

Market Structure and ETF Strategy

Important Considerations for NAV-Based ETF Trading

Executive Summary

13 February 2018

Trading an exchange-traded fund at a price tied to its future net asset value per share (“NAV”) is common practice in Europe. Indeed, Jane Street executes NAV trades for clients on a regular basis. Traders should be aware, however, that NAV trading involves risks that aren’t always readily apparent. Specifically, the risk of missing out on a market move, or of dealers impacting the NAV itself through their hedging activities, or of simply misunderstanding what exactly “NAV” represents can all potentially make NAV trading a sub-optimal execution method.

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In this report, we focus on three scenarios where the risks of NAV trading are heightened:

Scenario #1:

When the portfolio manager or trader wants immediate exposure to the ETF

Scenario #2:

When the trade is big relative to the liquidity of the underlying instruments

Scenario #3:

When the ETF’s NAV calculation is opaque or complex

Risk trading is an alternative to NAV trading that tends to work well in the scenarios described above. We discuss risk trading and another alternative – agency trading – at the end of the report.

Introduction and Benefits of NAV Trading

A NAV-based ETF trade – or just “NAV trade” – is one in which dealer and client agree to trade an exchange-traded fund at a price that’s tied to its future net asset value per share. NAV trades allow clients to convert the liquidity of the ETF’s underlying instruments (“the underlyings”) into liquidity in the ETF itself. Importantly, this conversion typically takes place at a time when liquidity and price discovery for the underlyings are usually quite robust: at the close.

What’s more, the process by which dealers typically effect these liquidity conversions – trading the underlyings at or near their closing prices, and swapping the underlyings for ETF shares or vice-versa – sees the dealers take little market risk. As a result, they’re usually willing to charge a very small mark-up relative to NAV to do the trade. So, absent the risks that we describe later in this report, NAV trading can be an inexpensive means by which to buy or sell an ETF at a price that faithfully represents its inherent value.

Additional Benefits

Bypassing the ETF’s Secondary Market

NAV trading also gives traders an alternative means by which to execute if the secondary market for the ETF does not reflect the collective fair value of the underlying instruments (adjusted for various costs). For example, the secondary market for the ETF’s shares could be inefficient by nature, or its price-discovery function could be impaired somehow. It must be said that such market states tend to be extremely rare. But, should they occur, traders can use a NAV trade to buy or sell the ETF without ever having to access its secondary market.

Mutual Fund-to-ETF Switches

Additionally – and this is somewhat of a niche use case – NAV trading can be useful when the risk of the trade overlaps with risk that can’t be unwound until the NAV is struck.

Take the case of an asset owner switching into an ETF from a mutual fund. Regardless of when the asset owner submits the redemption request to the mutual fund manager, the redemption will be priced at the next available NAV. If the asset owner were to then buy the ETF on risk¹ at the same time it submitted the redemption request, it would gain exposure to the ETF while still having exposure to the mutual fund. Usually, asset owners want to avoid such duplicative or overlapping exposure. Executing the ETF leg of the switch with a NAV trade can solve the problem by adding the ETF exposure at the same time the mutual fund exposure is removed.

It’s worth mentioning that the mutual fund may not necessarily strike NAV at the same time as the ETF, even when the underlying exposures are similar. For example, it’s common for many UK-domiciled funds to use midday – as opposed to end-of-day – prices to compute the NAV. Clients should make sure the NAV methodology of the mutual fund matches that of the ETF, otherwise the NAV trade may still produce unwanted exposures.

