

lakyara vol.192

Special Edition

# Asset management companies' evaluation of brokers

—State of asset management companies'  
trading in 2014—

1. April. 2014



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Underlined terms in this report are contained in the Glossary at the end of the report.

## Highlights

# Asset management companies' evaluation of brokers

At NRI, we periodically conduct surveys on asset management companies' trading activities. Our first survey, conducted in 2007, captured the growing use of algorithmic trading. Our second survey, conducted in 2009, investigated usage of alternative trading venues (e.g., dark pools, PTSs), which were then starting to gain prominence.

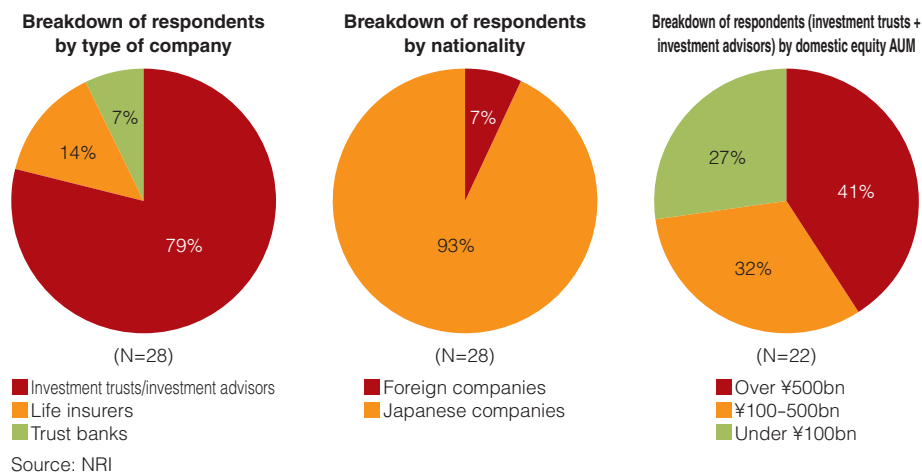
Since then, brokers have been launching new services such as algorithmic trading and dark pools while linking up with the Tokyo Stock Exchange's arrowhead trading system and complying with new short-selling regulations. Now that IT investment in such electronic trading infrastructure has slowed, differentiation of execution services has become more difficult than in the past.

Against such a backdrop, we conducted our third survey in September 2013 to shed light on asset management companies' evaluation of brokers' services. We surveyed asset management companies with in-house trading operations in Japan, including investment trust companies, investment advisors, life insurers, and trust banks. We sent questionnaires to the top 60 such companies as ranked by assets under management (AUM) and received valid responses from 28 of them.

About eighty percent of the respondents were investment trust companies and investment advisors. The remaining 20% were life insurers and trust banks. About forty percent of the investment trust companies and investment advisors have domestic equity AUM in excess of ¥500 billion while nearly 30% have less than ¥100 billion of domestic equity AUM. Over 90% of all respondents were Japanese companies. Foreign companies accounted for only 7% of respondents (Exhibit 1).

In addition to usage of execution services such as algorithmic trading and principal trading, our latest survey also focused on how asset management companies decide which broker to submit equity trading orders to and how they evaluate brokers' services. This line of inquiry yielded some interesting findings, including

### Exhibit 1: Survey respondents' attributes



that direct spoken communication between asset management companies and brokers is decreasing and use of execution methods that reduce market impact and timing risk is increasing.

### Discretionary executions decreasing amid shift toward electronic trading

Our survey inquired about the four main execution services that brokers provide to asset management companies: principal trading, discretionary execution, algorithmic trading and DMA (direct market access). The survey found that principal trading and discretionary execution are used by over 90% of respondents and that algorithmic trading and DMA are used by roughly half of respondents.

Relative to three years earlier, some 40% of respondents reported that they have reduced their use of discretionary execution and about 80% reported increased use of algorithmic trading and DMA. These data suggest that asset management companies are migrating to electronic trading.

### Information provision capabilities have diminished in wake of migration to electronic execution services

Asset management companies receive advice from brokers' sales traders about execution strategies, order conditions and other such matters. They also obtain

information from sales traders about pending orders' status. About half of our survey's respondents reported that such communication with brokers has decreased in recent years.

Reasons behind this decrease include that brokers have reduced sales trader staffing and opportunities for direct telephone conversations have decreased as a result of increased use of algorithmic trading, DMA and other forms of electronic trading.

After brokerage commissions were liberalized in Japan in 1999, competition among brokers intensified, giving rise to cost-cutting pressures and driving widespread electronification and automation of execution services. This led to mechanization of the trade execution business, leaving brokers with no choice but to downsize their sales forces. Weakening of brokers' information provision capabilities due to the decrease in direct spoken communication with asset management companies can be considered a drawback of the shift toward electronic trading.

### **Trend toward avoidance of market impact has gained momentum**

When asked about intended future usage of brokers' execution services, over 60% of survey respondents reported that they want to increase their use of dark pools and brokers' in-house matching services that utilize IOIs (indications of interest).

In comparison to stock exchanges, both dark pools and in-house matching are distinguished by a lower risk of self-induced price movements when large orders are executed, because bid and ask quotes are not publicly disclosed. There is a growing trend toward avoidance of market impact. This trend presumably reflects growth in order size and growing use of basket orders and average execution prices.

With respect to dark pools, survey respondents' expectations include execution of trades at prices better than on-exchange execution prices. Survey respondents also hope that dark pools' execution processes will become more transparent so that they can trade in dark pools with peace of mind even if bid and ask price quotes are not visible. Until a few years ago, brokers were able to improve their client satisfaction ratings solely by offering a dark pool, but now that dark pools

are widely available, brokers are faced with the challenge of how to differentiate their dark pool from competitors' in terms of factors such as reliability and order execution rates.

### **Asset management companies' traders are becoming more specialized**

In evaluating brokers, asset management companies place as much importance on execution performance as they do on execution services that reduce market impact and information provided about pending orders. They evaluate actual execution prices using their own benchmarks. Survey respondents were preponderantly dissatisfied with execution performance across all execution methods, including discretionary execution and algorithmic trading.

In recent years, more and more asset management companies are pursuing improved operating efficiency by separating the job of fund managers in charge of managing portfolios from the job of traders in charge of buy and sell orders. Additionally, we have heard that the position of buy-side trader is becoming increasingly specialized, partly because asset management companies are hiring former sell-side traders. This trend is likely one factor behind asset management companies' increasingly demanding attitude toward execution performance.

Asset management companies' evaluation of brokers heavily reflects changes in the regulatory and business environment. The new needs and trends engendered by such changes are deeply interrelated, not independent of each other. While the trend toward electronic trading has led to a decrease in communication, it is also connected to traders' growing specialization and the increased importance placed on execution performance.

Brokers that have been investing in infrastructure to automate their business processes and realize labor cost savings face the difficult problem of how to meet demand for manually provided services such as execution advice and in-house order matching. It goes without saying that IT is the key to doing so. Perhaps only brokers capable of offering solutions to this challenge will be able to earn high ratings from asset management companies and win continued order flow.

## Chapter 1

# Current state of asset management companies' trading

## Usage of execution services

The term “low-touch execution” entered market parlance in the wake of automation of execution services. It refers to execution of asset management companies' orders without the involvement of a broker's trading staff. Specific low-touch execution services include algorithmic trading<sup>1)</sup> and DMA (direct market access). High-touch execution, by contrast, refers to order execution involving a broker's trading staff. The two modes of high-touch execution are discretionary execution, where the manner in which an order is executed is left to the discretion of a broker's traders, and principal trading, where the broker acts as the trade's counterparty using its proprietary trading book. Discretionary execution, algorithmic trading, and DMA are collectively referred to as agency trading because the broker acts solely as an intermediary between its client and the trading venue without taking any proprietary positions (Exhibit 2).

To utilize low-touch executions, asset management companies must have the IT infrastructure to convert order information into FIX messages and transmit them to brokers. Consequently, not all asset management companies use the low-touch mode of execution. Of 28 asset management companies that participated in our survey, 16 use both high- and low-touch executions. The remaining 12 use high-touch executions only (Exhibit 3). Of the respondents that use both high- and low-touch executions, 71% have group-wide equity AUM of at least ¥500 billion,

### NOTE

1) When asset management companies use algorithmic trading, they do so in one of two ways. One way is direct strategy access (DSA), whereby the asset management company transmits data directly to a broker's IT system without the involvement of the broker's trading staff. The other way involves the broker's trading staff, who initiate algorithmic trading after receiving data from the asset management company. As discussed herein, algorithmic trading refers to DSA.

**Exhibit 2: Classification of execution services**

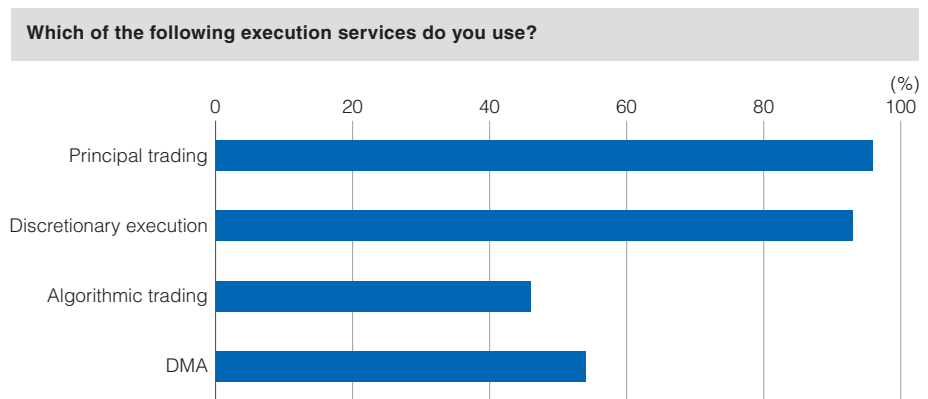
Category 1	Category 2	Execution services
High-touch execution	Principal trading	Principal trading
	Agency trading	Discretionary execution
Algorithmic trading		
DMA		
Low-touch execution		

Source: NRI

whereas only 12% of the high-touch-only respondents have equity AUM of at least ¥500 billion. More than half of the high-touch-only respondents have equity AUM of less than ¥100 billion (Exhibit 4). These data imply that asset management companies need a certain minimum level of financial resources to afford the IT infrastructure required for low-touch execution.

