuvreux

Kepler Cheuvreux offers clients a number of core algorithms, including market participation or benchmark algos such as VWAP, TWAP, percentage volume and market on close, as well as key price improvement strategies, including implementation shortfall and iceberg. In terms of asset classes, the firm's algorithms cover both equities and ETFs across Europe, MENA and North American markets. Kepler Cheuvreux saw a record year for volume and revenue in 2020, while gaining significant market share. "During the peak of the coronavirus crisis in March last year, traders turned to liquidity seeking strategies and traded over a shorter duration, sell-side liquidity access was a key driver for the buy-side when choosing an algo provider", state the firm in their provider submission to the survey.

Kepler Cheuvreux garnered too few responses from hedge fund managers to be included within the 2020 provider profiles. Notwithstanding, it remains notable that year-on-year increases were recorded across 14 of the 15 categories and the firm's overage average has increased by 0.50 points. In this year's survey, Kepler outperformed the category average in 12 of the 15 service areas under review and their overall average score places the firm 0.14 points ahead of the survey average of 5.82. Notably, customisation (6.09) was recorded at 0.42 points higher than the category average (5.67) and execution consistency (6.13) scored 0.37 points above the benchmark. The latter, along with price improvement (+0.28), recorded the highest category scores among all providers profiled.

Thirty-six percent of hedge fund clients who use Kepler Cheuvreux, traded at least 50% of their portfolio algorithmically. Managers with more than US$10 billion in AUM represent 20% of all the firm's hedge fund respondents, who were drawn exclusively from the UK and Europe. In Q4 2020, Kepler completed an upgrade to their entire trading architecture. The upgrade, underpinned by Quantitative Algorithmic Infrastructure (QAI), leverages open source streaming technologies and is supported by machine learning. The new tech stack also includes a new regionally located smart order router.

KEPLER CHEUVREUX RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.17	5.94	6.13	6.09	5.88	5.87	5.83	6.09	6.11

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.79	6.24	5.71	5.88	5.77	5.93	5.96

KEY STATS **Overall Outperformer:** **Category Outperformer:** ★ **X12**

6.24
Highest score
(customer support)

5.71
Lowest score
(execution consulting)

0.95
Most improved
(algo monitoring)

-0.13
Least improved
(anonymity)

Liquidnet

Liquidnet is a global institutional investment network that connects asset managers with liquidity. The New York-based firm offers a number of core algorithms, including dark and alternative liquidity seeking algos, implementation shortfall, market on close, peg, percentage volume (participation), VWAP, TWAP and dynamic POV, across equities and listed ETFs.

Liquidnet received 34 submissions from hedge fund clients in this year's survey, which in terms of number of responses, ranks the firm sixth amongst its peers. Liquidnet scored an overall average of 5.94—up from 5.84 in last year's survey – exceeding the survey average by 12 basis points. Fifty-three percent of respondents who use Liquidnet managed upward of US$1 billion. In terms of geographic coverage, clients came from UK (41%), Europe (15%), Hong Kong (26%), North America (12%) and ROW (6%). Precisely 50% of respondents trade at least half of their portfolio algorithmically.

The firm outperformed the category average across 12 aspects of service and scored highest among all providers profiled in the area of reduce market impact, coming in at an impressive 64 basis points above the category average. In stark contrast however, Liquidnet's score for cost (5.39), ranked lowest of all providers profiled, underperforming the benchmark by 40 basis points.

Liquidnet increased its score from last year's survey across 10 categories, with the most significant increase seen in speed (+0.28). Increases were also observed in algo monitoring capabilities (+0.28) and ease of use (+0.27). Year-on-year decreases were recorded in five category areas, including anonymity which dropped by over 0.16 points, yet still sits comfortably within the Very Good range (6.00 – 6.99). In terms of additional features that respondents would like to see from Liquidnet, some commented that they want better MOC trading functionality, on-trade AI, and more pre-trade and TCA services. There was also mention of pairs algos as well as seamless trading and settlement of dual-listed equities.

