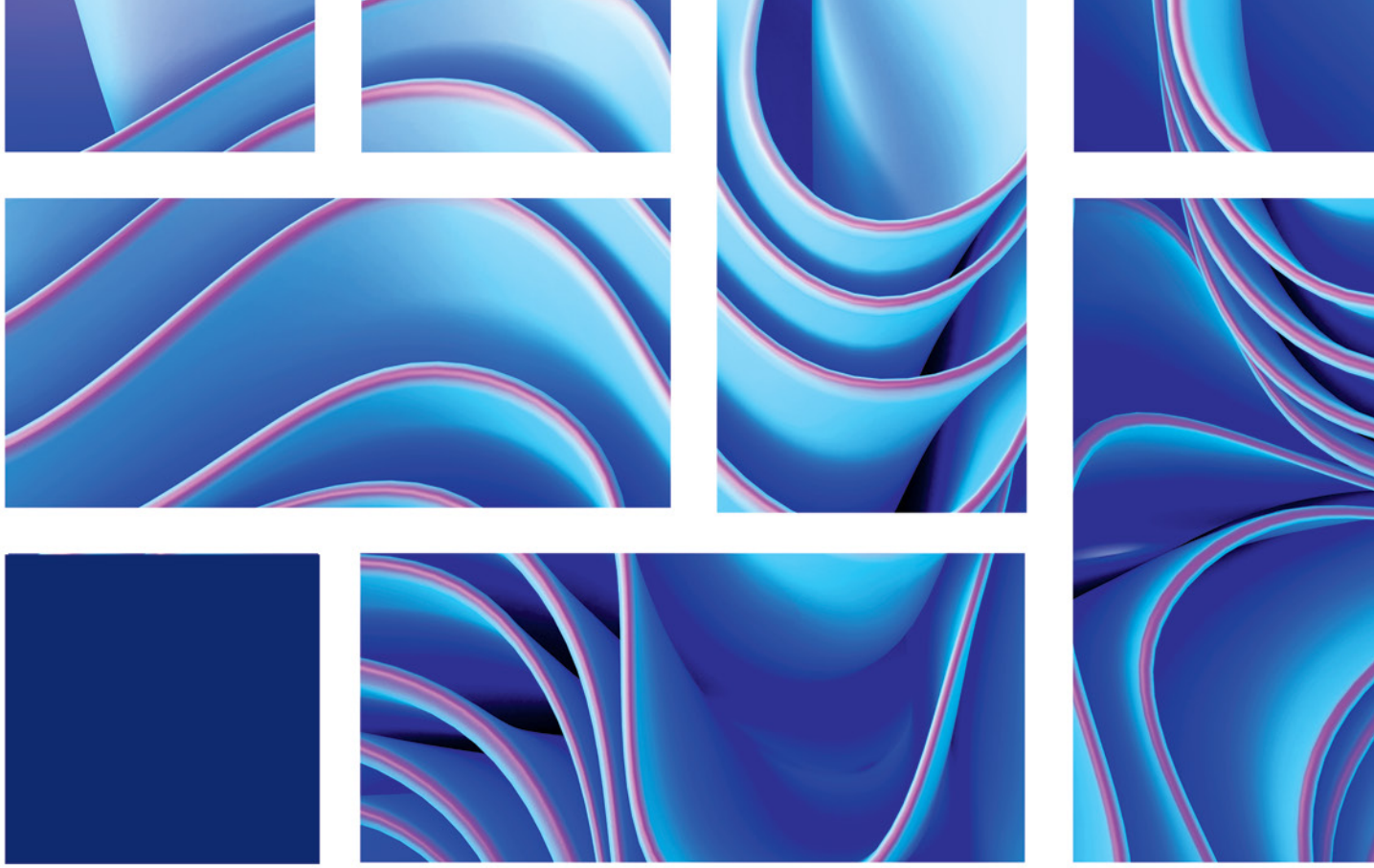

Brief

A Comprehensive Guide to ETFs (2nd edition) Module 2: Evaluating ETFs

Joanne M. Hill, PhD
Elisabeth Kashner, CFA
Dave Nadig

CFA Institute Research Foundation

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Statement of Purpose

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A COMPREHENSIVE GUIDE TO ETFs (2ND EDITION) MODULE 2: EVALUATING ETFs

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Introduction

In the first of the three modules of the second edition of *A Comprehensive Guide to ETFs*, we described the product features, benefits, mechanics, trends in fees, and history of exchange-traded funds (ETFs). We explored the factors behind ETFs' exponential growth and provided an in-depth look into the US ETF landscape. In Module 2, we turn to the process of evaluating the extensive menu of ETF options. We consider the factors critical to using these products in a portfolio given a specific set of investor objectives.

In the first section of this module, we discuss the criteria for selecting an ETF, including the funds' holding costs and operational risks, liquidity, and investment features. We focus on assessing active risk relative to a specific market segment. We call the set of criteria for effective ETF evaluation the Efficiency, Tradability, and Fit (E-T-F) framework.

The second section introduces six investor personas to illustrate how investors with different frameworks, objectives, and horizons might analyze a specific ETF selection problem using situation-appropriate due diligence criteria. The personas include a mid-career professional accumulating retirement savings, a registered investment adviser, a large global family office, a foundation, a multi-strategy hedge fund, and a young, speculative investor. For each, we describe the background, investment needs or objectives, and ETF choices and set out a process for arriving at a selection.[1] By understanding how different investors apply the E-T-F framework, we match ETF characteristics to investor needs.

[1]This second edition of the guide, like the first, is intended to be educational and informative for the average investor. The case studies are illustrative and do not constitute recommendations or investment advice.

The Elements of ETF Due Diligence: Efficiency, Tradability, and Fit

ETFs have become so successful that the process of choosing one has become overwhelming. ETF issuers have competed to fill every market niche and are well on their way to displacing structured products and separately managed account (SMA) offerings. How would a thoughtful investor make an informed, discerning choice among the thousands of ETFs on the market?

There is no single answer, because each investor has different priorities, but common principles can help. It is critical to start with a strong classification system for ETFs, one that allows users to start with broad asset classes and ask increasingly detailed questions to identify a tractable set of candidates.

A solid due diligence process grounded in cost and risk analysis should select efficient, effective products. The best such process should marry a focus on objective criteria, such as expense ratios and trading spreads, with subjective ones, such as meeting a specific cash flow goal, gaining a targeted exposure, or adopting a particular risk profile.

For the purposes of our discussion of ETF due diligence, we use FactSet Research Systems' fund classification and due diligence system, originally designed by coauthors Dave Nadig and Elisabeth Kashner, which organizes the task of ETF analysis thusly:

- *Efficiency* measures a fund's long-term holding costs and operational risks.
- *Tradability* assesses an ETF's liquidity, meaning the ability to trade at portfolio value, at scale.
- *Fit* expresses the level of active risk a fund takes, through over- and underweights relative to its specific market segment.

Finally, it is useful to document the decision process in choosing an ETF, including the major efficiency, tradability, and fit inputs, and the rationale used to achieve balance. A written record serves as a reminder of the investment goals, the comparison process, and the relative weights given to each of the pillars of ETF due diligence.

As we lay out the details of the E-T-F analysis framework, we use several ETFs to illustrate these concepts. These examples do not represent recommendations, investment advice, or the endorsement or criticism of any particular ETF.[2]

Efficiency

The longer you hold an ETF, the more critical it becomes to minimize holding costs and risks because fund costs compound over time—each penny spent on fees is a penny not earning investment returns. Costs can be ongoing or potential. Ongoing costs encompass the fund's tracking difference or expense ratio, along with tax impacts. Risks include potential counter-party default, fund closure, and delayed portfolio disclosure.

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[2]Unless otherwise indicated, all data in this module are provided by FactSet Research Systems, Inc., as of 31 December 2025, and are reproduced with permission.

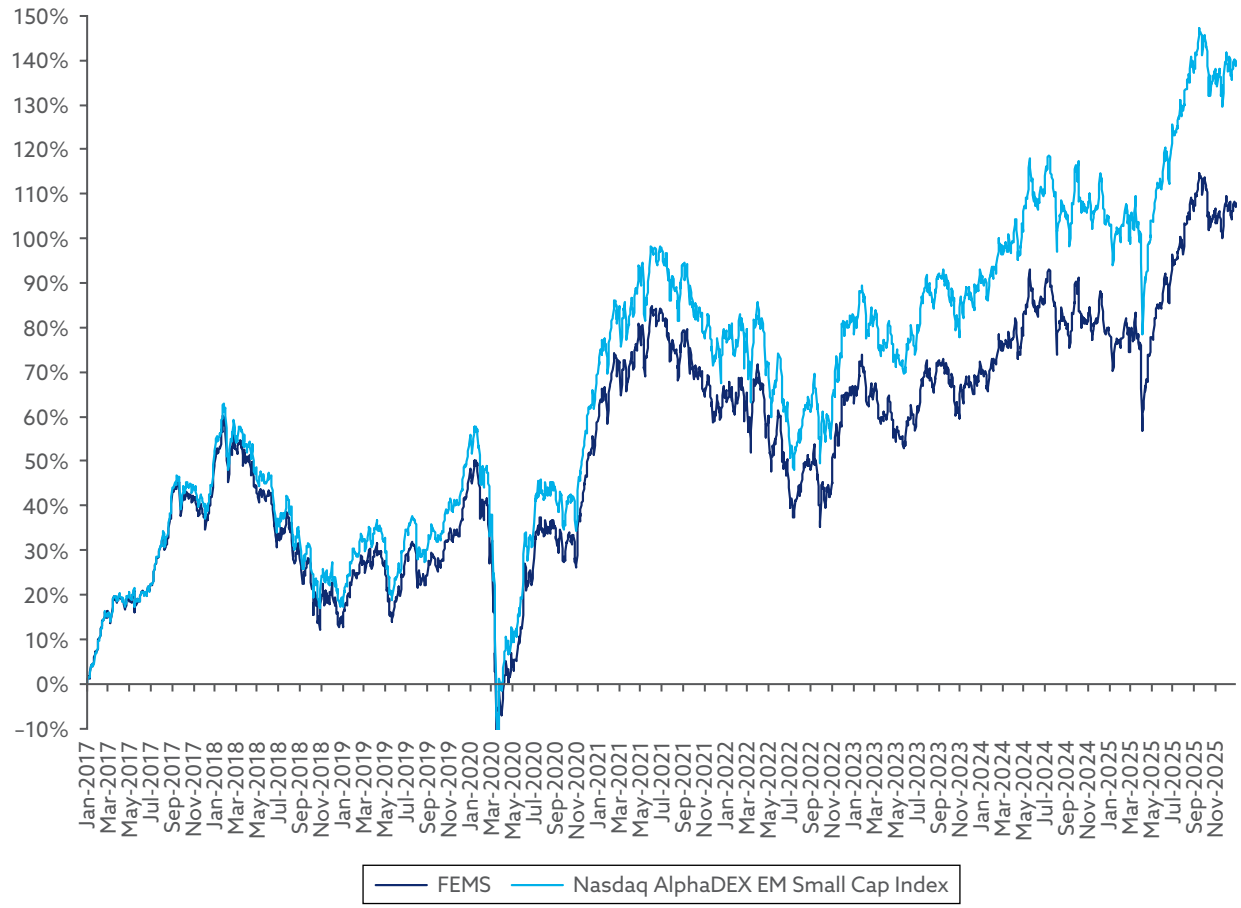
Ongoing Expenses

Expense ratios and annual distributions are often published on an ETF's homepage. It would be a mistake, however, to assume that simply knowing this information gives a full picture of fund costs. For passive products, meaning those that track an index, operational issues can open a wedge between the expected returns of the index and the actual performance of the ETF, resulting in a return that is lower than one would expect based on the expense ratio. Likewise, an ETF's structure or its managers' operating decisions can generate unwanted annual tax costs.

Deep Dive into the Concept of Tracking Difference

The importance of *tracking differences* is best illustrated with an example. Consider First Trust Emerging Markets Small Cap AlphaDEX Fund (FEMS), which has tracked the Nasdaq AlphaDEX Emerging Markets Small Cap Index since October 2015. Over the nine years between 30 December 2016 and 31 December 2025, this index appreciated by 10.21% per year. Yet FEMS returned just 8.48%—a 1.73% annual discrepancy. **Exhibit 1** compares the total returns of FEMS, measured by its net asset value (NAV), and those of its underlying index, net of foreign dividend taxes.

Exhibit 1. FEMS Index Tracking



Source: Data from FactSet Research Systems.

The gap between an ETF's returns and those of its underlying index is best expressed as tracking difference. Tracking difference is calculated by choosing a starting date, finding the one-year trailing total return of both the ETF's NAV and its underlying index, comparing the two, backtracking one trading day and repeating the process over a 12-month period, and then calculating the median value of the daily comparisons. This calculation differs from tracking error, which measures the standard deviation of daily return differences. Tracking error focuses on the distribution of returns and fails to indicate directionality; median tracking difference highlights the central tendency.

Many factors can contribute to the tracking difference.

- *Expense ratio:* The expense ratio is based on fees paid to the asset manager by the fund holder.
- *Securities lending:* Tracking difference can be affected by income to the fund from lending portfolio securities, which, depending on market conditions, can offset the expense ratio.
- *Foreign dividend tax withholding and recapture:*
  - Index providers calculate dividend payments net of foreign withholding tax and sometimes use rates that are not precisely suited to registered investment companies. Oddly, this can create a positive tracking difference, in which the ETF returns more than the index does, particularly if the index provider uses conservative withholding rates.
  - Index providers may ignore local capital gains taxes altogether. For example, the iShares MSCI India ETF returned 7.32% annually in the 10 years through 31 May 2025, versus 8.90% for MSCI India Index. The 1.68% annual discrepancy was attributable, at least in part, to a difference in withholding practices between the asset manager and the index provider.[3]
  - Asset managers devote significant resources to optimizing their foreign tax treatments, thus sometimes recouping portions of the withheld dividends.
- *Optimization or sampling:* ETF portfolio managers might hold a subset of the index securities, rather than fully replicate the index.
- *Slippage:* Some trades by the portfolio manager may occur in the capital markets (rather than through the creation/redemption baskets), at prices other than the official market close on which the NAV is based. This situation creates the possibility of generating tracking differences.
- *Commissions:* Trading fees paid to brokers by the ETF manager.
- *NAV inputs:* Tracking difference can also come from measurement rather than portfolio operations. Some portfolio holdings may have more than one appropriate price. For instance, foreign exchange, bond valuations, and precious metals prices may be struck at 4:00 p.m. GMT or 4:00 p.m. ET. If the fund accountants use one pricing method and the index provider uses another, the daily returns could be significantly different, thus creating the perception of a wide daily variation.[4]

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[3]"iShares MSCI India ETF," iShares, accessed 14 April 2026, www.ishares.com/us/products/239659/ishares-msci-india-etf.

[4]For additional details and illustrations, see E. Kashner, "The Confusing World of ETF Premiums and Discounts," FactSet (15 November 2018), https://insight.factset.com/etf-premiums-and-discounts-can-be-confusing-or-downright-misleading; and E. Kashner, "Will The Real ETF Valuation Metric Please Stand Up?," FactSet (21 March 2019) https://insight.factset.com/will-the-real-etf-valuation-metric-please-stand-up.