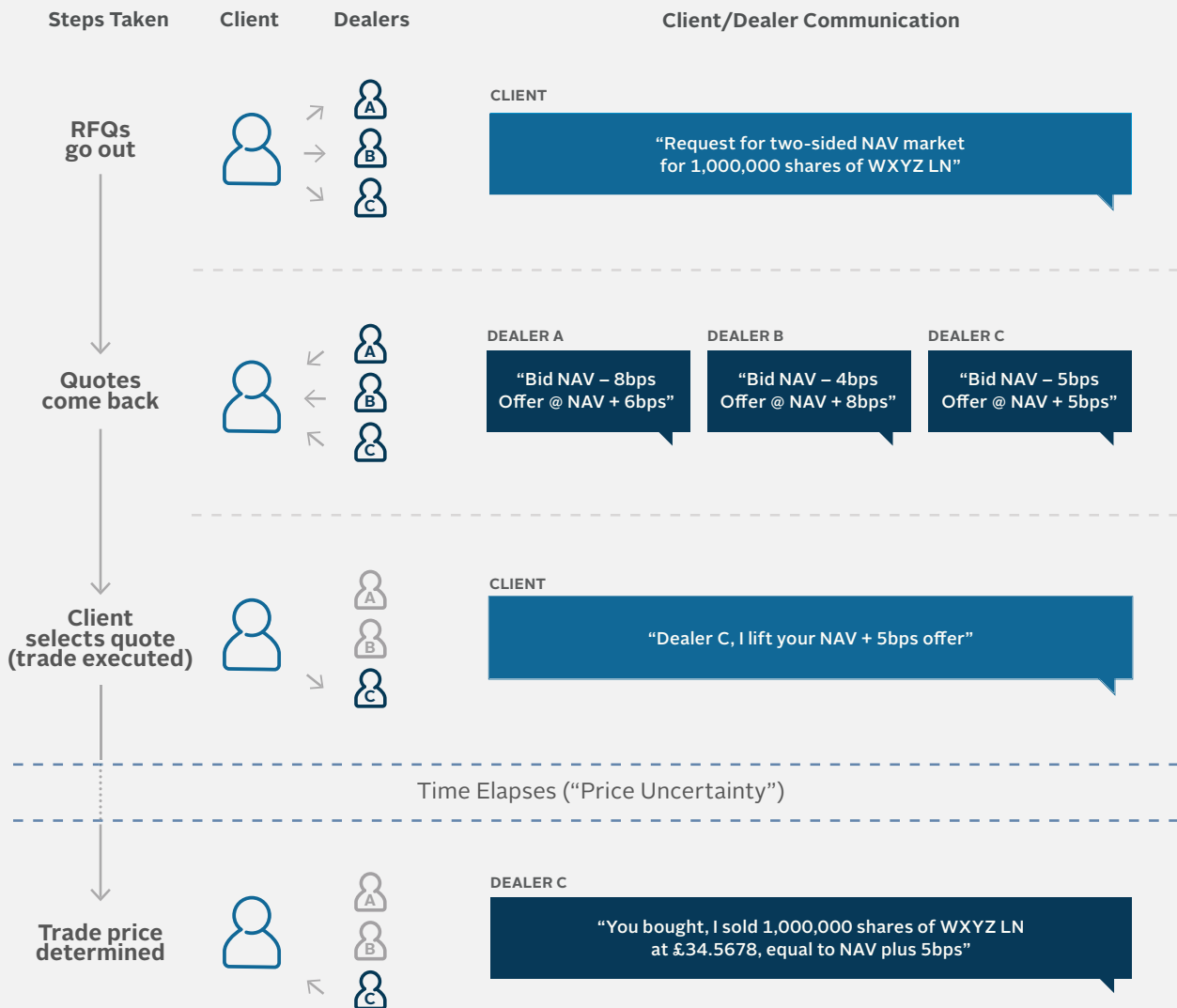
ETF-to-ETF Switches

Using a NAV trade to switch into an ETF from another ETF is usually safer in the sense that the two ETFs’ NAV methodologies are more likely to match up – particularly when the underlying exposures are similar. We see many clients effecting these NAV-trade-enabled ETF-to-ETF switches. That said, as with mutual fund-to-ETF switches, it’s incumbent upon the client to confirm beforehand that the two ETFs’ NAV methodologies do indeed match up.

¹We discuss risk trading, which involves the market maker committing capital to facilitate the client’s immediate trading interest, later in this report.

How NAV Trades are Executed

A NAV trade is a trade between a client and a dealer at a price based on the ETF's future NAV. The diagrams below demonstrate how NAV trades are executed.



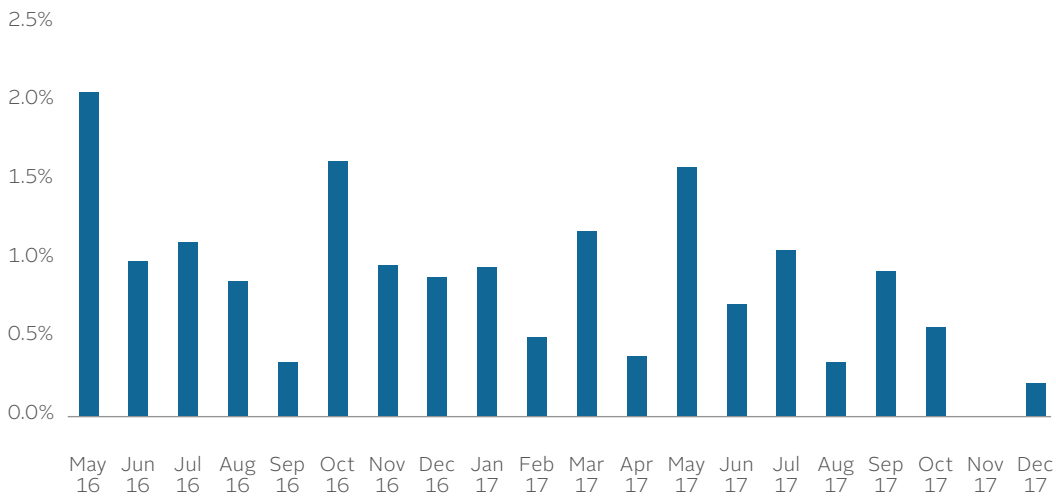
Notes:

1. Prior to MiFID II, dealers were not obligated to print trades if they weren't members of an exchange that required printing. Now that MiFID II is live, however, all OTC dealers (and RFQ MTF platforms) must print their ETF trades – including NAV trades.
2. The amount of time that elapses between the client's RFQ and the dealer's response, and between the dealer's response and the client's decision of whether or not to execute, depends on many factors. A small, straightforward NAV trade can be negotiated and executed inside of a minute. Larger, more complicated trades can take several minutes or longer to execute. Clients have the option of limiting the amount of time dealers have to respond to an RFQ, and can use speed-of-response as a criterion when comparing quotes.
3. We discuss the time that elapses between the client selecting a quote and the determination of the trade price later in this report.

NAV Trading Popularity

Last year, we commissioned a [survey](#) on global trends in institutional ETF trading. Ten percent of the European buy-side traders surveyed said that NAV trading is their preferred method of execution for ETFs. Meanwhile, the chart below – which is for equity ETFs only – shows that NAV trading is a small and gradually declining segment of Jane Street’s business in Europe.

Equity ETF NAV Trades Executed by Jane Street for European Clients as % of All Equity ETF Trades*



*Data reflect trades executed via RFQ platforms only

In reality, NAV trading accounts for more than 1-2% of Jane Street’s equity ETF trading with European clients. The data in the chart above encompass only the trades we executed via RFQ platforms, and most NAV trades are negotiated and executed via electronic chat services.

NAV Trading in the United States

For the sake of comparison, Jane Street’s NAV trades with US clients amounted to just 0.82% of all RFQ-platform trades in 2017. So on both sides of the Atlantic, NAV trading accounts for a very small percentage of our client trades. Meanwhile, in our institutional ETF trading survey, 16% of US buy-side traders said that NAV trading was their preferred method of execution.