LIQUIDNET RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.27	6.40	5.63	5.39	6.00	6.14	5.70	5.54	6.08

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.79	6.26	5.67	6.40	5.91	5.94	5.94

KEY STATS **Overall Outperformer:** **Category Outperformer:** **X12**

6.40
Highest score
(dark pool access)

5.39
Lowest score
(cost)

0.29
Most improved
(speed)

-0.17
Least improved
(anonymity)

Morgan Stanley

Morgan Stanley offers electronic access across equities, options and futures markets globally. Morgan Stanley Electronic Trading (MSET) offers clients with a broad suite of algorithms, smart order routing (SOR) and direct market access (DMA). The bank recieved 36 submissions from hedge fund clients in this year's survey, which in terms of number of responses, ranks the firm fourth across all providers in the survey. Almost one-third manage assets greater than US$10 billion and 56% trade over half of their total traded volume through algorithms. In terms of geographical breakdown, respondents were based in the UK (47%), Europe (25%) and North America (22%), with the remainder from APAC.

The bank's overall average score of 5.71 in this year's survey has certainly travelled in the right direction - up from 5.60 in 2020 - yet still falls slightly below the survey average of 5.82. Morgan Stanley underperformed the category averages across 14 of the 15 services areas under review, recording disappointing scores for clients in a number of key areas, such as anonymity (-0.27) and customisation (-0.20). It's not all bad news however for the New York-headquartered investment bank, as hedge fund clients rate services provided as Very Good for ease of use (6.09) and breadth of dark or alternative liquidity sources (6.00).

Year-on-year increases were achieved in 10 categories, having improved most significantly in ease of use (+0.42), customer support (+0.42) and execution consulting (+0.39). Overall, MSET scored highest in ease of use (6.09) and lowest in price improvement (5.36). Cost is the area in which the bank received its biggest drop, down 41 basis points from last year.

In terms of additional features that the respondents relying on Morgan Stanley for algos would like to see, comments included more customisation on liquidity providers, auto auction engagement, global cash market access in lit and dark markets, an ability to trade single-name swaps in global markets, and a holistic venue overview of performance data for the platform over the past five years.

MORGAN STANLEY RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.91	5.61	5.68	5.78	5.91	5.58	5.36	5.47	6.09

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.60	5.85	5.52	6.00	5.74	5.59	5.71

KEY STATS Category Outperformer: ★ X1

6.09
Highest score
(ease of use)

5.36
Lowest score
(price improvement)

0.42
Most improved
(ease of use)

-0.41
Least improved
(cost)

Redburn

Redburn is Europe's largest independent equities broker, providing institutional investors with research and agency execution in equity markets across both Europe and North America. Redburn offers clients a number of core algorithms, including market participation or benchmark algos such as VWAP, TWAP, percentage volume (participation), market at open and market on close. It also provides key price improvement strategies, including implementation shortfall and dark or alternative liquidity seeking algos.

Redburn outperforms the average in 12 of the 15 functional categories covered by the survey, recording an overall score of 6.04, 22 basis points above this year's survey average of 5.82. Redburn performed particularly strongly in a number of key areas, including dark pool access (+0.58), ease of use (+0.34) and data on venue/order routing logic or analysis (+0.33), achieving top scores compared to the other providers profiled. Anonymity (+0.34) and price improvement (+0.25) also recorded solid scores. Areas where hedge fund clients indicated they would like to see improvements are cost, speed and execution consulting, which fall short of the benchmarks by a marginal nine, two and two basis points respectively.

Redburn received too few responses to be included within the providers profiled in last year's survey, however it remains noteworthy that improvements were observed across 12 categories, including access to dark pools (+0.62), data on venue/order routing logic or analysis (+0.51) and customer support (+0.50). In terms of AUM, 24% of hedge fund respondents manage upward of US$10 billion and 47% manage between US$1 and 10 billion. Sixty-five percent of hedge fund clients who use Redburn, trade over 50% of their portfolio algorithmically. By way of measuring algo performance, respondents use implementation shortfall TCA and liquidity capture. Throughout last year Redburn continued to invest heavily in execution services, particularly in its implementation shortfall and auction strategies, as well adding new liquidity sources.