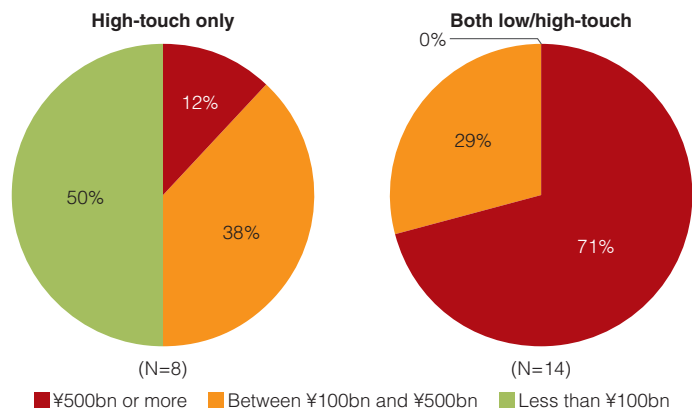
Next, in terms of execution service usage, the high-touch-only respondents use agency trading (discretionary execution) for 76% of their trades and principal trading for the remaining 24%. Among respondents that use both high- and low-touch executions, principal trading's share of trading volume in value terms is about 10 percentage points higher than among high-touch-only respondents. For agency trading, the respondents that use both high- and low-touch executions use a

**Exhibit 3: Execution services used by survey respondents**



Source: NRI

**Exhibit 4: Breakdown of survey respondents by AUM**

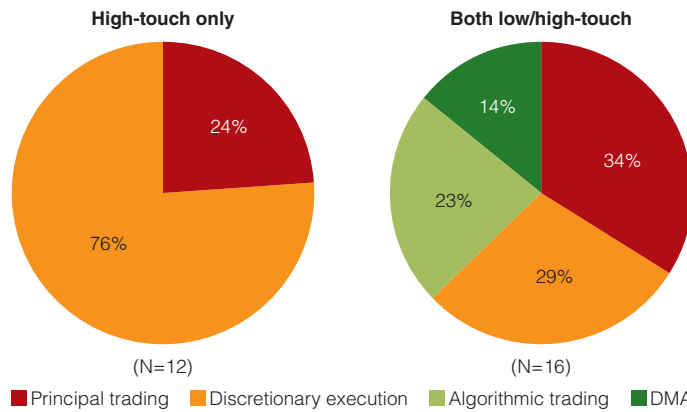


Note: Excludes life insurers and trust banks  
Source: NRI



### Exhibit 5: Usage of execution services

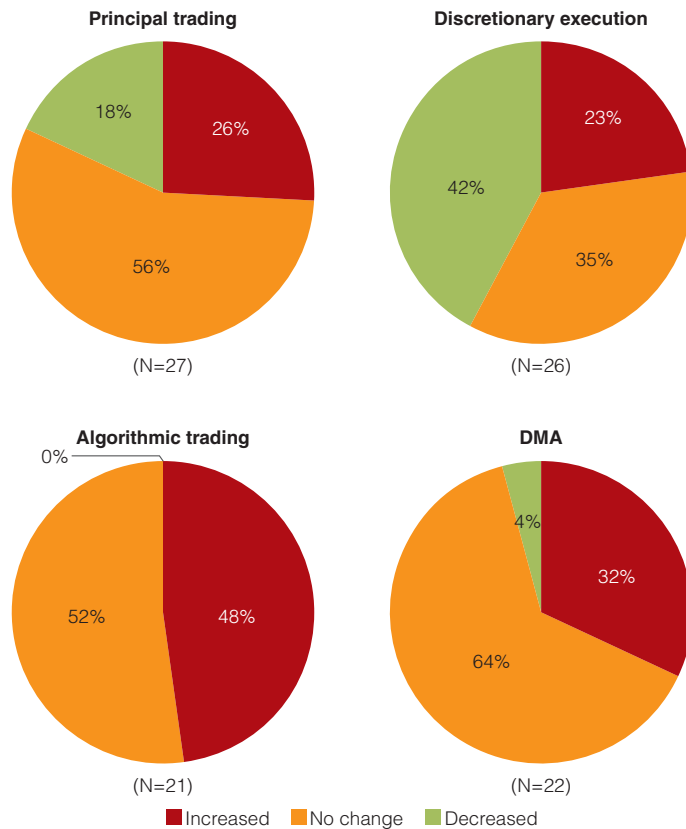
For approximately what percentage of your trading volume (in value terms) do you use the following execution services?



Source: NRI

### Exhibit 6: Usage of execution services in comparison to three years earlier

How has the following execution services' share of your total trading volume changed relative to three years ago?



Source: NRI

combination of discretionary execution, algorithmic trading and DMA (Exhibit 5).

In comparison to three years earlier, 42% of respondents reported that they have reduced their usage of discretionary execution while 48% have increased their usage of algorithmic trading and 32% have increased their usage of DMA. These data confirm that asset management companies are shifting to electronic trading (Exhibit 6).

## Broker evaluation

Asset management companies typically do business with 10 to 20 brokers. From these brokers, asset management companies receive research services (e.g., analyst reports) in addition to the execution services discussed above. Brokers are compensated for their research services in the form of trading commissions. Accordingly, the share of orders that an asset management company sends to a given broker is determined by the asset management company's overall assessment of its satisfaction with the broker's execution and research services (see "Sidebar: Broker scoring" on page 11).

Our survey found that, on average, asset management companies assign nearly twice as much weight (66:34) to research services than to execution services when scoring brokers (Exhibit 7). This disparity reflects that fund managers generally outnumber traders at asset management companies and most asset management companies believe that stock-picking contributes more to alpha generation than trade execution does. Because company research is a source of alpha for asset management companies, some asset management companies place priority on in-house analysts' opinions instead of relying on brokers' research. Some such asset management companies assign more weight to execution services than to research services (as much as 60:40) in evaluating brokers.

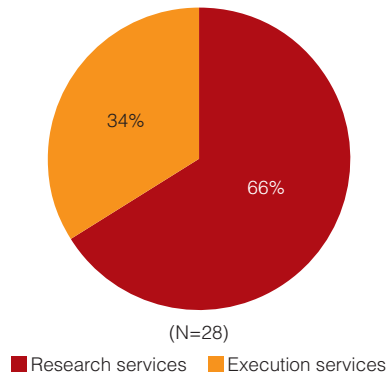
Although asset management companies thus tend to place more importance on research services, they still place substantial importance on execution services amid a trade execution environment that has changed drastically in recent years. Adaptation to various changes at stock exchanges (e.g., system upgrades, mergers, market rule changes), connectivity to PTS (Proprietary trading system) markets, and utilization of IT infrastructure-based services (e.g., algorithmic trading, DMA, dark pools, SOR (smart order routing)) are all within the realm of execution services. We focused on execution services in our survey whose results

are reported herein.

Survey respondents' biggest focal points in terms of evaluating brokers' execution services are information provision capabilities, liquidity provision capacity, and execution performance. These three points are the most important for both respondents that use only high-touch executions and respondents that use both high- and low-touch executions. The latter assign little weight to commissions.

**Exhibit 7: Relative importance of execution services and research services**

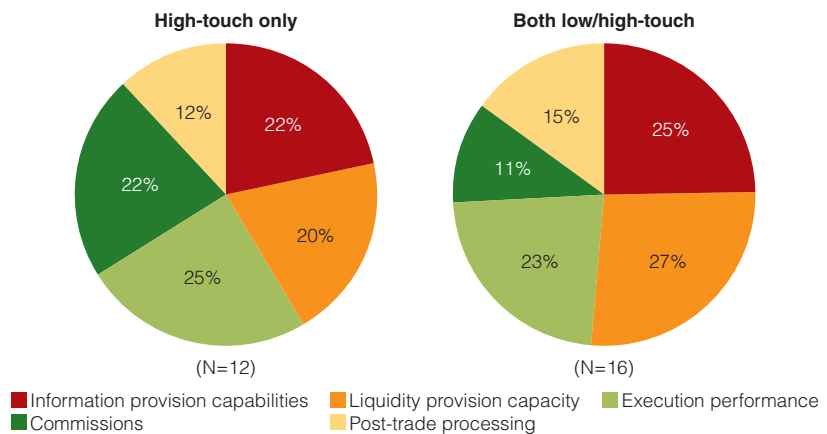
In evaluating brokers, approximately how much weight (in %) do you place on research services and execution services, respectively?



Source: NRI

**Exhibit 8: Asset management companies' priorities in terms of execution services**

In evaluating brokers' execution capabilities, approximately how much weight (in %) do you assign to each of the following five factors, including information provision capabilities and liquidity provision capacity?



Source: NRI

Many asset management companies presumably realize that commissions are already about as low as they can go under the current system, where commissions are compensation for both research and execution services. Survey respondents do not assign much weight to post-trade processing either, probably because brokers are largely indistinguishable in terms of IT system stability and the quality of their back-office processing (Exhibit 8).

In the remainder of this report, we discuss information provision capabilities, liquidity provision capacity, and execution performance as the three key elements of execution services in the eyes of asset management companies. In doing so, we look at recent trends and their implications for brokers.

## Sidebar

### Broker scoring

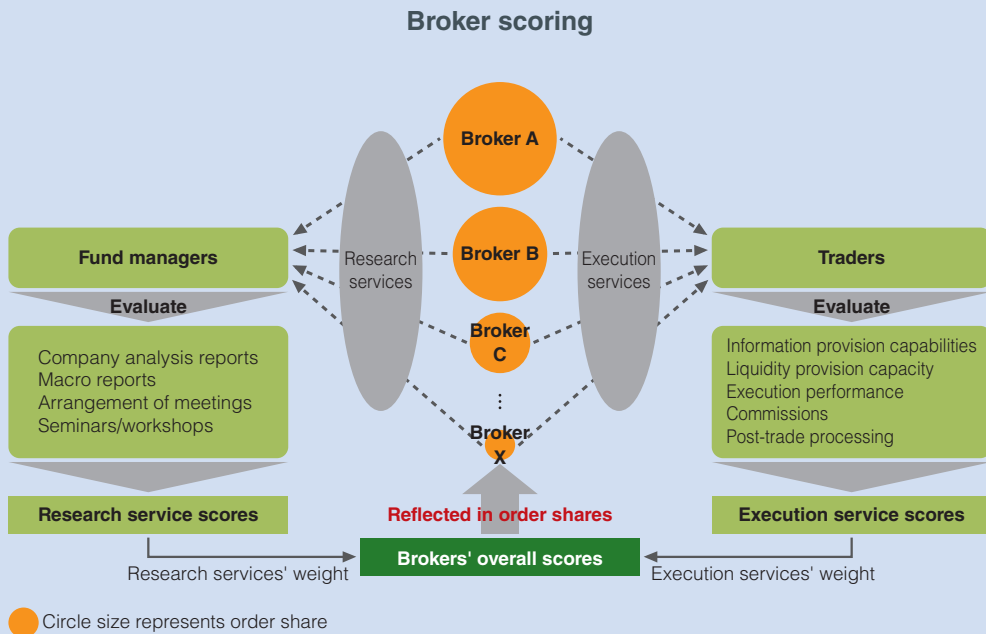
Services that brokers provide to asset management companies can be classified as execution services or research services. Execution services are defined as all services for asset management companies' traders. They include not only receiving and executing orders but also providing information and IT services in conjunction therewith. As compensation for execution services, brokers are paid brokerage commissions, calculated as a certain percentage of a trade's execution value. Research services, by contrast, are provided to fund managers. Specific research services include providing a variety of analytical reports and arranging meetings to facilitate company analysis. Compensation for research services is likewise paid in the form of brokerage commissions. Asset management companies compensate brokers for research by placing orders with the brokers that provide research services to them. Brokerage commissions thus include compensation for both execution services and research services.