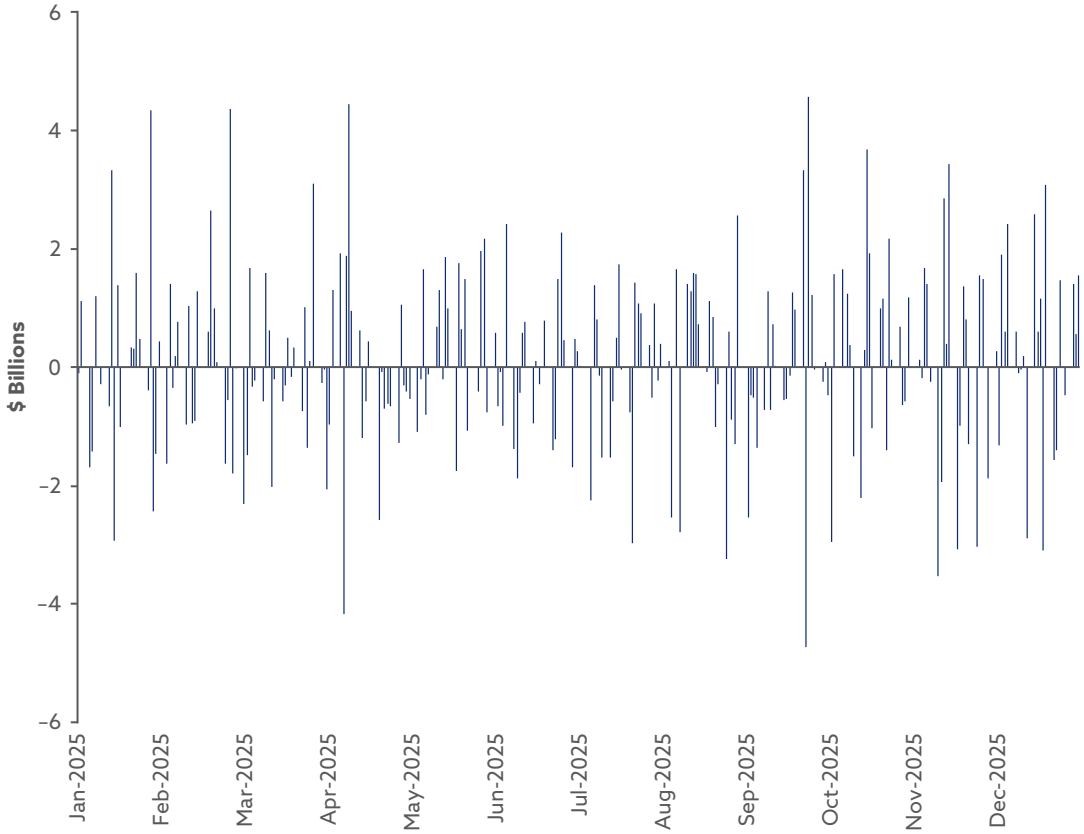
All of these sources of tracking difference except for optimization and sampling affect both passive and actively managed ETFs. Active ETFs, however, lack some of the accountability and transparency that tracking difference provides because the portfolio managers are not bound to replicate the performance of an index. Investors in actively managed ETFs should investigate the manager's policies for securities lending, foreign dividend tax recapture, internally traded portfolio turnover, and trading commissions.

Tax Consequences

ETFs' vaunted *tax efficiency*, a major differentiator from mutual funds, comes from their ability to control the realization of capital gains through in-kind redemptions (see Module 1). Redemption requests from authorized participants (APs) provide ETF portfolio managers with the opportunity to remove the shares with the highest tax liability from the portfolio.

ETF portfolio managers rely on a steady stream of redemptions to avoid realizing capital gains while repositioning the fund. The more frequent or extensive the portfolio turnover, the greater the need for redemptions. The Invesco QQQ Trust (QQQ) trades upward of $20 billion per day and experiences frequent creations and redemptions, presenting regular opportunities to wash out low-basis positions. This scenario is demonstrated in **Exhibit 2**, which shows QQQ's daily

Exhibit 2. QQQ Flows, 2025



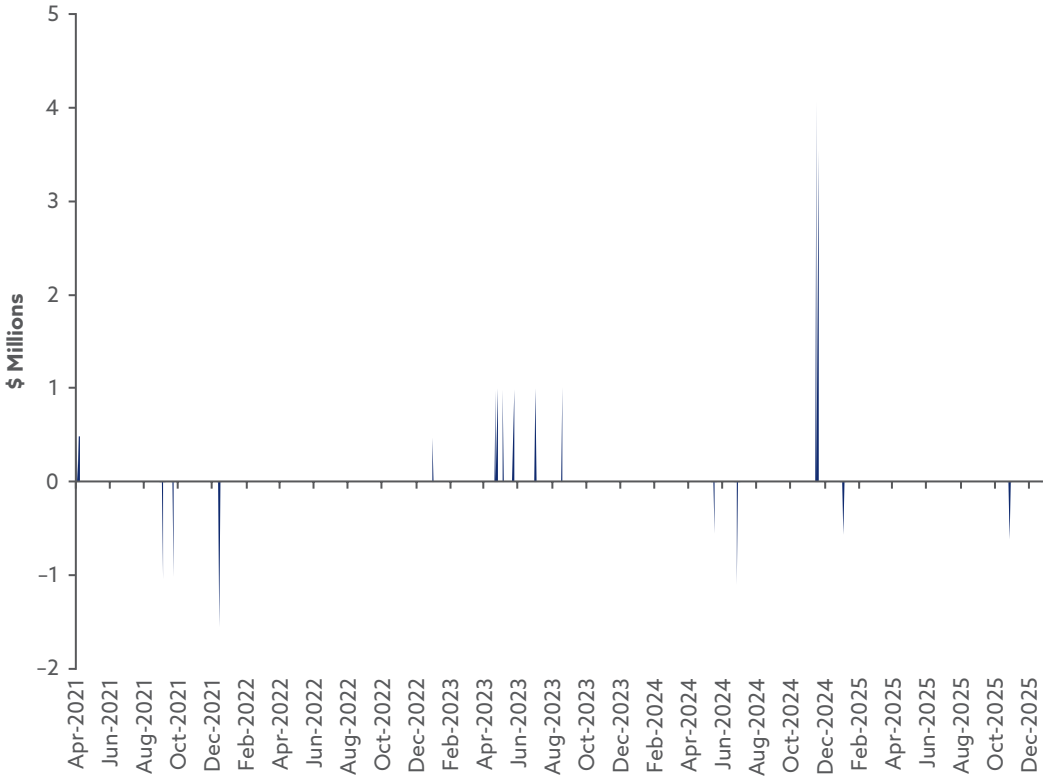
Source: Data from FactSet Research Systems.

inflows and outflows, measured in US dollars. Flows are the result of net creation or redemption activity.

Managers of thinly traded ETFs may have few redemption opportunities and therefore risk realizing capital gains when rebalancing or repositioning their portfolios (assuming they are selling winners), which results in a year-end capital gain distribution. This situation occurred with the SmartETFs Dividend Builder ETF (DIVS), which experienced no redemptions (outflows) in 2022 or 2023, as shown in **Exhibit 3**.[5]

In 2022, 2023, and 2024, DIVS's portfolio managers distributed capital gains as they closed winning trades through direct sales rather than redemptions. DIVS investors got hit with short-term gains of 1.36% (of the year's initial NAV) in 2024 and long-term gains of 3.46%, 0.18%, and 1.08% in 2022, 2023, and 2024, respectively.

Exhibit 3. DIVS Flows from Inception in 2021 through 2025



Source: Data from FactSet Research Systems.

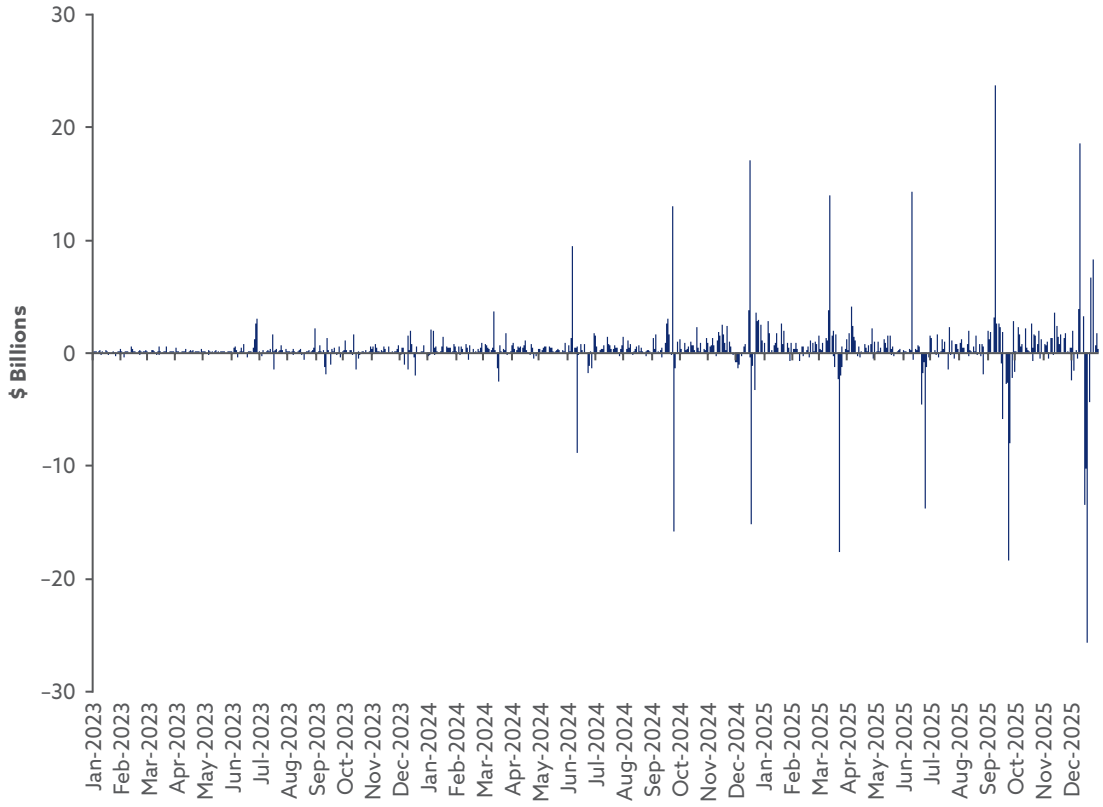
[5]"DIVS Dividend Builder ETF," Guinness Atkinson Funds, accessed 14 April 2026, www.gafunds.com/our-funds/divs.

Deep Dive into ETF Tax Management: The Heartbeat Trade

DIVS suffered a redemption drought and had to face the consequences of passing on short-term gains to their investors. That was unfortunate because many ETF portfolio managers have leveraged their relationships with their APs to manufacture redemptions through the so-called heartbeat trade.[6] The term *heartbeat* describes a regular pattern of spikes—first upward (creations) and then downward (redemptions)—in the ETF flows chart, like the display on a cardiac monitor. This coordinated transaction creates artificial redemption opportunities, allowing managers to wash out low-basis shares and avoid capital gains distributions.

Here is how it works: A few days before a major portfolio turnover date, such as an index rebalance, an AP creates a large number of ETF shares. On the rebalance date, the AP redeems those shares, providing the portfolio manager with a perfect opportunity to exchange away winners. This pattern creates distinctive spikes in the flows chart resembling a heartbeat on a cardiac monitor. A good example can be found with the Vanguard S&P 500 ETF (VOO) in **Exhibit 4**.

Exhibit 4. VOO Flows, 2023–2025



Source: Data from FactSet Research Systems.

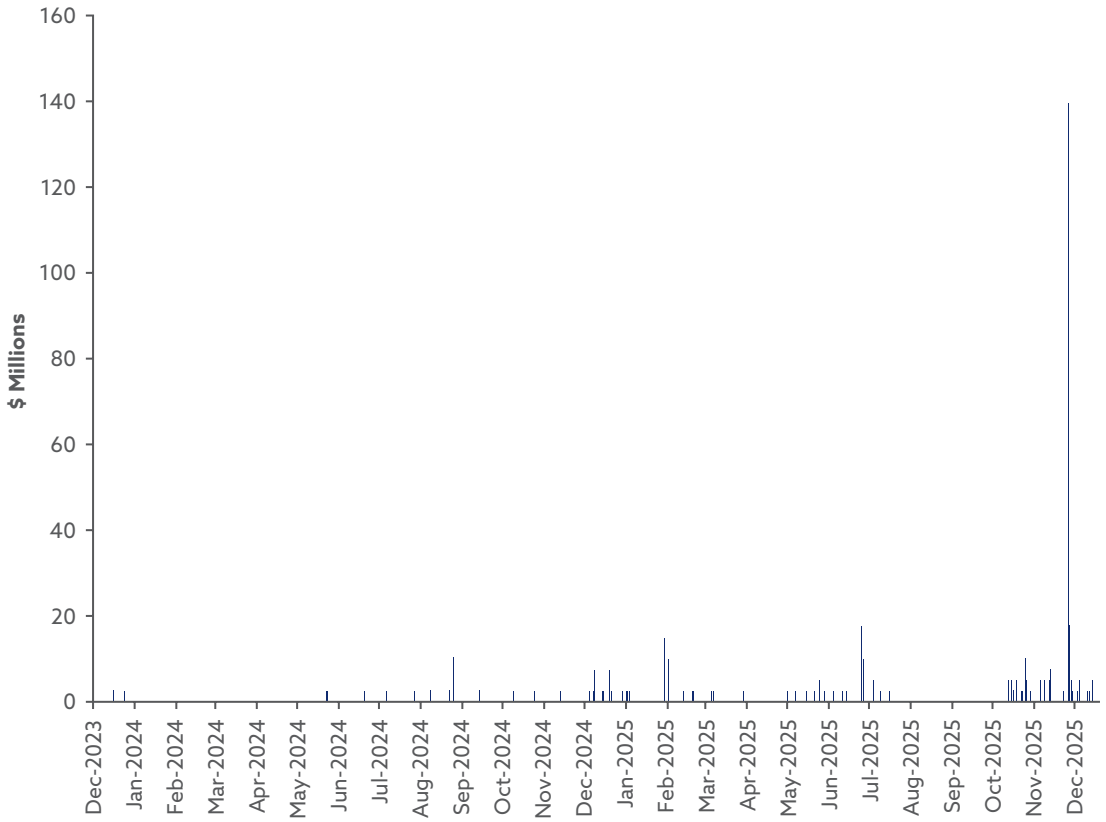
[6]See E. Kashner, "The Heartbeat of ETF Tax Efficiency," FactSet (18 December 2017), https://insight.factset.com/the-heartbeat-of-etf-tax-efficiency.

The paired spikes shown in Exhibit 4 are telltale indicators of a *heartbeat trade*. To check whether an ETF is likely to distribute capital gains, an investor can analyze its flows activity. If there are frequent redemptions, as with QQQ, or heartbeats, as with VOO, chances are good the ETF will avoid an unwanted tax bill.

Many ETFs use natural or manufactured redemptions to avoid realizing capital gains, but some are not able to do so. ETFs that make heavy use of derivatives or that hold certain foreign stocks are often forced to realize gains. Bond ETFs often cannot engage in heartbeat trades. If they could, we would not have seen capital gains distributions (0.52%) from the iShares Total Return Active ETF (BRTR) in 2024. The lack of redemptions, both natural and heartbeat, is shown in **Exhibit 5**.

The previous discussion applies specifically to ETFs organized as open-end funds under the 1940 Investment Company Act, which represent the bulk of the US ETF market. ETFs organized under the 1933 Securities Act—including many that hold commodities, cryptocurrencies, and derivatives—have distinct tax profiles that need to be evaluated in the due diligence process. For example, some ETFs that use futures or swaps as a primary holding issue Schedule K-1 tax forms (K-1s) to report ownership, gains, and distributions, which can complicate a tax return.

