Jane Street

ETF Execution Strategies: A Guide for Institutional Traders

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Executive Summary

The sheer variety of exchange-traded funds, and their unique liquidity and risk characteristics, have led traders to develop a variety of different execution strategies. Some of them tend to work better than others depending on the ETF and the circumstances of the trade.[1]

In the first section of this report, we discuss the strengths and weaknesses of the most popular ETF execution strategies:

1. Risk trading
2. Net asset value (NAV) trading
3. Agency trading

In the second section, we explain how traders can use the size of the trade and their execution urgency to guide their decision about which strategy to use. Our intention is to create a loose set of guidelines—not hard and fast rules. Traders need to do their own due diligence when deciding on the best way to execute a trade.

In an appendix at the end, we discuss some of the less-popular strategies like guaranteed market-on-close (GMOC), guaranteed volume- or time-weighted average price (GVWAP/GTWAP), and directed create/redeem.

1 For simplicity, we use the terms "exchange-traded fund" and "ETF" throughout this report as umbrella terms that encompass actual exchange-traded funds as well as all other types of exchange-traded products.

Part I: Defining Risk, NAV and Agency Trading

An ETF's secondary market is comprised of orders and quotes from market participants interested in buying or selling the ETF, just like the secondary market for a stock or a bond. Unlike stocks or bonds, however, an ETF also derives its liquidity from the liquidity of a basket of underlying securities or instruments ("the underlyings"). Risk trading, NAV trading and agency trading give investors access to ETFs' multidimensional liquidity through different channels.

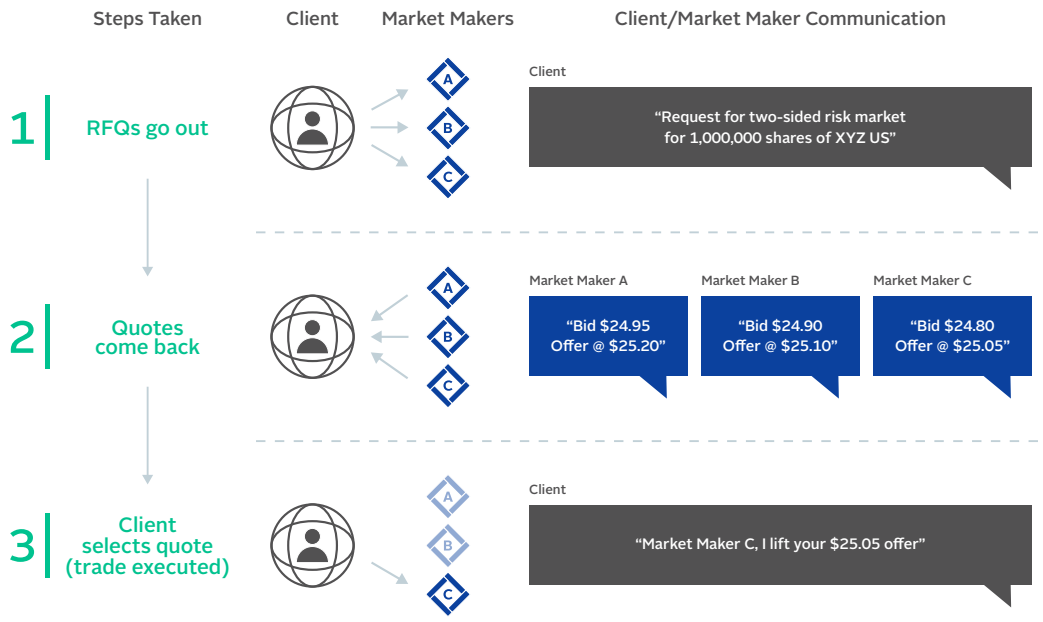
Below, we describe these three strategies in more detail. For each strategy, we explain how it works, point out how the risk of the trade is managed by the counterparties to the trade, and note its strengths and weaknesses.

Risk Trading

What is it and how does it work?

In a risk trade, a client requests a bid or offer (or both) from one or more market makers for the full size of the order. This request is often called a request-for-quote or RFQ. The client selects one of the bids or offers—usually the highest-priced bid or the lowest-priced offer—which triggers a trade and an immediate transfer of risk from client to market maker. The diagram below shows how risk trading works in practice:

Figure 1. How Risk Trades Are Executed



How is the risk managed by the market maker?

After the trade, the market maker manages the risk however it deems prudent. A market maker that has just bought ETF shares from a client could choose to sell the underlyings and redeem the ETF shares in order to flatten out its position. Alternatively, it could sell a correlated instrument as a hedge, or keep the risk on its books in the hopes of unwinding it in the future at more favorable prices, or do any combination of these things. Or, the trade could end up being risk-reducing for the market maker, in which case the market maker could choose to do nothing at all (and may be able to offer an even more competitive price as a result).[2] The market maker's anticipation of the cost of managing its risk, and its sophistication in doing so, are major drivers of its pricing when responding to a client's RFQ.

Strengths

- **Risk transfer is immediate.** Timing risk—the risk that the price will drift before or during the execution of the order—is eliminated as the trade is executed within seconds of the client's RFQ. Another way to describe how a risk trade eliminates timing risk is to say that it eliminates price uncertainty.
- **Market makers' quotes are comparable.** There is little nuance to choosing from among the market makers' quotes, as they are firm and usually explicitly priced. The lowest offer or highest bid is typically the most advantageous quote to trade against.[3]
- **Clients leverage the risk-management and execution expertise of professional market makers.** The more efficiently a market maker can manage the costs and risks of an ETF trade, the tighter it can quote and the greater its odds of winning the trade. Market makers are thus incentivized to keep costs as low as possible, and to manage risk as efficiently as possible. Clients benefit directly from the competition as it encourages ever-tighter markets (which equate to ever-lower trading costs).