To receive these two types of services, asset management companies typically do business with 10 to 20 brokers. They place orders with so many brokers due to their research needs. They want access to diverse market views.

If asset management companies pay for both execution and research services with brokerage commissions, how they allocate their order flow among brokers is very important. They determine what share of their orders goes to each broker through broker scoring.

Broker scoring is conducted quarterly or semiannually and the scores are reflected in the next quarter or semiannual period's commission shares. Scoring of execution services is done by asset management companies' traders. Evaluation criteria differ among companies, but they can be broadly classified into several categories, including (1) information provision capabilities, (2) liquidity provision capacity, (3) execution performance, (4) post-trade processing (accuracy), and (5) commission level (cost).

Scoring of research services is done by fund managers. Scoring criteria include frequency of broker-arranged events such as analyst briefings, meetings with company management, production plant tours, and seminars/workshops in addition to ratings of brokers' individual analysts. Lastly, the respective scores for execution and research services are weighted and tallied to arrive at an overall score for each broker. Based on these scores, asset management companies determine individual brokers' order shares.



## Chapter 2

# Evaluation of information provision capabilities

### Information provided by brokers

Among brokers' execution services, providing information is one major function. Information provision is a key evaluation criterion in broker scoring also. Brokers are keenly interested in how highly their information provision capabilities are rated.

Information possesses a wide variety of attributes. First, information can be classified into two categories based when it is provided (Exhibit 9). One category is general information provided without any temporal connection to a specific trade. General information is a broad category, including information related to the industry as a whole, not information specific to individual asset management companies and individual trades. The second category is information pertaining to asset management companies' specific trades. Trade-specific information can be classified into five subcategories based on when it is provided in relation to trade execution. The subcategories are pre-execution analytical tools (number 4 in Exhibit 9), advice on execution methods (5), information provided during execution on how stocks are trading and what other investors are doing (6, 7), and post-execution feedback of execution results (8).

Exhibit 9 shows that brokers provide a wide variety of information at various points

#### Exhibit 9: Information provided by brokers

	Types of information
General Information	1. Explanations of algorithms, dark pools and SOR functions
	2. Market microstructure explanations
	3. Information on regulations regarding exchanges/PTSs
Trade-specific information	4. Pre-execution analytical tools
	5. Advice regarding execution conditions (e.g., algorithm selection)
	6. Intraday feedback on individual stocks
	7. Intraday feedback on other investors' behavior
	8. Post-execution analysis (e.g., TCA), other post-execution information

Source: NRI

in time. How do asset management companies feel about brokers' information provision capabilities?

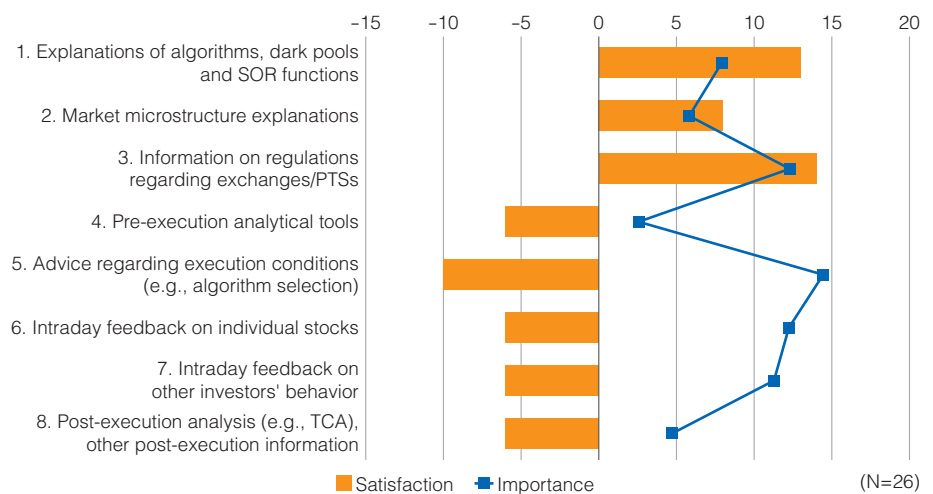
### Information not satisfactorily provided

Our survey inquired about the importance of and satisfaction with each of the types of information listed in Exhibit 9. The responses, shown in Exhibit 10, reveal asset management companies' leanings in terms of informational priorities and degree of satisfaction with broker-provided information.

Most survey respondents reported that they are satisfied with general information provided by brokers, presumably reflecting that brokers provide extensive information through such means as reports and seminars. The most noteworthy data points are that the survey respondents are preponderantly dissatisfied with advice regarding execution conditions (e.g., algorithm selection), intraday feedback on individual stocks, and intraday feedback on other investors' behavior despite placing a high degree of importance on these categories of information. What these three categories have in common is that they encompass largely real-time

**Exhibit 10: Evaluation of information provision capabilities**

**This question inquires about information provision capabilities in your evaluation of brokers. For each of the specific types of information listed below, select the response that best describes your degree of satisfaction. Additionally, select up to three types of information that you consider to be most important.**



Note 1: Satisfaction scores are response tallies, where very satisfied = 2, satisfied = 1, dissatisfied = -1, and very dissatisfied = -2.

Note 2: Importance scores are response tallies, where the selected responses are assigned one point and unselected responses are assigned zero points.

Source: NRI

information mainly provided over the telephone during order execution. Survey respondents' dissatisfaction is likely attributable to the fact that communication via the telephone has decreased in prevalence.

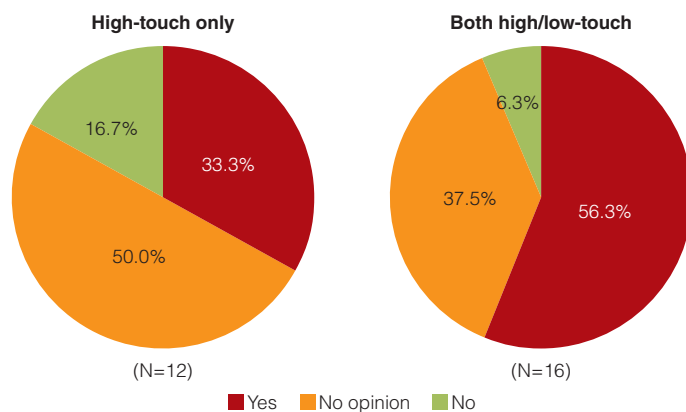
High-touch executions require direct spoken communication between the asset management company and broker when the order is placed. Brokers can accordingly provide information while on the telephone with the asset management company. In contrast, low-touch executions, which are gaining prevalence, do not require spoken communication. Asset management companies can get minimal information (e.g., share prices) from their own terminal screens, but much of the information they formerly obtained from conversations with brokers is not available from terminal screens. Communication with brokers is decreasing because asset management companies are increasingly using low-touch executions more than high-touch executions. Asset management companies may feel that brokers are not satisfactorily providing information that used to be communicated by telephone.

### Loss of opportunities to provide information

Asset management companies do in fact feel that communication has decreased. When asked whether communication with brokers during the trading day has decreased, 56.3% of respondents that use both high-touch and low-touch executions answered affirmatively (Exhibit 11). These respondents vastly

**Exhibit 11: Change in amount of communication with brokers**

**Do you think that communication with brokers during the trading day has decreased? (choose only one response)**



Source: NRI

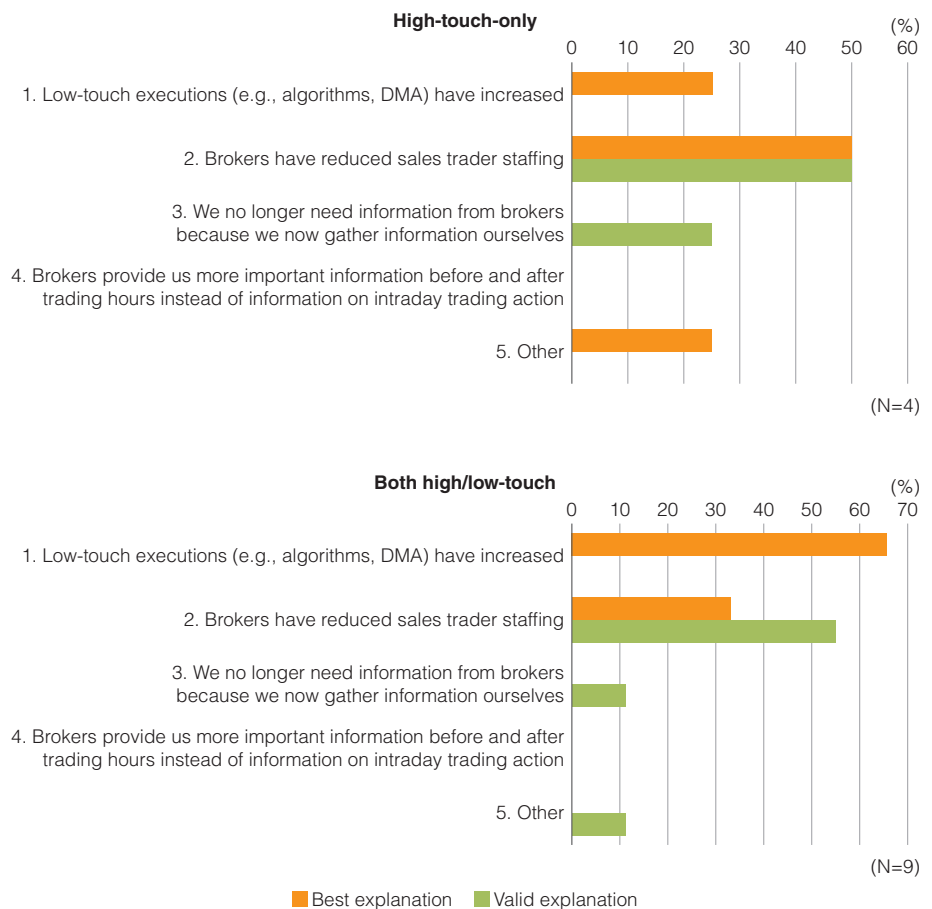


outnumbered the 6.3% of respondents that answered negatively. Regarding the reason for decreased communication, 66.6% of respondents that use both high-touch and low-touch executions cited increased use of low-touch executions such as algorithmic trading and DMA as the best explanation (Exhibit 12).