Exhibit 5. BRTR Flows from Inception in 2023 Through 2025



Source: Data from FactSet Research Systems.

To assess ongoing ETF costs, examine the tracking difference versus the ETF benchmark and the flows chart. If the tracking difference is unavailable because of data limitations or active management, investigate the expense ratio, as well as the manager's policies for securities lending, foreign dividend tax recapture, internally traded portfolio turnover, and trading commissions.

ETF Operating Risks

In addition to understanding the explicit and implicit costs of holding an ETF, it is essential to understand what could happen if the fund cannot operate as usual. Default, fund closure, and inability to know the portfolio exposure can be uncomfortable and sometimes expensive.

Default

For the most part, the securities in ETFs are held in trust for the fund holders. However, for one index-based, exchange-traded structure—exchange-traded notes (ETNs)—counterparty risk becomes a factor. In extreme cases, counterparties can default, leaving fund holders without good recourse to access their invested capital or returns on that capital. Because ETNs are structured notes, investors are exposed to the credit risk of the issuer, which is generally a large bank. ETN defaults are rare. The vast majority of ETNs that have stopped trading have either matured or been called according to their prospectus terms.

The most notable default occurred when Lehman Brothers collapsed in 2008, leaving holders of its three ETNs with senior creditor status in bankruptcy proceedings. Although such events are uncommon, they underscore the importance of monitoring issuer creditworthiness. ETN holders should periodically check the credit ratings of the issuing bank and monitor credit default swap (CDS) rates as an early warning system. Consider liquidating an ETN position if the issuer's CDS rate rises above your comfort level.

All-out default is an extremely bad outcome because ETN holders must get in line with all other senior, unsecured creditors to get a partial payout. There are other, gentler types of default to consider as well, namely counterparty failure in the derivatives or securities lending markets.

ETFs organized as 1940 Act open-end funds are permitted to hold and write derivatives and to lend their portfolio securities. Listed derivatives, such as exchange-traded futures and options, enjoy the protection of having a central clearinghouse as the trade counterparty, but OTC derivatives may offer only daily settlement of gains and losses as a protection. A losing counterparty could fail to post a settlement payment, leaving the winner unable to collect the day's profits—and needing to find a more trustworthy counterparty. Unfortunately, keeping track of an ETF's OTC derivative counterparties can be difficult because daily disclosures are not required.

The same is true of securities lending. The SEC requires borrowers to post collateral, and industry practice is to overcollateralize at 102% for domestic stocks and 105% for foreign ones, but any day's profits above that level could be under threat if a borrower refuses to return the lent securities following a sharp rally. Asset managers facing this rare situation will often endeavor to make investors whole, rendering this extremely rare occurrence practically painless.

In many cases, the risk of lending portfolio securities is well compensated. An example is the VanEck Digital Transformation ETF (DAPP). DAPP's securities lending revenue appears in

Exhibit 6. DAPP Statement of Operations, 1 October 2024–31 March 2025

	Biotech ETF ($)	Digital Transformation ETF ($)	Energy Income ETF ($)	Environmental Services ETF ($)
Income:				
Dividends	2,056,034	—	1,201,595	317,564
Interest	6,631	10,453	907	1,090
Securities lending income	9,068	558,541	15,065	57,662
Net foreign taxes withheld	(32,688)	—	(93,780)	(4,539)
Total income	**2,039,045**	**568,994**	**1,123,787**	**371,777**

Source: VanEck Filings.

its annual and semiannual financial statements.[7] Lending fees, as shown in **Exhibit 6**, drove DAPP to outperform its underlying index by 3.88% annually between 31 December 2021 and 31 December 2025.

Fund Closure

ETF closures are not a credit event. They happen regularly for funds that are not profitable or do not find sufficient investors to meet listing standards. Between 2008 and 2025, about 6.3% of ETFs closed down annually (the percentage is based on the number of ETFs trading at the end of the prior year).

Investors in funds that are shutting down will be made whole as security positions are liquidated and the proceeds are distributed. Nevertheless, an ETF closure is disruptive and often brings potential tax and reputational consequences. Anyone receiving a payout from an ETF closing (delisting on its exchange) has the problem of redeploying the cash; financial advisers face the additional headache of breaking the news to their clients. The task gets worse if the ETF's NAV has risen in value since the purchase date because the holder expects to realize a capital gain when the ETF closes.

Low assets are the strongest predictor of ETF closure. Historically, the median assets under management (AUM) of closed ETFs have been $7 million, measured 60 days before each ETF's closure date. Yet not all ETFs with low assets face closure risk. ETF issuers may have additional patience for low-asset funds that exhibit growth, by way of inflows. They also may choose to hold on if their product occupies a distinct market niche that happens to be out of favor.

[7]"Semi-annual Financial Statements and Other Information," VanEck (31 March 2025), https://vaneck.onlineprospectus.net/vaneck/DAPP/index.php?ctype=sem_fin_statement.

Because ETNs and levered and inverse ETFs are particularly vulnerable to market disruptions, their closure rate is higher than that of other ETF structures. Banks that issue ETNs respond to their risk desks' need to limit their balance sheet exposures. Issuers of geared ETFs respond to exchange listing requirements that specify a minimum trading price, a situation that can arise when the gearing direction is contrary to market trends.

To assess an ETF's viability, check its AUM, legal structure, use of leverage, shorting, OTC derivatives, recent flows, and competitive landscape.

Transparency

ETF investors have come to expect an extraordinary level of product disclosure. Published daily holdings, NAVs, upcoming distribution schedules, and, for passive products, links to methodology documents that detail the construction and rules for maintaining the index all provide investors with the tools needed to assess ETF holding costs and risks. Most ETFs, specifically those that qualify under the SEC's ETF Rule (Rule 6c-11), are required to publish complete holdings daily. Many others voluntarily meet this standard.

The disclosure of daily ETF holdings allows investors to monitor their exposures in real time—a significant advantage over traditional mutual funds, which typically disclose holdings only monthly or quarterly. This transparency is especially valuable during geopolitical events or company-specific crises, when understanding precise portfolio exposure can inform critical investment decisions. Access to NAVs (and distributions) allows investors to measure portfolio managers' performance apart from capital markets activity. Distribution schedules help time investment, making it easier to avoid "buying the dividend" or even receiving a capital gains distribution.

Detailed index methodology documents are key to understanding the rules and processes that drive security selection and weighting, as well as rebalancing and reconstitution. The most investor-friendly ETF webpages contain a link to such documents. Webpages should at least provide the full index name; the asset managers should ensure that the index provider publishes such documents without barriers. Without index construction guidelines, investors cannot evaluate the fund's investment process, leaving themselves vulnerable to unexplained changes in performance.

Investors in actively managed ETFs face this vulnerability regularly. Full portfolio disclosure can mitigate the uncertainty on a day-to-day basis but cannot substitute for the predictability of a fully rules-based investment strategy. For any passively managed ETF that does not disclose holdings daily, index methodology access and transparency can also bridge the gap, and a tight tracking difference can assure investors that intraperiod holdings hew to the index constituents.

An ETF's efficiency—the minimization of ongoing costs and risks—is core to ETF due diligence. Time invested in measuring explicit and implicit fund expenses and key risks can protect investors against unwanted expenditures and product failures.

Tradability

The other half of the objective portion of ETF due diligence is tradability, an assessment of the cost to buy and sell an ETF. ETFs must be bought and sold on exchanges. Minimizing trading costs promotes investor success.

Secondary Markets

ETF trading happens on the world's stock exchanges, each operating with the regulatory framework of the jurisdiction in which it is based. The main data point to watch is the trading spread, or the difference between the highest bid and the lowest offer. The tighter the spread, the easier it will be to complete a trade close to the intraday portfolio value. It is also important to look for high trading volumes because the presence of multiple shares on the bid and offer keeps spreads tight and stable. Moreover, volume history may hint at hidden liquidity, with occasional spikes showing episodic large trades.

Order Types

ETF traders can enter two types of orders: market or limit. The examples below portray purchases; sales work the same way, in reverse.

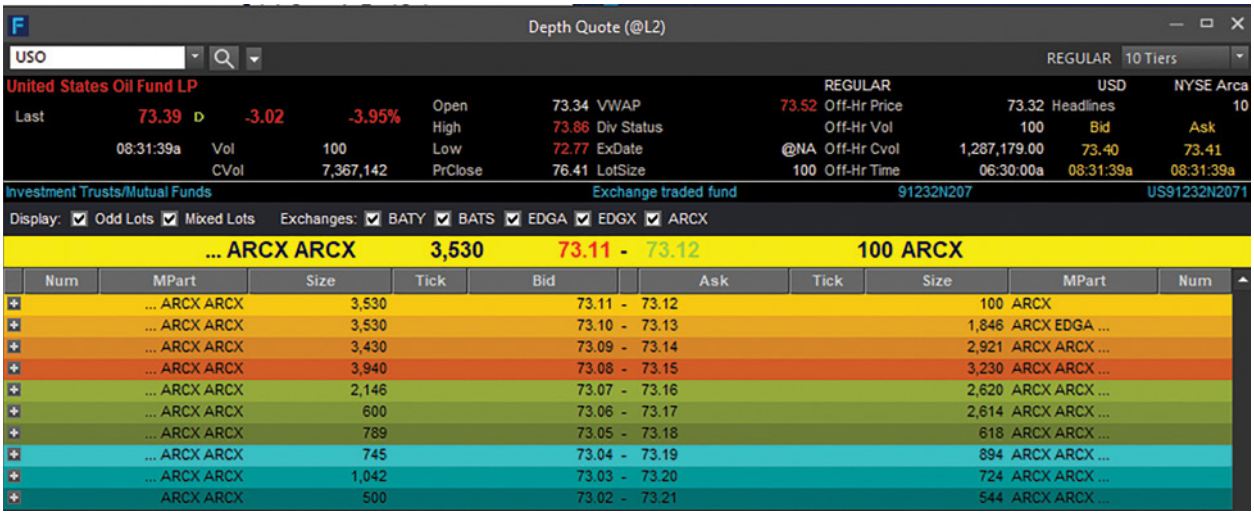
- *Market order:* The buyer specifies the number of shares but not the price. The order is filled starting with the lowest offer and, if necessary, working up the order book by price, taking the next lowest, and then the next, and so on, until the specified number of shares are purchased. Market orders will be filled expeditiously, but the buyer might pay a price for speed and certainty. Market orders can be suitable for the most liquid ETFs if volatility is moderate, lessening the chance of a swift change in prices. In other cases, when volumes are modest and spreads are wide or inconsistent, limit orders are the safer bet.
- *Limit order:* The buyer specifies both the number of shares and the maximum price, getting in the queue behind other buyers who previously placed bids at that same price (if any). The order will be filled if sellers offer shares at the specified price or if a market order works its way through the order book. Limit orders may be filled quickly, slowly, or not at all; fulfillment depends on the price behavior of sellers. Limit orders are suitable for investors who have a clear sense of the price they wish to pay or who wish to control trading costs.

Consider how each type of order would work when buying 10,000 shares of United States Oil Fund (USO), based on the order book from 24 June 2025 at 11:31:40 a.m. ET, as shown in **Exhibit 7**. A market order to buy 10,000 shares would work through the order book, buying all 100 shares offered at $73.12, the 1,846 shares at $73.13, and so on, ending with a purchase of 1,903 of the 2,620 shares offered at $73.16. The average price (weighted) would be $73.145, which is 2.5 cents higher than the best offer.

A market sell order would follow the same logic, working from top to bottom of the bids. At the moment of this snapshot, the bids were for larger numbers of shares, so a market sell order would get slightly better execution, with an average price of $73.101, just one penny below the best bid.

Instead, if a buyer placed a limit order to purchase 10,000 shares of USO at $73.10, those shares would slide in at the end of the queue at that price, behind the 3,530-share lot at $73.11 and the same-size lot at $73.10. This order might not be filled if traders place additional buy orders at $73.11 or higher, pushing the "ten cent kind" lower in the queue. Even if USO started trading at $73.10, the buy order would be filled only if sellers offered at least 13,530 ETF shares at that price. A partial fill is also possible.

Exhibit 7. Consolidated USO Order Book, Level 2, 24 June 2025 (time stamps in Pacific time)



Source: FactSet Research Systems.

USO is highly liquid. Most ETFs have a far thinner order book. Trade these with caution, and, if your trade is sizable, reach out to an ETF trading specialist (more details can be found in the section "When and How to Call an ETF Specialist").

Volume

In general, ETFs that have high trading volumes also have tight spreads. **Exhibit 8** illustrates the relationship between ETF volumes and spreads in ETFs of all asset classes, excluding leveraged and inverse products. As 45-day median volumes (*x*-axis, in millions of US dollars) increase, 45-day median time-weighted average spreads (TWASs) decrease.

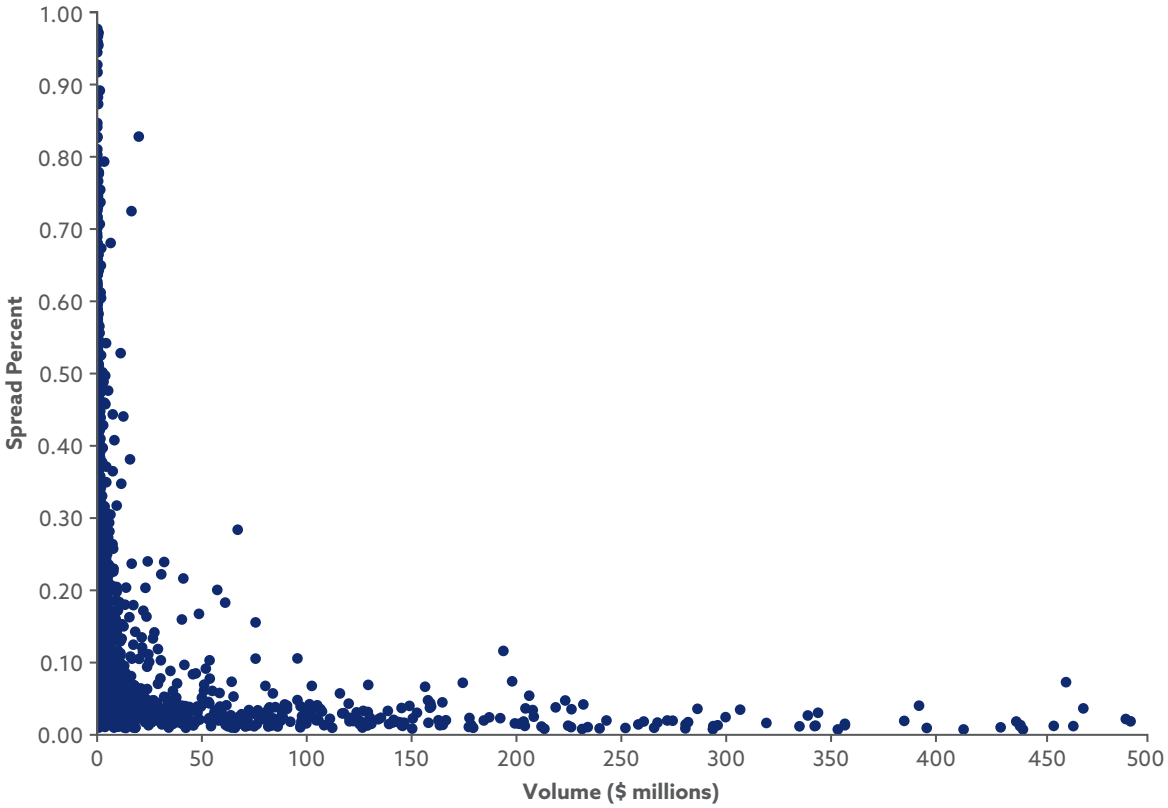
For ETFs with daily volume exceeding $200 million, spreads are uniformly below 10 bps. Some low-volume ETFs can accommodate high-volume trades, taking advantage of so-called hidden liquidity. This scenario is described in the section "When and How to Call an ETF Specialist."