Weaknesses

- **Choosing the right set of market makers can be challenging.** Sending RFQs to too many market makers increases the odds of information leakage,[4] while sending to too few reduces the odds of finding the market maker with the most competitive quote. Finding the right balance, and sending RFQs only to market makers who stand a reasonable chance of being competitive for a given trade, can be challenging even for experienced traders. Also, it's possible that a market participant that is not a market maker could be looking to offset risk and would be willing to trade at a competitive price. Though atypical, in these situations including only market makers as potential counterparties would mean missing the opportunity of trading with other offsetting counterparties.

2 We discuss how market makers manage ETF risk in more detail in our report, *Credit ETF Trading in Stressed Markets*. The report is retrievable here: https://www.janestreet.com/static/pdfs/Credit_ETF_Trading_in_Stressed_Markets.pdf.

3 Other factors besides the price—such as differences in commission rates or value-added services—can influence the competitiveness of a bid or offer.

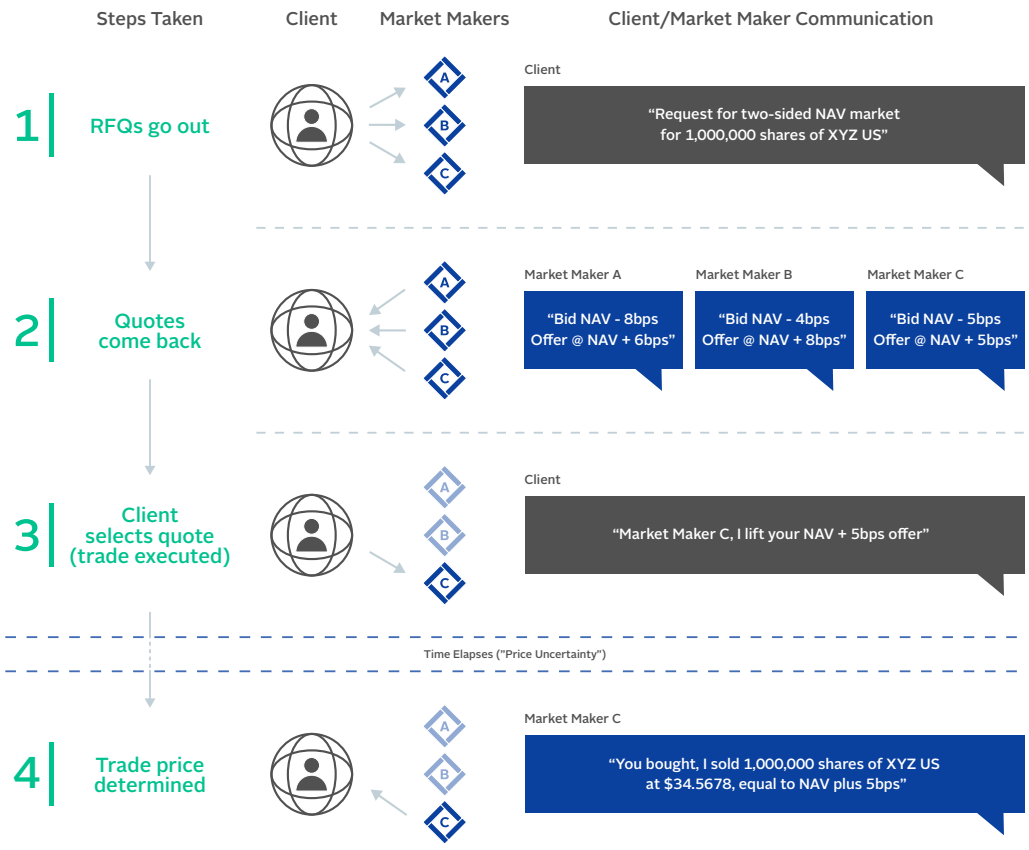
4 Requesting two-sided markets - i.e. both bids and offers, even though the client is only looking for one or the other - can help to reduce information leakage.

NAV Trading[5]

What is it and how does it work?

A NAV trade is a trade between a client and a market maker at a price based on the ETF's next (future) NAV. Like risk trading, NAV trading begins with a client sending RFQs to one or more market makers for the full size of the order. Market makers respond with quotes that are priced at the ETF's future NAV plus or minus some offsetting value (e.g. "NAV plus 12 basis points," or "NAV minus 10 basis points"). The client selects one of the bids or offers, and that triggers a trade. The final execution price is not known until the NAV is struck at some point in the future—usually later that day or the following day. Here's a diagram showing how NAV trading works in practice:

Figure 2. How NAV Trades Are Executed



5 For an in-depth exploration of NAV trading, see our report, *Important Considerations for NAV-Based ETF Trading*. The report is retrievable here: https://www.janestreet.com/wp-content/themes/janestreet/pdf/Important_Considerations_for_NAV_Based_ETF_Trading.pdf.

How is the risk managed by the market maker?

As with risk trading, market makers have options when it comes to managing the risk of a NAV trade. They can take the risk onto their balance sheet, hedge with other instruments, or lay the risk off by trading the underlyings (or combine these approaches). Unlike risk trading wherein the client transfers risk to the market maker immediately at market prices, a NAV trade is an agreement to transfer the risk at a future time at a benchmark price. As a result, market makers have more leeway to position their book before - or at the same time as - the transfer of risk so that they are left with less (or no) market risk to manage after the trade is completed.