Reasons to Be Cautious

Notwithstanding its benefits, NAV trading can expose traders to significant risks. The delays inherent to NAV trading mean that traders may miss out on a market move. Dealers trading the underlying instruments in order to hedge can cause market impact that makes the NAV price worse for the client. And failure to understand what “NAV” truly represents can cause confusion that can lead to bad trading decisions. In the pages below, we explore three scenarios where these risks tend to be acute:

Scenario #1:

When the portfolio manager or trader wants immediate exposure to the ETF

Scenario #2:

When the trade is big relative to the liquidity of the underlying instruments

Scenario #3:

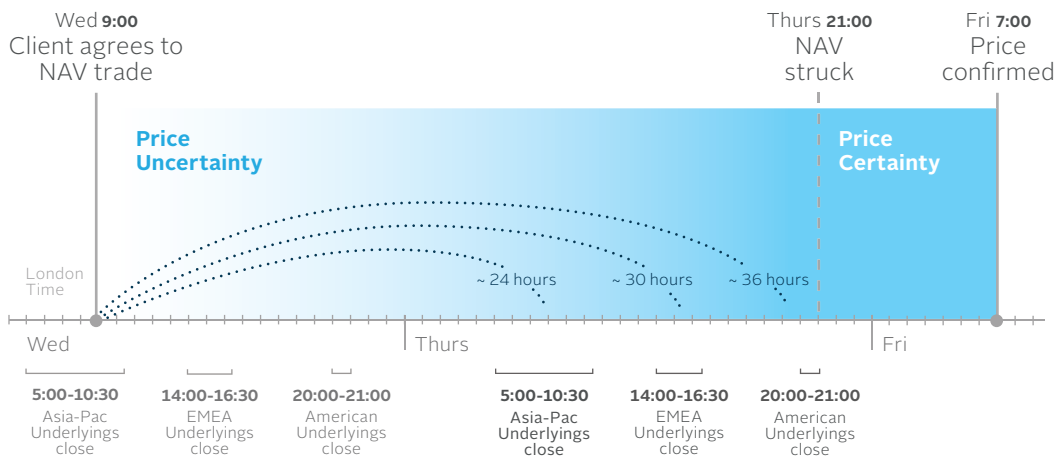
When the ETF’s NAV calculation is opaque or complex

Scenario #1: Urgent Need for Exposure

With a NAV trade, the client agrees to trade a given quantity of an ETF with a dealer. The price can’t be determined at the time of the agreement, however, because it’s based on a NAV that won’t be struck until later that day – or until the following day. Between the time of the agreement and the time the NAV is struck, the underlying market can move and the client will not have exposure to that move. We refer to this lack of exposure as “price uncertainty,” and the amount of uncertainty can be significant when the ETF’s underlyings trade in different time zones.

Consider, for example, a European private bank client that wants to invest in an international equity ETF listed in London. If it agrees to a NAV trade with a dealer on a Wednesday at, say, 9 a.m. London time, it would expect to receive the Thursday NAV since most of the underlyings listed in Asia-Pac would have already completed their Wednesday trading session.² The Thursday NAV would likely be struck after the US close on Thursday night. As the timeline below shows, the client would be exposed to roughly 24 hours of price uncertainty for the Asia-Pac component of the ETF, 30 hours for the EMEA component, and 36 hours for the Americas component.

Price Uncertainty for a NAV Trade in an International Equity ETF



²We discuss the reasons behind dealers and clients selecting tomorrow’s NAV instead of today’s in more detail later in this report.

Of course, if the ETF in question tracks, say, Western European stocks, and the client agrees to the trade at 2 p.m. London time, the price uncertainty would last for just two and a half hours (see the Appendix at the end of this report for timelines that illustrate the price uncertainty concept for various types of ETFs). Regardless of the specifics, portfolio managers or traders considering NAV trading need to first understand how urgent their need for exposure to the underlyings is. If the prospect of missing out on a market move over the next hour, next trading session, or next two trading sessions seems painful, NAV trading is probably not the ideal execution method.

Scenario #2: Big Trade

As the name implies, NAV trading ensures that the client's execution price hews closely to NAV. Depending on the size of the trade and how the dealer manages the risk, however, the NAV itself can be impacted in a way that imposes a real trading cost on the client. Below, we use a handful of examples of how dealers can manage the risk of a NAV trade to illustrate how a big trade can create impact.

Risk Management Example 1

Consider a dealer that agrees to sell £5 million of an emerging markets small-cap ETF to a pension fund client at NAV plus some amount of basis points. If the dealer doesn't have the ETF in its inventory, or even if it does, it can buy the underlying equities and swap them for newly created shares of the ETF. If the dealer buys the underlyings in their closing auctions, it is essentially paying NAV (plus trading and creation costs) for ETF shares that it then turns around and sells to the pension fund at NAV (plus some amount of basis points). The dealer makes a small profit and bears very little risk. Exhibit 1 to the right depicts how the dealer might buy the underlying small-cap stocks in this scenario.

Risk Management Example 2

Now consider that the same dealer has agreed to sell not £5 million, but £100 million, of this ETF to its client. The dealer follows the same procedure of buying the underlying equities to create the ETF, only this time the orders it sends into the closing auctions are 20 times bigger. One can imagine that buying a few thousand shares of an emerging market stock that typically closes on a few hundred shares could impact its closing price. If enough of the underlyings are impacted by the dealer's closing-auction activity, the NAV itself could be impacted and the client could end up paying a higher price for the ETF (Exhibit 2).

Program traders – traders who execute entire portfolios of stocks simultaneously – will recognize these dynamics because they frequently find themselves needing to execute outsize orders against closing-price benchmarks. The more a program trader tries to prevent slippage against the benchmark, the more market impact comes into play. It's the same for an ETF dealer positioning its book ("hedging") ahead of a big NAV trade.

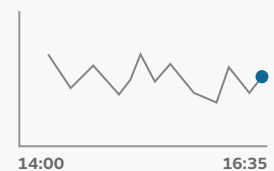
It's worth noting that there is an information leakage component to NAV trading as well. Per the Markets in Financial Instruments Regulation (MiFIR), NAV trades must now be reported publicly as close to real-time as is technically possible at the time the agreement is struck. That means that any market participant watching the tape can see that a NAV trade has been agreed many hours before the NAV has been determined. Nothing in the trade report indicates which side of the trade the client is on, but much of the crucial information about the trade will be exposed for all to see. We are not aware of any other regulatory regime globally that requires this degree of what is essentially pre-trade transparency for benchmark trades.