Spreads

Trading spreads measure the gap between the highest bid and the lowest offer, expressed as a percentage of their midpoint. The narrower (or tighter) the spread, the better the chances of efficient trade execution. Spreads are critical to understanding an ETF's overall trading costs.

The SEC requires all ETFs authorized under Rule 6c-11 ("The ETF Rule") to publish the 30-day median bid–ask spread, calculated using a series of snapshots of the National Best Bid and Offer (NBBO) taken every 10 seconds. Many ETF issuers provide spread data for all their ETF suite,

Exhibit 8. Average Spreads vs. Volumes of US ETFs, 45 Trading Days Through 31 December 2025



Source: Data from FactSet Research Systems.

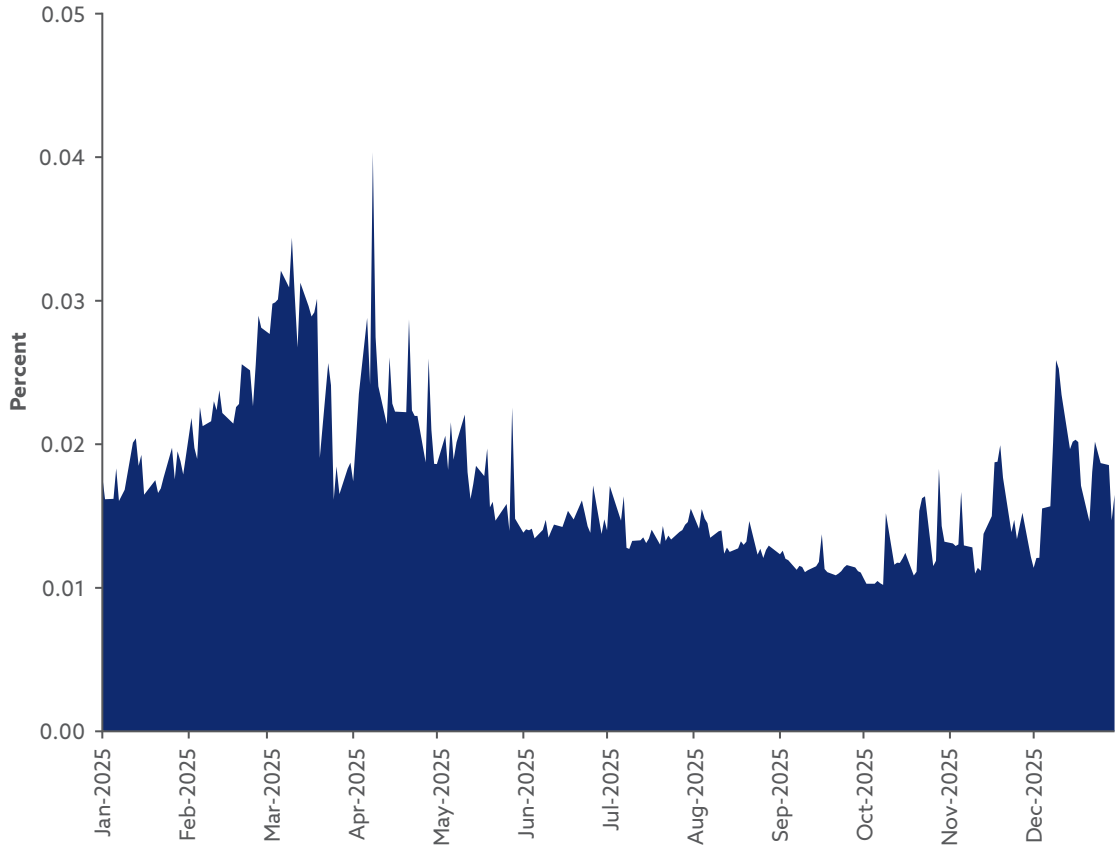
even if some ETF products are not governed by Rule 6c-11. This is a key ingredient for ETF tradability analysis—but not the final word.

The SEC's metric has limitations that investors should understand:

- NBBO spreads may be based on as few as 100 shares per side, so executing larger trades may require accepting wider spreads as you move through the order book.
- The median calculation excludes outliers, which helps identify typical conditions but will not reveal the full range of trading costs you might encounter.

To solve the outlier issue, examine a separate metric, the time-weighted average spreads (TWAS). TWAS includes all NBBO inputs, adjusted for their duration during the trading day. **Exhibit 9** shows the range of TWAS values over the course of 2025 for the State Street SPDR S&P Biotech ETF (XBI), which are anything but static.

Exhibit 9. XBI Time-Weighted Average Spread, January 2025–December 2025



Source: Data from FactSet Research Systems.

Secondary Market Due Diligence Metrics

Ahead of placing a trade, make sure to gather as much information as possible on recent spreads (in percentage) and trading volume (in dollars, for comparability). Use these data to weigh the risks and benefits of market and limit orders and to decide whether to involve an ETF liquidity provider—a specialty ETF trading firm—or to consult with the ETF capital markets desk of the broker with whom you are working.

Primary Markets

Investors trade ETFs on the secondary markets (stock exchanges). The spreads encountered in these markets can be influenced by primary market conditions—namely, the costs and risks an AP bears for creating or redeeming ETF shares, a process described in Module 1. Investors should understand the factors that APs must consider, to contextualize trading spreads and

engage effectively with third-party liquidity providers. Put simply, understanding what goes on inside AP firms can help investors when they talk to their trading desk or broker.

ETF primary market activity—that is, creation or redemption activity transacted between the AP and the ETF issuer—requires delivery or receipt of a basket of securities in exchange for ETF shares. To profit from the creation or redemption, an AP must calculate the likely transaction price (and associated fees) for each basket security given the required number of shares. This calculation will consider several variables, including volume, volatility, trading hours, and exchange rates. The AP will use these to estimate the market impact of buying or selling the basket securities.

Underlying Volume

One metric that helps contextualize market impact is underlying volume per million, which is a weighted average of the percentage of shares required to execute a $1 million portfolio transaction.

The Dimensional US Core Equity Market ETF (DFAU) holds a portfolio of US stocks, primarily (by weight) large caps and mega-caps, with top holdings in NVIDIA, Apple, Microsoft, and Amazon (as of 31 December 2025). A $1 million portfolio trade would barely be noticeable because it would involve just 0.0003% of DFAU's overall share volume. In contrast, the Principal International Equity ETF (PIEQ) holds just 41 stocks, all traded outside the United States. A $1 million portfolio trade for this ETF would represent 12.14% of the recent share volume for its component stocks, as of 31 December 2025.

DFAU makes execution easy in other ways: Its portfolio of US-listed securities trades during US market hours. PIEQ's portfolio's trading hours overlap with just 42.15% of US market hours.

Trading ETFs with Foreign Holdings

Market hours overlap (MHO) measures the percentage of home country exchange hours during which the fund's constituents are open for main-session trading. If the ETF holds only stocks, bonds, or futures that trade on US exchanges, MHO should be 100%. In contrast, the MHO of the iShares MSCI Japan ETF (EWJ) is 0% because Japanese and US main trading hours do not overlap. EWJ holds only Japanese-listed stocks and a sliver of cash-like instruments. Generally, US APs will have to delay transacting in the Japanese markets for several hours after trading EWJ in the United States. This situation creates risk because security prices and foreign exchange rates might change while the AP waits for Japan's markets to open. Instantaneous arbitrage will not be possible. To hedge this risk, APs and market makers widen their spreads when MHO values are low.

Premiums and Discounts

Under normal conditions, the fair value of an ETF's portfolio should sit at the midpoint between its bid and offer. If not, it is important to explore why the ETF has been trading at a premium or discount. Sometimes there is a good reason. Impairment of the creation–redemption mechanism, which happens in the rare instance in which the asset manager deems a market inaccessible, such as Russian equities following the 2022 invasion of Ukraine, is a major issue. In such cases, the ETF may serve as a price discovery vehicle. An impaired ETF behaves like

a closed-end fund and no longer has the key properties of ETFs while it is closed for creation or redemption.

Away from the headlines, ETF premiums and discounts may occur for other reasons. Persistent one-way flows in a short period can make one side of the trade more attractive, driving spreads off-center vs. intra-day NAV. Asset managers might charge transaction fees to make up for uncertainties in NAV valuations. Differences between creation and redemption basket constituents might drive different valuations for the bid and the offer.

Sometimes, premiums and discounts may be illusory, based on stale NAVs. This happens in fixed income during times of rapid changes in interest rates or credit ratings as well as in precious metals, international equities, and some futures. An ETF specialist can provide an assessment of real-time fair value.

When and How to Call an ETF Specialist

ETF specialists are teams at brokers that have specific expertise in trading ETFs. Their ability to transact in the primary markets allows them to pass on savings relative to executing solely based on the order book.

When should you involve an ETF specialist rather than place an order directly? A practical threshold is when your trade represents more than 10% of the ETF's average daily volume. Beyond this size, your order may move the market or require walking significantly through the order book, making specialist execution potentially more cost-effective. ETF specialists can access the primary market through creation and redemption mechanisms, potentially offering better prices than you could achieve by trading solely in the secondary market.

ETF specialists want to earn your business with fair pricing and prompt, clear communication. These firms operate in highly competitive markets, so do not be afraid to make them work for your business. Put out a request for quote to several firms, just as you would when buying or selling a car.

Make sure to ask the specialist for a two-sided quote, so you do not reveal your intentions in the negotiation phase. Before handing an order to an ETF specialist, educate yourself by checking volumes, spreads, underlying volumes, market hours overlap, and recent premium and discount levels. This information will help you assess their quotes and the quality of their advice. Likewise, seeing ETF pricing through their eyes will help you understand the pricing and context they provide.

Specialists may offer the choice between intraday and end-of-day execution. Although stock volumes tend to be highest at the market open and close, ETF volume and liquidity can be lower at these times because market makers can find it more difficult to conduct arbitrage across the ETFs and its underlying holdings at those times.

Another path for executing based on creation and redemption costs is working with ETF asset managers' capital market desks. ETF issuers offer this service to clients to support a positive trading experience.

Tradability—price impact minimization when buying or selling—is as essential to ETF due diligence as efficiency. Make sure you watch the bids and offers and compare the spreads and volumes before selecting an ETF.

Fit

While efficiency and tradability focus on minimizing known costs, fit addresses a different challenge: ensuring that the ETF's investment strategy aligns with your objectives. The cost of getting fit wrong can dwarf concerns about expense ratios or spreads. Consider the relative impact of lapses in each dimension:

- *Efficiency:* In most cases, tracking differences will be somewhat larger (meaning more negative) than the expense ratio, generally by 0.10% to 1.00%.
- *Tradability:* The TWAS gives a good first-order estimate of trading costs. Bad execution (short of a major mishap) might add 0.05% to 0.20% to the TWAS.
- *Fit:* In some cases, the spread between the best and worst one-year performance among competing ETFs can be quite large—as high as 60% for narrowly based, high-volatility ETFs.

For example, in 2024, all six US ETFs offering exposure to the global digital economy did well. The Fidelity Crypto Industry and Digital Payments ETF (FDIG) returned 17.7%, but the First Trust SkyBridge Crypto Industry and Digital Economy ETF (CRPT) blew the lid off, returning 74.2%. These ETFs have distinct differences in construction that drive their pattern of returns. Effective due diligence must include a deep dive into each ETF's process of security selection and weighting to understand how and why the portfolio might diverge from its starting universe.

Classification Is the Bedrock for Gauging Fit

As described in Module 1, ETFs offer a wide variety of exposures, from broad funds that mimic entire markets to targeted ones, such as the previously described digital economy ETFs. A sound fit analysis must start by identifying an exact set of funds that suit the investor's purpose. For example, an investor seeking a bond ETF must first choose the issuer type (corporate, government, or both; domestic or international), the credit quality (investment grade, high yield, or both), and the maturity, which can range from ultra-short-term to long-term maturities. Homing in on ultra-short-term US Treasuries, for example, would allow the investor to ignore 926 bond ETFs and evaluate only 22. **Exhibit 10** shows FactSet's ETF screener results for this search.

In crowded segments, additional refinement might be useful to identify the funds of interest. For example, as of 31 December 2025, 78 US-domiciled ETFs offered exposure to the core US small-cap equity market, excluding value and growth.[8] These funds can be further sorted into nine separate strategies, as shown in **Exhibit 11**.

Winnowing ETFs within a segment by investment strategy makes fit analysis far easier. It can be a daunting task to review 78 small-cap ETFs, but it is far simpler to sift through 12 vanilla, 9 fundamental, or 4 low-volatility offerings. A strategy-agnostic investor could use a two-step process, selecting one ETF from each attractive strategy and comparing the winners head to head.

Notably, every index provider defines the large-, mid-, small-, and micro-cap breakpoints differently. As of 31 December 2025, ETFs that track the S&P 600 Index had an asset-weighted

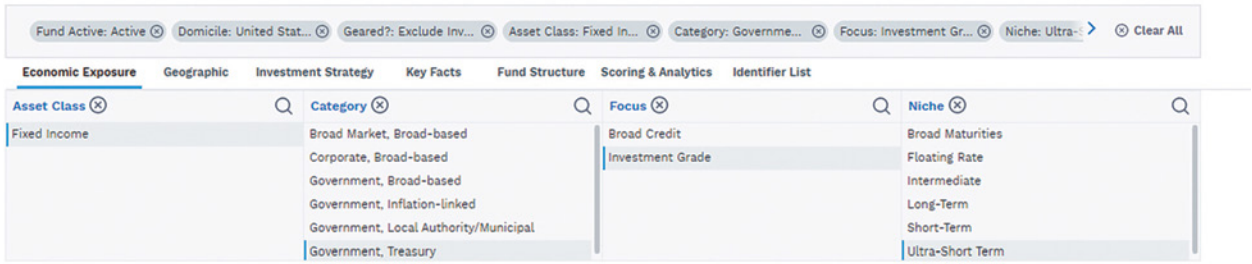
[8]FactSet classifies funds based on statements made in the prospectus and documents incorporated by reference, such as index methodologies.

average market cap of about $3.8 billion; for Vanguard's CRSP-based small-cap ETF, it was $11.6 billion. The top holding in the S&P 600 ETFs was TTM Technologies, with a market cap of $10.4 billion. The largest company held in the Vanguard Small-Cap Index Fund ETF (VB) was Sandisk Corp, with a market cap of $60.6 billion. The 12 most straightforward US small-cap ETFs vary significantly and therefore require close attention as part of a due diligence process.

Benchmarks Help Anchor Comparisons

Imagine you are a strategy-agnostic investor who would like to select a small-cap US equity ETF, and you have identified the most efficient and liquid ETF from each of the strategies shown previously. Because of the disparities in the definitions of small caps, you include two vanilla ETFs, one tracking the S&P 600 and one tracking a broader index. **Exhibit 12** lists the finalists.