Strengths

- **Liquidity in the underlyings can be robust on or around the close.** Most ETF issuers use the underlyings' closing prices to calculate the fund's NAV. Thus, in a NAV trade, market makers can limit their risk by trading the underlyings at prices equal to or close to their closing prices. For many ETFs—equity ETFs and commodity ETFs in particular—the underlyings tend to trade more actively later in the day when the closing prices are being formed. Thus, NAV trading allows market makers to trade the underlyings at a time when they tend to be liquid.
- **NAV trades can be useful for executing mutual-fund-to-ETF (or ETF-to-mutual-fund) switches.** Mutual funds only offer liquidity at NAV or a NAV-based price. So, for a client that wants to sell a mutual fund to buy an ETF (or vice versa), trading the ETF at NAV is a convenient way to ensure that there are no overlaps or gaps in exposure. For these switch trades, the onus is on the client to verify that the ETF's NAV will be struck at the same time as the mutual fund's NAV. If the mutual fund and ETF strike NAV at different times, or use significantly different calculation methodologies, the client may be left with an unwanted exposure.
- **NAV trades are useful for swapping the underlyings for an ETF or vice versa.** For clients who own a basket of stocks or bonds and would prefer to hold an ETF, or in the opposite case—the client owns an ETF and would prefer to hold the underlyings—NAV trades are useful because they do a reasonable job of matching the aggregate value of the underlyings to the value of the ETF at the time of the swap (not accounting for fees).

Weaknesses

- **Risk transfer is not immediate.** Though the trade has been agreed, the market risk of the trade does not transfer from client to market maker until the NAV is struck. That can mean hours, and in some cases days, during which the client remains exposed to price fluctuations.
- **The potential for market impact means that market makers' NAV quotes can be misleading and hard to compare.** As mentioned above, market makers have leeway to position their book both before NAV is struck, and while NAV is struck, in a way that leaves them with little or no risk after the trade has been

completed. This could result in market impact that adversely affects the NAV itself. This can make it difficult for clients to discern the true competitiveness of market makers' quotes. That is, the market makers that are showing the most aggressive quotes relative to NAV could be those that are most willing to allow for subsequent market impact in the underlying basket. For more on these dynamics, see our report titled *Important Considerations for NAV-Based ETF Trading*.

- **NAV calculations can be complex.** For many ETFs, the NAV calculation can be complex. This is particularly true for ETFs with underlyings that are traded in different time zones or that are denominated in different currencies, and for many fixed income ETFs. Further, different ETFs calculate NAV in different ways, and these differences may not be naturally transparent to the client. Complexity and nuance can lead to misunderstandings between clients and dealers, and ultimately to errors that are costly to correct.

NAV Trades for Fixed Income ETFs: Different Dynamics

Most bonds don't have closing auctions, and are assigned closing marks by third-party pricing services that use a variety of different inputs in their closing-mark calculations. As a result, it's hard for market makers trading fixed income ETFs on NAV to trade the underlying bonds at the same prices that are used in the NAV calculation—much harder than it is for market makers trading equity ETFs, for example, to trade the underlying equities at their NAV-equivalent (usually auction-determined) prices.

The flipside of the difficulty of matching the NAV-equivalent prices is that it's also more difficult to impact the NAV. Thus, some of the aforementioned concerns around impact—and the attendant difficulty of comparing market makers' quotes—aren't as relevant for fixed income ETFs.