Stylized Dealer Risk Management Examples

Below, we present six stylized examples of how a dealer that has agreed to sell an equity ETF to a client at a NAV-based price might go about acquiring the underlying stocks. We've annotated the charts to indicate how tight to NAV we would expect the dealer's quote to be, and whether we would expect NAV to be impacted by the dealer's activity.

Exhibit 1: Small NAV trade, dealer hedges underlyings on close

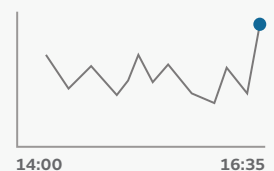
- Dealer executes entire buy order



Quote is **tight** to NAV;
NAV is **not impacted**

Exhibit 2: Big NAV trade, dealer hedges underlyings on close

- Dealer executes entire buy order



Quote is **tight** to NAV;
NAV is **impacted**

Risk Management Example 3

Like program traders, ETF dealers that win NAV trades can and often do trade the underlying equities in the minutes or hours leading up to the close. They can also trade the underlyings on the close, as described above, or after the close. A dealer's decision about when to hedge has implications for how NAV is (or is not) impacted, and how tightly to NAV the dealer can quote.

When a dealer begins hedging ahead of the closing auctions, it reduces the amount of shares it needs to buy in those auctions. All else equal, that should reduce the impact on closing prices. Of course, if the dealer executes the before-the-close portions at prices worse than the closing-auction prices, it risks losing money. To compensate for this risk, the dealer may quote a wider NAV market than dealers that aren't as concerned about impact. Exhibit 3 to the right shows a dealer electing to mitigate the potential impact on the close by trading some portion of the orders before the close.

Risk Management Example 4

On the other hand, a dealer hedging ahead of the closing auctions may quote a much tighter NAV market if it is confident that its pre-auction fills will be better than the closing-auction prices. This can happen if, after executing some portion of the orders in the underlyings before their closing auctions, the remaining portions to be executed in the auctions are still big enough to impact closing prices (Exhibit 4).

Risk Management Examples 5 and 6

Finally, the dealer can also choose to partially hedge, or to not hedge at all. Doing so mitigates the impact on the closing prices of the underlyings by reducing closing-auction order sizes. It can also leave the dealer with a position that it has to work out of or hedge, in which case the dealer would likely widen out its market to compensate for the additional risk (Exhibits 5 and 6).

The takeaway from all of these examples is that clients will almost always incur substantial costs when trying to trade large size on a NAV basis. Again, this is no different than a program trader choosing whether to impact the close or accept slippage when trading a large basket against a closing-price benchmark. For ETF NAV trading, different dealers may incorporate the costs into their markets differently depending on how they choose to manage the risk. That makes comparing NAV markets from different dealers challenging to say the least.

Scenario #3: NAV Complexity

As the diagram below shows, the NAV calculation itself is fairly simple.

The NAV Calculation

1. Converting Closing Prices to Individual Market Values

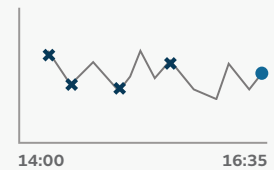
$$\begin{array}{l}
 \text{a} \quad \begin{array}{l} \text{Each Underlying's Closing Price} \\ \times \\ \text{Qty of Shares, Bonds (etc.)} \\ \text{Held in Each Underlying} \\ = \\ \text{Each Underlying's Value (Local CCY)} \end{array} \\
 \text{b} \quad \begin{array}{l} \times \\ \text{Relevant FX Rates} \\ = \\ \text{Each Underlying's Value (Base CCY)} \end{array}
 \end{array}$$

2. Using Individual Market Values to Calculate NAV

$$\begin{array}{l}
 \text{c} \quad \sum \text{Each Underlying's Value (Base CCY)} \\
 = \\
 \text{d} \quad \text{Total Asset Value} \\
 - \\
 \text{e} \quad \text{Fees} \\
 = \\
 \text{Net Asset Value} \\
 \div \\
 \text{ETF Shares Outstanding} \\
 = \\
 \text{Net Asset Value per Share ("NAV")}
 \end{array}$$

Exhibit 3:
Big NAV trade, dealer hedges underlyings into/on close

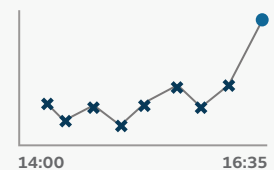
- ✕ Dealer buys
- Dealer completes buy order



Quote is **wider** to NAV;
NAV is **not impacted**

Exhibit 4:
Very big NAV trade, dealer hedges underlyings into/on close

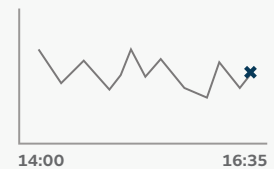
- ✕ Dealer buys
- Dealer completes buy order



Quote is **tight** to or better than NAV; NAV is **impacted**

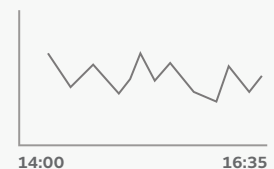
Exhibit 5:
Big NAV trade, dealer hedges partially on close

- ✕ Dealer buys



Quote is **wider** to NAV;
NAV is **not impacted**

Exhibit 6:
Big NAV trade, dealer does not hedge



Quote is **wider** to NAV;
NAV is **not impacted**

When it comes time to actually calculate a given ETF's NAV, however, traders will find that the various inputs can be opaque, counterintuitive, and not standardized across asset classes or products.³ Misunderstandings about what an ETF's NAV actually represents can spill over into trading, with clients asking to trade on NAVs that are partially stale, or simply not knowing when they're getting specific exposures or at what prices.

Different NAV Inputs for Different Asset Classes

For single-country or single-region equity ETFs priced in the same currencies as their underlyings, the NAV inputs are transparent and misunderstandings are rare. The same is true for many commodity ETFs with physical underlyings, as they typically use transparent, auction-determined fixing prices as their closing prices.