Exhibit 10. FactSet ETF Screener, Ultra-Short-Term US Treasury ETFs



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RESULTS: 21

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Summary

Add Columns ETP_NAV_TRET(12/31/2025,1YR)

	Ticker Symbol	Proper Name	ETF Issuer	Expense Ratio	AUM 12-31-25	ETF Launch	ETF Strategy	2025 Return (NAV TR)
1	SGOV	iShares 0-3 Month Treasury Bond ETF	BlackRock, Inc.	.09%	68,552,678,028	05/26/2020	Vanilla	4.24
2	BIL	State Street SPDR Bloomberg 1-3 Month T-Bil	State Street	.14%	42,691,625,552	05/25/2007	Vanilla	4.16
3	SHV	iShares Trust iShares 0-1 Year Treasury Bond	BlackRock, Inc.	.15%	19,955,148,183	01/05/2007	Vanilla	4.20
4	GBIL	ACCESS TREASURY 0-1 YEAR ETF	Goldman Sachs	.12%	6,692,690,000	09/06/2016	Vanilla	4.19
5	TBIL	US Treasury 3 Month Bill ETF	1251 Capital Group Inc.	.15%	6,306,668,460	08/09/2022	Vanilla	4.21
6	VBIL	Vanguard 0-3 Month Treasury Bill ETF	Vanguard	.07%	4,637,715,000	02/07/2025	Vanilla	-
7	BILS	State Street SPDR Bloomberg 3-12 Month T-B	State Street	.14%	3,853,960,443	09/23/2020	Vanilla	4.21
8	TBLL	Invesco Short Term Treasury ETF	Invesco	.08%	2,244,913,856	01/12/2017	Vanilla	4.24
9	CLIP	Global X 1-3 Month T-Bill ETF	Mirae Asset Global Investme	.07%	2,165,006,343	06/20/2023	Vanilla	4.24
10	XHLF	BondBloxx Bloomberg Six Month Target Durati	Bondbloxx Investment Mana	.03%	1,993,816,832	09/13/2022	Target Duration	4.23
11	CSHI	NEOS Enhanced Income 1-3 Month T-Bill ETF	Neos Investments LLC	.39%	805,745,607	08/30/2022	Active	5.02
12	XBIL	US Treasury 6 Month Bill ETF	1251 Capital Group Inc.	.15%	749,339,817	03/07/2023	Vanilla	4.17
13	XONE	BondBloxx Bloomberg One Year Target Duratic	Bondbloxx Investment Mana	.03%	675,059,825	09/13/2022	Target Duration	4.44
14	VGUS	Vanguard Ultra-Short Treasury ETF	Vanguard	.07%	530,036,250	02/07/2025	Vanilla	-
15	OBIL	US Treasury 12 Month Bill ETF	1251 Capital Group Inc.	.15%	296,105,070	11/15/2022	Vanilla	4.28
16	BENJ	Horizon Landmark ETF	Acp Horizon Holdings LP	.40%	167,010,774	01/22/2025	Active	-
17	WEEK	Roundhill Weekly T-Bill ETF	Roundhill Investments	.19%	143,000,572	03/06/2025	Active	-
18	JMMF	JPMorgan 100% U.S. Treasury Securities Mon	JPMorgan Chase	.16%	53,068,900	12/10/2025	Active	-
19	TRSY	Xtrackers US 0-1 Year Treasury ETF	Deutsche Bank AG	.06%	21,653,310	10/09/2024	Vanilla	4.25
20	ICPI	iShares 0-1 Year TIPS Bond ETF	BlackRock, Inc.	.09%	1,497,862	11/19/2025	Vanilla	-
21	CMBO	Wayfinder Dynamic U.S. Interest Rate ETF	Gladius Capital Managemen	.15%	1,006,798	11/04/2025	Active	-

Source: FactSet Research Systems.

Exhibit 11. Count of US Small-Cap ETFs by Investment Strategy

ETF Strategy	Count
Active	25
Multi-factor	16
Vanilla	11
Fundamental	10
Buy-write	4
ESG	4
Low volatility	4
Dividends	2
Momentum	2

Source: Data from FactSet Research Systems.

Exhibit 12. Most Efficient and Liquid US Small-Cap ETFs by Investment Strategy

Ticker	Name	Strategy
VB	Vanguard Small-Cap ETF	Vanilla
SPSM	State Street SPDR Portfolio S&P 600 Small Cap ETF	Vanilla
DFAS	Dimensional US Small Cap ETF	Active
FNDA	Schwab Fundamental U.S. Small Company ETF	Fundamental
SMLF	iShares U.S. Small-Cap Equity Factor ETF	Multi-factor
XSMO	Invesco S&P SmallCap Momentum ETF	Momentum
ESML	iShares ESG Aware MSCI USA Small-Cap ETF	ESG
SMDV	ProShares Russell 2000 Dividend Growers ETF	Dividends
SMMV	iShares MSCI USA Small-Cap Min Vol Factor ETF	Low volatility

Source: Data from FactSet Research Systems.

Comparing them can get a bit overwhelming. Consider the portfolio characteristics shown in **Exhibit 13**.

The following observations are noteworthy:

- Weighted average market cap ranges from $2.7 billion to $11.6 billion.
- P/E can be as low as 13.5 and as high as 18.1.
- P/B ranges from 1.4 to 2.5.
- Dividend yields range from 0.8% to 3.3%.
- Concentration varies widely, with Herfindahl ratios as minuscule as 0.11% and as large as more than 10 times that number (1.41%).

Is SMDV, with its exposure to the tiniest of the small caps and its attractive 3.3% yield, best suited to your use case? Or is its low holdings count and relatively high concentration pointing to too much idiosyncratic risk? Is a value-leaning approach targeting the lowest P/E and P/B appropriate?

Exhibit 13. Portfolio Aggregates for US Small-Cap ETFs

Ticker	Strategy	Number of Holdings	Weighted Average Market Cap ($, Millions)	Price-to-Earnings Ratio (P/E)	Price-to-Book Ratio (P/B)	Portfolio Yield	Concentration (Herfindahl Ratio)
VB	Vanilla	1,322	11,611	17.8	2.3	2.5	0.16%
SPSM	Vanilla	606	3,894	14.8	1.6	3.0	0.25%
DFAS	Active	2,075	5,862	15.6	1.8	2.4	0.11%
FNDA	Fundamental	895	8,071	15.4	1.8	3.0	0.16%
SMLF	Multi-factor	842	10,334	18.1	2.5	1.2	0.24%
XSMO	Momentum	113	4,898	17.3	2.5	0.8	1.41%
ESML	ESG	904	7,915	17.4	2.1	2.5	0.17%
SMDV	Dividends	105	2,704	13.5	1.4	3.3	0.96%
SMMV	Low volatility	314	7,382	17.2	2.2	3.3	0.79%
MSCI USA Small Cap Index	**Benchmark**	**1,646**	**8,052**	**29.7**	**2.3**	**1.3**	**0.13%**

Source: Data from FactSet Research Systems.

Introducing a benchmark helps contextualize these choices. MSCI's small caps range from the 85th to the 99th percentile of capitalization in the US market.[9] Using this definition, ESML is a close fit; SMDV is quite different. This view helps the investor understand VB's and SPSM's index construction because we see that CRSP uses a higher market-cap range (85% to 98%) and S&P Dow Jones Indices uses a lower one, defined in dollars ($1.2 billion to $8.0 billion as of January 2026).[10]

Adding a benchmark is also useful when comparing each ETF's sector exposures, as shown in **Exhibit 14**.

Finance may be the top sector for each candidate ETF, but the weighting for this sector is just 19.9% in momentum-driven XSMO and a hefty 42.2% in dividend-oriented SMDV. It is useful to know that in MSCI's methodology, 23.7% is the finance sector's market weight. Summing up the absolute values of the difference in each sector's weight between the MSCI USA Small Cap Index and each ETF, we find that SMDV is the most divergent, with 73.1% of combined over- and underweights. ESML is the closest, with just 4.8% divergence.

ESML's similarity to the MSCI USA Small Cap Index is hardly random. ESML tracks an MSCI index that selects securities from the MSCI USA Small Cap Index and targets a tracking error of no more than 0.50%.

We see this similarity again when we compare each ETF's one-year returns against those of the MSCI USA Small Cap Index (see **Exhibit 15**).

ESML tracks the MSCI USA Small Cap Index almost perfectly. SMDV and SMMV have a looser goodness of fit and a distinctly lower beta, as one might expect given their strategies. More perplexingly, DFAS, FNDA, and SMLF come close to replicating the benchmark's performance, showing little sign of difference despite their complex selection and weighting methodologies. "Closet indexing" is not limited to actively managed products.

Comparing an ETF's performance and holdings to that of an appropriately selected, well-constructed, broad-based, cap-weighted index creates a context for discussing the degrees of similarity and difference between each candidate ETF and the index.

[9]See www.msci.com/eqb/gimi/stdindex/methodology.html

[10]"CRSP US Small Cap Index," CRSP, accessed 14 April 2026, www.crsp.org/indexes/crsp-us-small-cap-index; "S&P U.S. Indices Methodology," S&P Dow Jones Indices (February 2026), www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf.

Exhibit 14. US Small-Cap ETF Sector Weights

	VB	SPSM	DFAS	FNDA	SMLF	XSMO	ESML	SMDV	SMMV	MSCI USA Small Cap
Strategy	Vanilla	Vanilla	Active	Funda-mental	Multi-Factor	Momentum	ESG	Dividends	Low Volatility	**Benchmark**
Finance	21.7%	25.5%	22.7%	24.4%	21.5%	19.9%	22.2%	42.4%	25.5%	**23.7%**
Industrials	15.7%	11.7%	15.3%	14.8%	14.2%	18.8%	15.6%	12.6%	7.0%	**14.7%**
Technology	14.6%	13.4%	11.4%	11.8%	16.8%	18.9%	13.6%	1.5%	7.6%	**13.1%**
Health Care	11.8%	12.5%	11.1%	7.5%	13.1%	6.8%	12.8%	2.0%	17.6%	**12.8%**
Non-Energy Materials	8.1%	7.4%	8.7%	8.3%	6.6%	7.6%	7.2%	10.3%	4.8%	**7.5%**
Consumer Cyclicals	7.4%	9.1%	8.2%	8.1%	7.9%	6.2%	7.2%	3.4%	3.0%	**6.7%**
Consumer Services	4.8%	4.6%	4.0%	5.6%	3.2%	5.4%	4.9%	0.8%	5.2%	**5.0%**
Consumer Non-Cyclicals	4.5%	4.4%	5.7%	6.7%	5.4%	8.1%	4.5%	6.3%	9.2%	**4.8%**
Energy	3.7%	4.8%	5.6%	4.8%	4.2%	1.6%	4.7%	0.8%	3.2%	**4.3%**
Business Services	2.6%	2.6%	2.7%	3.9%	2.6%	1.8%	2.4%	3.2%	6.8%	**2.6%**
Utilities	2.9%	2.3%	2.7%	2.6%	1.9%	2.0%	2.1%	15.8%	6.6%	**2.2%**
Telecommunications	1.1%	1.3%	1.0%	1.4%	1.3%	2.8%	1.2%	1.0%	2.5%	**1.1%**
Other	0.0%	0.0%	0.0%	−0.1%	0.0%	0.0%	0.0%	−0.1%	0.0%	**0.0%**

Source: Data from FactSet Research Systems.

Exhibit 15. Single-Factor Regression Metrics, US Small-Cap ETFs vs. MSCI USA Small Cap Index

Ticker	Name	Strategy	Goodness of Fit	Beta
VB	Vanguard Small-Cap ETF	Vanilla	1.00	0.98
SPSM	State Street SPDR Portfolio S&P 600 Small Cap ETF	Vanilla	0.97	1.00
DFAS	Dimensional US Small Cap ETF	Active	0.98	0.98
FNDA	Schwab Fundamental U.S. Small Company ETF	Fundamental	0.97	0.96
SMLF	iShares U.S. Small-Cap Equity Factor ETF	Multi-factor	0.99	1.02
XSMO	Invesco S&P SmallCap Momentum ETF	Momentum	0.91	0.95
ESML	iShares ESG Aware MSCI USA Small-Cap ETF	ESG	1.00	1.00
SMDV	ProShares Russell 2000 Dividend Growers ETF	Dividends	0.73	0.71
SMMV	iShares MSCI USA Small-Cap Min Vol Factor ETF	Low volatility	0.71	0.51

Source: Data from FactSet Research Systems.

Making the Choice

Most investors have a purpose in mind when selecting an ETF. The strategy-agnostic approach described previously, in which investors compare vanilla, multi-factor, ESG, and actively managed strategies, is probably unusual. Investors who follow suggestions from academic research and industry reports, such as SPIVA,[11] which demonstrate that active risk (taking bets against a market segment) rarely pays off, are likely to stick to broad-based vanilla ETFs. This explains why 82% of the US small-cap ETF market share rests in six vanilla funds.

Investors with a conviction that drives them to take active risk need to select their strategy first and then decide which ETF offers the exposure that best suits their needs. It is critically important to understand each candidate ETF's methodology for selecting and weighting securities, so that one can have confidence that when the portfolio changes in response to market conditions, the shifts align with a methodology that has been vetted.

Investors are best served by selecting the characteristics that best suit the investment hypothesis. They may consider shifting to the second- or third-best choice if the most suitable ETF does not meet their standards for efficiency and tradability after evaluating the trade-off between known costs and uncertain rewards. Last, it is important to keep in mind that ETFs with active risk often have extended periods of out- and underperformance versus their selection universe.

[11] "SPIVA: Results by Region," S&P Global, accessed 14 April 2026, www.spglobal.com/spdji/en/research-insights/spiva.

Conducting ETF Due Diligence for Investor Personas

At the top of the list of advantages of ETFs is their broad accessibility. When we listed the features of ETFs in Module 1, we highlighted the breadth of ETF investors in terms of investment horizons, ranging from intraday traders to those looking to invest for five years or more. Tradability is key for the day trader; efficiency matters most for long-term investors.

The products that appeal to investors with different objectives also will vary significantly. The reality of the current ETF market is that there are almost as many types of investors using ETFs as there are ETFs on the market. A 20-year-old retail trader speculating with a spare $400 may be looking for a set of very different products than a $20 billion endowment with an infinite time horizon and known liabilities.

In this module, with its focus on the due diligence process, we introduce six "investor personas" to explore how different types of investors might analyze the choices offered in a range of market segments. We selected each persona to represent specific objectives, constraints, and ETF due diligence criteria. By understanding how different investors apply the E-T-F framework, we can better match ETF characteristics to investor needs.[12]

Six Prototype ETF Investor Personas

The hypothetical investor personas we selected for case studies on ETF selection cover the spectrum in terms of portfolio size, sophistication, and risk appetite. Some are institutional investors, for which the key decision makers are financial professionals whose careers are in investment management services. Others include individual investors who need to make investment decisions to plan for future cash flows (retirement) and who are early in their career with a high risk appetite, who treat the opportunity as a mix of long-term investing and an entertaining hobby. We first provide short summaries of each persona and then take a deep dive into the investment problems they encounter and explain how they solve them with specific ETF choices.

- **Mid-career retirement savers:** Representing a huge chunk of the retail investor market, these investors have a 20- to 30-year investment time horizon and are focused primarily on capital appreciation and ensuring that they have enough money at their future retirement date. Their portfolios range in size from a few hundred thousand dollars to a few million. With no current income needs from their retirement assets that are locked away in tax-advantaged accounts, liquidity is relatively unimportant. These investors are extremely fee sensitive, gravitating toward low-cost, broadly diversified ETFs from recognized brands. Their primary ETF selection criteria are typically expense ratios, broad diversification, and availability on their brokerage platform. Tax considerations are minimal and mostly pertain to asset location—keeping fixed income in sheltered accounts where possible.
- **Registered investment advisers (RIAs):** Managing anywhere from $500 million to $2 billion in client assets, RIAs juggle mixed time horizons ranging from 5 to 30 years, depending on the client. Their investment objectives center on total return, tax efficiency, and personalization. They pursue core–satellite strategies, use ETFs for tax-loss harvesting, and make

[12]These case studies are hypothetical examples of applying the E-T-F framework. They do not represent recommendations, investment advice, or the endorsement or criticism of any particular ETF.

tactical tilts. Fee sensitivity is high but not absolute—they will pay for value. Key selection criteria include liquidity, tax efficiency (including the convenience of avoiding K-1s and other tax complexities), simplicity for client reporting, and genuine fitness for purpose. Tax considerations are critical because most client accounts are taxable.

