THE 2023 ALGORITHMIC TRADING SURVEY

HEDGE FUNDS

With special analysis from Datos Insights

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Hedge funds change algorithmic priorities in light of continued challenging conditions

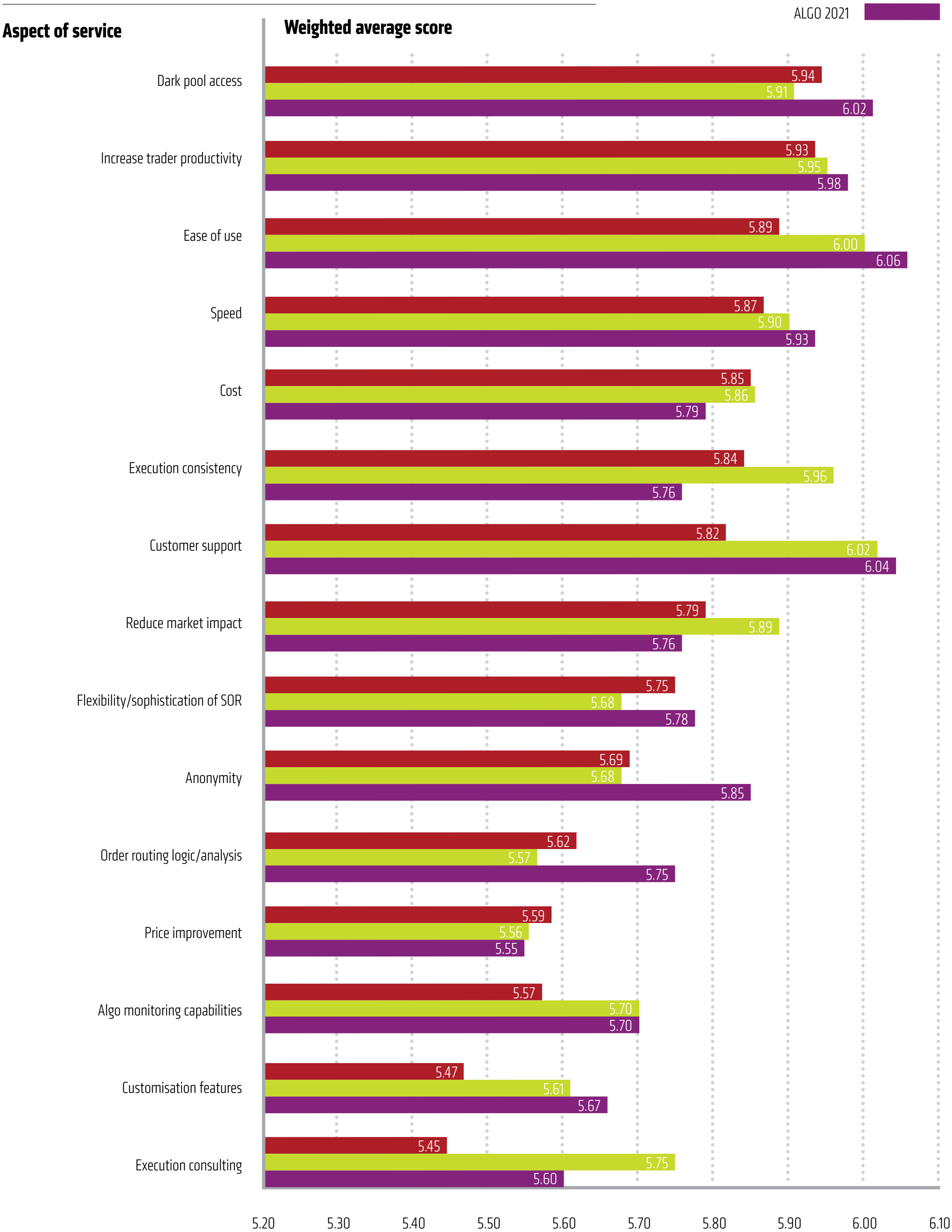
Hedge fund results from The TRADE's Algorithmic Trading Survey saw a decline in overall scores for 2023, as market volatility resulted in the buy-side calling for better execution consulting and customer support from their algo providers.

While the hedge fund industry was unable to escape the rampant recession fears and market volatility that echoed throughout global markets in 2022, there are some silver linings. According to the Barclay Hedge Fund Index, hedge funds lost 8.59% in 2022 which may not seem great except when compared to the S&P 500 Total Return Index which fell 18.14%. In fact, 2022 marked the first time in over 14 years where hedge funds outperformed the S&P 500 in a calendar year. Overall industry performance however was once again truly nonlinear, with the largest hedge funds and those deploying macro strategies coming out ahead of their counterparts. As we move further into 2023, it is clear that market challenges are far from over, making the results from The TRADE's Algorithmic Trading Survey and the factors impacting the use of algos and the perceptions of quality and execution all the more timely.

The overall score of hedge fund respondents to the 2023 Algorithmic Trading Survey declined to 5.74 from 2022's score of 5.80, marking the lowest overall score by hedge fund respondents since 2019's survey (5.72). Respondents were based primarily in the UK (43%), Europe (31%), North America (12%), and rest of world (11%), with a handful coming from APAC (4%). The most impactful features of algorithms for hedge fund respondents differed some from last year and were identified as dark pool access, increased trader productivity, ease of use, speed, and cost. The final two categories, speed and cost, replaced execution consistency and customer support in the top five highest rated aspects of service for 2022.