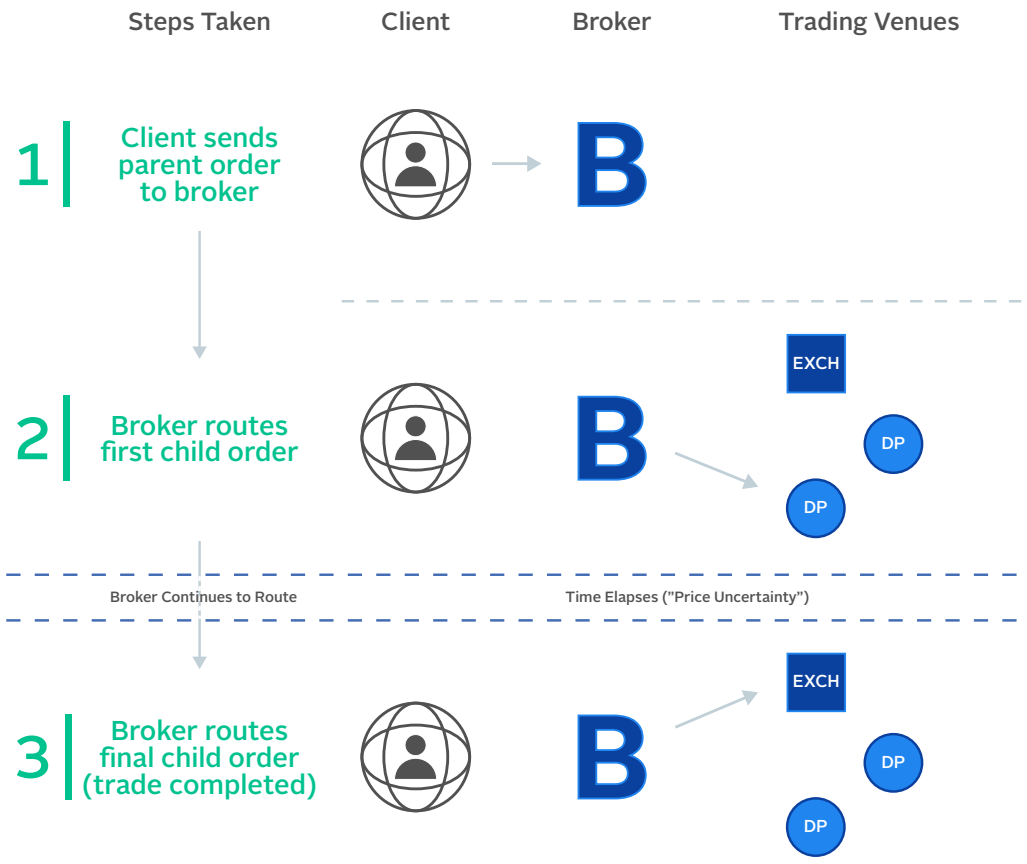
Agency Trading

What is it and how does it work?

In an agency trade, a broker buys or sells the ETF on the client's behalf. In some cases, the broker sends out RFQs and trades on risk with a market maker. This is essentially risk trading in an agency trading wrapper, and we don't discuss it in this report. What is more commonly understood as agency trading, and what we cover in more detail below, is when a broker trades algorithmically on exchanges and in dark pools

in pursuit of a benchmark like the arrival price, the closing price, or the volume- or time-weighted average price (VWAP or TWAP). This schematic shows how brokers execute agency orders algorithmically:

Figure 3. How Agency Trades Are Executed



How is the risk managed by the market?

For agency trades where the order is sliced up and "worked" on exchanges and dark pools, or submitted into an exchange's closing auction in the case of an agency market-on-close or MOC trade, the risk of the trade is transferred to one or more anonymous counterparties. If those counterparties happen to be offsetting counterparties, no new risk needs to be managed. If the counterparties are market makers that happen to be adding to their risk by trading, however, those market makers will need to manage the risk just like they would for any risk trade (by taking the risk on-balance sheet, hedging it, laying it off, etc.).

Strengths

- **Agency trading can be cheap and straightforward.** When the trade size is small relative to the amount of on-exchange liquidity, and when exchange markets are tight and deep, implicit trading costs will likely be low. Agency

trading is also simple and straightforward for clients that have experience trading equities.

- **Agency execution tools make it easy to spread trades out over time.** Spreading the trade out by trading it algorithmically against a VWAP or TWAP benchmark can be attractive for traders or portfolio managers who don't want to risk buying or selling their entire position at an inopportune time. It can also be attractive to traders or PMs who want to trade a foreign-listed ETF in its native time zone without having to monitor the trade as closely.
- **Finding other offsetting counterparties could reduce trading costs.** It is possible that an agency broker working an ETF order on exchanges and in dark pools could find and trade with offsetting counterparties that wouldn't have otherwise been in the frame had the client elected to trade on risk or NAV. Offsetting counterparties are typically more willing to trade at aggressive prices, which means that trading with them could lead to lower trading costs.

Weaknesses

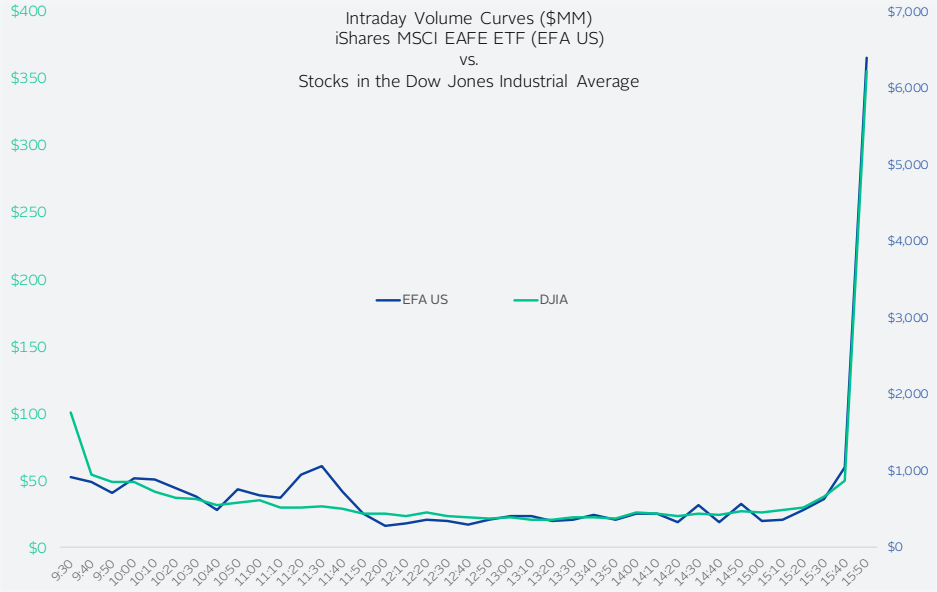
- **Implicit trading costs can be high.** Agency trading can be expensive when exchange markets are wide and thin, particularly for bigger trades. Trading aggressively in order to limit timing risk (price uncertainty) usually means incurring more market impact. Trading patiently, on the other hand, reduces market impact but introduces more timing risk (price uncertainty). Information leakage is a concern regardless of how patiently the order is traded. The threat of higher trading costs is explained by the fact that agency trading is usually—though not always—essentially a form of risk trading wherein the broker slices the trade up and transfers the risk in pieces to market makers who are providing on-exchange liquidity. In other words, agency trading still typically entails risk-transfer to risk-adding counterparties, only anonymously and with no visibility—from the perspective of the market maker—into the full size of the order.
- **Implicit trading costs are unpredictable**. Pre-trade analytics help to provide a general understanding of what the cost will be, but the exact cost cannot be known until after the execution.
- **Brokerage commissions increase trading costs.** Agency brokers typically charge a per-share commission. Principal trading counterparties trading on risk or on NAV, on the other hand, don't need to charge a commission—though sometimes they do so for clients who want to ensure a level playing field across all their brokers and counterparties. Principal counterparties typically factor in the commission when pricing risk or NAV trades.