- **Global multi-family offices:** Managing substantial wealth ranging from $500 million to $10 billion, family offices typically operate on 10- to 20-year investment time horizons—sometimes longer when pursuing such strategies as borrowing against assets. They have high income needs and seek total returns consistent with social or values-based constraints. Their ETF usage follows a core–satellite approach with income and risk targets, supplemented by limited tactical and specialty fund allocations. Key selection criteria include global diversification, the ability to scale positions with anonymity, liquidity, and openness to derivatives for income generation and hedging. Fee sensitivity is moderate. Tax considerations are high: Most accounts are taxable, and basis reset at death is a key consideration, particularly because cash can be extracted during life through securities-backed borrowing rather than selling appreciated positions.
- **Foundations:** With perpetual time horizons, foundations focus on generating real returns above a target (typically 4%–5%) annual spending rate plus inflation. The largest foundations manage more than $1 billion and use ETFs as core holdings in their public market sleeve, alongside collective investment trusts (CITs), SMAs, and private securities. They may use ETFs to transition out of private manager positions. Key selection criteria include fitness for purpose, high AUM and liquidity (they want to represent a small percentage of any fund's ownership), low tracking difference, and securities lending revenue. Fee sensitivity is moderate—they will pay for desired characteristics. Tax considerations are minimal because of their tax-exempt status, and liquidity needs align with quarterly distributions.
- **Multi-strategy hedge funds:** Operating on time horizons measured in days to months, these funds often manage between $500 million and $2 billion and seek absolute returns, alpha generation, and precise risk targeting. They use ETFs for hedging, pairs trading, and rapid tactical shifts, requiring daily or even intraday liquidity. Fee sensitivity is low; what matters is tight spreads, deep liquidity, the ability to short, and understanding the risk impact of positions. Tax considerations are moderate because gains and losses pass through to investors.
- **Next-generation retail investors:** These short-term speculators, known as "YOLO" (you only live once), typically have portfolios ranging from $10,000 to $100,000 and time horizons under a year and seek maximum gains—with entertainment value as part of the appeal of their investing experience. They have a very high risk tolerance, using ETFs for thematic plays, leveraged bets, and trend following. Selection criteria prioritize momentum, social buzz, and narrative over fundamentals. Fee sensitivity is low, and tax considerations are often ignored entirely. Liquidity needs are high because positions turn over frequently.

These investor personas represent archetypal approaches to ETF selection, each highlighting different priorities within the E-T-F framework. While individual investors may blend characteristics from multiple personas, examining each archetype clarifies how different objectives drive the due diligence process. The goal is not to match yourself perfectly to one category but to understand how to evaluate the features and characteristics of different ETFs in the context of specific investment objectives.

The Mid-Career Professional Retirement Saver

This investor is typical of millions of individuals saving for retirement through employer-sponsored plans and self-directed individual retirement accounts (IRAs). We are assuming someone 35–45 years of age with 20–30 years until retirement who has accumulated $500,000 to $2 million through consistent contributions and market appreciation. Their ETF knowledge is basic or intermediate, often limited to what they have learned from workplace retirement seminars or personal finance websites. They likely use the mutual funds or CITs offered by their employer for the bulk of their retirement portfolio, augmenting in a rollover or spousal IRA with ETFs. They gravitate toward low-cost, broadly diversified ETFs from recognized brands, such as Vanguard, BlackRock, or State Street. For this investor, expense ratios are paramount—they have internalized the message that fees matter. They are not focused on tracking differences or such concepts as securities lending revenue. Their primary fear is outliving their assets by not saving enough or by making the "wrong" investment choice, so they seek safety in popular, long-established funds from familiar providers.

Their primary ETF selection criteria are typically expense ratios, broad diversification, and availability on their brokerage platform. Tax considerations are minimal and mostly about asset location—keeping fixed income in sheltered accounts where possible.

Scenario

Sarah, a 42-year-old software engineer, recently changed jobs and transferred her 401(k) to a rollover IRA. Frustrated with her former employer's expensive, actively managed mutual funds and their mediocre returns, she is excited to build her own ETF portfolio. For starters, she wants to find two ETFs: one tracking a broad-based equity index and one focusing on Treasury Inflation-Protected Securities (TIPS).

Equity Selection

Sarah peruses a handful of ETF websites until she finds a screener she likes. At first, she is overwhelmed by the number and variety of ETFs. Using data as of 31 December 2025, Sarah filters for equity funds with expense ratios of 0.05% or lower and gets 63 results. She decides to weed out (1) high-dividend funds because she will not need income for decades and (2) sector-focused ETFs, mid-caps, and small caps because they are too narrow. She removes funds that invest exclusively outside the United States. Now she is down to 37 choices. That is still too many, so she removes the growth and value options, leaving 24 choices.

She notices that some ETF issuers are represented more than once, so she tries to figure out a way to get down to one ETF per issuer. Vanguard and iShares (Blackrock) each offer four. Upon visiting the iShares and Vanguard websites, Sarah learns that total stock market ETFs hold the largest number of stocks—thousands, rather than the hundreds in the large-cap portfolios. She eliminates the large-cap options in favor of the total market ones. This leaves 12 ETFs for further review. She adds holdings count to her screen. Four ETFs hold at least 1,000 stocks, and they all cost 0.03% per year.

Sarah logs into her brokerage account. She discovers that only one of these is on her broker's commission-free platform. In the end, her broker made the final choice for her.

Exhibit 16. US Total Market ETF Basic Efficiency and Tradability Statistics

Ticker	AUM	Tracking Difference	Spread (45-day Median)	Volume ($, 45-day Median)
VTI	574,934,270,081	−0.02%	0.006%	1,206,178,770
ITOT	80,706,032,485	−0.04%	0.007%	352,946,011
SCHB	38,466,222,000	−0.03%	0.038%	218,529,094
SPTM	12,113,473,603	−0.05%	0.013%	45,844,242

Source: Data from FactSet Research Systems.

If Sarah had a freer hand, she would have probably chosen the Vanguard Total Stock Market Index Fund ETF (VTI) because of its breadth and popularity (highest AUM). An analysis of tracking difference and trading costs (see **Exhibit 16**) would have led to the same choice because VTI has the tightest tracking, the lowest spreads, and the highest volumes.

Sarah's insistence on low cost and portfolio breadth led her to an excellent outcome. Because she wound up in a highly competitive market segment, she found high-quality options at low cost.

Having successfully navigated the equity ETF selection process, Sarah now turns to the fixed-income portion of her portfolio. She wants inflation protection through TIPS but realizes this market segment requires more analytical rigor than her equity selection.

Inflation-Protected Fixed-Income Selection

For this scenario, we imagine that Sarah has access to professional-grade ETF research data and applies the E-T-F framework.

Sarah wants TIPS because she likes the idea of earning a real return above inflation. At age 42, she estimates that she has about 25 years before retirement, so she would prefer a fund that specializes in TIPS with long maturities but would also consider one with a broad maturity spectrum.

Sarah wants to focus primarily on fit but first applies some basic efficiency and tradability screens: She looks for expense ratios of 20 bps or less and AUM of at least $50 million (to minimize fund closure risk). She also requires bid–ask spreads of 10 bps or less and daily volumes of $1 million or more because she intends to add to this position in the future and will also have to reinvest dividends (most bond funds distribute income monthly).

Six ETFs qualify. As shown in **Exhibit 17**, five are passively managed and market-cap weighted, and one is actively managed.

Sarah's first task is to review whether active management confers any advantages. Because TIPS have no credit risk, Sarah can focus on active management of interest rate risk and the associated returns. She discovers that DFIP's real yield per unit of effective duration (18 bps) is slightly

Exhibit 17. US Long-Term and Broad-Based TIPS Meeting Basic Efficiency and Tradability Criteria

Ticker	Name	Strategy
SCHP	Schwab US TIPS ETF	Vanilla
TIP	iShares TIPS Bond ETF	Vanilla
DFIP	Dimensional Inflation-Protected Securities ETF	Active
SPIP	State Street SPDR Portfolio TIPS ETF	Vanilla
LTPZ	PIMCO 15+ Year US TIPS Index Exchange-Traded Fund	Vanilla
VTP	Vanguard Total Inflation-Protected Securities ETF	Vanilla

Source: Data from FactSet Research Systems.

lower than that of SCHP (18.2 bps) and TIP (18.4 bps). Sarah sees no reason to take active risk in her TIPS ETF.

Sarah reads the index methodology for each of the five passive ETFs. She learns that the indexes differ in float adjustment practices with respect to TIPS held by the US Federal Reserve: SCHP, TIP, and VTP track indexes that remove the Federal Reserve's holdings from the overall market value, leading to lower weights for TIPS that are held by the central bank. (There are also non-material differences in market-cap requirements for inclusion.) The float adjustments and differences in sampling methodologies lead the portfolios to take on slightly different characteristics. As a group, these Fed holdlings excluders had slightly lower average maturities and durations compared to includers LTPZ and SPIP.

The additional interest rate risk has not paid off. Like DFIP, SPIP and LTPZ have produced less real yield per basis point of duration than SCHP and TIP. Although she started by searching for long maturities, Sarah eliminates LTPZ and SPIP. For the final round, Sarah returns to efficiency and tradability for a detailed review. Her findings are shown in **Exhibit 18**.

Exhibit 18. TIPS Finalists' Efficiency Metrics

Ticker	Name	AUM ($, Billions)	Expense Ratio	Median Tracking Difference	Portfolio Disclosure
SCHP	Schwab US TIPS ETF	14.66	0.03%	−0.03%	Daily
TIP	iShares TIPS Bond ETF	13.91	0.18%	−0.17%	Daily
VTP	Vanguard Total Inflation-Protected Securities ETF	0.07	0.05%		Monthly, after a 15-day delay

Source: Data from FactSet Research Systems.

Sarah notes that TIP and VTP track the same underlying index, the ICE BofA Treasury Inflation Linked Bond Index. TIP is larger and offers daily portfolio disclosure but costs significantly more.

VTP's low assets present a risk that Vanguard might close the ETF. Sarah does a bit more research and discovers that VTP launched recently and has been growing well. After further research, she learns that Vanguard has indeed closed one ETF in the United States, in 2022, but she decides the risk of VTP closing is low.

To choose between TIP and VTP, Sarah will have to decide whether to prioritize low fees or daily portfolio disclosure. Sarah reviews VTP's latest annual report and sees a portfolio turnover rate of 4% per year. She decides that she can forgo daily disclosure when holdings are likely to remain unchanged most of the time and declares VTP to be more efficient than TIP and advances VTP to direct competition with SCHP.

SCHP is the clear cost winner. Its expense ratio of 3 bps explains all of its median tracking difference. SCHP meets all transparency standards. Sarah does not evaluate the candidates' tax efficiency, because she plans to hold them in her IRA.

The efficiency winner is SCHP.

As shown in **Exhibit 19**, TIP has tighter spreads and higher volumes than SCHP or VTP. All three trade at a slight premium, but TIP's is closest to zero. Sarah will have to hope that the trading premium remains when she is ready to sell her ETF shares. SCHP and TIP are so liquid that it is not necessary to examine primary market conditions. She is trading a tiny dollar amount, relatively speaking; third-party liquidity providers would not take her business. For Sarah, it is all about the secondary markets.

The tradability winner is TIP.

Now what? SCHP is more efficient, but TIP is more liquid. Sarah plans to hold her TIPS ETF for decades, so for her, efficiency is far more important than tradability. Sarah picks SCHP for her retirement portfolio.

Exhibit 19. TIPS Finalists' Tradability Metrics

Ticker	Name	Spread	Volume ($, 45-day Median)
SCHP	Schwab US TIPS ETF	0.04%	88,680,309
TIP	iShares TIPS Bond ETF	0.01%	280,271,235
VTP	Vanguard Total Inflation-Protected Securities ETF	0.06%	1,081,374

Source: Data from FactSet Research Systems.

The Registered Investment Adviser

Managing between $500 million and $2 billion for high-net-worth clients, RIAs operate in a fiduciary capacity for clients with a range of investment goals, where performance is a primary focus. These professionals typically oversee 100–300 client relationships with account sizes ranging from $2 million to $20 million. Their ETF usage is sophisticated, pursuing core–satellite strategies, tax-loss harvesting, and tactical asset allocation. Some manage portfolios in-house using their expertise and professional portfolio management tools. Others prefer model portfolios, customized to the range of clients' risk preferences and their time horizon.

RIAs care about total cost of ownership, including fund expenses, tracking difference, and tax management. They need transparency and predictability from asset managers, especially around ex-dividend dates and fund holdings. The following scenario demonstrates how an RIA balances index methodology differences, cost considerations, and client portfolio monitoring needs when restructuring international equity exposure.

Scenario

Carl, a 55-year-old RIA, runs a small operation with a few certified financial planners and investment professionals, plus some support staff. He oversees $1 billion in assets for 75 wealthy families. Carl's clients have come to trust his acumen in running a globally diversified, multi-asset portfolio.

Carl believes a multi-year period of international outperformance is ahead, which will be led by emerging markets (EMs) and small caps, so he has decided to increase his "default" international equity allocation for his clients from 10% to 20%, with a focus on smaller companies in emerging economies.

Traditionally, Carl has used the Vanguard Total International Stock Index Fund ETF (VXUS) for international stock exposure, valuing its broad, capitalization-weighted exposure to non-US equities and its extremely low cost of just 0.05% per year. However, VUXS's 75% allocation to developed markets and 70% weight to large-cap stocks is not appropriate for Carl's current thesis. Carl's team suggested disaggregating the international portfolio into developed ex-US (which sometimes means also excluding Canada) and EMs to customize the exposure. EM companies will often be small caps, allowing the EM position to do double duty.

Carl searches for both types of ETF. His in-house rule of thumb is to stick to total market, plain, unhedged, vanilla index-based (passive) products because he wants to emphasize his macro market positioning. Carl further avoids funds charging more than 50 bps or those with less than $500 million in AUM. He does so because, using size as a proxy for trading volume (which can vary widely day to day), Carl never wants to be a meaningful part of the day's volume, especially if he moves all his client's assets in one day. That leaves him with 10 different developed market ETFs, holding a collective $550 billion. He scans the biggest players of this ETF group (by AUM), shown in **Exhibit 20**.

Exhibit 20. Top Developed Ex-US and Developed Ex-North America ETFs

Ticker	Fund Name	AUM ($, Millions)	Expense Ratio (bps)	Average Daily Volume (ADV) Notional ($)
VEA	Vanguard FTSE Developed Markets ETF	196,969	3	844,945,736
IEFA	iShares Core MSCI EAFE ETF	163,276	7	984,129,342
EFA	iShares MSCI EAFE ETF	70,672	32	1,425,744,317
SCHF	Schwab International Equity ETF	55,510	3	231,695,060
SPDW	SPDR Portfolio Developed World ex-US ETF	33,552	3	192,052,331

Source: Data from FactSet Research Systems.