For most non-equity asset classes, however, the closing-price determination is less obvious. Commodity ETFs with futures contracts as underlyings tend to use an end-of-day volume-weighted average price. Volatility ETFs tend to use an end-of-day mid-market price for the contracts they track. Fixed-income ETFs, meanwhile, don't have a uniform standard for determining closing prices for their underlying bonds: some use bid prices, and some use mid-market prices. And they use a variety of pricing services to determine actual marks, and those pricing services have their own methodologies.

In other words, while the NAV calculation itself may not be overly complex for any given ETF, it can be difficult to keep track of the inputs to the calculation for the various ETF types.

NAV Trading for Fixed Income ETFs: A Different Animal

Many of the points made in this paper – including, most notably, the points about market impact – apply mainly to equity ETFs. For fixed income ETFs, two wrinkles in particular set them apart from their equity ETF brethren:

1. The bonds underlying fixed income ETFs tend not to have closing auctions.
2. Some issuers of fixed income ETFs use the underlying bonds' bid prices to calculate NAV, and some use their mid-market prices.

No Closing Auctions

When the underlying instruments close with a closing auction, as is the case with most equity ETFs, dealers can ensure their participation in the underlying closing prints that feed into the NAV calculation. That takes a lot of the risk out of a NAV trade, since dealers can be reasonably sure that they can at least match the NAV with their hedging trades and come out of the trade flat.

Because bonds don't have closing auctions, dealers hedging fixed income ETF NAV trades can only try their best to execute at prices equal to, or at least close to, closing prices. Thus, there is an element of slippage risk that doesn't exist for most equity ETF NAV trades.

Bid-Price NAVs vs. Mid-Market NAVs

Clients should also be aware that the issuer's choice of closing price can have an impact on dealers' NAV markets. Consider the example of a client comparing NAV markets for two emerging market sovereign debt ETFs:

- The Lyxor iBoxx \$ Liquid Emerging Markets Sovereigns UCITS ETF (symbol: LEMB FP)
- The Amundi ETF Global Emerging Bond Markit iBoxx UCITS ETF (symbol: AGEB FP)

³It must be said that mutual fund NAV calculations tend to be even more opaque. Unlike ETFs, mutual funds typically don't publish their holdings. In addition, they employ swing pricing, which is an adjustment of NAV to account for purchase and redemption activity.

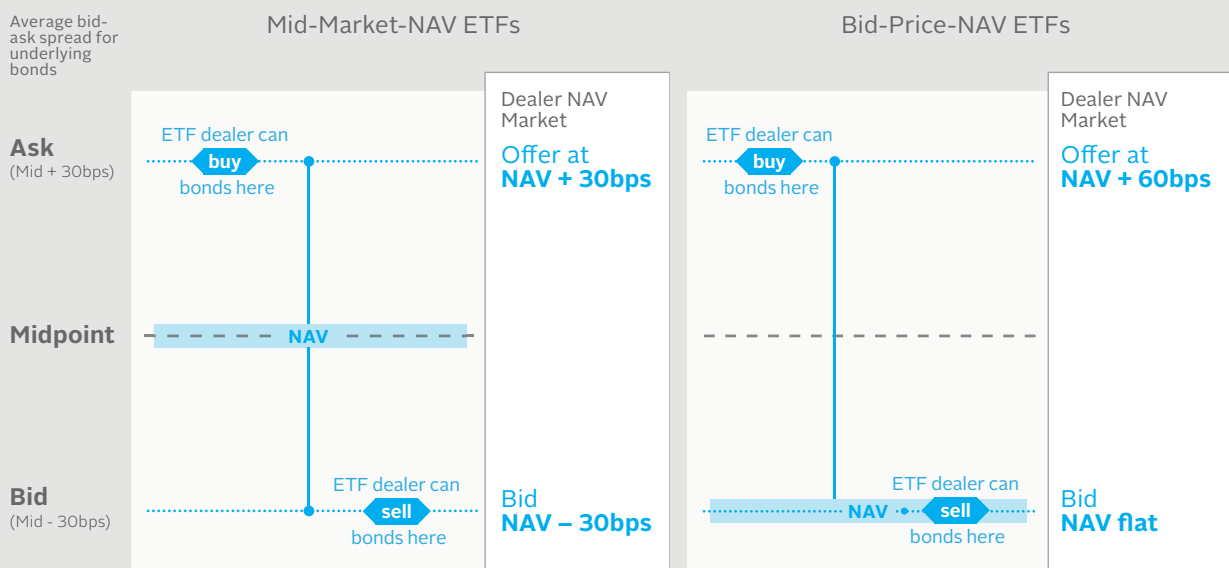
LEMB FP tracks an index that uses the midpoints of the bid-ask spreads of a portfolio of bonds to calculate its value. AGEB FP tracks an index that uses the bid prices of the same portfolio of bonds to calculate its value. As a result, LEMB FP and AGEB FP hold a very similar portfolio of bonds, but LEMB FP's NAV is calculated using the bonds' mid-market prices whereas AGEB FP's NAV is calculated using their bid prices.

The differing NAV calculation methodologies have next-to-no impact in the long run: with either ETF, clients are gaining essentially the same exposure at essentially the same trading cost. Nevertheless, dealers' NAV markets will be different for the two funds. If clients don't understand why, they might erroneously draw the conclusion that the fund using bid prices is more expensive to trade than its mid-market cousin.

Deriving Bid-Price NAVs and Mid-Market NAVs

To illustrate how clients could make this mistake, consider the diagrams below. They show, in greatly simplified fashion, how a dealer might derive a NAV market on the basis of where it can trade the underlying bonds. It's important to note that dealers aren't always looking to trade the underlyings on the back of a NAV trade, and as such their NAV markets may in some cases be tighter. It's also true that cash bond dealers will often buy or sell bonds inside quoted spreads, which allows ETF dealers to quote commensurately tighter NAV markets. But for the sake of illustrating the difference between mid-market-NAV ETFs and bid-price-NAV ETFs, we assume in the diagrams below that the dealer aims to hedge the trade by transacting in the underlying bonds at their bid or ask prices.