Agency VWAP Trading Nuances

Agency volume-weighted average price (VWAP) trading, where the broker attempts to match the VWAP over some agreed-upon time interval, is popular in many parts of the world as an ETF execution strategy. In addition to the broader considerations around when agency trading is more or less useful, there are some nuances to VWAP trading that are worth bearing in mind:

1. Even actively traded ETFs can have intraday volume patterns that are different than the volume patterns of an actively traded equity. An example is the US-listed iShares MSCI EAFE ETF (symbol: EFA US), which tends to see volume pick up around the time that European markets are closing. If agency brokers aren't attuned to symbol-specific volume patterns, they run the risk of missing the VWAP benchmark.

Figure 4. Intraday Volume Curves



Source: NYSE, Nasdaq

Notes: The data show dollar value traded in 10-minute intervals, averaged across the thirty trading days from September 11, 2019 to October 22, 2019 (excluding the quadruple witching date of September 20, 2019). The last tranche was extended to 4:20 p.m. to ensure that the data include the closing auction trade. The values for the Dow Jones Industrial Average represent the sum of the dollar value traded for all 30 index constituents.

2. VWAP calculations involve assumptions about what trades should count toward the calculation. For example, excluding average-price trades, or auction trades, or trades above a certain size from the VWAP calculation is not uncommon, and market-data vendors sometimes exclude such trades by default. Decisions about whether certain types of trades should be excluded should be driven by the client's trading objectives. Regardless of the specific choices made, clients need to make sure their brokers are aware of them so that performance aligns with expectations.

PART II: Choosing a Suitable Execution Strategy

In Part I, we hint at some of the factors that ought to influence a trader's choice of execution strategy for a given ETF trade or trade-flow. In this section, we explicitly discuss the three factors that we believe should influence the trader's choice the most:

1. Trade size relative to the ETF's on-screen (exchange and dark-pool) liquidity
2. Trade size relative to the liquidity of the ETF's underlyings
3. The trader's urgency to get the trade done

In the decision tree below, we opine on which strategies work best given different combinations of these factors. Risk trading shows up most frequently as a suitable strategy, probably because it pits market makers against each other—and against on-exchange liquidity providers—so effectively. In any market where there's robust, open competition, the primary beneficiaries are typically the consumers.

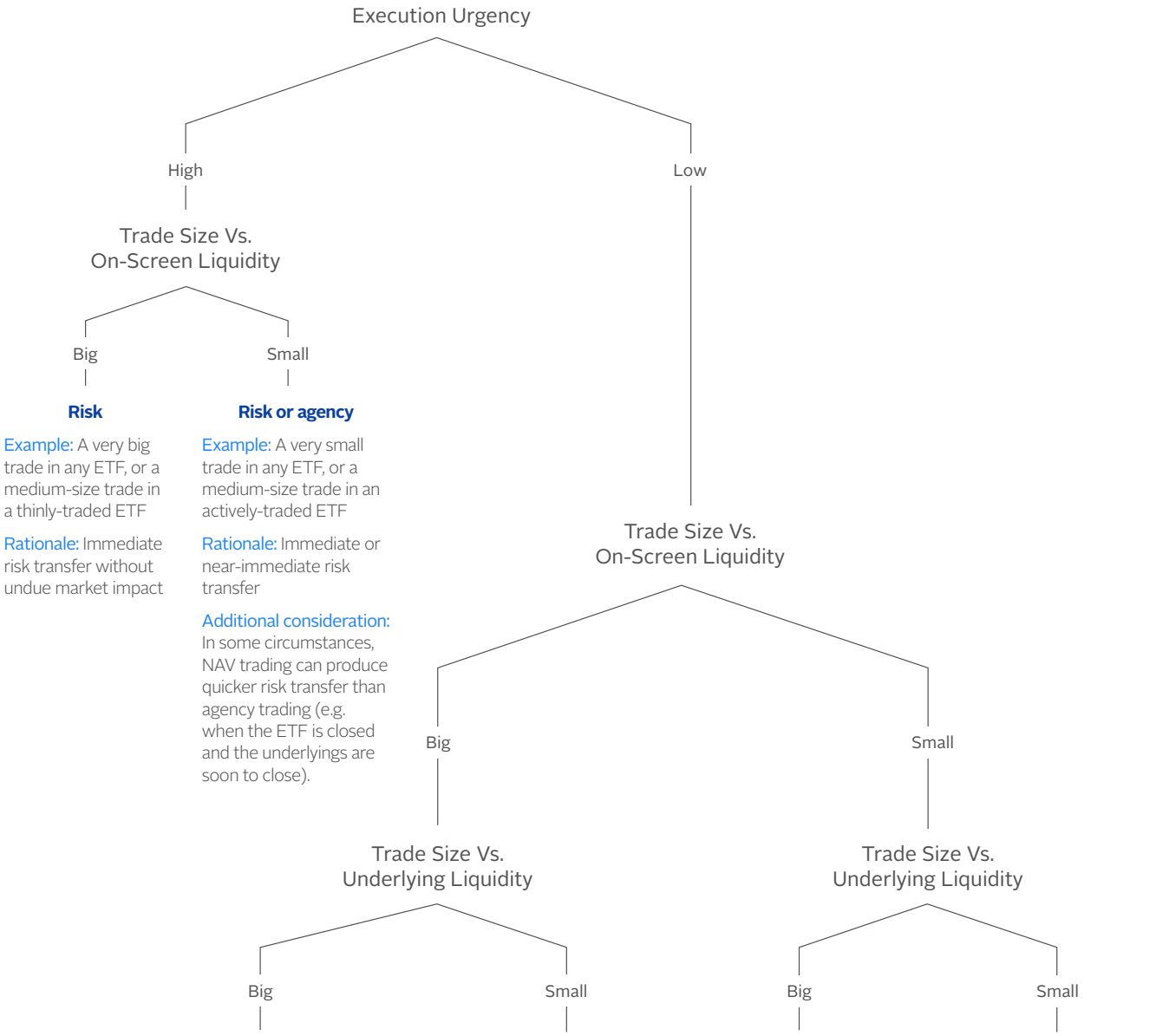
NAV trading tends to work well when the urgency to trade is low, which should not be surprising given that the actual transfer of market risk is put off until the next NAV is struck. NAV trades work less well for bigger trades, meanwhile, given how difficult it can be for clients to unpack the effects of market impact from other trading costs when comparing NAV quotes.[6]