Of the fifteen categories assessed in the survey, 10 saw year-over-year decreases in their overall ratings (Figure 1). The largest drop was observed in execution consulting which decreased 30 basis points to 5.45, followed by customer support which decreased 20 basis points to 5.82. Providers are well aware that while access, speed and ease of use are table stakes, the relationship is the differentiator. Rather than a reflection of providers pulling back on the personal services and high touch they are providing clients, we believe there are two factors at play driving this notable

Figure 1: Rating of algo performance



decrease. First, the talent wars created a high degree of turnover and loss of expertise that has played out across industries. The loss of both key contacts and the expertise they developed around specific solutions is something we are seeing more broadly. Second, buy-side desks are becoming increasingly sophisticated and their expectations for the support providers can offer is likely in many cases running ahead of the capabilities of those providers. Although ranking in the bottom half of the service aspects assessed in the survey, the largest increases were seen in flexibility and sophistication of SOR (+.07) and order routing logic/analysis (+.05). In fact, some respondents made it a point to note that they want to see additional features such as real-time routing and venue analysis tools, automatic merging of similar orders and increased conditional trading functionality.

Respondent's reasons for using algorithms are presented in Figure 2 as a percentage of respondents for years 2021-2023. The top reasons for using algorithms as indicated by hedge fund respondents remain unchanged from last year. They are ease of use (12.03%), reduce market impact (10.87%), increased trader productivity (9.33%), and consistency of execution performance (8.83%). Despite remaining the primary reasons for using algorithms, all four of these categories did experience a decline in their percentage rates compared to the prior year. In fact, consistency of execution performance had the largest year-over-year decline of any category (-1.60%). The largest increases in reasons for using algorithms however were seen in customisation capabilities (+2.00%), higher speed/lower latency (+1.46%), and flexibility and sophistication of SOR (+1.26%).

When it comes to firm size, the results are generally consistent across respondents, although there were a few exceptions. In contrast to the broader survey results, firms with over $50B in AUM responding to the survey tended to put less emphasis on higher speed/lower latency and customisation capabilities and instead increased their response rate in areas like algo monitoring capabilities and lower commission rates. Additionally, firms in this demographic, who typically have larger positions to move, continued to rank greater anonymity among their top five reasons for using algorithms. Anonymity was ranked ninth most important by all hedge fund respondents overall.

The 2023 survey reveals that hedge funds on average, decreased the number of algo providers they use (Figure 3). This marks a reversal from last year's survey results that showed firms of all sizes either increasing or maintaining the number of algo providers used. The decline in

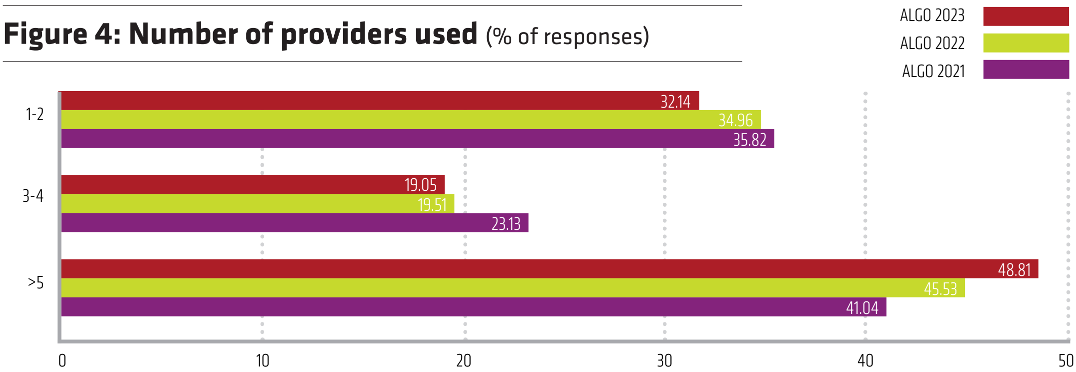
Figure 2: Reasons for using algorithms (% of responses)

Feature	2023		2022	2021
Ease of use	▼	12.03	12.06	11.21
Reduce market impact	▼	10.87	11.58	10.78
Increased trader productivity	▼	9.33	10.24	8.68
Consistency of execution performance	▼	8.83	10.42	10.29
Higher speed, lower latency	▲	8.44	6.99	8.28
Customisation capabilities	▲	8.37	6.37	8.47
Better prices (price improvement)	▲	8.25	7.36	9.27
Lower commission rates	▼	7.67	8.17	7.02
Greater anonymity	▼	7.48	7.55	6.90
Flexibility and sophistication of SOR	▲	6.28	5.02	5.91
Algo monitoring capabilities	▼	6.05	7.50	7.18
Data on venue/order routing logic or analysis	▲	5.17	4.46	4.16
Results match pre-trade estimates	▼	1.23	2.28	1.85

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

Feature	2023		2022	2021
More than $50 billion	▲	5.17	3.94	3.94
$10 - 50 billion	▼	5.00	5.52	4.00
$1 - 10 billion	▼	4.89	5.39	3.90
$0.5 - 1 billion	▲	4.60	3.89	3.36
$.025- 0.5 billion	▼	1.67	2.60	2.20
Up to $0.25 billion	▼	2.25	3.33	1.80
Not answered	▼	3.71	4.00	3.78

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



the number of providers reflects a long-term trend disrupted by the 2020-2021 pandemic in which firms are looking to consolidate relationships. This year's data once again shows some anomalies however, that indicate firms are continuing to evaluate new providers and their solutions. The increased sophistication of the buy-side trading desk will continue to evolve, and that evolution creates opportunities and competitive threats for providers.