Even among respondents that use only high-touch executions, 33.3% agreed that communication has decreased while only 16.7% disagreed. As noted previously, low-touch executions do not require communication with brokers. It is only natural that asset management companies that use only low-touch executions would find that their communication with brokers has decreased. However, even among asset management companies that use high-touch executions, many respondents

### Exhibit 12: Factors behind decrease in communication

**This question is for those who think that communication with brokers during the trading day has decreased. Select up to two reasons that you feel are behind the decrease in intraday communication, including the reason you consider to be the best explanation and one other reason, if any, that you consider to be valid.**



Source: NRI

reported that communication has decreased. Why?

The reason unanimously cited by high-touch-only respondents is that brokers have reduced their sales trader headcounts. Brokers are investing heavily in algorithmic trading in anticipation of order flow continuing to shift toward low-touch executions. Meanwhile, they have reduced sales trader staffing, presumably to recoup their investments in algorithmic trading. The fact that brokers are placing much more priority on low-touch executions may be materially detrimental even to asset management companies that use high-touch executions only.

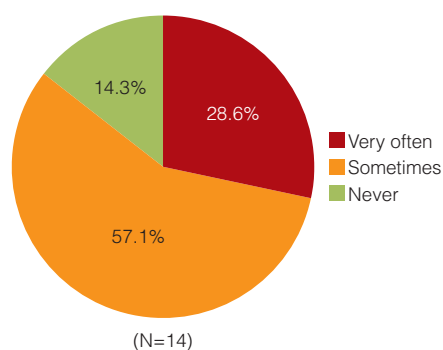
### Asset management companies' pursuit of information

Against such a backdrop, asset management companies are actively seeking communication with brokers. For example, 80% of the survey respondents that use both high- and low-touch executions report that they sometimes submit orders to be executed discretionarily even when the order is suitable for algorithmic execution (Exhibit 13).

In terms of why they do so, the most often cited reason was lack of confidence in algorithmic trading itself (“anxiety about algorithms' behavior during times of heightened market volatility”). However, one third of respondents cited a “desire to obtain information about a specific stock” as the best explanation of why they sometimes use discretionary executions in situations conducive to algorithmic

#### Exhibit 13: Use of discretionary execution for orders suitable for algorithmic trading

How often do you use discretionary execution for orders that are suitable for algorithmic trading? (choose one response)



Source: NRI

trading. Another popular response was a “desire to obtain information about what other investors are doing.”

Orders suitable for algorithmic trading include orders that involve sufficiently liquid stocks and do not impose any special conditions on their execution. For asset management companies that use low-touch executions, there is theoretically little if any advantage to choosing discretionary execution, which requires time and effort and also tends to entail higher commissions, for an order suitable for algorithmic trading. Additionally, discretionary execution entails a risk of the order being leaked to other investors. The fact that asset management companies nonetheless sometimes use discretionary execution when not required implies that they are strongly motivated to gain information about the market, individual stocks, and other investors' behavior through communication.

### **Challenges facing brokers as low-touch execution grows in prevalence and possibility of providing information tailored to individual clients**

With brokers mechanizing the order execution business, order processing is being automated at a rapid pace. Business processes related to providing information, however, have not been automated. Instead, such operations have been downsized while remaining dependent on sales traders.

Asset management companies want information of the same quality that they were receiving when using only high-touch executions. Brokers had sales traders who were assigned exclusively to individual asset management companies and knowledgeable about clients' policies and the nature of their orders. Sales traders were familiar with asset management companies' respective needs and wishes and able to flexibly meet them. Additionally, the more sales traders on staff, the fewer asset management company accounts that each sales trader serviced. Sales traders were consequently able to monitor stocks and provide intraday feedback on orders' execution status in accord with asset management companies' wishes. In other words, sales traders were able to provide detailed recommendations to asset management companies in real time.

One potential way to provide information on a par with the high-touch trading era is to revert to a labor-intensive approach by increasing sales trader staffing again.

However, asset management companies still want to keep brokerage commissions low. Can brokers find new ways to provide information while maintaining reduced sales trader staffing? One broker has adopted an innovative approach that offers insight into how to potentially resolve this difficult challenge.

First, the broker installed an IT system to manage atypical information. Atypical information is information that cannot be converted to a standard format. Historically, management of atypical information was dependent on human memory. Examples of atypical information include the content of preliminary consultations with clients and information learned from conversations (e.g., order execution policies), not information in a standard format such as order history. Atypical information can be made accessible to sales staff by using an IT system to manage it and render it retrievable on demand. Previously, if a client mentioned wanting to buy or sell stocks with certain attributes but did not place an order to do so, this information would not be retained or shared among traders. If brokers store the content of client consultations in an IT system, even if the client does not immediately place an order, they may be able to use the information to generate future orders by making better recommendations based on the client's needs.

Second, the broker installed a system that automates market monitoring and alerts. The system can be used to quantify clients' detailed needs with respect to individual trades as client-specific values. By automating these functions, the broker can monitor a large number of stocks and provide information to asset management companies based on alerts generated by the system.

Asset management companies' satisfaction with brokers' ability to provide information in response to their specific needs is low. By utilizing IT systems such as those described above to conduct formerly labor-intensive monitoring and store and provide information, brokers can make asset management companies feel that they are able to obtain information about their trades like they did back when they were served by dedicated traders providing high-touch executions.

Now that algorithmic trading and DMA have been adopted on a fairly widespread basis, all brokers are trying to figure out their next step. Developing systems able to provide individual trade information on a par with high-touch execution services while reducing sales trader staffing should be a powerful differentiating factor. Asset management companies are seeking brokers able to provide ample information tailored to their needs.

## Chapter 3

# Evaluation of liquidity provision capacity

### Brokers supply off-exchange liquidity to reduce uncertainties associated with on-exchange executions

Brokers generally execute asset management companies' orders on exchanges or PTSs, but execution on an exchange or PTS entails costs stemming from execution uncertainties such as market impact and price fluctuation risk. Brokers add value by providing services to minimize such costs while increasing execution certainty. They supply liquidity by serving as trading venues themselves to provide execution opportunities. Methods by which brokers provide liquidity most notably include proprietary positions, dark pools, and in-house matching (Exhibit 14). Exhibit 14 summarizes the relationship between liquidity provision and the execution methods discussed in Chapter 1. The execution method whereby brokers provide liquidity to investors through their proprietary trading position is principal trading. When liquidity is provided via in-house matching, discretionary execution and principal trading are used as execution methods in conjunction with IOIs (see sidebar on page 28). Dark pools are liquidity accessed via SOR (smart order routing) in combination with discretionary execution or algorithmic trading. In addition to the advantage of avoiding market impact and price fluctuation risk,

**Exhibit 14: Types of on-exchange and off-exchange traded executions**

			Liquidity source			
			Exchange, PTS	Liquidity supplied by brokers		
				Proprietary positions	In-house matching (IOI)	Dark pools (via SOR)
Execution method	Low-touch	DMA	○			
		Algorithmic trading	○			○
	High-touch	Discretionary execution	○		○	○
		Principal trading		○ (Negotiated trades, EFP, guaranteed VWAP trades, etc.)	○	

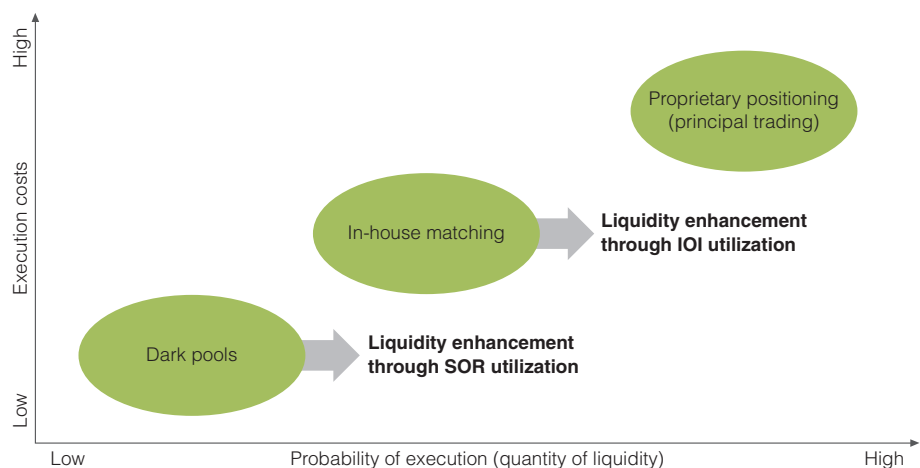
Source: NRI

these execution methods offer the advantage of a high degree of confidentiality because the trades are executed off-exchange. Another recognized benefit is price improvement, reflecting that trades are often executed at market mid-point prices when a dark pool or in-house matching is used.

Principal trading is often used when asset management companies, mainly those that manage index funds, want to immediately and unfailingly execute trades in multiple stocks at agreed-upon prices to minimize tracking error. Once a broker receives a request from an asset management company for price quotes on stocks that the asset management company wants to trade, the broker sets execution prices in advance of the trades, taking into account its proprietary positioning. The supply of liquidity provided by brokers that use principal trading is now substantial, as evidenced by basket cross trades' widespread prevalence throughout the industry. Principal trading is regarded as an execution method highly likely to result in executed trades (Exhibit 15). To ensure executability, brokers must perform sophisticated tasks such as optimization of proprietary positions, price quoting, and rapid unwinding of proprietary positions. Principal trading consequently tends to entail high processing costs. As a result, execution costs also tend to be relatively high.

Meanwhile, asset management companies, particularly those with actively managed funds, sometimes want to pursue the best execution price even at the risk of sacrificing execution certainty to some extent. In such cases, in-house

**Exhibit 15: Execution methods classified by probability of execution and execution costs**



Source: NRI

matching and dark pools are often utilized.

In the case of in-house matching, where brokers execute asset management companies' orders against their own proprietary trading books or by crossing two asset management companies' offsetting orders, the extent to which brokers can increase liquidity provision capacity (i.e., increase the probability of a match) is a key issue. To do so, brokers attempt to increase the probability of matching orders by issuing IOIs to selected asset management companies that the broker thinks may be interested in trading a given stock based on the asset management companies' previous trading activity. Brokers are internally experimenting with IOIs in various ways, including by offering liquidity to asset management companies in the form of IOIs when seeking to unwind proprietary positions. Additionally, brokers' sales personnel knowledgeable about their asset management company clients' trading activity attempt to accurately target those asset management company clients with appropriate IOIs by exchanging information amongst themselves.