As for agency trading, its suitability clearly hinges on the existence of robust exchange and dark-pool liquidity.

It's important to note that the decision tree below is only meant to help traders think about how to choose from among the major execution strategies. Our assertions about which strategies work best certainly shouldn't be taken as hard and fast rules. Further, we acknowledge that a lot of important nuance is lost in the exercise of trying to make things simple and formulaic. Where it's unclear which of the below scenarios maps to a given trade, our hope is that the concepts laid out in Part I above will help traders choose the optimal trading strategy for their needs.

6 As we discuss in more detail elsewhere in the report, market impact (and the difficulty of comparing quotes) is not as big of a concern when trading fixed income ETFs on NAV.

Figure 5. Choosing a Suitable Execution Strategy



Time-Zone Wrinkles

The trader's decision about how to execute becomes more complicated when the ETF trades in a different time zone, or has underlyings that trade in a different time zone. The factors discussed above—trade size and urgency—should still drive the choice of execution strategy, but time-zone differences can increase or decrease the attractiveness of certain strategies under certain circumstances.

Below, we describe some trading scenarios where time zones are a complicating factor, and make some assertions about which execution strategies might be more suitable than others in a given scenario. As with the decision tree above, our aim is to provide high-level guidance—not hard and fast rules.

Scenario: The ETF and the underlyings are both closed

Examples for **Asia-Pacific**-based traders:

- Trading a US-listed ETF tracking North American underlyings (e.g. EWC US)
- Trading a UCITS ETF tracking European underlyings in the morning before European markets have opened (e.g. MSE FP or IEAC LN)

Examples for **EMEA**-based traders:

- Trading a US-listed ETF tracking North American underlyings in the morning before North American markets have opened (e.g. EWC US)

Examples for traders based in the **Americas**:

- A Latin American client trading a UCITS ETF tracking European underlyings in the afternoon after European markets have closed (e.g. MSE FP or IEAC LN)

One obvious consequence of choosing to trade an ETF outside of its normal market hours is that agency trading will involve more timing risk (because the client or broker must wait until the market opens before starting to trade). Risk trading will be the only option for clients looking for immediate risk-transfer. Market makers might quote slightly wider risk markets than they would if the ETF and underlying markets were open. NAV trading should not be impacted much, as the trading and risk-management process that underpins the strategy takes place when the underlying markets are open.

Scenario: The ETF is closed but the underlyings are open

Examples for **Asia-Pacific**-based traders:

- Trading a US-listed ETF tracking Asian underlyings (e.g. INDA US or BBJP US)
- Trading a UCITS ETF tracking Asian underlyings in the morning before European markets have opened (e.g. XMJP GY or AASI FP)

Examples for **EMEA**-based traders:

- Trading a US-listed ETF tracking European underlyings in the morning before the US market has opened (e.g. EZU US)[7]

Examples for traders based in the **Americas**:

- A Latin American client trading a UCITS ETF tracking US underlyings in the afternoon after European markets have closed (e.g. CSPX LN or MINT LN)

As noted above, choosing to trade an ETF outside of its normal market hours on an agency basis implies a lack of execution urgency since the broker has to wait for the market to open to begin trading. For high-urgency trades, risk trading is the only viable option. The ETF being closed usually does not impact NAV trading in a meaningful way.