When AUM is removed from the equation, the number of providers used by hedge funds continues to show a barbell like distribution, with little change from prior years (Figure 4). Most respondents fall into the camp of using either one to two providers (32%) or more than five (49%). The remaining 19% of respondents use a number in between. Although it is perhaps slow moving it is interesting to note that over the last few years, the gap between the percentage of respondents that use one to two providers and those that use more than five has gotten wider. In the last three years, the percentage of respondents using one to two providers has slowly decreased while the percentage of those using more than five has slowly increased. The reason for this trend is likely multi-faceted. First, while the survey did not ask about prime brokerage relationships, decisions around the use of different providers is likely correlated to both prime broker relationships and the use of disparate strategies. More broadly there are two conflicting business imperatives that are driving the addition and consolidation of providers. On the one hand, funds are occasionally driven to diversify vendor exposure and capabilities by engaging in additional provider relationships. On the other hand, with providers generally improving their offerings over the years, there have been efforts to consolidate relationships that have occurred on both sides.

According to this year's survey, less than half (45%) of hedge fund respondents say they use algorithms to trade the majority of their portfolio value (Figure 5), a notable decrease from the almost 66% that claimed to do so the year before. It's therefore unsurprising that when broken down into smaller brackets one can see that all bar one over the 50% threshold, the 70-80% bracket, experienced year-over-year declines. The largest was seen in the percentage of respondents that said they trade between 60-70% (-13.24), and those that answered >80% (-6.99). This means of course that the brackets representing between 0 and 40% of portfolio value traded via algorithms experienced year-over-year increases in percentage of respondents.

The drop in the percentage of respondents that use algorithms to trade the majority of their value was even more dramatic when it came to the largest firms responding to this year's survey. The results show that almost 49% of respondents from firms with over $50B in AUM used algos to trade the majority of their value in 2023 compared to 75% the year before. This could be a result of hedge funds shifting their holdings increasingly toward asset classes that are not typically traded via algos. In addition, as we see funds move toward multi-asset trading strategies, survey respondents now include entries for instruments outside of just equities, such as fixed income, FX, and ETF's, which they typical use algos for less often than they do equities.

In 2023, we see hedge funds decreasing their use of nearly every type of algorithm (Figure 6), which is in direct contrast to last year's results but in line with this year's drop in overall algo performance ratings as well as the marked decline in the percentage of portfolio value traded with algos. The only exception to this is dark liquidity seeking algos and "other", which saw an increase of almost 5% and 2.3% by respondents year-over-year. The algorithms with the largest declines in usage by hedge funds were target close/auction (-14.9%), TWAP (-10%), and VWAP (-9.4%). While the movement away from participation-based algorithms reflects the growing sophistication of the buy-side trading community, an overwhelming majority of hedge fund respondents continue to use dark liquidity seeking (84.5%), VWAP (70.2%), and % volume (69.1%) algorithms to fulfill their trading needs.

We also see that amongst the largest, and primarily hybrid traditional/hedge players, an even distribution of Bloomberg EMSX, FactSet Portware, and FlexTrade being used to access algorithms. Amongst those with less than $50 billion in assets under management however, Bloomberg EMSX continues to be the dominant EMS platform.

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

Feature	2023	2022	2021
Not answered	▲ 2.67	1.63	5.14
0 - 5%	▲ 14.67	6.50	3.70
5 - 10 %	▲ 5.33	3.25	6.17
10 - 20%	▲ 14.67	5.69	4.73
20 - 30%	▲ 6.67	4.07	9.05
30 - 40%	▲ 5.33	4.07	8.85
40 - 50%	▼ 5.33	8.94	8.44
50 - 60%	▼ 13.33	15.45	7.82
60 - 70%	▼ 9.33	22.76	12.76
70 - 80%	▲ 9.33	7.32	12.96
>80%	▼ 13.33	20.33	20.37

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

Feature	2023	2022	2021
Other	▲ 7.14	4.88	6.58
Implementation shortfall (basket)	▼ 15.48	17.89	10.91
TWAP	▼ 27.38	37.40	27.16
Implementation shortfall (single stock)	▼ 45.24	45.53	44.24
Target Close/Auction Algos	▼ 45.24	60.16	no data
% Volume (participation)	▼ 69.05	69.11	56.38
VWAP	▼ 70.24	79.67	58.64
Dark liquidity seeking	▲ 84.52	79.67	67.49

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 1,661 ratings were received across 35 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 some responses provided by affiliated entities were 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. This year's analysis for the Algorithmic Trading Survey has been carried out by Datos Insights (formerly Aite-Novarica Group).

Berenberg

Berenberg's electronic offering includes global portfolio trading, data-driven algorithmic strategies and ETF liquidity aggregation. BEAT - Berenberg's Algorithmic Trading - offers a comprehensive suite of core algos, that cover equity markets and ETFs across Europe and North America. The broker garnered 26 responses from hedge fund clients in this year's survey, down from 37 the year before. The majority of respondents were based in the UK (65%), with the remainder split between North America (20%) and Europe (15%). Of the 26 Berenberg clients responding to this year's survey, nearly half (46%) are at firms managing north of $50 billion in assets.

Berenberg achieved an overall average of 6.18 in this year's survey, outperforming the survey average by 44 basis points, albeit a slight decrease of -0.11 compared with its score in 2022. Berenberg's highest scores were in key areas such as customer support (6.54) and ease of use (6.40), while lower scores were recorded in customisation (5.85) and anonymity (5.92). The broker outperformed the category average in all of the 15 areas under review and achieved the highest overall score of all providers profiled in this year's survey. The areas where the broker differentiates itself the most compared to the category average are algo monitoring (+.80), customer support (+.72) and execution consulting (+.64). Additionally, Berenberg landed within the top three scores - of all 16 providers featured in the hedge fund results – across 11 categories. The broker did, however, suffer year-over-year score decreases across ten categories, with the largest being execution consulting (-.34), breadth of dark pools (-.34) and customisation features (-.32).