How Dealers Derive NAV Markets for...



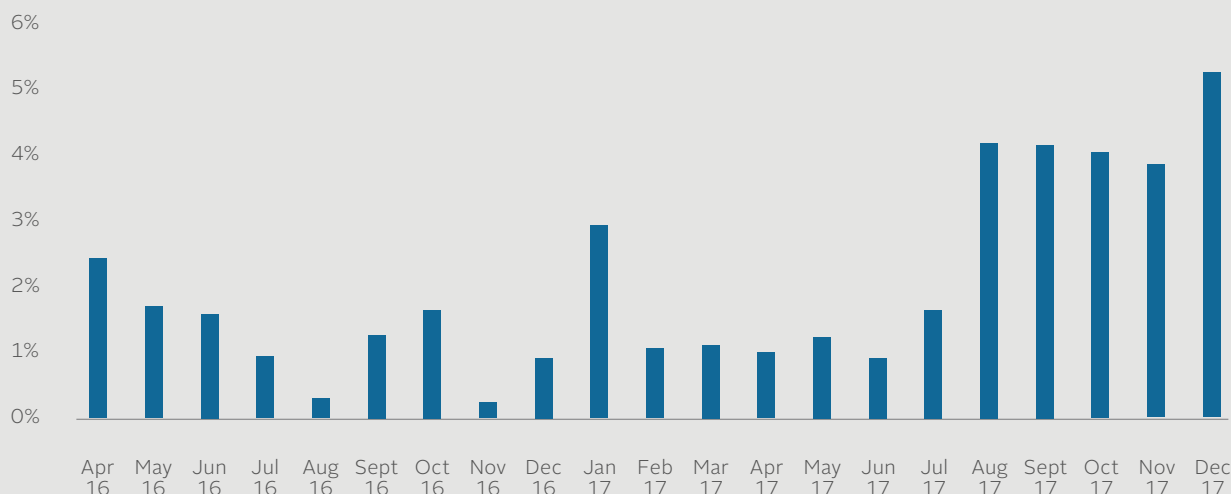
The “bid NAV – 30bps, offer at NAV + 30bps” market for the mid-market-NAV ETF (left diagram) should make sense to most traders: the dealer would buy below some price and sell above that same price, which is generally what dealers do. The “bid NAV flat, offer at NAV + 60bps” market for the bid-price-NAV ETF (right diagram) is less intuitive. The dealer is communicating that it would buy at some benchmark price (NAV), which generally is not what dealers do (they tend to charge for the risk they take by bidding *below* the benchmark). In this case, however, the dealer is estimating that it can sell the underlying bonds at the same bid prices that get imputed into NAV. That means it can afford to buy the ETF from the client at NAV and come out of the trade essentially flat.

It's important to note that the dealer is trading the underlying bonds at the same prices in both examples, and the client is ultimately paying the same amount for the exposure to those bonds. The math behind a roundtrip NAV trade bears this out. A client that is seemingly “paying up” by lifting a dealer’s NAV + 60bps offer for a bid-price-NAV ETF would make up for it by hitting a NAV flat bid when selling out of the position. A client that lifts a NAV + 30bps offer for the mid-market-NAV ETF, meanwhile, would have to hit a NAV – 30bps bid when selling out of the position. So the roundtrip cost relative to NAV for both clients would be 60bps.

How Popular Is NAV Trading for Fixed Income ETFs?

Earlier in this report, we discussed the apparent decline in popularity of equity ETF NAV trading amongst European institutional investors. For fixed income ETF NAV trading, the trend appears to be going in the other direction. As shown in the chart below, our fixed income ETF desk in London has seen an uptick in interest in recent months.

Fixed Income NAV Trades Executed by Jane Street for European Clients as % of all Fixed Income ETF Trades*



*Data reflect trades executed via RFQ platforms only

As with our equity ETF data, the above fixed income ETF data encompass only the trades we executed via RFQ platforms. Because NAV-trade negotiations tend to be less time-sensitive than those for risk trades, the need for a software platform that coordinates the NAV quoting process amongst dealers hasn't been as great. As a result, many clients and dealers still conduct NAV trade negotiations over electronic chat services.

FX Conversion Issues

Another wrinkle of complexity comes from the FX rate the ETF uses to convert underlying market values into the home or base currency for NAV calculation purposes. While the underlyings close at various times throughout the day, most issuers use the WM/Reuters 4 p.m. London fix to do the currency conversion. This means that international ETF NAVs don't reflect currency values at the time the underlyings close, nor do they reflect currency values “now.” Rather, they reflect currency values from a single point in time earlier that day.

In addition to being somewhat arbitrary, issuers' use of the WM/Reuters 4 p.m. London fix can create unusual trading dynamics. Consider, for example, the US-listed iShares MSCI Canada ETF (EWC US), which uses the 4 p.m. London fix to convert Canadian dollars into US dollars for the NAV calculation. At the time of the fix, five hours remain before the close of the Canadian equity market. As a result, dealers' NAV markets can drift above or below NAV as the Canadian dollar fluctuates against the US dollar between 4 p.m. and 9 p.m. London time. A client that isn't aware of this phenomenon might wonder why dealers' post-fix NAV markets look unusually competitive (or uncompetitive).

Time Zone Issues

The EWC US example is admittedly an edge case, but it's one that highlights what is perhaps the most challenging aspect of NAV trading: knowing how the time of day affects the markets that dealers quote. This challenge extends to knowing what NAV the dealer thinks the client is referencing when the client asks for a NAV market.