Dark pools, which electronically automate in-house matching of orders, reduce processing costs by virtue of such automation. While dark pools consequently offer the advantage of relatively low execution costs, their drawback is that orders do not get executed unless sufficient liquidity is available. Dark pools are often used as one venue for executing brokers' discretionary and algorithmic trades. Brokers are therefore endeavoring to boost their liquidity provision capacity through such means as using SOR in combination with dark pools and linking their dark pools with other brokers'. When SOR is used to route orders to a dark pool, the dark pool becomes an SOR-destination market. Additionally, by placing precedence on order matching within dark pools and routing orders to the Tokyo Stock Exchange or PTSs on an as-needed basis, SOR reliably executes orders by taking advantage of dark pools' price improvement effect while also tapping into the Tokyo Stock Exchange and PTSs' abundant liquidity as needed.

### **Principal trading is widely used; usage of IOIs and dark pools is expected to increase**

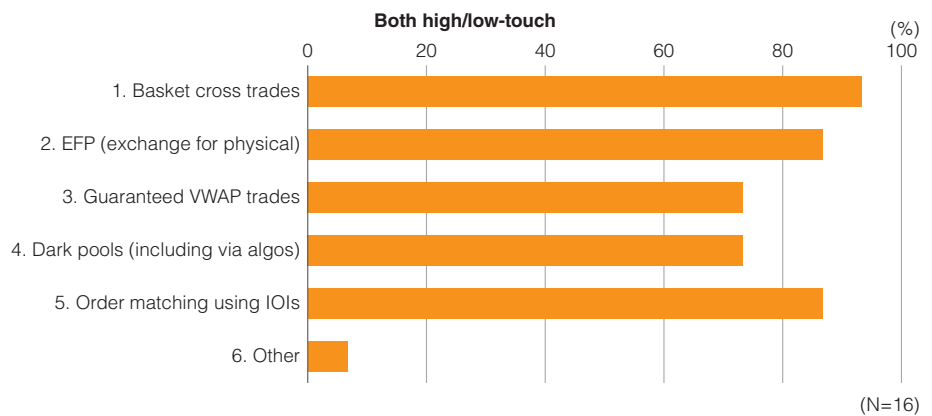
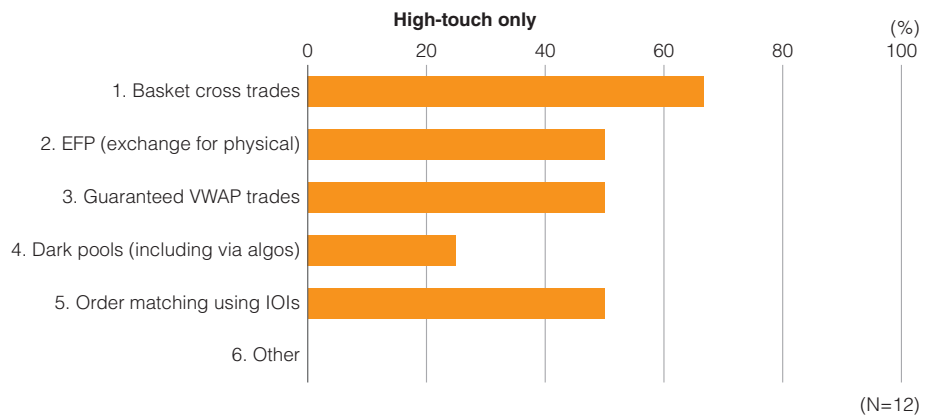
Our survey found that principal trading, dark pools and IOIs are widely used (Exhibit 16). All three are used by over 70% of respondents that use both high- and low-touch executions. Even among respondents that use only high-touch executions,

more than half use principal trading and IOIs, although less than 30% use dark pools as a venue for discretionary executions. In comparison to previous survey data, use of in-house matching in combination with IOIs has grown sharply.

Looking ahead, over 60% of respondents reported that they want to increase their usage of IOIs (Exhibit 17). Despite the current gap in dark pool usage's prevalence between high-touch-only respondents and respondents that use both high- and low-touch executions, over 60% of all respondents reported that they want to increase their use of dark pools. This data point presumably reflects that dark pools offer confidentiality and better execution prices than exchanges and that orders' probability of execution in dark pools has been rising as a result of utilization of SOR and algorithms in conjunction with dark pools.

### Exhibit 16: Usage of liquidity provision methods

Which of the following do you use when trading in dark pools or with a broker acting as a principal?

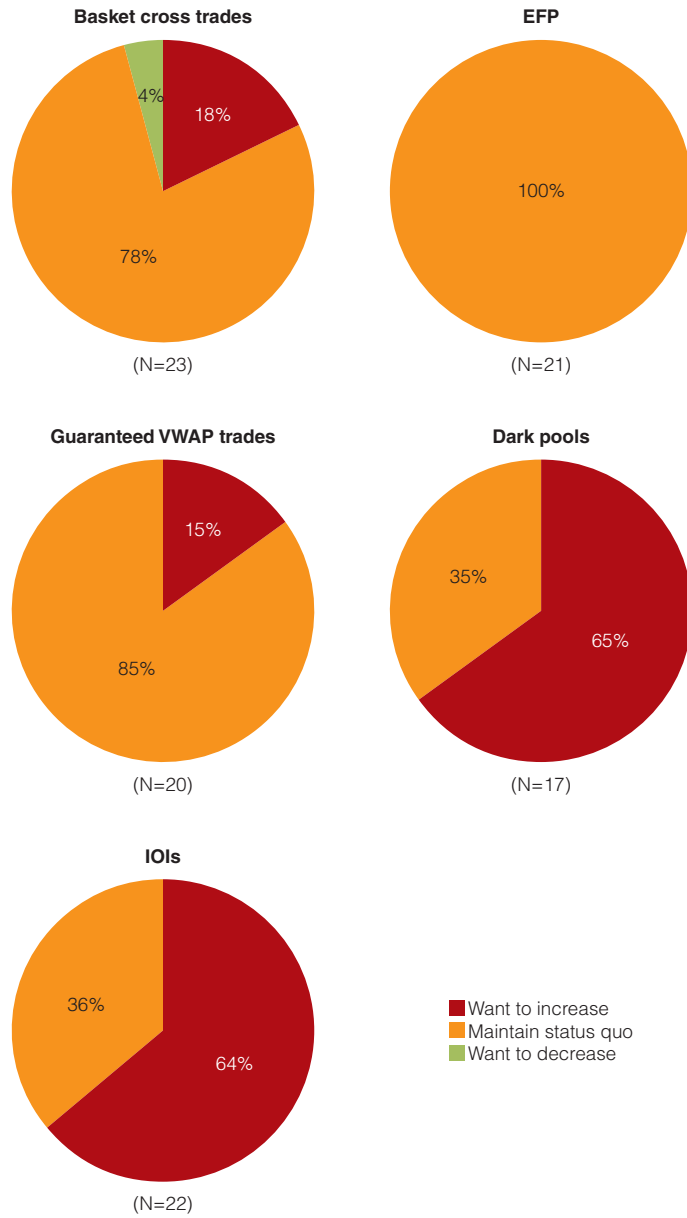


Source: NRI



### Exhibit 17: Future intentions with respect to use of liquidity provision methods

Select the response that best describes your intentions regarding your future use of the following in conjunction with principal trading and/or dark pool trading.



Source: NRI

## Growth in IOI usage driven by growth in average-price basket orders' size

One factor behind growth in the use of in-house matching in combination with IOIs is that asset management companies' orders have been growing in size.

When asset management companies' orders are executed by brokers, the trade execution results (stock codes, prices, quantities) must be allocated among multiple client accounts or funds. Brokers have to do this allocation for asset management companies. When an order is split into multiple suborders that are executed separately, execution quantities and prices end up varying among the suborders. As a result, the price calculations required for allocation purposes became very complex.

From the early 2000s, the securities industry sought to improve the efficiency of executed-order allocation to shorten settlement deadlines in preparation for migration to a T+1 settlement cycle. Against such a backdrop, the Cabinet Office Ordinance on Securities Companies was amended effective July 2003 in the aim of ensuring fair allocation of execution prices among multiple accounts or funds. This amendment permitted brokers to use the average execution price per share, calculated by dividing total execution value by the total number of shares traded, for groups of trades in a single stock. As a result, growth in order size accelerated, driven by basket orders. The need to avoid the market impact associated with increasingly large orders has led to wider use of in-house matching in combination with IOIs, partly because such large orders are difficult to fill in dark pools. Another contributing factor is that principal trading entails the disadvantage of higher execution costs.

## Satisfaction with liquidity provision methods and suggestions for brokers

Our survey inquired about respondents' satisfaction with dark pool and IOI services, both of which asset management companies intend to increasingly use going forward, and about which of these services they place importance on (Exhibit 18).

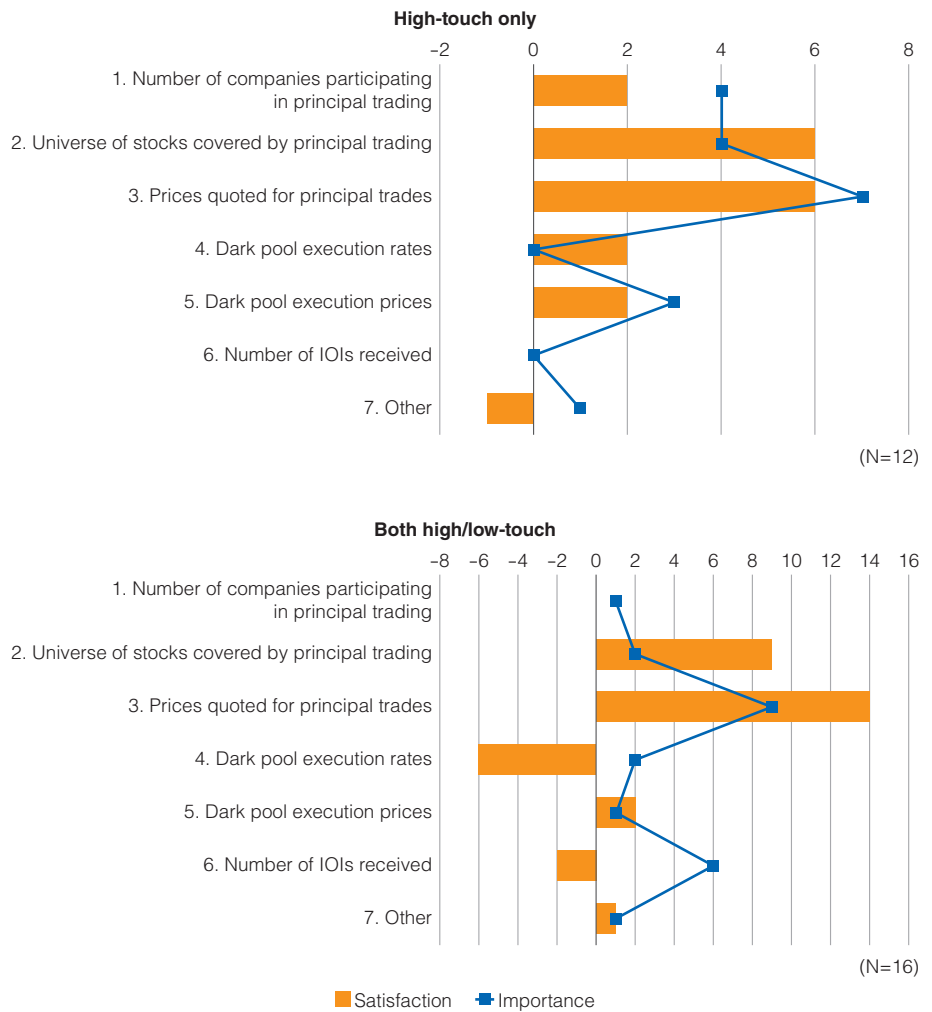
With respect to principal trading, the survey revealed that all respondents are

relatively highly satisfied with brokers' quoted prices and the universe of stocks in which brokers are willing to trade as principals. Brokers currently appear to be providing principal trading services on a level sufficient to satisfy asset management companies.