REDBURN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.22	5.98	6.07	5.70	5.91	6.19	5.80	5.74	6.40

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
6.09	6.33	5.57	6.60	6.05	5.93	6.04

KEY STATS Overall Outperformer: Category Outperformer: X12

6.60 Highest score (dark pool access)

5.57 Lowest score (execution consulting)

0.62 Most improved (dark pool access)

-0.13 Least improved (execution consistency)

UBS

UBS was an early pioneer of electronic trading and provides access to unique liquidity, algorithms, execution consultancy, performance analysis and market structure expertise. Headquartered in Zurich, the firm's suite of algorithms aids clients to minimise market impact and optimise performance. UBS received 38 submissions to its algorithmic trading solutions in this year's survey, which in terms of number of responses, ranks the firm second amongst its peers. Clients were based mainly in the UK (47%) and Europe (40%), with 37% of the respondent hedge funds managing upward of US$50 billion in AUM. Over 63% of clients execute more than half of their total traded volume through algorithms.

UBS recorded an overall average of 5.52, which at -0.30 points is firmly below the survey average of 5.82 and represents a decline from last year's score of 5.72. Disappointingly, the firm underperforms the benchmarks across all aspects of service under review. Notable key service areas include anonymity (-0.59), flexibility and sophistication of smart order routing (-0.41), data on venue/order routing logic or analysis (-0.33) and ease of use (-0.19), where clients highlight the need for improvement by ranking the firm lowest across all providers profiled in this year's results. Nonetheless UBS' scores for all categories remain in the Good range (5.00 – 5.99).

Year-on-year declines were recorded in 11 service areas, with the firm seeing its scores in the customisation and anonymity categories falling significantly, by 84 and 69 basis points respectively. The good news for UBS is that year-on-year increases were observed in four categories, including algo monitoring capabilities (+0.33) and breadth of dark or alternative liquidity sources (+0.11).

When it comes to features on the respondents' wish list, some common requests are seen in the comments. For example, clients want smart/auto auction engagement, liquidity seeking algos and constant improvement in impact and outcome distributions.

UBS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.69	5.54	5.57	5.62	5.83	5.26	5.45	5.11	5.87

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.43	5.64	5.32	5.73	5.37	5.44	5.52

KEY STATS

5.87
Highest score
(ease of use)

5.11
Lowest score
(customisation)

0.33
Most improved
(algo monitoring)

-0.84
Least improved
(customisation)

Virtu

Virtu Financial is a leading provider of financial services, trading products and market-making. The firm's algorithmic trading services, known as Virtu Frontier, supports over 500 institutional clients on the buy-side and offers a comprehensive suite of core algorithms, designed for low latency and maximum flexibility. Over the course of 2020, the firm continued to migrate ITG execution clients onto Virtu algorithms. Asset classes covered include equities and EFTs, across the regions of North America, Europe, APAC and LATAM. Responding Virtu clients to this year's survey were drawn mainly from the UK (43%), continental Europe (29%) and Canada (21%). Around one third of hedge funds manage assets of over US$10 billion, with around 43% of managers executing upward of 60% of their portfolio algorithmically.

Virtu received an overall average of 5.78 in this year's survey, scoring just 4 basis points short of the survey average of 5.82. The firm beat the category average in eight service areas under review, with its most impressive scores relative to the benchmarks, being dark pool access (+0.33), increase trader productivity (+0.32), anonymity (+0.24) and flexibility and sophistication of smart order routing (+0.22). In contrast, several service areas missed the mark, most notably customisation, execution consulting and algo monitoring capabilities, which underperform the category average by 59, 56 and 40 basis points respectively. Moreover, the New York-headquartered firm recorded year-on-year declines across most categories with the exception of flexibility and sophistication of smart order routing, up by 0.21, ease of use, up by 0.18, and increase trader productivity, up by 0.11.

Over the course of 2020 the firm's execution algorithm suite provided clients liquidity and stability amidst the volatility of the COVID-19 pandemic. Clients also benefit from multiple sources of liquidity provided from the firm's principal market-making flow, institutional blocks and presence in the US retail marketplace. When asked what additional features are wanted, respondents expressed interest in algo customisation consultancy, real-time USD fills pairs equity versus futures, plus seamless trading and settlement of dual-listed equities.

VIRTU RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.30	5.80	5.90	5.62	6.06	6.09	5.44	5.08	6.24

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.52	6.04	5.04	6.35	6.00	5.29	5.78

KEY STATS Category Outperformer: ★ X8

6.35
Highest score
(dark pool access)

5.04
Lowest score
(execution consulting)

0.21
Most improved
(flexibiltiy and sophistication of SOR)

-0.84
Least improved
(customisation)