The South Korea Exposure Issue

Comparing VEA and IEFA, the two with the largest AUM, on his top criterion, his ability to express his macro market call, Carl notes the very big portfolio difference between the MSCI-based products and the FTSE products: South Korea. FTSE includes South Korea among developed markets, but MSCI leaves it in the EMs. South Korea's weight in VEA, 5.5%, is less than half of its 13.3% weight in IEMG—a function of being a small part of MSCI's developed market allocation versus a large part of the FTSE EM allocation.

Carl might not be able to mix and match developed ex-US and EM ETFs, because of the risk of gaps or overlaps in South Korean exposure. He recognizes that cap-weighted combinations from either index family (FTSE or MSCI) should produce similar long-term results. Given his intent to increase EM exposure overall and his assessment that South Korea's economy is similar to other developed economies, Carl decides to deemphasize South Korea.

Carl reruns his search, looking for pairs of developed ex-US and EM ETFs that meet his initial criteria from index providers that assign South Korea to their developed market products. His results are shown in **Exhibit 21**.

Pairs from Vanguard, Schwab, and State Street meet his new criteria. The Vanguard and Schwab ETFs track FTSE Group indexes; the State Street ETFs track those of S&P Dow Jones Indices. Carl notes that SCHF's and SCHE's underlying indexes exclude small caps. Carl's investment thesis bets on small caps, so the Schwab pair is truly not fit for purpose.

The State Street ETFs track total market indexes, but they optimize heavily, holding less that 50% of the index securities, by count. Comparing the EM ETFs' tracking differences, Carl finds

Exhibit 21. Vanilla, Total Market, International Equity ETF Pairs

Ticker	Name	Index Family	South Korea Classification	Market-Cap Range	Tracking Range
SCHE	Schwab Emerging Markets Equity ETF	FTSE Group	Developed	Large and mid-cap	1.62%
SCHF	Schwab International Equity ETF	FTSE Group	Developed	Large and mid-cap	0.21%
SPDW	State Street SPDR Portfolio Developed World ex-US ETF	S&P Dow Jones Indices	Developed	Total market	0.53%
SPEM	State Street SPDR Portfolio Emerging Markets ETF	S&P Dow Jones Indices	Developed	Total market	3.74%
VEA	Vanguard FTSE Developed Markets ETF	FTSE Group	Developed	Total market	0.46%
VWO	Vanguard FTSE Emerging Markets ETF	FTSE Group	Developed	Total market	1.21%
BBIN	JPMorgan BetaBuilders International Equity ETF	Morningstar	Emerging	Large and mid-cap	0.17%
BBEM	JPMorgan BetaBuilders Emerging Markets Equity ETF	Morningstar	Emerging	Large and mid-cap	
IEFA	iShares Core MSCI EAFE ETF	MSCI	Emerging	Total market	0.10%
EFA	iShares MSCI EAFE ETF	MSCI	Emerging	Large and mid-Cap	0.11%
IDEV	iShares Core MSCI International Developed Markets ETF	MSCI	Emerging	Large and mid-Cap	0.08%
IEMG	iShares Core MSCI Emerging Markets ETF	MSCI	Emerging	Total market	1.12%

Source: Data from FactSet Research Systems.

that VWO's one-year range was 1.21%, whereas SPEM's was 3.74%. The optimization takes its toll on index tracking. Carl prefers the coverage and predictability that the Vanguard pair offers.

Luckily, VEA and VWO pass all of Carl's efficiency and tradability criteria. Among the finalist pairs, they charge the lowest expense ratios, post acceptable tracking medians and ranges, and have no recent history of distributing capital gains. Like most major ETF providers, Vanguard publishes ex-dividend dates well in advance. Carl would prefer daily portfolio disclosure over Vanguard's lagged monthly schedule, but VEA's and VWO's ultra-low turnover rates give Carl confidence that the portfolios will not shift much over short intervals.

The Global Multi-Family Office

Family offices provide legal, investing, and other personal support services for ultra-high-net-worth families, serving as the chief financial officer for the family unit. Globally, approximately 8,000 family offices manage more than $3 trillion in assets, according to a report on the family office landscape by Deloitte.[13] These organizations must differentiate themselves from traditional financial advisers through deeply personalized service: tailoring investment portfolios to each family member's needs, managing multigenerational tax and estate planning, overseeing family governance, and coordinating philanthropic activities.

Multi-family offices combine features of single-family offices and financial advisers, serving a small group of families with potentially differing needs, interests, and risk profiles. ETFs are well suited for family offices because of their low cost and tax management opportunities. The family office staff must be familiar with all aspects of ETF due diligence, prioritizing fit and emphasizing efficiency over tradability because most investment time horizons are expected to be quite long.

Scenario

A multi-family office called Casa Palo Alto serves three ultra-high-net-worth pharmaceutical and biotech executives and their families whose wealth is tied up in restricted stock holdings. The families sometimes exercise stock options and borrow against their restricted stock through securities-backed lines of credit, generating liquidity without triggering capital gains. This cash allows them to diversify their concentrated equity positions and generate supplemental income for living expenses—all while maintaining their core pharmaceutical holdings.

This borrowing strategy creates a tax planning opportunity: Margin interest expense can offset portfolio income, reducing taxable cash flow. For this reason, the family office seeks fixed-income investments that generate regular distributions to offset both borrowing costs and living expenses. Corporate bonds meet this need by providing predictable income, reasonable yields, and investment-grade credit quality.

Casa Palo Alto's staff, led by senior analyst Grace, is looking to replace an active corporate US dollar bond manager whose inconsistent performance has not warranted the fees that the family office is being charged.

Initial Screen

Grace begins by defining her investment criteria. She wants intermediate-term exposure with effective duration between five and eight years, which rules out short-term bond funds and requires examining each fund's maturity constraints. She will consider both intermediate-only portfolios and broad maturity funds that maintain duration in her target range but will exclude "bullet maturity" ETFs that start with appropriate duration but decline over time.

Credit quality must be investment grade—no high-yield exposure. To ensure adequate liquidity and minimize closure risk, she sets a $1 billion minimum AUM threshold. Finally, fees must stay

[13]R. Gooch, "The Family Office Insights Series—Global Edition: Defining the Family Office Landscape, 2024," Deloitte Private (2024), www.deloitte.com/global/en/services/deloitte-private/research/defining-the-family-office-landscape.html.

under 35 bps, the blended rate the family office typically pays for actively managed corporate bond accounts.

At this point, Grace is open to a variety of investment strategies. Determining the right approach will be her first priority. Her screen produces 11 candidates—a healthy field but still too large for detailed analysis.

Winnowing Down

A group of 11 ETFs is too large for consideration. Grace would prefer a smaller group for a detailed deep dive, so she looks for ways to cull the group. She would like to get down to one representative per investment strategy. Grace examines the underlying methodologies to identify meaningful differences. While nearly all the ETFs use market-value weighting, their security selection processes vary significantly. She groups them into four distinct rubrics: credit rating, principles-based, multi-factor, and market value. Grace gets to work choosing representatives of each rubric.

Credit rating and multi-factor selection schemes are associated with one ETF apiece:

- Credit rating: iShares Aaa-A Rated Corporate Bond ETF (QLTA)
- Multi-factor: iShares Investment Grade Systematic Bond ETF (IGEB)

Grace advances both QLTA and IGEB to the next round.

Two principles-based ETFs passed Grace's screen: the Vanguard ESG U.S. Corporate Bond ETF (VCEB) and the iShares ESG Aware USD Corporate Bond ETF (SUSC). She looks at each one's weighting scheme and finds that VCEB's portfolio is market-cap weighted, whereas SUSC's is weighted according to the ESG score. Grace selects SUSC as the more differentiated of the two.

Seven plain vanilla, market-value selection–based ETFs passed Grace's initial screen. Because vanilla ETFs can vary widely in their investment universe, Grace wants to select two or three vanilla candidates in this round. Drawing on her knowledge of the drivers of differences in ETF portfolios, Grace turns to an analysis of the index providers to help narrow down this list. As a tiebreaker, she will also look at efficiency criteria. Bloomberg, ICE Data, and S&P Global's Markit iBoxx indexes are all on offer. Markit iBoxx has just one candidate: the iShares iBoxx $ Investment Grade Corporate Bond ETF (LQD).

Two Bloomberg indexes underlie four candidate ETFs. Grace chooses the index that selects only intermediate-maturity bonds, rejecting its parent, which is broader. Two ETFs track this index, but the Vanguard Intermediate-Term Corporate Bond ETF (VCIT) shows a tighter historic tracking range than its Schwab competitor. Grace chooses VCIT to represent Bloomberg-based ETFs for this search.

Like Bloomberg, ICE Data indexes underlie one intermediate and two broad maturity ETFs. Grace selects the intermediate one: the iShares 5–10 Year Investment Grade Corporate Bond ETF (IGIB).

Grace selects LQD, VCIT, and IGIB for further consideration. The six ETFs shown in **Exhibit 22** will advance to the next round.

Exhibit 22. Corporate Bond ETF Semifinalists

Ticker	Name	Selection	Weighting	Underlying Index
QLTA	iShares Aaa-A Rated Corporate Bond ETF	Credit rating	Market value	Bloomberg US Corporate Aaa – A Capped Index
VCIT	Vanguard Intermediate-Term Corporate Bond ETF	Market value	Market value	Bloomberg US Aggregate Credit – Corporate (5–10 Y)
LQD	iShares iBoxx $ Investment Grade Corporate Bond ETF	Market value	Market value	iBoxx USD Liquid Investment Grade Index
IGIB	iShares 5–10 Year Investment Grade Corporate Bond ETF	Market value	Market value	ICE BofA US Corporate (5–10 Y)
IGEB	iShares Investment Grade Systematic Bond ETF	Multi-factor	Market value	BlackRock Investment Grade Systematic Bond Index
SUSC	iShares ESG Aware USD Corporate Bond ETF	Principles-based	Principles-based	Bloomberg MSCI US Corporate ESG Focus

Source: Data from FactSet Research Systems.

Fit Analysis

Now Grace gets to work evaluating the merits of each semifinalist ETF's investment strategy.

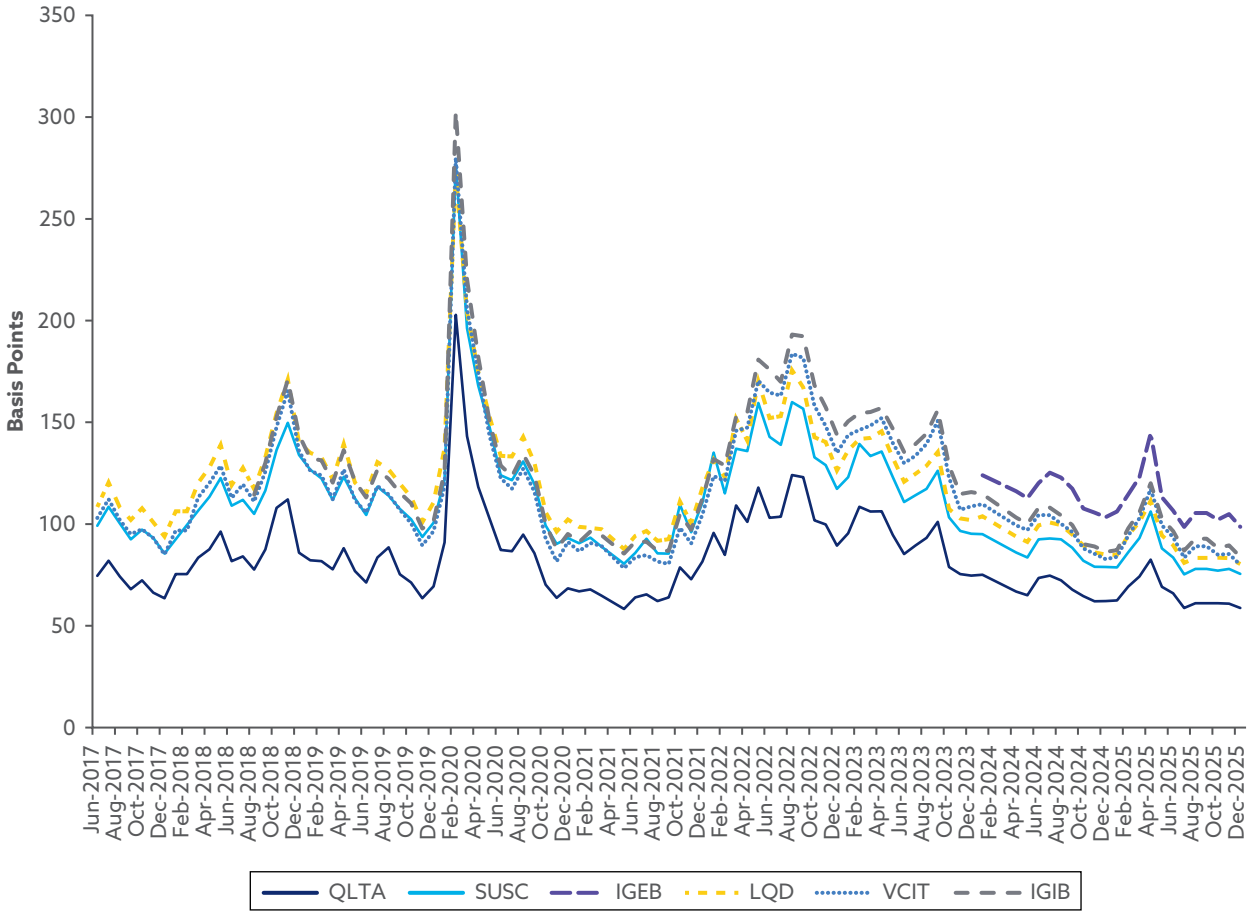
Grace checks each ETF's historical credit and interest rate risk levels to ensure that they fit Casa Palo Alto's parameters. She is careful in preparing her data and seeks to present relevant statistics. Her analysis period begins at the latest ETF launch date among her candidates, which was July 2017. However, some of the candidate ETFs have changed the indexes they track since 2017, so Grace edits the results accordingly by removing all of IGEB's and IGIB's histories before their respective January 2024 and August 2018 index change dates.

Credit Risk

Corporate bonds involve credit risk. Grace decides to research each candidate ETF's historical option-adjusted spread (OAS), which measures a bond's yield versus a US Treasury security of the same maturity, taking a bond's call risk into consideration. The lower the OAS, the lower the credit risk–liquidity premium. OAS scales linearly, whereas credit ratings tend to scale exponentially in relation to default probability. **Exhibit 23** shows the OAS history of the semifinalists.

These spread patterns reveal each fund's risk positioning. QLTA's lower OAS reflect its A–AAA mandate—it simply does not own the riskier end of investment grade. SUSC's modest spreads suggest its ESG governance screens may inadvertently select higher-quality issuers. IGEB's elevated spreads indicate it is comfortable taking more credit risk for incremental yield. For a family office managing concentrated pharmaceutical positions, lower credit risk may be preferable—it already has company-specific risk in abundance. Grace eliminates IGEB.

Exhibit 23. Option-Adjusted Spread of US Corporate Bond ETF Semifinalists



Source: Data from FactSet Research Systems.