In comparison to principal trading, survey respondents are less satisfied with dark pool execution rates and execution prices and the number of IOIs they receive.

**Exhibit 18: Satisfaction with and importance of liquidity provision capacity**

Select your level of satisfaction with each of the following specifics of brokers' liquidity provision capacity in evaluating brokers. Additionally, select up to two items that you consider to be most important.



Note 1: Satisfaction scores are response tallies, where very satisfied = 2, satisfied = 1, dissatisfied = -1, and very dissatisfied = -2.

Note 2: Importance scores are response tallies, where the selected responses are assigned one point and unselected responses are assigned zero points.

Source: NRI

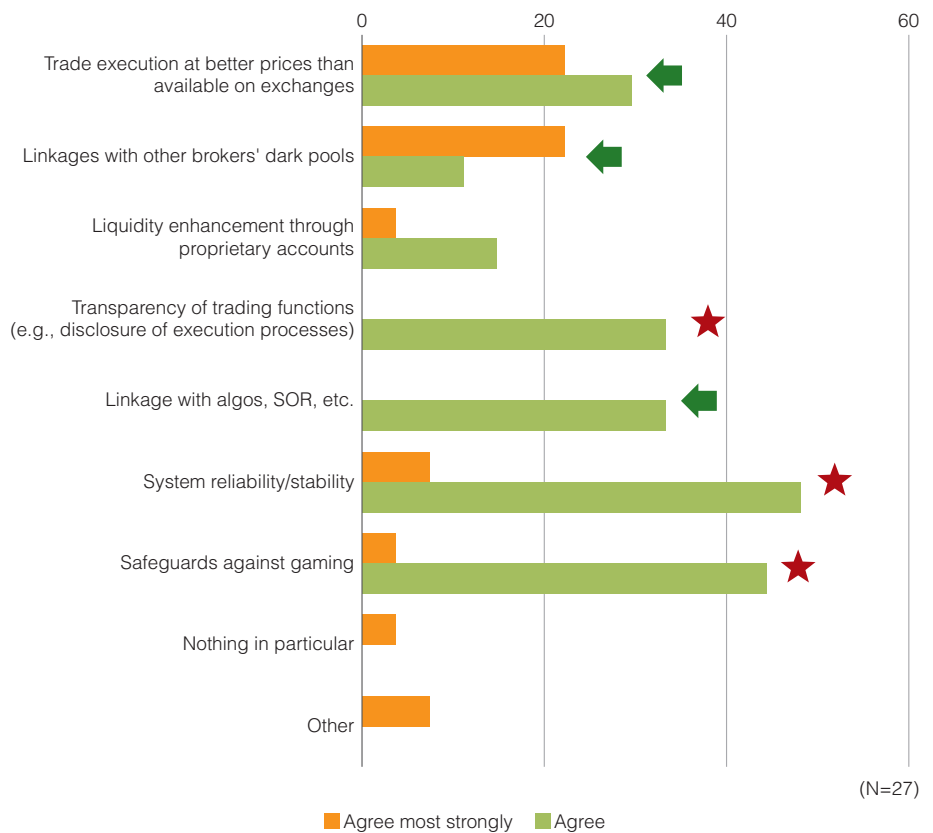
Dissatisfied responses were particularly numerous among respondents that use low-touch executions, which tend to be heavy users of dark pools and IOIs.

Growth in order size, a presumptive driver of growth in IOI usage, is likely to continue. To increase the number of IOIs issued, brokers will have to improve communication among sales personnel in the aim of capturing liquidity from asset management companies, utilize more actively liquidity derived from proprietary positioning, improve the timeliness of IOI issuance, and target IOIs more precisely in terms of selection of stocks, bid/offer quantities, and recipients.

Regarding dark pools, brokers will likely face pressure to increase their liquidity provision capacity and boost execution rates through such means as improving

**Exhibit 19: Dark-pool functions and services that should be added/improved**

**With respect to dark pools, which of the following functions/services do you think should be added/improved? Select the response with which you agree most strongly and up to two other responses with which you agree.**



Note: Scores are response tallies, where responses with which respondents agree most strongly are assigned two points and other selected responses are assigned one point.  
Source: NRI

linkages between dark pools and SOR/algorithmic trading, linking their own dark pools with other dark pools, and utilizing proprietary positions more effectively.

Meanwhile, our survey also revealed the respondents' unease with the fact that dark pools are an opaque source of liquidity used to cross orders. That is, some asset management companies are concerned that dark pools may be executing trades at disadvantageous prices with liquidity from hedge funds or high-frequency traders. Dark-pool functions that many survey respondents want to see improved in the future include trade execution at advantageous prices, linkages with other dark pools and linkage with SOR/algorithmic trading (Exhibit 19). Many respondents are hoping for improvement in transparency of trading functions (e.g., disclosure of execution processes) and safeguards against gaming also. Brokers may need to make efforts to convince asset management companies that there is no risk of their trades being executed at disadvantageous prices due to gaming. Brokers should endeavor to dispel asset management companies' concerns through such means as explaining dark pools' operational processes and providing assurance that trades were not executed at disadvantageous prices by disclosing bid and ask price quotes after trades are executed.

## Sidebar

### IOI

“Indication of interest” (IOI) refers to (1) a broker's act of informing an asset management company of a quantity of a given stock available for sale or purchase and (2) said information itself. Brokers issue IOIs based on orders received from asset management companies. If an IOI elicits an offsetting order from another asset management company, the broker can execute that order against the original order through in-house matching (in-house execution of offsetting buy and sell orders), thereby reducing costs such as market impact (the matched orders are reported as a cross execution to an off-market). A broker can increase the probability of matches by selectively issuing IOIs to asset management companies that it believes may be interested in the

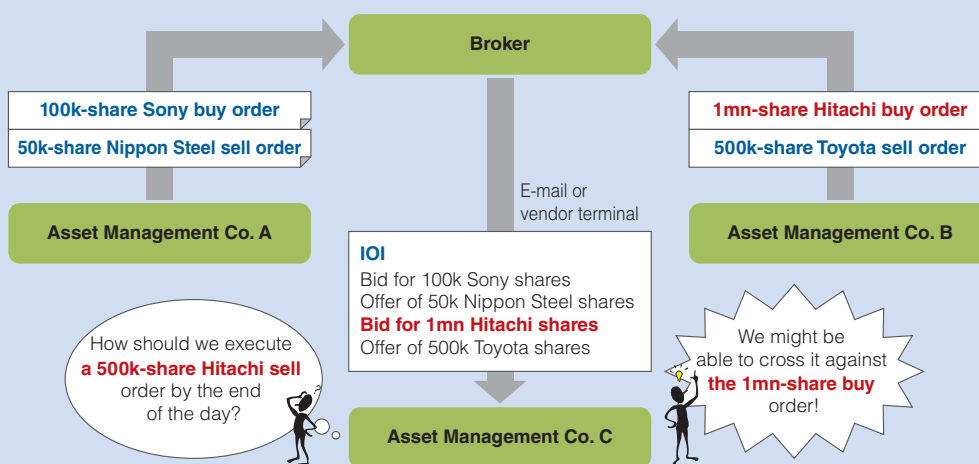
stock based on their previous trading activity.

One advantage of in-house matching of orders facilitated by IOIs is that the broker can provide price improvement to both buyer and seller by executing their orders at the midpoint between on-exchange bid and ask price quotes. For example, if a stock is offered at ¥510 per share and bid at ¥500 per share on an exchange, a market buy (sell) order would be executed on the exchange at ¥510 (¥500). However, if the order was executed at ¥505 by in-house matching, both buyer and seller would be able to benefit from a ¥5 per share price improvement relative to an on-exchange execution.

Brokers often utilize IOIs even when unwinding proprietary positions. Brokers issue IOIs to asset management companies through their broker staff before its proprietary traders unwind positions through on-exchange executions. If an IOI elicits an offsetting order, the broker would be able to execute the trade while avoiding the market impact cost that both the broker and asset management company would likely have otherwise incurred.

FIX is often used to send IOIs in addition to general modes of communication such as telephone, e-mail, and chat messages. IOI information sent as FIX messages can be viewed by the recipient asset management company on its information vendor terminal.

### Example of IOI utilization



## Chapter 4

# Execution performance measurement

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### Benchmarks for measuring execution performance

Orders placed by asset management companies that manage investment trusts or pension assets are generally very large. If executed all at once on the market, their orders would have market impact in the form of sharp upward or downward price movements. Conversely, executing large orders gradually to avoid market impact entails timing risk, the risk of market prices deviating over time from the price level at which the fund manager initially intended to buy or sell. When executing large orders, traders must pace themselves to balance the tradeoff between market impact and timing risk. How skillfully or unskillfully they do so gives rise to differences in execution performance.

Execution performance is measured by comparing execution prices with a benchmark price that is calculable after the fact based on predetermined rules. Two of the most commonly used benchmarks are VWAP (volume weighted average price) and IS (implementation shortfall).

VWAP is the volume-weighted average of every market price at which a stock traded on a given day.

IS is a benchmark based on arrival price (the price at the moment that order execution is initiated). The arrival price itself may be used as the benchmark or it may be adjusted to factor in estimated market impact based on order size. Alternatively, a participation-weighted price (PWP) may be used. A PWP is a weighted-average price calculated based on the assumption that the order will account for a certain share (e.g., 20%) of total market volume over the interval from order arrival until the order has been completely filled.