Client feedback was limited, with one European based head of trading adding, "great transparent service", while a senior UK equity trader commented, "very good feel of use and results". The majority of clients reported using Berenberg's dark liquidity seeking (84%) and VWAP (65%) algorithms. Additionally, 69% of respondents said they are not planning to make use of any additional algorithmic trading providers in the next 12 months.

BERENBERG RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.18	6.15 ▼	6.29 ▼	6.11 ▲	6.05 ▼	5.92 ▼	6.12 ▲	5.85 ▼	6.40 ▼

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
6.17 ▼	6.54 ▲	6.09 ▼	6.34 ▼	6.06 ▼	6.37 ▲	6.18 ▼

KEY STATS **Overall Outperformer:** 🏆 **Category Outperformer:** ★ **X15**

6.54
Highest score
(customer support)

5.85
Lowest score
(customisation)

0.13
Most improved
(algo monitoring)

-0.34
Least improved
(dark pool access)

Bernstein

Bernstein's algorithmic trading offering includes a full suite of strategies to support equities and ETF trading across global markets. The broker continues to invest in development of its algorithmic offering, "a new analytics dashboard has been launched that allows the quick investigation of both market structure and the drivers behind client performance. A better understanding of performance drivers translates directly to optimal performance within client algo wheels" states Bernstein in its provider submission to the survey. In total, 16 responses were received from hedge fund managers this year, down from 26 in 2022.

Bernstein achieved an overall score of 5.82 in this year's survey, outperforming the survey average by eight basis points. On a category level, Bernstein outperformed the benchmarks in 12 of the 15 service areas under review, most notably cost (+.33), algo monitoring (+.31) and routing logic analysis (+.21). In addition, the category of cost was the broker's highest score (6.18), which also represents its highest year-over-year increase, coming in 26 basis points higher than the year before. Unfortunately, however, other year-over-year performance was less positive, as Bernstein recorded year-over-year decreases in nearly every other category. Areas such as customer support, execution consulting and pre-trade cost estimates and ease of use recorded decreases of -.66, -.64 and -.43 points respectively, whilst the broker's overall score fell by almost 23 basis points compared with 2022.

Responding hedge fund clients of Bernstein's in this year's survey were based in the UK (44%), Europe (31%), North America (19%) and APAC (6%). Of those, nearly a third (31%) manage assets in excess of $50 billion. In terms of asset classes, 100% of respondents use Bernstein's algos to trade equities and almost 30% to trade ETFs. Popular trading strategies include dark liquidity seeking (79%), %Volume (Participation) (64%), implementation shortfall (Single Stock) (50%) and VWAP (50%). Finally, over 70% of hedge funds responding to Bernstein said they are not planning to make use of any additional algorithmic trading providers in the next 12 months.

BERNSTEIN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.00 ▼	5.87 ▼	5.89 ▼	6.18 ▲	6.00 ▼	5.78 ▼	5.49 ▼	5.65 ▼	5.88 ▼

Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.83 ▲	5.61 ▼	5.47 ▼	6.04 ▼	5.79 ▼	5.88 ▼	5.82 ▼

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

6.18
Highest score
(cost)

5.47
Lowest score
(execution consulting)

0.26
Most improved
(cost)

-0.66
Least improved
(customer support)

Bank of America Securities

Bank of America Securities (BofAS) offers a full suite of algorithmic trading strategies across multiple assets classes. The bank, formerly known as Bank of America Merrill Lynch, garnered 23 responses from hedge fund clients in this year's survey, down from 35 in 2022. Of those, 39% are from funds with over $50 billion in assets under management. BofAS's hedge fund clients responding to the survey were based primarily in the UK (48%), Europe (30%) and the US (17%).

BofA Securities received an overall score of 5.51 in this year's survey, which falls six basis points below their 2022 score (5.57) and 23 basis points below this year's survey average of 5.74. Unfortunately, this resulted in the bank failing to reach the survey benchmarks in all bar one category, namely execution consulting and pre-trade cost estimates, in which it outperformed the category average by 15 basis points. The most notable areas of underperformance relative to the category averages are customer support (-.49), price improvement (-.44) and flexibility and sophistication of SOR (-.38). Overall BofAS landed in the bottom three providers profiled in this year's survey across seven categories. In contrast, year-over-year scores are more encouraging, with the bank recording improvements across six key categories, including increase trader productivity (+.44) routing logic analysis (+.36) and customisation features (+.14).

The most common algos used by BofA Securities responding hedge fund clients were dark liquidity seeking (78%), %Volume (Participation) (61%), followed by VWAP (57%), target close auction (52%) and implementation shortfall (single stock) (48%). Client feedback was limited however several respondents noted they would like to see BofAS provide better performance and increased customisation capabilities, as well as real time routing and venue analysis tools. Finally, over 65% of hedge funds stated they are not planning to make use of any additional algorithmic trading providers over the next 12 months.

