INVESTING AND TRADING

# INTRA-DAY PRICING: HOW ETF SHARES ARE PRICED

Many investors appreciate the benefits of being able to trade ETFs throughout the day at prices that are updated continually. For others, the concept of being able to buy and sell a fund throughout the day is something they are still getting comfortable with. The first step in this process is understanding how the prices of ETF shares are actually set?

This article outlines the factors that may influence prices and spreads — including when the market that a fund provides exposure to is closed.

**KEY POINTS**

+ In normal markets ETFs are priced around 'fair value', which is based on two factors: the value of the underlying securities, and the cost of hedging exposure to them
+ Competitive markets tend to keep prices close to fair value — discounts or premiums are usually quickly arbitraged away
+ The size of an ETF's spread depends on several factors, including the level of costs, the accuracy with which market makers can hedge exposures, and market conditions
+ Price expectations evolve continually. Thus, ETF prices may change even when the market that an ETF offers exposure to is closed

## ETF FAIR VALUE

In normal market conditions, an ETF share will be priced around its fair value. The concept of fair value is that each share has an intrinsic worth, based primarily on the value of the underlying securities the ETF holds. This fair value will change throughout the day as the value of the underlying securities changes.

To understand how fair value is calculated, let's start with the notion that ETF shares are created in exchange for a basket of securities. Suppose an authorised participant (AP) — a financial institution that creates and redeems ETF shares and acquires the underlying assets for the ETF issuer — creates 100,000 shares in exchange for securities worth US$1 million. Absent any other costs, each ETF share would be worth US$10.

ETF shares are created once per day, at the end of the day. However, the AP essentially locks in the cost of creating those shares at the time it purchases the underlying securities. This is known as hedging, and it means that the AP always knows the price at which it will be able to create shares at the end of the day, as long as it knows the cost of the hedge.

Together, these two factors — the cost of the underlying basket of securities, plus the cost of the hedge — are the basis for the fair value calculation and the price at which a market maker will quote an ETF share throughout the trading day.

## CONFIDENCE IN MARKET PRICE

Understanding the theory of ETF fair value is one thing, but why should an investor trust that the quote they see on an exchange reflects this value? The answer is competitive markets — coupled with the direct link that the creation/redemption mechanism establishes between the underlying securities and the ETF share.

Suppose a market maker was quoting a price for an ETF share on an exchange that was too high (i.e., at a premium to fair value). Another market participant could a make riskless profit by trading against this price ('arbitraging'). This would work as follows:

1. The market participant creates a short position in the ETF by selling it against the market maker's quoted price
2. They purchase the underlying basket of securities
3. The basket of securities is used to acquire ETF shares from the issuer through the creation process
4. These ETF shares are used to close out the short position created in step 1. The arbitrage profit is the difference between the quoted ETF price and the cost of creating the ETF shares.

Multiple market makers, APs and various other market participants continually monitor ETF prices, all of whom have a financial incentive to know the fair value of an ETF. Market makers therefore need to quote accordingly, or risk losing money by being on the wrong side of the arbitrage. This competitive dynamic usually drives ETF prices back towards fair value whenever they stray out of line (the arbitrage process would work roughly in reverse if the ETF had been priced at a discount).

## FAIR-VALUE BAND

So far, we have assumed there is a single price for each of the underlying securities, and that the securities can be bought and sold at that price. Several factors impact the price a security can be traded at, including its bid-offer spread and the costs associated with trading.

Let's take a simplified example of an ETF tracking the FTSE 100 index, with the following properties:

1. ETF fair value (based on the last traded price of the underlying securities): **100**
2. Spread on the underlying securities: **4 bps** (basis points)
3. Cost of creating/redeeming ETF shares: **2 bp**
4. UK Stamp Duty (financial transaction tax): **50 bps**

Given these properties, the fair price to buy the ETF would be 100.56, and the fair price to sell would be 99.94 (UK Stamp Duty is paid on share purchases, but not on sales). These two prices represent the top and bottom of what is known as the fair-value band, which is the range the ETP can trade in before the arbitrage mechanism described earlier would be triggered.

## SPREAD

Just like the underlying securities, ETFs trade with a spread. The spread represents the difference between the prices at which other market participants (market makers or other investors) are willing to buy and sell the ETF at a given time.

The spread is quoted by market makers is driven by the costs they face from hedging and from the creation/redemption activities associated with transacting in the ETF's shares. Typically, these costs are directly reflected in the spread seen by investors: the higher the underlying costs, the wider the spread. Once again, competitive market forces keep spreads in line with these costs – market makers are incentivised to put forward their best possible prices in an effort to "win" the trade.

An ETF may trade with a spread that is tighter than that indicated by the underlying costs. Taking again our FTSE 100 ETF example, the fair value band is 62 bps. However, the most popular ETFs tracking the index trade with a spread of less than 5 bps. This is due to natural buyers and sellers transacting in the shares at a mutually acceptable price (in other words, the ETF shares simply change hands, without creation/redemption costs being incurred). Exactly where within the fair-value band an ETF will trade is determined entirely by market forces and will depend on the balance of buyers and sellers (i.e., supply and demand) at any given time.