## Execution strategies differ depending on the benchmark

When VWAP is used as the benchmark, traders generally do not fully execute orders over a short interval, even if market liquidity is sufficient to immediately do so. The reason they refrain from executing orders quickly is the possibility of an opportunity to buy or sell at a substantially better price arising later in the day. When performance is benchmarked against VWAP, traders typically adopt the attitude that they are unable to forecast price action and execute orders evenly throughout the remainder of the trading day. With market volume tending to be heaviest at the open and close of trading sessions, traders usually set the pace of order execution based on the historical average distribution of trading volume throughout the trading day. To execute an order evenly over the course of the day, traders must buy or sell certain quantities during specific time slots. Consequently, limit orders awaiting execution at a more advantageous price sometimes must be converted to market orders. If done repeatedly, this detracts from VWAP performance. The cost incurred when a limit order is converted to a market order is called the bid-ask spread. Because executions benchmarked against VWAP are divided up into small tranches, the market impact per tranche is small, but the trader is exposed to timing risk as a result of prolonging order execution.

When IS is used as the benchmark, timing risk due to the duration of order execution is also taken into account. Traders therefore do not unnecessarily prolong order execution. If a trader expects to be able to completely fill an order at or near the arrival price, he will do so as swiftly as possible. The key point in terms of improving IS performance is how to buy or sell the requisite number of shares while avoiding market impact. In contrast to VWAP, the execution style associated with IS is avoiding timing risk as much as possible by swiftly filling orders when the opportunity to do so is available.

## Benchmark usage

Do asset management companies favor VWAP or IS as a benchmark? According to our survey results, respondents use VWAP as a benchmark for 65% of their trades (Exhibit 20, top graph). Reasons behind VWAP's popularity include that the Tokyo Stock Exchange reports VWAPs on a daily basis and market participants are familiar with VWAP. Another reason is that VWAP is easily understandable due to its similarity to market averages such as the TOPIX and Nikkei 225 and



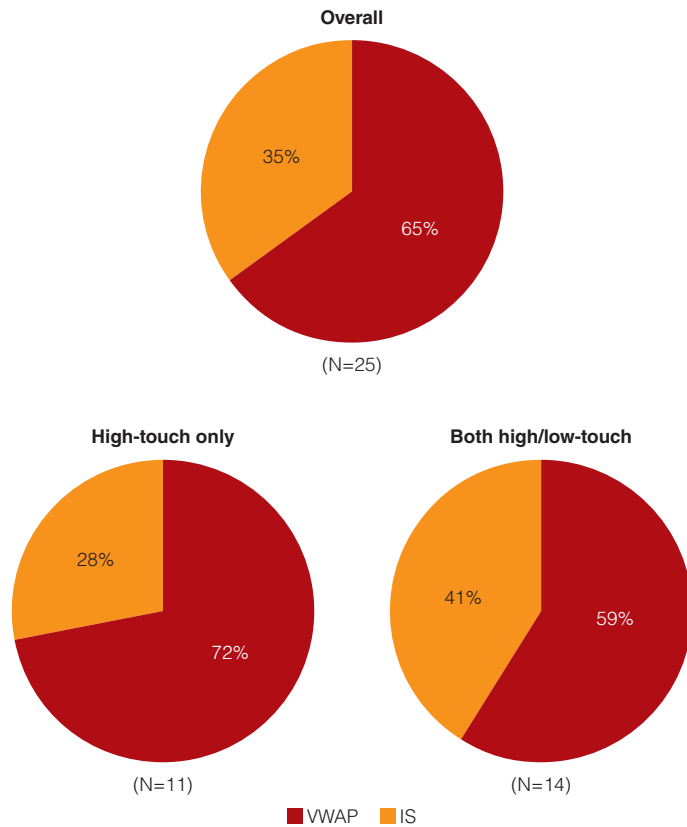
therefore a convenient means of explaining execution performance to bosses and pension fund sponsors.

One criticism of VWAP is that, as long as it is used as the benchmark, traders will inevitably take their time to execute orders, even if the market is sufficiently liquid and they have the opportunity to fill an order in the vicinity of the arrival price (see “Sidebar: Differences in execution performance measurement between benchmarks” on page 36) .

Use of IS as a benchmark is much more prevalent among respondents that use low-touch executions. Specifically, 41% of respondents that use low-touch executions use IS as a benchmark versus only 28% of respondents that use only high-touch executions (Exhibit 20). This difference presumably reflects that asset

**Exhibit 20: Benchmark usage as a percentage of total trades**

For approximately what percentage of your executions do you use VWAP as a benchmark and for approximately what percentage do you use IS as a benchmark?



Source: NRI

management companies that use low-touch executions have more choices in terms of execution methods and therefore can use whichever benchmark is best suited to their funds' respective attributes.

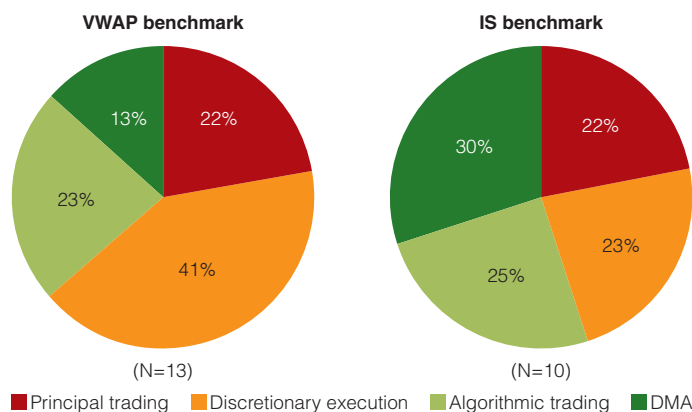
In terms of which execution methods are used in conjunction with each benchmark, our survey found that respondents that use both low- and high-touch executions most often use discretionary execution when VWAP is the benchmark. When IS is the benchmark, they use discretionary execution less often and DMA most often (Exhibit 21). These findings indicate that when using IS as a benchmark, asset management companies tend to execute trades themselves using DMA instead of entrusting the order to a broker's discretion.

However, even when using IS as a benchmark, asset management companies appear to have a preference for entrusting trade execution to brokers. When asked whether brokers should provide more execution methods compatible with IS benchmarking, a total of 42% of respondents answered affirmatively (sum of “strongly agree” and “agree” responses). Such respondents vastly outnumbered the 8% respondents that answered negatively (Exhibit 22).

These survey results reveal that asset management companies want access to IS-benchmarked execution methods that execute trades faster, not only

**Exhibit 21: Execution methods used in conjunction with each benchmark (limited to respondents that use both high- and low-touch executions)**

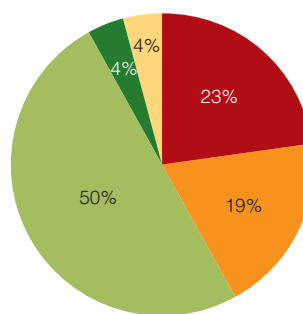
For approximately what percentage of your trades do you use each of the following execution methods when using VWAP and IS, respectively, as a benchmark?



Source: NRI

## Exhibit 22: Expectations with respect to IS-benchmarked executions

Do you agree that brokers should provide more IS-benchmarked execution methods (e.g., principal trading, IS algorithmic trading)? (Choose only one response)



■ Strongly agree ■ Agree ■ No opinion ■ Disagree ■ Strongly disagree

Source: NRI

execution methods that needlessly entail timing risk like VWAP benchmarking. They also imply that brokers may not be providing adequate services or that asset management companies may not be fully satisfied with brokers' execution performance.

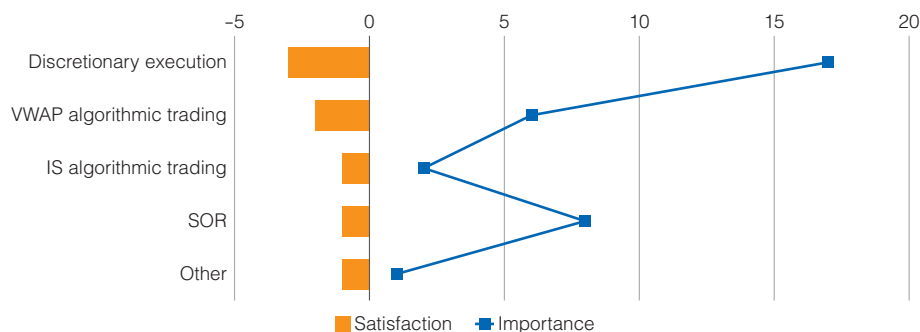
## Satisfaction with execution performance

Exhibit 23 shows survey respondents' degree of satisfaction with various execution services' performance. The line graph plots the importance that respondents place on each execution service's performance. The bar graph represents respondents' degree of satisfaction. The bar graph's satisfaction scores are all negative, indicating that many asset management companies are relatively dissatisfied.

This negative assessment of execution performance may be related to asset management companies upgrading their trading staff in recent years. The advent of DMA and other such market infrastructure has enabled asset management companies to utilize trading systems on a par with brokers' systems. Additionally, some asset management companies have been hiring former sell-side traders. Such traders may think that they can execute trades better than brokers or have their own opinions about how algorithmic trading or SOR should be done.

### Exhibit 23: Importance of and satisfaction with execution performance

This question inquires about execution performance in connection with evaluating brokers. Indicate whether you are “very satisfied,” “satisfied,” “dissatisfied,” or “very dissatisfied” with each of the services listed below. Additionally, select up to two services that you consider to be most important.



Note 1: Satisfaction scores are response tallies, where very satisfied = 2, satisfied = 1, dissatisfied = -1, and very dissatisfied = -2.

Note 2: Importance scores are response tallies, where the selected responses are assigned one point and unselected responses are assigned zero points.

Source: NRI

### Brokerage services desired by asset management companies' specialist traders

Given that VWAP-benchmarked orders are executed evenly throughout the day as explained above, even asset management companies can execute them if they are willing to do so. In the case of IS-benchmarked executions, by contrast, brokers have an advantage over asset management companies by virtue of being order flow hubs, whereas asset management companies are dependent solely on the market to aggregate liquidity. Brokers are consequently able to enhance execution performance by substantially reducing market impact through various means.

For example, if brokers can identify offsetting orders from among their voluminous order flows, they can execute the orders against each other with no market impact. Brokers can also temporarily hold stocks as proprietary positions, hedge market risk with futures, and close out the positions gradually enough to avoid market impact. Brokers' other advantages include access to liquidity within dark pools and the ability to utilize SOR to rapidly search for liquidity.

Methods of reducing market impact are not limited to improving IS execution performance. Avoiding market executions by crossing offsetting orders or using dark pools to execute orders at Tokyo Stock Exchange mid-point price

improves VWAP performance by reducing costs imposed by the bid-ask spread, a factor that detracts from VWAP-benchmarked execution performance. Asset management companies' use of IS benchmarking incentivizes brokers to increase their liquidity provision capacity. Increased liquidity should help to improve execution performance across the board and increase asset management companies' specialist traders' personal satisfaction with brokers' execution performance.