BANK OF AMERICA SECURITIES RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.89 ▲	5.51 ▼	5.59 ▼	5.80 ▼	5.58 ▼	5.34 ▼	5.15 ▲	5.10 ▲	5.75 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.47 ▲	5.33 ▼	5.60 ▼	5.79 ▲	5.37 ▼	5.35 ▼	5.51 ▼

KEY STATS Category Outperformer: X1

5.89
Highest score
(increase trader productivity)

5.10
Lowest score
(customisation)

0.44
Most improved
(increase trader productivity)

-0.51
Least improved
(execution consistency)

Citi

Citi received 19 submissions from hedge fund managers in this year's Algorithmic Trading Survey, down from 22 the year before. Of those, a majority (52%) came from hedge funds with over $50 billion in AUM. Respondents using Citi's algo trading services were based in the UK (42%), Europe (32%), the United States (16%) and ROW (10%).

Citi's overall score of 5.22 is in line with its 2022 score (5.23), however, lands 52 basis points below this year's survey average of 5.74. The bank underperformed the benchmarks in all 15 categories under review, with the most significant being in breadth of dark pools (-.72), reduced market impact (-.71), execution consistency (-.69) and price improvement (-.64). In addition, Citi recorded scores within the bottom three across 14 of the 15 categories, when compared to all providers profiled in this year's survey, as well as receiving the lowest overall score. In contrast, year-over-year scores are much more encouraging, as the bank achieved improvements across nine key categories, including customisation features (+.43), flexibility and sophistication of SOR (+.40), routing logic analysis (+.34) and ease of use (+.24). Disappointingly however many of these improvements were matched with year-over-year rating decreases, for example areas such as customer support (-.48), execution consulting (-.40), reduced market impact (-.40) and speed (-.33) all recorded a significant drop in scores. Citi's highest rated category in this year's survey was ease of use (5.69), followed by cost (5.55) and increase trader productivity (5.42).

Client feedback was limited but positive, with one European based senior trader commenting, "excellent pre-trade TCA". When asked what additional features they would like to see, respondents focused on a desire for more customisation and better performance, as well as improved real-time routing and venue analysis tools. The most commonly used algos among hedge fund clients rating Citi in this year's survey were dark liquidity seeking (74%) and VWAP (53%).

CITI RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.42 ▲	5.08 ▼	5.15 ▲	5.55 ▲	5.28 ▼	5.11 ▼	4.95 ▲	5.23 ▲	5.69 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.05 ▲	5.36 ▼	4.83 ▼	5.22 ▲	5.36 ▲	5.00 ▼	5.22 ▼

KEY STATS

5.69
Highest score
(ease of use)

4.83
Lowest score
(execution consulting)

0.43
Most improved
(customisation)

-0.48
Least improved
(customer support)

Goldman Sachs

Goldman Sachs Electronic Trading (GSET) offers a full suite of algorithmic trading strategies, which cover global equity markets, ETFs, fixed income, foreign exchange and listed derivatives. In its provider submission to the survey, the investment bank highlights its focus "to differentiate [itself] and remain at the forefront of the industry through constant product investment and innovation, across all assets". Goldman Sachs received 29 responses from hedge fund managers in this year's survey – compared to 47 responses received in 2022 – which in terms of submissions, ranks the bank fourth amongst its peers. Responding clients were based mainly in the UK (52%), Europe (28%) and North America (14%).

Goldman Sachs recorded an overall average score of 5.63 in this year's survey, the exact same as last year, placing the investment bank 11 basis points below the survey average of 5.74. Despite this, Goldman was able to outperform the industry benchmark in several key categories, including routing logic analysis (+.08), execution consulting and pre-trade cost estimates (+.06), customisation features (+.04), and cost (+.02). In contrast, the firm's most notable areas of underperformance compared to the industry benchmarks were anonymity (-.38), reduced market impact (-.27) and breadth of dark pools (-.21).

GSET recorded its highest scores in the categories of cost (5.87), ease of use (5.83) and increase trader productivity (5.79). In addition, year-over-year improvements were captured across seven categories, including routing logic analysis (+.40), increase trader productivity (+.15) and flexibility and sophistication of SOR (+.08). The bank saw its largest drop in ratings in the areas of reduced market impact (-.37) and customisation features (-.25). Of Goldman's 29 hedge fund client responses, just over a third (34%) represent funds with over $50 billion in assets under management. Similar to other providers in this year's survey, client feedback for Goldman was limited however several respondents expressed interested in additional customisation features.

GOLDMAN SACHS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.79 ▲	5.51 ▼	5.68 ▼	5.87 ▲	5.77 ▼	5.31 ▼	5.47 ▲	5.52 ▼	5.83 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.69 ▲	5.61 ▼	5.52 ▼	5.73 ▼	5.63 ▲	5.45 ▲	5.63

KEY STATS

Category Outperformer: ★ X4

5.87
Highest score
(cost)

5.31
Lowest score
(anonymity)

0.40
Most improved
(routing logic analysis)

-0.37
Least improved
(reduce market impact)

Jefferies

Jefferies' Electronic Trading Solutions (JETS) provides a global electronic trading platform with algorithmic access to markets across EMEA, APAC and the Americas. The independent investment bank provides a comprehensive suite of liquidity seeking and benchmark tracking algorithms aimed to reduce market impact and improve trading performance. Jefferies received 21 responses in this year's survey from hedge fund managers, down from the 31 responses submitted in 2022.

Jefferies' overall average score of 5.94 was down 24 basis points from its 2022 score of 6.18, yet comfortably outperforms the survey average by 20 basis points. Jefferies' scored above a 6.0 (very good) in five categories, including increase trader productivity, reduce market impact, execution consistency, ease of use and customer support. Despite this, the bank lost ground year-over-year in all bar one category, with the most notable being the areas of execution consulting and pre-trade cost estimates (-.67), algo monitoring (-.53), speed (-.33) and price improvement (-.32).