This phenomenon of an ETF trading at a tighter spread than its theoretical level is typically seen in ETFs whose underlyings are in higher-cost or illiquid markets, such as equity markets with financial transaction taxes, or in emerging market equities and fixed income. It is less likely to occur in very liquid markets — where spreads on the underlying are already tight — and in low-cost markets, because there will be little scope to tighten the spread.

## CONTINUOUS MARKETS

We discussed above that an ETF's fair value is linked to two factors: the value of the underlying basket of securities, and the price at which a market maker is able to hedge this exposure.

This is a relatively straightforward concept when the ETF is traded on a market that is open at the same time as the market for the underlying securities. But what about an ETF that provides exposure to, say, Japanese equites that is traded during European hours? How would a market maker know what price to quote for this ETF at 1pm UK time if the market for the underlying had been closed for several hours?

The reality is that financial markets are 24-hours in nature. Exchanges are excellent venues for setting prices and exchanging securities in a transparent way, but they only operate for limited hours. Price expectations, on the other hand, evolve continually based on news or events that could affect the performance of a company.

Anyone who has looked at a multi-day for a chart for a listed security will have observed that the price the security closed at yesterday will be different to the price it opened at today. Similarly, the price of an ETF providing exposure to the Japanese market will reflect the aggregated evolving price expectations for the underlying securities throughout the European trading day.

## ADVANCED HEDGING

ETFs are not the only instruments that may be priced on the biases of 24 price evolution. Many financial products are priced outside of the hours of the market to which they provide exposure — futures contracts being the most common of these. Active markets in such instruments can help ETF market makers gauge price expectations, as well as giving them a way to hedge their exposures in lieu of trading the underlying basket of securities.

For some underlyings, the markets for related instruments traded in other time zones are highly developed. These instruments therefore have a significant influence on ETF pricing and make it possible to hedge ETF exposure with a high degree of certainty. For other underlyings, the related instruments do not hedge ETF exposures very precisely. Indeed, in some cases an ETF may be the only instrument offering exposure to a given underlying, in which case market participants would have to rely on a proxy model for the purposes of hedging. As the certainty (or accuracy) of a hedge decreases, the risk taken by a market maker in pricing an ETF increases. This will be reflected in a wider bid/offer spread.

## MARKET CONDITIONS

Finally, market conditions can also affect ETF spreads. When situations arise that limit the liquidity of a market, or during times of increased volatility, it can be difficult for a market maker to know with certainty the price at which it will be able to purchase the relevant hedge. Once again, this increased uncertainty adds to the risk taken by a market maker and is reflected in a wider bid/offer spread.

In some circumstances market disruptions can be quite severe – to the point of underlying instruments being suspended from trading or a particular market becoming very illiquid. Such situations can have adverse impacts of the market stability of an ETF and may result in wider spreads, trading at a premium or discount or market makers pulling quotes altogether.  Whilst these events are quite rare it's important for investor to be aware of the possibility.

As a result of this, it is important for an investor to ensure that they are aware of the current market conditions at the time at which they wish to execute to ensure that they experience an unexpected result. If you're ever in doubt about the market conditions it is advisable to speak to either your broker or the ETF issuer in question.

***For more insights into ETFs, please see our Market Insights.***

## IMPORTANT INFORMATION

**Communications issued in the European Economic Area ("EEA"):** This document has been issued and approved by WisdomTree Ireland Limited, which is authorised and regulated by the Central Bank of Ireland.

**Communications issued in jurisdictions outside of the EEA:** This document has been issued and approved by WisdomTree UK Limited, which is authorised and regulated by the United Kingdom Financial Conduct Authority.

WisdomTree Ireland Limited and WisdomTree UK Limited are each referred to as "WisdomTree" (as applicable). Our Conflicts of Interest Policy and Inventory are available on request.

**For professional clients only. Past performance is not a reliable indicator of future performance. Any historical performance included on this document may be based on back testing. Back testing is the process of evaluating an investment strategy by applying it to historical data to simulate what the performance of such strategy would have been. Back tested performance is purely hypothetical and is provided on this document solely for informational purposes. Back tested data does not represent actual performance and should not be interpreted as an indication of actual or future performance. The value of any investment may be affected by exchange rate movements. Any decision to invest should be based on the information contained in the appropriate prospectus and after seeking independent investment, tax and legal advice. These products may not be available in your market or suitable for you. The content of this document does not constitute investment advice nor an offer for sale nor a solicitation of an offer to buy any product or make any investment.**

An investment in ETPs is dependent on the performance of the underlying index, less costs, but it is not expected to match that performance precisely. ETPs involve numerous risks including among others, general market risks relating to the relevant underlying index, credit risks on the provider of index swaps utilised in the ETP, exchange rate risks, interest rate risks, inflationary risks, liquidity risks and legal and regulatory risks.