For ETFs with underlyings trading in a single time zone, the NAV that dealers expect to reference is usually the next NAV to be struck.⁴ When the underlyings are scattered across multiple time zones, however, it's more common for dealers to expect to reference the NAV that is struck *after* the next NAV. That's because for US- and Europe-based traders at least, the next NAV for international ETFs is almost always partially stale. For example, on Wednesday morning in London, many Asian markets have already closed. As a result, Wednesday's NAV will have already been partially formed by the closing prices of the ETF's Asian underlyings. Clients wanting a true NAV trade with no element of risk trading must therefore accept Thursday's NAV as their reference price.

The Appendix at the end of this report clarifies when dealers expect to trade on today's or tomorrow's NAV. The long story short is that dealers' expectations are usually based on the time the trade is agreed and the nature of the underlying instruments.

Fair Value Adjustment

One last idiosyncrasy to keep in mind is that some issuers adjust their NAVs to account for market movements that occur between the time the underlying markets close and the time NAV is actually struck. This adjustment is usually called a fair value adjustment, and the act of adjusting is referred to as "fair valuing." In practice, fair valuing involves the issuer increasing the NAV when it believes the underlyings have increased in value in the hours between the market close and the NAV calculation, or decreasing the NAV when it believes the underlyings have decreased in value during those hours.

To understand why an issuer would fair value an ETF, imagine that the ETF in question is an emerging-market equity ETF with Asia-Pac, EMEA and American underlyings. The Asia-Pac underlyings close during the London morning, and the EMEA underlyings close that afternoon. Then, in the evening, the US Federal Reserve surprises markets with an unusually dovish FOMC statement. Latin American equities quickly appreciate by 2%, and futures contracts tracking emerging-market equity indexes in Asia-Pac and EMEA do as well. The ETF is now clearly worth more than it was before the release of the FOMC statement. In the absence of a fair-value adjustment, the NAV would reflect the depressed, stale prices for its Asia-Pac and EMEA underlyings. With an adjustment, the NAV would likely be more closely aligned with its fair value.

Whether or not fair valuing is desirable is an open question. What is clear, however, is that it creates some uncertainty for dealers as the issuers' fair-valuing methodologies are opaque. It's also just one more factor that clients need to consider when trying to fully understand the nature of the exposure they're getting when they do a NAV trade.

⁴Clients can request NAV markets based on just about any NAV, past or future. However, requesting a NAV market that's based on a past or "stale" NAV is functionally no different than requesting a risk market, so these are NAV markets in name only. Meanwhile, requesting a NAV market based on a NAV that's further into the future than tomorrow is rare.

Conclusion and Alternatives to NAV Trading

NAV trading is a useful tool. It works particularly well for asset owners switching into an ETF from a mutual fund or from another ETF, or in any situation where some other risk in the portfolio is being put on or unwound at NAV. And it can act as a safety net if price discovery in the secondary market appears to be inefficient or impaired.

In normal market conditions, NAV trading tends to work best when the client's need for risk transference is not especially urgent, trade size is relatively small, and the NAV calculation is simple and transparent. As the client's urgency increases, as trade size grows, and as the NAV calculation grows more complex and opaque, the risks involved with NAV trading become more prominent. Being aware of these risks, and being flexible enough to choose a trading style that mitigates them, should add value to the client's trading process. Below, we close by highlighting two such alternative trading styles: risk trading and agency trading.

Risk Trading

Risk trading is a common alternative to NAV trading. With a risk trade, the client requests a market from one or more dealers that it can act on immediately. Dealers build the expected cost of managing the risk of the trade into their quotes, which makes the all-in cost of the trade transparent to the client. The transparency makes it easier for clients to compare quotes from different dealers, which in turn heaps pressure on dealers to make their quotes more competitive.

Risk trading also reduces price uncertainty, as the entire negotiation process can be completed in seconds. Information leakage is less of a concern, too, since dealers aren't in possession of information about the size of the client's interest for hours before the trade takes place.

Because of these attributes – cost transparency, immediate risk transference, low odds of information leakage – risk trading tends to be quite popular with clients. Indeed, 41% of buy-side traders surveyed in the report we commissioned on institutional ETF usage – the highest percentage across all execution methods – said that risk trading is their preferred execution method.

Agency Trading

Employing a broker to trade the ETF in the secondary market on an agency basis is another option. However, there are only a handful of European ETFs that have enough on-screen liquidity to support meaningful agency trading. In the first half of 2017, 70 ETFs listed in the US – where agency trading is more prevalent – traded more than \$100MM per day on exchanges. In Europe, no ETFs reached the \$100MM mark (DAXEX GY came closest with \$88MM). The changes to pre- and post-trade transparency required by MiFID 2 may encourage more on-screen liquidity provision over time, but for now at least agency trading is not a compelling alternative to NAV trading or risk trading – particularly for bigger trades.

Even if agency trading does become more viable in Europe, clients will need to weigh its attractiveness against that of other execution methods. Just as clients sometimes balk at risk markets that seem wide relative to NAV markets – even though the risk market might be the better deal when all costs are taken into account – they sometimes choose agency execution because the visible costs are low. In these cases, they're also on the hook for the less-visible cost of market impact, however. As with any execution method, it's the all-in cost that matters.

Appendix: NAV Trading Timelines for Europe-Listed ETFs with Underlyings in Different Time Zones

When a dealer receives a NAV RFQ, it will usually base its expectations about what NAV the client is targeting on two factors:

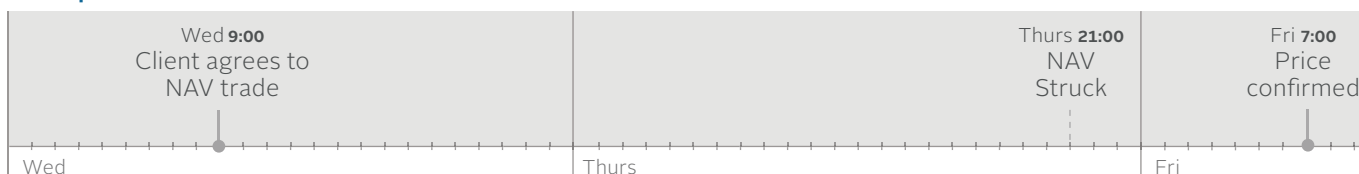
1. The time of day
2. The time zone (or zones) of the ETF's underlying instruments

In the diagrams below, we show how these two factors influence whether a London-based client negotiating a NAV trade on a Wednesday can expect to trade on Wednesday's NAV or Thursday's.