On the other hand and perhaps more importantly, the firm outperformed the industry benchmarks across 13 categories, including customisation features (+.45), increase trader productivity (+.39), customer support (+.35) and routing logic analysis (+.30). In addition, scores in increase trader productivity (6.32), customisation features (5.92) and order routing logic or analysis (5.92) were ranked within the top three scores of all profiled providers in this year's survey.

Hedge fund clients responding for Jefferies this year were based primarily in the UK (48%), Europe (24%) and the United States (14%), with the remainder split between South Africa and Hong Kong. Client feedback was positive, one trader at a London-based hedge fund states "the touchdown algo with Jefferies is best in the industry - more smart algos like that would be incredible." Finally, over 66% of hedge funds responding to Jefferies said they are not planning to make use of any additional algorithmic trading providers in the next 12 months.

JEFFERIES RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.32 ▼	6.05 ▼	6.07 ▼	5.92 ▼	5.99 ▼	5.97 ▼	5.78 ▼	5.92 ▼	6.06 ▼

Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.92 ▲	6.17 ▼	5.44 ▼	5.93 ▼	5.77 ▼	5.78 ▼	5.94 ▼

KEY STATS **Overall Outperformer:** **Category Outperformer:** ★ X13

6.32
Highest score
(increase trader productivity)

5.44
Lowest score
(execution consulting)

0.11
Most improved
(routing logic analysis)

-0.67
Least improved
(execution consulting)

JP Morgan

JP Morgan received 34 responses from hedge fund managers in this year's survey, in line with the 35 responses submitted in 2022. In terms of the overall number of submissions, JP Morgan ranks second among the 35 algo providers surveyed this year. Most hedge fund clients responding to the bank were based in either in the UK (47%), Europe (32%) or North America (12%), while the remaining 9% were based in APAC and ROW.

JP Morgan achieved an average score of 5.80 in this year's survey, which represents an .18 decrease from its 2022 score (5.98), nevertheless outperforms the survey average by six basis points. The global investment giant outperformed the survey benchmarks in all but four categories. The most notable areas of category outperformance were customer support (+.28), execution consistency (+.23), customisation features (+.18) and price improvement (+.14). The bank's highest scores this year were recorded in customer support (6.10), execution consistency (6.07), increase trader productivity (6.01) and breadth of dark pools (6.00). JP Morgan did however experience year-over-year decreases in 13 of the 15 service areas measured in this year's survey, including execution consulting and pre-trade cost estimates (-.55), ease of use (-.41) and speed (-.28).

A large proportion (41%) of the participant funds using JP Morgan's algos manage over US$50 billion in assets and represent some of the world's largest hedge fund managers. Just over 64% stated they are not planning to make use of any additional algorithmic trading providers within the next 12 months. Additional features on clients' wish lists include real time routing and venue analysis tools. Lastly, when considering all of JP Morgan's hedge fund clients responding to this year's survey, results show the most commonly used algorithms are dark liquidity seeking (76%), target close/auction algos (44%), and implementation shortfall (single stock) (41%).

JP MORGAN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.01 ▼	5.81 ▼	6.07 ▼	5.93 ▼	5.87 ▼	5.56 ▼	5.73 ▲	5.65 ▼	5.93 ▼

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.70 ▼	6.10 ▼	5.30 ▼	6.00 ▲	5.71 ▼	5.64 ▼	5.80 ▼

KEY STATS Overall Outperformer: Category Outperformer: X11

6.10
Highest score
(customer support)

5.30
Lowest score
(execution consulting)

0.03
Most improved
(price improvement)

-0.55
Least improved
(execution consulting)

Kepler Cheuvreux

Kepler Cheuvreux Execution services platform offers a comprehensive suite of core algorithms, serving around 500 clients on the buy-side, across ETFs and equity markets throughout North America and Europe. Last year Kepler Cheuvreux Execution underwent a rebrand to KCx, with a new mission statement: "To be the most trusted, agile, multi-local agency broker, building solutions which clients love". Kepler received 18 responses from hedge fund clients in this year's survey, which is down from the 25 submissions received in 2022.

Kepler Cheuvreux received an average score of 5.75 this year, in line with its 2022 score of 5.76 and once again lands just above the survey average (5.74), qualifying the agency broker with overall outperformer status. On a category level, Kepler outperformed the survey benchmarks in eight of the 15 areas under review, including key aspects of service such as cost (+.41), customisation features (+.22) and customer support (+.09). In fact, its score achieved for the category of cost (6.26) was the highest across all providers profiled this year, indicating clients are very satisfied in terms of value for money. Year-over-year improvements were recorded in eight categories, including price improvement (+.78), anonymity (+.63), ease of use (+.46) and customisation features (+.30). In contrast, the most notably decreases were recorded in routing logic analysis (-.65), algo monitoring (-.61), and breadth of dark pools (-.42).

Hedge fund clients responding to Kepler Cheuvreux in this year's survey were largely based in continental Europe (61%) and the UK (33%), while the remainder was located in the United States (6%). Of those, around 17% represented funds with more than US$50 billion in AUM, a lower percentage than many of the other algo providers profiled in this year's report. When it came to the most commonly used algos, most respondents use VWAP, POV and dark liquidity seeking.