Scenario: The ETF is open but the underlyings are closed

Examples for **Asia-Pacific**-based traders:

- Trading an Asia-listed ETF tracking US underlyings (e.g. 9140 HK)
- Trading a UCITS ETF tracking US underlyings in the afternoon after European markets open (e.g. D5BM GY or IHYU LN)

Examples for **EMEA**-based traders:

- Trading a US-listed ETF tracking Asian underlyings in the afternoon after US markets have opened and after Asian markets have closed (e.g. FXI US)

Examples for traders based in the **Americas**:

- Trading a US-listed ETF tracking Asian underlyings (e.g. EWJ US or VPL US)
- A Latin American client trading a UCITS ETF tracking Asian underlyings in the morning before European markets have closed (e.g. IFFF LN or VDJP LN)

When an ETF is trading but its underlyings are not, ETF market makers can't immediately lay off risk by trading the underlyings. Without the ability to trade the underlyings, market makers might quote slightly wider risk markets than they would if the underlyings were trading. At the same time, trading bigger orders on an agency basis is likely to be more expensive as well, and for the same reason: counterparties to the trade will need to manage risk without being able to immediately lay it off by trading the underlyings. NAV trading should not be not meaningfully impacted by the fact that the underlyings aren't currently trading.

7 This scenario is somewhat uncommon for EMEA-based traders, as they seldom trade US- or Asia-listed ETFs outside of the normal market hours for those ETFs. Today, there are very few asset classes or regions that are tracked by a US- or Asia-listed ETF that aren't tracked by a UCITS ETF, which means that it's rarely the case that an EMEA-based trader needs to trade a US- or Asia-listed ETF for lack of a Europe-listed option. When a US- or Asia-listed ETF is the only viable option or is the preferred option, the overlap between EMEA market hours and American or Asian market hours means that the trader can usually trade when the ETF and the ETF's underlyings are both open.

When Bigger Trades Get Better Pricing

Typically, the bigger the trade size, the bigger the risk and the more a risk-adding counterparty will want to charge for having to manage it. For thinly traded ETFs, however, trade sizes that are below the creation unit size can potentially be more costly for market makers to manage than trade sizes that are close to or equal to the creation unit size.

A small position in a thinly traded ETF could sit on the market maker's balance sheet for a considerable period of time, tying up capital. In cases where the market maker has sold the ETF short to a client and can't locate the shares needed to make delivery, the market maker may need to create a full unit's worth of shares, resulting in a sizable long position that ties up capital. A bigger trade, on the other hand—specifically, one that's closer in size to the creation unit size—could be removed from the balance sheet quickly and relatively cheaply via the creation/redemption process.

Appendix: Other Execution Strategies

The execution strategies described below—guaranteed market-on-close (GMOC), guaranteed VWAP or TWAP (GVWAP/GTWAP) and directed create/redeem—are viable strategies. They're not as popular as risk, NAV and agency trading, however. It could be that their mix of strengths and weaknesses isn't as compelling, or it could simply be that clients aren't as familiar with them. The lack of a robust, mature market for an execution strategy can be a weakness even if the strategy is otherwise (theoretically) compelling.

GMOC trades are similar in some ways to NAV trades: both involve a transfer of market risk at a single future benchmark price, and as a result their strengths and weaknesses are similar. GVWAP/GTWAP trades borrow from the strengths—and share some of the weaknesses—of both risk trading and agency trading. Directed create/redeem trades—sometimes referred to as agency create/redeem trades—give clients discretion over how the underlyings are traded in the process of creating into or redeeming out of an ETF position.

Below, we elaborate on the what, how and why—and the why not—of these three strategies.

Guaranteed Market-On-Close (GMOC)

What is it and how does it work?

In a guaranteed market-on-close or GMOC trade, a market maker agrees to trade an ETF with a client at a price based on the ETF's next (future) closing price. Usually, the closing price is the price of an end-of-day auction. Clients typically request quotes from one or more market makers, and the market makers respond with quotes that are priced at the ETF's future close plus or minus some offsetting value (e.g. "close plus six basis points," or "close flat"). To be clear, a GMOC trade is tied to the closing price of the ETF itself, whereas a NAV trade in most cases is tied to the closing prices of the ETF's underlyings.

How is the risk managed by the market maker?

By trading the ETF ahead of and in the closing auction, the market maker can position its book so that it is left with less (or no) market risk to manage after the trade is completed. The market maker doesn't have to position its book in this way, however, if—for example—it fears that doing so will lead to excessive market impact. Instead, it

can choose to take the risk onto its balance sheet, hedge with other instruments, or lay the risk off by trading the underlyings (or combine these approaches).

Strengths

- **Closing auctions tend to be liquidity events.** Closing auctions are carried out at the same time every day in a central, accessible location—the primary listing exchange—with the listing exchange publishing order-imbalance information that advertises whether and to what extent liquidity is available. As a result, closing auctions have been fairly successful in gathering liquidity at the same place at the same time and finding a risk-clearing price.

Weaknesses

- **Waiting for the close introduces timing risk.** Like any benchmark trade, waiting for the benchmark price to be struck or published introduces a risk that the price will drift between the time the trade is originated and the time it is executed.

- **For GMOC trades, market makers' quotes can be misleading and hard to compare.** Similar to a NAV trade, market makers can position their book before the closing auction in a way that leaves them with little or no risk after the trade has been completed. Such positioning—buying the ETF during the continuous session or in the auction before selling it to the client in a GMOC trade, for example—can accrue to the benefit of the client, but in some instances it can impact the closing price in a direction that is unfavorable for the client. The amount of impact usually depends on the size of the trade and how aggressively the market maker trades to position its book. To truly make an apples-to-apples comparison of market makers' GMOC quotes, then, the client must know how aggressively each market maker intends to trade into and on the closing auction.

Guaranteed VWAP/TWAP

What is it and how does it work?