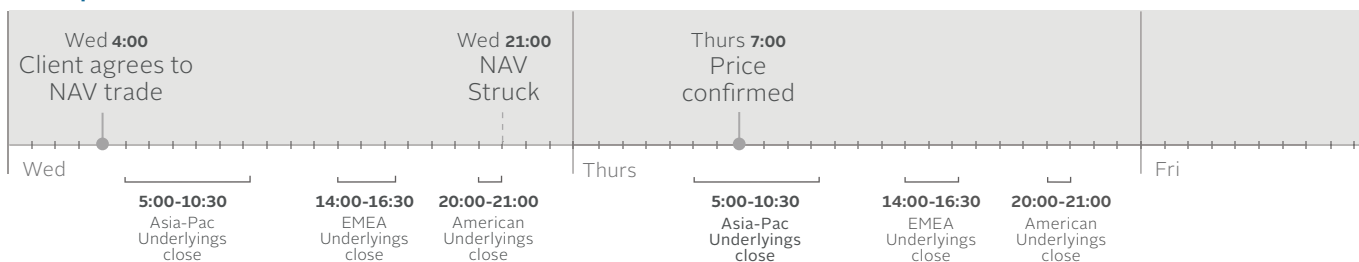
International ETFs (e.g. IEEM LN, XMWO GY)

Unless the client and dealer both get up very early on Wednesday morning to negotiate the trade – as in Example 2 below – the dealer will expect to trade on Thursday's NAV. Example 2 is a viable scenario for Asia-based clients and dealers negotiating trades in UCITS ETFs.

Example 1



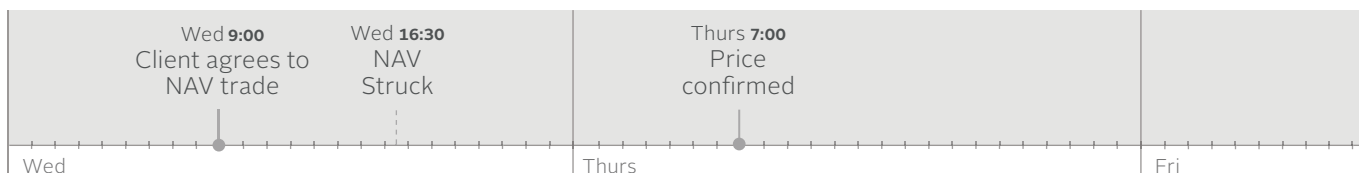
Example 2



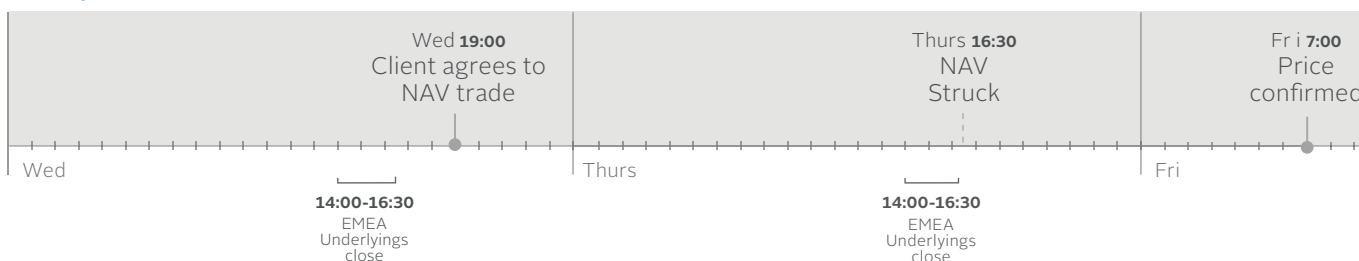
ETFs with Only European/EMEA Underlyings (e.g. SX5EEX GY, MSE FP)

If the client fails to negotiate the trade before the underlyings close on Wednesday afternoon – as in Example 2 below – it will have to accept Thursday's NAV.

Example 1



Example 2



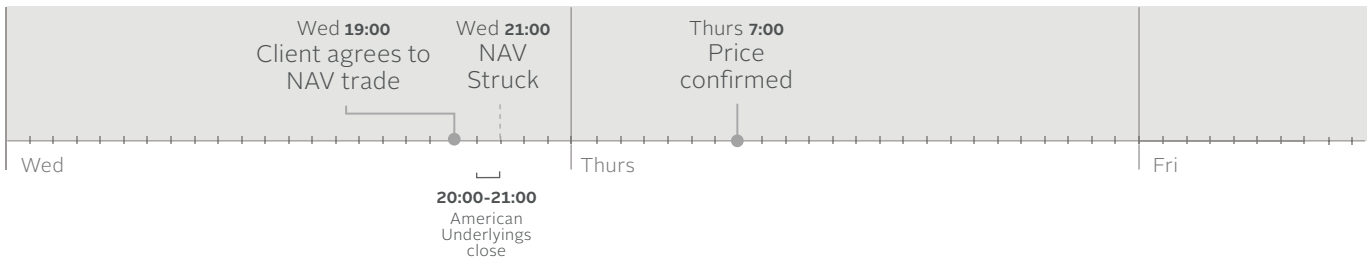
ETFs with Only American Underlyings (e.g. CSPX LN, VUSA LN)

Even if the client waits until after the European close on Wednesday to negotiate the trade – as in Example 2 below – it can still ask the dealer to trade on Wednesday’s NAV (so long as the ETF’s American underlyings haven’t yet closed).

Example 1



Example 2



Note: Other factors – like whether or how the dealer intends to hedge, and whether the create/redeem deadline for the ETF has already passed – are likely to impact how tightly around NAV dealers will quote. As a general rule, if the create/redeem deadline has passed, the odds are higher that the dealer will quote a wider market.

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