KEPLER CHEUVREUX RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.00 ▲	5.75 ▼	5.85 ▼	6.26 ▲	5.89 ▼	5.73 ▲	5.65 ▲	5.69 ▲	5.81 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.49 ▼	5.91 ▼	5.31 ▲	5.81 ▼	5.70 ▲	5.40 ▼	5.75 ▼

KEY STATS **Overall Outperformer:** 🏆 **Category Outperformer:** ★ **X8**

6.26
Highest score
(cost)

5.31
Lowest score
(execution consulting)

0.78
Most improved
(price improvement)

-0.65
Least improved
(routing logic analysis)

Liquidnet

Liquidnet's offering provides equity algorithmic trading solutions to more than 400 buy-side clients. The company is continuing to invest significantly into its algorithmic trading services as well as its traditional block crossing technology and is also continuing to work on its new algo container technology. Liquidnet – part of interdealer broker TP ICAP – stated in its provider submission to the survey that "new innovations including Smart Blocks and Fusion single-stock RFQ are examples of how a combination of product and service are helping Liquidnet members to solve their liquidity challenges."

The firm's algorithmic solutions support equities trading across TWAP, percentage of volume (POV), dynamic POV, market-on-close (MOC), implementation shortfall (IS), and VWAP. Liquidnet received 30 responses from hedge fund managers using its algorithms in this year's survey – up from 26 in 2022.

Liquidnet received an overall survey score of 5.60 in 2023's survey, which is 10 basis points below its 2022 score of 5.70 and 14 below the overall survey average (5.74). Despite this, the firm was able to increase its scores in several categories, most notably in flexibility and sophistication of SOR (+.65), breadth of dark pools (+.30), anonymity (+.28), and reduce market impact (+.19). The largest year-over-year decreases were in increase trader productivity (-.78), execution consulting and pre-trade cost estimates (-.53), and execution consistency (-.46).

Compared to the survey benchmarks, Liquidnet outperformed the industry average in three key areas, including anonymity (+.37), reduced market impact (+.32), and breadth of dark pools (+.21). Significant areas of underperformance however were recorded in cost (-.52), customisation features (-.46), execution consulting and pre-trade cost estimates (-.40), and execution consistency (-.40).

Hedge fund clients responding to Liquidnet in this year's survey are scattered across the globe with 43% located in the UK, 27% in Europe, 17% in South Africa, 10% in the United States, and 3% in Hong Kong. The firm received positive feedback. One UK-based trader commented: "The team at Liquidnet are the best in the industry". They added: "Their unique coverage system allows traders to have a direct point of contact for trading specifically as well as wider business needs".

LIQUIDNET RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.64 ▼	6.10 ▲	5.44 ▼	5.33 ▼	5.77 ▲	6.06 ▲	5.56 ▲	5.01 ▼	5.58 ▼

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.41 ▲	5.71 ▼	5.06 ▼	6.15 ▲	5.75 ▲	5.49 ▼	5.60 ▼

KEY STATS **Category Outperformer:** ★ **X3**

6.15
Highest score
(dark pool access)

5.01
Lowest score
(customisation)

0.65
Most improved
(flexibility of SOR)

-0.78
Least improved
(increase trader productivity)

Morgan Stanley

Morgan Stanley Electronic Trading (MSET) received 37 responses from hedge funds in this year's survey which in terms of number of overall submissions, ranks the bank first among the 35 algo providers surveyed this year. Respondents were located primarily in the UK (38%) and Europe (32%), with the remainder in South Africa (14%), the US (11%), and Hong Kong (5%). Nearly one third (32%) of hedge fund managers responding to the bank represent firms managing assets greater than US$50 billion.

Morgan Stanley achieved an average score of 5.85 in this year's survey, a 21 basis point increase from its 2022 score (5.64), placing the bank comfortably above the overall survey average of 5.74. Morgan Stanley outperformed the average in 11 of the 15 categories surveyed, including speed (+.40), flexibility and sophistication of SOR (+.31), breadth of dark pools (+.25), and routing logic analysis (+.22). Additionally, the bank's scores in speed (6.27) and dark pool access (6.19) landed within the top three scores of all providers featured in the hedge fund results. In terms of year-over-year improvements, Morgan Stanley recorded increases in all categories with the exception of customer support (-.26). The most notable improvements were in routing logic analysis (+.56), breadth of dark pools (+.51), customisation features (+.45), and flexibility and sophistication of SOR (+.41).

Hedge fund clients responding to this year's survey use a range of Morgan Stanley's algos to support their strategies. The most common were dark liquidity seeking (76%), VWAP (73%), percent volume (68%), and target close auction algos (51%). Lastly, over 78% of respondents stated they are not planning to make use of any additional algorithmic trading providers within the next 12 months.

MORGAN STANLEY RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.94 ▲	5.84 ▲	5.88 ▲	5.84 ▲	6.27 ▲	5.62 ▲	5.77 ▲	5.68 ▲	5.99 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.84 ▲	5.52 ▼	5.58 ▲	6.19 ▲	6.06 ▲	5.73 ▲	5.85 ▲

KEY STATS **Overall Outperformer:** **Category Outperformer:** ★ **X11**

6.27
Highest score
(speed)

5.52
Lowest score
(customer support)

0.56
Most improved
(routing logic analysis)

-0.26
Least improved
(customer support)

Redburn

Algorithmic trading solutions provider Redburn offers a full suite covering equities markets throughout Europe and North America. Redburn was acquired by Rothschild & Co in December and is now part of their equities markets solutions group. In its provider submission to this year's survey, the broker stated that it has heavily invested into its auction trading capabilities including the launch on a new dynamic auction strategy. Of Redburn's hedge fund client base, 19 responded to this year's survey, which is up from last year's 16. Respondents to Redburn were based in the UK (63%), Europe (32%) and North America (5%).