## Sidebar

### Differences in execution performance measurement between benchmarks

How would execution performance measurement differ between VWAP benchmarking and IS benchmarking in the hypothetical case of the stock price chart below?

We assume that a fund manager sends a buy order to a trader at 08:30 and the trader has from 09:00 to 15:00 to fill the order. The order quantity is 50,000 shares, roughly 1% of the stock's average daily trading volume. Market liquidity is thus amply available. The stock's closing price on the previous day was ¥500.

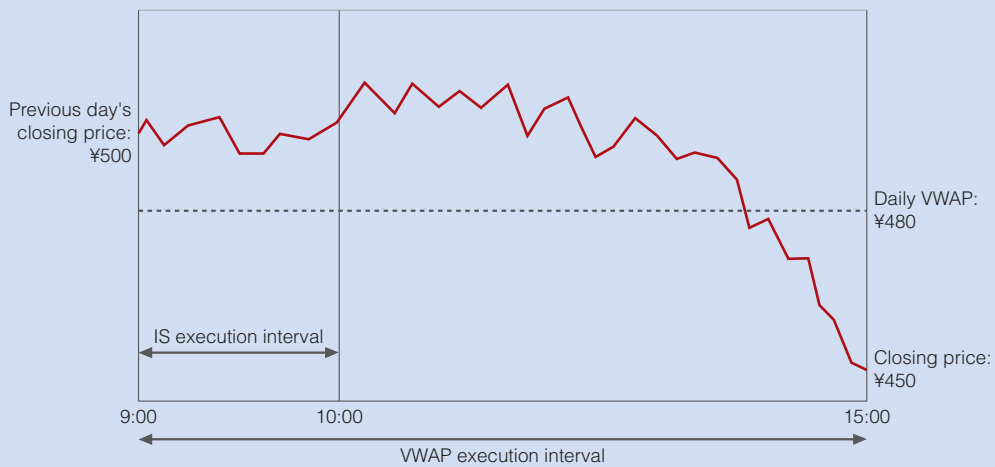
If VWAP is used as the benchmark, the trader would execute the order evenly throughout the day, utilizing the entire allotted time from 09:00 to 15:00. This approach results in an average execution price of ¥480, equivalent to the market's VWAP. If IS is used as the benchmark, we assume that the trader would execute entire order between 9:00 and 10:00, while the stock is trading stably, because sufficient liquidity is available. This approach would result in an average execution price of ¥500. In both cases, execution performance would be the same zero variance from the benchmark.

The average execution price, however, is ¥20 lower (¥500 - ¥480) in the VWAP scenario than in the IS scenario, reflecting that the trader in the former scenario was able to take advantage

of the stock's sharp decline late in the day because his execution interval stretched throughout the entire day. However, if we assume that traders cannot predict whether a stock will rise or fall in price heading into the market close, the expected value derivable from waiting to execute an order is zero. Additionally, risk increases the longer execution is delayed.

In the above scenario, we can conclude that the fund manager decided to buy the stock at ¥500, the price at the time he submitted the order to the trader. By using VWAP as a benchmark, the fund manager would pass up the chance to fill the entire order at a price of ¥500 and assume the risk of the stock's price moving substantially over time. While VWAP-benchmarking is an effective means of avoiding market impact, it must be used with an awareness that such timing risk exists when sufficient liquidity is available.

### A stock's price performance on a given day



## Glossary

### FIX

FIX (Financial Information eXchange) is a universal message protocol for electronic trading of financial instruments. It standardizes various message formats used by securities firms' front offices. For equity trading, for example, FIX has a series of protocols and message formats for initiation of communication between an asset management company and broker, order transmission, order execution, allocation, and termination of communication. The de facto standard protocol for electronic trading, FIX is widely used among financial institutions.

### Market impact

Market impact is the change in an order's execution price caused by the order's matching at an exchange. For example, when a large buy order are placed at an exchange, it is executed with sell orders in ascending order of price, beginning with the sell order with the best ask price. The buy order's average execution price and the stock's latest exchange-traded prices rise as a result of the order's execution. This price rise is the order's market impact. To avoid market impact, brokers often split large orders and place them little by little or reduce exchange-executed order volume by means of principal trading. Simple methods of quantifying market impact include the average bid-ask spread (difference between bid and ask price quotes) and ratio of order quantity to historical average trading volume. More sophisticated methods include models that estimate market impact based on order quantity.

### Timing risk

Timing risk is the risk of price movements due to executing an order over time. While executing an order over an extended timeframe helps to avoid market impact, it increases the possibility of the order's average execution price deviating from its initial execution price. Commonly used quantitative measures of timing risk include historical price volatility in the case of individual equities and tracking error (deviation of historical performance against a benchmark index) in the case of multiple equities (basket orders). Principal trades' prices are generally determined by quantifying both market impact and timing risk and using the resultant values as price-setting inputs.

### High-touch execution

Execution services provided by brokers are classified as high-touch executions if there is substantial involvement by the broker's sales traders or as low-touch executions if sales traders have little or no involvement. With high-touch executions, sales traders execute orders while making detailed decisions based on the stock(s) being traded, order quantity, price conditions, and other order attributes. The most common forms of high-touch execution include discretionary execution and principal trading. Because high-touch executions are done manually, brokers charge higher commissions for high-touch executions than for low-touch executions.

### Discretionary execution

Discretionary execution is a high-touch execution service where orders are mainly executed on an exchange. In the case of stocks with relatively high liquidity, execution is sometimes sent to algorithms (automated execution systems). In the case of stocks with low liquidity and orders whose execution requires special attention, sales traders execute the orders while personally monitoring market conditions. Execution results depend on the sales trader's acumen. Discretionary execution tends to entail a high risk of price movements. Asset management companies select discretionary execution mainly when buying or selling illiquid stocks. They often use discretionary execution when they expect to end up with a better execution price, even after paying a high commission, by utilizing a sales trader's execution skills.

### Principal trade

A principal trade is a trade between an asset management company and a broker's proprietary trading desk at an agreed-upon price. Principal trades are classified as high-touch executions. The most common types of principal trades are basket cross trades, guaranteed VWAP trades, and EFP (exchange for physical). For asset management companies, the advantages of principal trades include assurance of execution at a designated price and the ability to avoid the market impact and timing risk associated with execution on an exchange. Principal trades are generally executed outside of exchange trading hours (e.g., before the open, between morning and afternoon trading sessions).



### Basket cross trade .....

A basket cross trade is one type of principal trade. An asset management company notifies a broker of a basket order's specifications (stock list, buy or sell, quantity, etc.). The broker prices the basket, taking into account the position, timing risk, market impact at the time of on-exchange execution, and other such factors, and then quotes an execution price to the asset management company. If the trade is executed, the broker reports the execution to off-market. To the extent that the broker cannot fill the order from its own position, it executes the order on an exchange or borrows shares from other market participants. Asset management companies generally seek price quotes from multiple brokers and execute the trade with the broker that quotes the best price.

### Guaranteed VWAP trade .....

A guaranteed VWAP trade is similar to a basket cross trade in that the execution price is set based on basket information, but it differs substantially in that the execution price is set at the VWAP plus a commission and the trade is reported, usually to an off-market after the close (after VWAPs are known). To the extent that the broker cannot fully execute a guaranteed VWAP trade against its own position, it executes the order on an exchange by targeting the stocks' VWAPs. In such cases, algorithms are often used.

### EFP .....

An EFP is a trade between an asset management company and a broker's proprietary trading desk that involves the exchange of index futures for a basket of multiple stocks. For example, if an asset management company wants to quickly invest cash (e.g., at the time of a new investment trust's inception) in a large number of index-constituent stocks, it would first buy index futures with the funds that need to be invested instead of purchasing individual stocks (by doing so, the asset management company can reduce market impact and the time and effort required to buy stocks individually). Subsequently, the asset management company would use EFP to exchange the futures for a basket of stocks in which it had originally wanted to invest.

## Low-touch execution

With low-touch executions, a broker provides an asset management company with access to electronic trade execution infrastructure and the asset management company executes trades directly via the execution infrastructure. There are two types of low-touch executions, DMA and DSA (“algorithmic trading” is herein used synonymously with DSA). Brokers generally charge low commissions for low-touch executions because the trades are processed automatically without any human intervention.

## DMA

DMA (direct market access) is a form of execution where a broker relays an order (stock code, buy or sell, quantity, price, etc.) prepared by an asset management company to an exchange without any further involvement with the order. The broker merely provides access to the exchange. DMA is thus the epitome of low-touch execution. FIX is generally used to transmit orders.

## DSA

With DSA (direct strategy access), an asset management company uses FIX or a dedicated user interface provided by the broker to send trade execution instructions directly to the broker's algorithms. The asset management company directly controls the broker's algorithms by transmitting detailed algorithm parameters (e.g., order execution initiation and termination times) in addition to general order information such as stock code, price and quantity. The broker merely provides the algorithms and an access channel thereto. DSA is a form of low-touch execution.

## Dark pool

A dark pool is an in-house pool of order flow that brokers use to match offsetting buy and sell orders. Trades are usually executed at a price within exchanges' bid-ask spread. Dark pools thus offer the advantage of better execution prices than are available at exchanges. Recently, brokers have been endeavoring to boost their dark pools' trade execution rates and liquidity through such means as using SOR in combination with dark pools and making markets (originating their own buy and sell orders) within their dark pools. As the name implies, dark pools do not publicly disclose bid and ask price quotes. They are therefore superior to exchanges from the standpoint of preserving anonymity, but some asset management companies avoid dark pools out of concern about gaming.

### Gaming

Gaming is manipulation of dark-pool execution prices. Dark-pool execution prices are often linked to exchange price quotes (e.g., exchange's midpoint price). Some investors reportedly take advantage of this linkage by manipulating exchanges' price quotes to obtain better dark-pool execution prices. Brokers that provide outside investors with direct access to their dark pools are under pressure to implement safeguards against gaming.

### SOR

SOR (smart order routing) uses price information from multiple markets (e.g., Tokyo Stock Exchange, PTSs) to route orders to the market where they can be executed at the best price. SOR functions include order placement and cancellation based on real-time price data and optimal allocation of order quantities among markets. Dark pools have recently been joining the ranks of SOR-destination markets. By placing precedence on order matching within dark pools and routing orders to the Tokyo Stock Exchange or PTSs as necessary, SOR reliably executes orders by tapping into the Tokyo Stock Exchange and PTSs' abundant liquidity while also benefiting from dark pools' price improvement effect.

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## about NRI

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