In a guaranteed volume- or time-weighted average price (GVWAP or GTWAP) trade, the market maker agrees to trade the ETF over the counter with the client at the ETF's VWAP or TWAP over an agreed-upon time period plus or minus an offset. For example, the market maker could agree to sell the ETF to the client at the ETF's VWAP over the course of the entire trading session plus five basis points.

How is the risk managed by the market maker?

The market maker is effectively taking on incremental risk throughout the agreed-upon time period, and can manage that risk in whatever way it deems appropriate. By trading the ETF or its underlyings on a VWAP/TWAP schedule, the market maker can lay off each incremental unit of risk immediately. Alternatively, it can hedge by trading

other ETFs or instruments that might be more liquid than the ETF in question. Or, it can take the risk onto its balance sheet or let it net down risk that's already on the balance sheet.

Strengths

- **The client knows the degree of slippage against the benchmark up front.** If the market maker quotes "VWAP flat"—that is, the VWAP with no offset—the client knows that its execution price will match VWAP perfectly. If the market maker offers to sell an ETF at "VWAP plus five basis points," the client knows that it will be paying five basis points above the VWAP and can decide whether or not the cost is reasonable before agreeing to the trade.

- **Market makers have options when trading against a VWAP/TWAP benchmark.** In a traditional agency VWAP/TWAP trade, the broker is expected to trade the ETF in the secondary market. If the secondary market isn't active, the broker may be forced to cross wide spreads and generate impact in order to complete the trade. In a GVWAP/GTWAP trade, the market maker can trade the ETF in the secondary market if it so chooses, or it can trade the underlyings or other correlated instruments. Or, it can take the risk onto its books—or let the trade reduce risk already on its books—and trade nothing at all. This optionality allows the market maker to deliver an execution price at or close to the client's benchmark with potentially less impact than would have otherwise been the case.

Weaknesses

- **Stretching the execution out over time introduces timing risk.** Like any benchmark trade where the benchmark is calculated using future prices, there is a risk that the price will drift between the time the trade is originated and the time it is fully executed.

- **The benchmark may not accurately represent the ETF's value over the time period in question.** If trading in the secondary market is sporadic, individual trades may receive unwarranted weightings in the calculation of the benchmark.

- **The benchmark is not immune to market impact, and market makers' quotes are not necessarily comparable.** As with NAV trading, GVWAP/GTWAP trades involve tracking a reference price that can be impacted by the trading decisions of others. For example, a market maker who has agreed to a GVWAP trade may consider both the price and the volume of their hedging trades and how that would influence the VWAP.[8] Market makers' ability to affect the benchmark through their hedging activities means that one market maker's GVWAP quote may not be comparable to another's.

8 Consider a specific example where the cost of hedging by trading the ETF is roughly the same as the cost of hedging by trading the underlyings. A market maker that has agreed to sell such an ETF to a client at the VWAP could, if the ETF price has been rising throughout the day, decide to hedge by buying the ETF itself into the close so that more volume trades at higher prices. Such buying would produce a higher VWAP than if the market maker had hedged by buying the underlyings, which would play to the advantage of the market maker as they would be selling to the client at a higher price.

Directed Create/Redeem

What is it and how does it work?

In a directed create/redeem trade, the client instructs the broker or market maker to trade the underlyings in a certain fashion, create/redeem the ETF, and sell/buy the ETF shares to/from the client at a price that is derived from the execution prices for the underlyings. For example, a client wanting to buy an equity ETF at current prices could direct the broker or market maker to buy the underlying equities "in line," use the purchased equities to create the ETF, and sell the ETF to the client at a price that is derived from the prices paid for the equities (according to each equity's weighting in the ETF).

How is the risk managed by the market?

The risk of a directed create/redeem trade is transferred to counterparties in the underlying markets. These counterparties can be in the market to offset or take risk, with risk-taking counterparties needing to hedge, lay off or take on-balance sheet the risk of their trades.

Strengths

- **The execution process will be familiar to equity traders.** Buy-side equity traders who are accustomed to working with program trading desks will feel comfortable instructing brokers or market makers how to execute. All of the popular benchmarks for equity basket trading—implementation shortfall, VWAP, etc.—can be used to guide the execution.

- **It's a viable execution strategy when the underlyings are more liquid than the ETF's secondary market.** It may not be the best strategy under such circumstances, as we discuss below in the Weaknesses section, but it's a viable way to bypass illiquid exchange markets by accessing the liquidity of the underlyings.

Weaknesses

- **It deprives the client of the benefits of market maker competition.** ETF market makers provide value by looking across all possible risk-management options and execution methods for a given trade, figuring out which combination would produce the lowest execution cost, estimating what that cost would be, and quoting a market to the client that reflects that lowest-cost estimate in the hopes of winning the trade. Directed create/redeem trades effectively force the broker or market maker to incur the costs of trading the underlyings and doing a creation or redemption, when a market maker might be willing to take on the risk for a significantly lower cost.

- **It only works for a full creation unit (or units) of the ETF.** If the ETF's creation unit size is 50,000 shares, buying 80,000 shares will require additional risk-transfer beyond the directed create/redeem trade. That's because directed create/redeem trades require a creation or redemption of the ETF shares, and ETF shares can only be created or redeemed in blocks equal to the size of a creation unit. In the example cited above, the client would need to buy an additional 30,000 shares through some other means.

- **The operational details of creations and redemptions are complex.** Different countries have different settlement cycles, holiday schedules and regulatory regimes, and ETF issuers have different and complex methods for determining how a creation or redemption price is calculated. It is common that a customer will have to wait for several days or more before the final pricing details of a creation or redemption are known.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