Redburn's average score of 6.05 comes in slightly above last year's average (6.02) but significantly higher than the overall survey average (+.31). The firm's highest scores were in the areas of customer support (6.64), increase trader productivity (6.21), ease of use (6.18) and speed (6.17), in fact eight of its scores land within the top three ratings of all providers profiled in this year's survey. The firm recorded year-over-year increases in a number of service areas, most notably speed (+.35), customer support (+.26), and reduced market impact (+.23). It's largest year-over-year decreases were in breadth of dark pools (-.52), routing logic analysis (-.22), and customisation features (-.17). Redburn outperformed the industry benchmark in every category except cost, where it came in nine basis points below the catagory average of 5.85. The provider's most significant areas of outperformance were in customer support (+.82), execution consulting and pre-trade cost estimates (+.63), and anonymity (+.40).

The majority of responding clients for Redburn represented small to mid-size hedge funds, with only 16% from those managing over $50 billion in assets. The most common performance measurement metric by far was implementation shortfall, followed by VWAP. Additionally, only 11% of respondents state they expect to make use of additional algorithmic trading providers in the next 12 months.

REDBURN RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
6.21 ▲	6.07 ▲	6.15 ▲	5.76 ▼	6.17 ▲	6.09 ▲	5.86 ▼	5.72 ▼	6.18 ▼

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.88 ▼	6.64 ▲	6.09 ▲	6.00 ▼	6.00 ▲	5.87 ▼	6.05 ▲

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

6.64
Highest score
(customer support)

5.72
Lowest score
(customisation)

0.35
Most improved
(speed)

-0.52
Least improved
(dark pool access)

UBS

UBS, an early pioneer of electronic trading, continues to invest in the space by building on its equities technology and utilising their expertise to create FX, rates, credit and futures offerings. UBS received 28 responses from hedge fund managers to its algorithmic trading solutions in this year's survey, down from 36 in 2022. In terms of regional breakdown, over half of hedge fund managers responding to UBS were based in the UK (57%), 29% in Europe, 11% in North America, and 3% in ROW. Of those respondents, 43% are at funds that manage north of $50 billion in assets.

UBS' overall average score of 5.55 came in seven basis points higher than last year's score of 5.48, however falls below the survey average of 5.74. The bank underperformed the survey benchmark in every category except cost, where it landed seven basis points above the average with a score of 5.92. The most significant areas of underperformance compared to the category benchmarks were customer support (-.62), algo monitoring (-.43), plus routing logic analysis and reduced market impact, which were both 33 basis points below the category average. Overall, UBS landed in the bottom three ratings across six categories.

The bank recorded year-over-year improvements in nine categories, with the largest being in flexibility and sophistication of SOR (+.45), price improvement (+.41), anonymity (+.34), and customisation features (+.33). Ultimately these increases outweighed the bank's most significant year-over-year decreases which were in customer support (-.49), execution consulting and pre-trade cost estimates (-.28), and algo monitoring (-.14).

The most commonly used algorithms by responding clients of UBS are dark liquidity seeking (75%), percent volume (57%), and VWAP (54%). Client feedback was limited, however respondents did note additional features that are of interest, including better service, additional liquidity, real-time routing and venue analysis tools, and reduced cost.

UBS RATINGS FOR ALGORITHMIC PERFORMANCE

Increase trader productivity	Reduce market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation	Ease of use
5.68 ▲	5.45 ▼	5.59 ▲	5.92 ▲	5.85 ▼	5.65 ▲	5.46 ▲	5.37 ▲	5.86 ▲

Order routing logic/ analysis	Customer support	Execution consulting	Dark pool access	Flexibility/sophistication of SOR	Algo monitoring	Average score
5.29 ▼	5.20 ▼	5.25 ▼	5.76 ▲	5.71 ▲	5.14 ▼	5.55 ▲

KEY STATS **Category Outperformer:** ★ X1

5.92
Highest score
(cost)

5.14
Lowest score
(algo monitoring)

0.45
Most improved
(flexibility of SOR)

-0.49
Least improved
(customer support)

Others

BARCLAYS RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
5.89 ▼	5.61 ▼	5.79 ▲	5.90 ▲	5.82 ▲	5.61 ▲	5.36 ▼	5.48 ▼

Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.83 ▼	5.38 ▼	6.07 ▲	5.56 ▼	5.70 ▲	5.62 ▼	5.55 ▲	5.68 ▼

BNP PARIBAS EXANE RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.50 ▲	6.16 ▲	6.45 ▲	5.99 ▲	6.43 ▲	6.05 ▲	5.66 ▲	6.19 ▲

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 ▲	6.01 ▼	6.42 ▲	6.09 ▲	6.18 ▲	6.10 ▲	6.07 ▲	6.17 ▲

INSTINET RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.02 ▼	5.52 ▼	5.85 ▼	5.85 ▼	6.07 ▲	6.05 ▲	5.47 ▼	5.88 ▲

Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
5.55 ▼	5.34 ▲	6.05 ▼	5.28 ▼	6.37 ▼	6.21 ▲	5.08 ▼	5.77 ▼

VIRTU FINANCIAL RATINGS FOR ALGORITHMIC PERFORMANCE

Increased trader productivity	Reduced market impact	Execution consistency	Cost	Speed	Anonymity	Price improvement	Customisation
6.02 ▼	6.23 ▲	5.80 ▼	5.70 ▲	5.91 ▲	5.53 ▼	5.88 ▲	4.90 ▼

Ease of use	Order routing logic/analysis	Customer support	Execution consulting	Dark pool access	Flexibility and sophistication of SOR	Algo monitoring	Average score
6.04 ▲	5.20 ▲	6.17 ▲	5.62 ▲	6.08 ▲	5.78 ▲	5.33 ▼	5.75 ▲