The information contained on this document is not, and under no circumstances is to be construed as, an advertisement or any other step in furtherance of a public offering of shares in the United States or any province or territory thereof, where none of the Issuers or their products are authorised or registered for distribution and where no prospectus of any of the Issuers has been filed with any securities commission or regulatory authority. No document or information on this document should be taken, transmitted or distributed (directly or indirectly) into the United States. None of the Issuers, nor any securities issued by them, have been or will be registered under the United States Securities Act of 1933 or the Investment Company Act of 1940 or qualified under any applicable state securities statutes.

The products discussed on this document are issued by either WisdomTree Issuer PLC ("WT Issuer") or Boost Issuer (each of them separately, the "Issuer").

### WisdomTree Issuer PLC

WisdomTree Issuer PLC is an umbrella investment company with variable capital having segregated liability between its funds organised under the laws of Ireland as a public limited company and authorised by the Central Bank of Ireland ("CBI"). WT Issuer is organised as an Undertaking for Collective Investment in Transferable Securities ("UCITS") under the laws of Ireland and shall issue a separate class of shares ("Shares") representing each fund. Investors should read the prospectus of WT Issuer ("WT Prospectus") before investing and should refer to the section of the WT Prospectus entitled 'Risk Factors' for further details of risks associated with an investment in the Shares.

### Boost Issuer PLC

Boost Issuer on the other hand issues products under a Prospectus ("Boost Prospectus") approved by the Central Bank of Ireland, drawn up in accordance with the Directive 2003/71/EC. The Boost Prospectus has been passported to various European jurisdictions including the UK, Italy and Germany and is available on this document.

Boost Exchange Traded Products ("ETPs") are suitable for financially sophisticated investors who wish to take a short term view on the underlying indices and can understand the risks of investing in products offering daily leveraged or daily short exposures.

ETPs offering daily leveraged or daily short exposures ("Leveraged ETPs") are products which feature specific risks that prospective investors should understand before investing in them. Higher volatility of the underlying indices and holding periods longer than a day may have an adverse impact on the performance of Leveraged ETPs. As such, Leveraged ETPs are intended for financially sophisticated investors who wish to take a short term view on the underlying indices and understand such risks. As a consequence, WisdomTree Europe Ltd is not promoting or marketing Boost ETPs to retail clients. Investors should refer to the section entitled "Risk Factors" and "Economic Overview of the ETP Securities" in the Boost Prospectus for further details of these and other risks associated with an investment in Leveraged ETPs and consult their financial advisors as needed. Neither WisdomTree Europe Ltd. nor the Issuer has assessed the suitability of any Leveraged ETPs for investors other than the relevant Authorised Participants.

**Notice to Investors in Switzerland – Qualified Investors**

The distribution of shares of WisdomTree Issuer Plc sub-funds (the "Funds") in Switzerland which have been registered with the Swiss Financial Market Supervisory Authority (FINMA) will be made to, and directed at, qualified investors. The Funds which have not been registered with the FINMA will be marketed exclusively to regulated qualified investors. The Representative and Paying Agent in Switzerland is Société Générale Paris, Zurich Branch, Talacker 50, PO Box 5070, 8021 Zurich, Switzerland. The prospectus, the key investor information documents (KIID), the Articles and the annual and semi-annual reports are available free of charge from the office of the Swiss Representative and Paying Agent.

**Notice to Investors in France**

The information in this document is intended exclusively for professional investors (as defined under the MiFID) investing for their own account and this material may not in any way be distributed to the public. The distribution of the Prospectus and the offering, sale and delivery of Shares in other jurisdictions may be restricted by law. The Issuer is a UCITS governed by Irish legislation, and approved by the Financial Regulatory as UCITS compliant with European regulations although may not have to comply with the same rules as those applicable to a similar product approved in France. The Fund has been registered for marketing in France by the Authority Financial Markets (Autorité des Marchés Financiers) and may be distributed to investors in France. Copies of all documents (i.e. the Prospectus, the Key Investor Information Document, any supplements or addenda thereto, the latest annual reports and the memorandum of incorporation and articles of association) are available in France, free of charge at the French centralising agent, Societe Generale at 29, boulevard Haussmann – 75009 Paris, France. Any subscription for Shares of the Fund will be made on the basis of the terms of the prospectus and any supplements or addenda thereto.

**Notice to Investors in Malta**

This document does not constitute or form part of any offer or invitation to the public to subscribe for or purchase shares in the Fund and shall not be construed as such and no person other than the person to whom this document has been addressed or delivered shall be eligible to subscribe for or purchase shares in the Fund. Shares in the Fund will not in any event be marketed to the public in Malta without the prior authorisation of the Maltese Financial Services Authority.