Duration

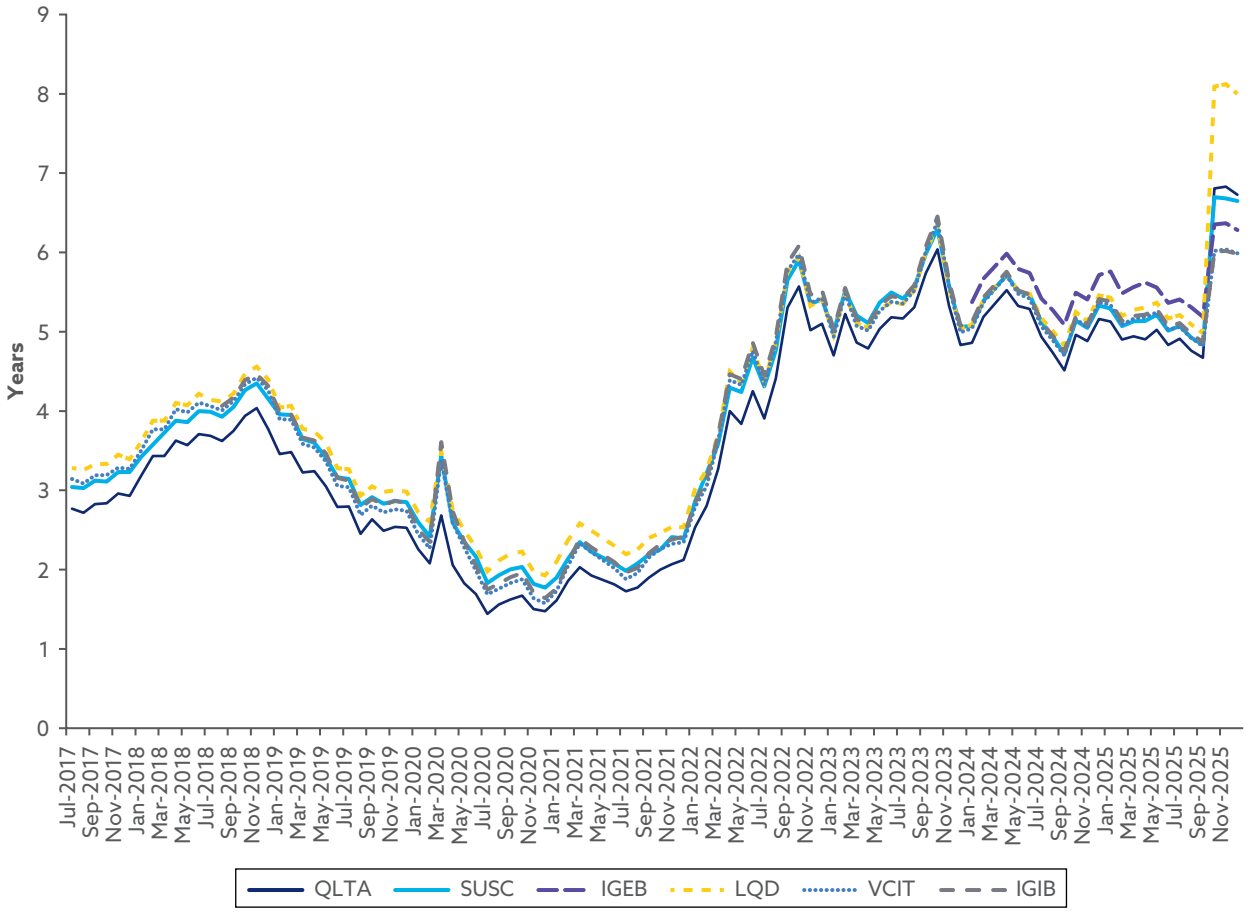
Next Grace checks each ETF's interest rate risk using the effective duration, which measures a bond's expected price change given a 1% change in interest rates and is expressed in years. **Exhibit 24** shows the duration history of the semifinalist ETFs.

In recent months, LQD's duration exceeded 8.0 years, Casa Palo Alto's upper bound. Grace eliminates LQD.

Yield to Maturity

After filtering for credit and duration history, Grace is down to four candidates: QLTA, VCIT, IGIB, and SUSC. To further narrow the field, Grace will compare the funds' results, based on their

Exhibit 24. Effective Duration of US Corporate Bond ETF Semifinalists



Source: Data from FactSet Research Systems.

historic yield to maturity, with the risks taken. **Exhibit 25** shows the yields to maturity for the candidate ETFs.

The four candidates have similar yield histories; IGIB and VCIT are nearly identical. Grace decides to eliminate one of them. She does this by assessing efficiency. Both funds track their indexes well. They differ in terms of portfolio disclosure frequency: VCIT's full holdings are published monthly, with a 15-day delay, whereas IGIB's are published daily. IGIB's daily portfolio disclosure allows Grace to monitor exposure in real time, critical for responding to family inquiries during market volatility. VCIT's monthly disclosure with a 15-day lag would leave the office blind during credit events. For a family office managing concentrated pharmaceutical positions, the ability to track and explain corporate bond exposure daily outweighs any minor cost advantage. Grace eliminates VCIT.

Exhibit 25. Yield to Maturity of US Corporate Bond ETF Semifinalists

Source: Data from FactSet Research Systems.

The Final Cut: Balancing Risk and Yield

Grace has narrowed the choice to IGIB, SUSC, and QLTA.

Credit wise, IGIB takes the most risk, followed by SUSC. QLTA has the least exposure to corporate default.

For most of the historical return period, QLTA had lower interest rate risk than IGIB and SUSC, but that situation reversed abruptly in October 2025, when both QLTA and SUSC saw their durations spike.

QLTA's yield has been consistently lower than IGIB's and SUSC's.

Grace would accept QLTA's lower yield in return for lower risk exposure, but QLTA's duration spike indicates that its low OAS will not necessarily protect Casa Palo Alto from interest rate risk. Grace eliminates QLTA.

Until October, IGIB's and SUSC's duration and YTM profiles were nearly identical. SUSC seemed to be offering the better risk-adjusted return, given its lower OAS. But SUSC's recent duration spike means that Grace cannot rely on past patterns to persist.

IGIB is an intermediate-only investment-grade fund; SUSC holds bonds of any maturity, except for paper with less than one year to maturity. SUSC's mandate to mirror the risk–return profile of a broad corporate bond index means that its maturity allocation is not constrained. In contrast, a fund that focuses solely on intermediate-maturity bonds will have a more predictable duration range.

Therefore, Grace recommends IGIB.

Grace has methodically applied the E-T-F framework to narrow 11 candidates to make a final choice. *Fit* analysis eliminated funds with inappropriate credit risk (IGEB), duration positioning (LQD), and consistency (SUSC) and also knocked out a less favorable risk–return profile (QLTA). *Efficiency* analysis gave a slight edge to funds with tighter tracking and lower costs. Holdings transparency proved critical enough to eliminate VCIT. Grace did not need to look to tradability as a differentiator.

The Foundation

Endowments and foundations are affiliated with tax-exempt, educational, or nonprofit organizations or may be established by private corporations. They accumulate capital through donor contributions to support long-term initiatives aligned with their missions. Fund sizes can range from $100,000 to $50 billion. These entities are typically overseen by investment professionals under the governance of an investment committee or board. Smaller foundations may outsource much of the investment process to outside managers, whereas larger ones maintain dedicated staff responsible for executing the board's investment policies.

Historically, foundations have used ETFs for tactical allocation, liquidity, and risk management and as interim beta exposure during manager transitions. Increasingly, however, many foundations are using ETFs as core holdings. Governance standards require that ETF selection involve multiple stakeholders, thorough documentation of the due diligence process, and regular performance reviews, similar to the process used for external asset managers.

ETFs are subjected to comprehensive due diligence, emphasizing efficiency, fit to portfolio return and risk objectives, index methodology, and tradability. Some foundations also review securities lending practices and consider risks of closure. If the foundation is also considering ETNs, which may be a vehicle for commodity and currency exposure, it may face counterparty risks. In addition, foundations may evaluate contributions to total portfolio return and risk, considering risk factors and correlations with non-ETF assets, which often include significant holdings in alternatives, such as hedge funds, private equity, and real assets.

Scenario

Arts4Kids Foundation is a nonprofit organization that supports education in the arts (music, theater, visual arts) in public schools. The foundation's original funding came from a contribution of $1 billion of stock in the technology company MacroSoft. Over the years, the founding investor has also convinced some of her friends and business associates to contribute to this worthy cause. Arts4Kids Foundation has grown through contributions and capital gains

to more than $2 billion and seeks to distribute 4%–5% of its assets annually to serve its arts educational mission.

David, the chief investment officer, established Arts4Kids Foundation's investment policy statement. A five-person staff of investment professionals manages the assets. The investment committee selects external managers for fixed income, alternatives, and real assets and chooses ETFs for its remaining public equity exposure. Lucy is responsible for equity ETF research. The foundation's current asset allocation as of 31 December 2025 is shown in **Exhibit 26**.

David would like to restructure the US equity exposure to increase the income yield to support the foundation's annual distribution objective. He asks Lucy to swap

- 100% of the $400 million position in MacroSoft for US equity dividend-focused ETFs yielding around 4.0% and
- 25% ($100 million) of the IVV position for equity income ETFs that engage in covered call writing to monetize upside and boost distribution potential on a portfolio of dividend-paying equities.

They hope to avoid further concentration in technology and real estate equities.

Restructuring for Income: High-Dividend ETFs

Lucy, who is responsible for equity ETF research, used professional database applications to search for ETFs with the following characteristics, as of 31 December 2025:

- Universe: US high-dividend-yield ETFs
- AUM of $1 billion or higher
- Expense ratio under 40 bps
- Spreads of 5 bps or lower
- Daily dollar volume of $1 million or higher

Exhibit 26. Arts4Kids Foundation Asset Allocation as of 31 December 2025

Asset Class	Weight	Yield
Public equity	60%	
MacroSoft stock	20%	1.5%
iShares Core S&P 500 ETF (IVV)	20%	1.5%
iShares Core MSCI EAFE ETF (IEFA)	20%	3.2%
Fixed income (active external managers)	20%	4.4%
Alternatives (hedge funds)	10%	–
Real estate and REITs	10%	4.0%

Lucy found seven candidate ETFs, detailed in **Exhibit 27**.

Some of these ETFs rely on sophisticated means of stock selection, whereas others represent more straightforward screening approaches based on dividend yield. Weighting also varies across these ETFs: Some use cap weighting, whereas others weight by dividend yield or apply an equity weighting methodology.

Lucy first examines the sector tilts that result from each candidate's security selection and weighting methodologies. SPYD has a 20% weight in real estate, which the foundation already has exposure to through its REIT holdings. VYM is appealing because of its low fees (0.06%), but it has a technology weight that is more than 15%. Lucy eliminates both.

Lucy now focuses on the fundamentals of the stock selection strategy. She would like the equity strategy to have a durable high yield through a significant tilt to companies that can sustain and grow their dividend yield. She wants to avoid methodologies that simply select stocks based on yield alone, which could be high simply because the stock price has fallen. Some fundamental metrics are shown in **Exhibit 28**.

Lucy rules out SDY and FDVV because of their relatively low dividend yield compared with the other candidates. That leaves SCHD, HDV, and DVY. All three select securities based on several fundamental factors, rather than simply those stocks with the highest dividend yield, as a countermeasure against the dividend trap. Also, all three have portfolios of 101 or fewer stocks, indicating a selective methodology.

HDV uses a proprietary approach developed by Morningstar to assess financial health, including assets versus debt. HDV tilts toward larger stocks because its holdings are weighted by the dollar amounts of dividends rather than dividend yields. Consumer non-cyclicals (26.8%) and

Exhibit 27. Top US High-Dividend-Yield ETFs

Ticker	Name	AUM ($, Millions)	Exp. Ratio (bps)	ADV Notional ($)	Spread (%)
SCHD	Schwab US Dividend Equity ETF	72,095	6	469,986,044	0.04%
VYM	Vanguard High Dividend Yield Index ETF	69,387	6	231,120,920	0.01%
DVY	iShares Select Dividend ETF	21,089	38	59,303,164	0.02%
SDY	State Street SPDR S&P Dividend ETF	20,023	35	38,834,183	0.02%
HDV	iShares Core High Dividend ETF	12,030	8	72,134,389	0.01%
FDVV	Fidelity High Dividend ETF	8,023	15	47,342,987	0.02%
SPYD	State Street SPDR Portfolio S&P 500 High Dividend ETF	7,282	7	88,546,193	0.02%

Source: Data from FactSet Research Systems.

Exhibit 28. Portfolio and Return Comparison Statistics for Top US High-Yield Dividend ETFs

Ticker	Portfolio Yield	P/E	P/B	R^{2*}	Beta*	Holdings Count
SCHD	4.0%	13.6	2.9	0.66	0.68	101
DVY	4.1%	12.2	1.6	0.57	0.68	101
SDY	3.1%	16.5	2.8	0.60	0.63	151
HDV	3.5%	17.48	3.8	0.46	0.50	75
FDVV	3.2%	15.7	2.6	0.83	0.77	108

Note: *Based on regression versus VTI's total daily returns from 2021 to 2025.

Source: Data from FactSet Research Systems.

consumer services (22.7%) have a combined weight of almost 50%, and health care exposure is more than 15%. This sector concentration and HDV's low R^2 and beta to the Vanguard cap-weighted index fund and fewer holdings indicate that HDV has the highest active tilt across the ETFs being considered.

SCHD seeks to offer a portfolio of quality companies with sustainable dividends. Holdings are cap weighted and drawn from companies that have a 10-year history of paying dividends, with a further fundamental screen applied that looks at the cash-flow-to-debt ratio, return on equity, dividend yield, and the dividend growth rate. SCHD's yield of 4.0% will help produce the required cash flow at low cost.

DVY is also appealing, despite its higher fee of 0.38%. With a 4.1% dividend yield, it would help achieve Lucy's target dividend yield of 4.0%. It would also serve as a strong value-oriented diversifier, given its low P/E and P/B. DVY has a selective approach, holding 100 companies that pay steady and rising dividends by using five-year dividend growth, payout ratio, and payment history as selection criteria. The largest sectors in DVY are financials and utilities, each with weights close to 25%.

After thorough analysis of methodology, costs, and portfolio characteristics, Lucy concludes that diversifying across three complementary approaches will best serve the foundation's income objectives while managing concentration risk. She structures her $400 million allocation as shown in **Exhibit 29**.

This mix sets her up for a position that has a fee and dividend yield in her target range. It brings together a group of ETFs that have an ability to sustain and grow their dividend yields and that have sector weights that diversify away from real estate and technology, accomplishing the fit goal for the selected ETFs.

Exhibit 29. High-Dividend-Yield Portfolio Allocations

Ticker	Allocation ($, Millions)	Expense Ratio	Portfolio Yield
SCHD	200	0.06%	4.03%
DVY	100	0.38%	4.13%
HDV	100	0.08%	3.53%
Total/average	400	0.15%	3.93%

Source: Data from FactSet Research Systems.

Covered Call Strategy ETFs for Enhanced Income

To find an additional income vehicle, Lucy next searches for ETFs that have high distribution yields from both dividends and option income. As she had in selecting the high dividend ETFs, she has a goal of having an active approach to stock selection with a value focus, which would tilt toward companies that can pay and sustain somewhat higher dividend payouts. She knows selling calls against stock holdings limits upside, and she does not want to give up all the return benefits of holding equities. Therefore, she would prefer strategies that allow for some equity upside participation. She uses several screening criteria as the first pass to identify her selection universe. These include the following:

- AUM of $1 billion of higher
- US large-cap stocks as the basis for primary holdings
- Expense ratios of 1.00% or lower
- Distribution yields of 4.50% or higher

To further narrow her selection criteria, she decides to use ETFs that draw only from the full range of US large-cap stocks, avoiding narrow sector and style box universes. The foundation's alternative managers have high exposure to technology and growth stocks; Lucy prefers to avoid duplicating this exposure.

Her screening identifies eight ETFs that warrant further analysis, shown in **Exhibit 30**.

Lucy notes that two of the ETFs with the highest distribution yields, SPYI and XYLD, sell calls against close to 100% of their portfolio holdings, thus forgoing almost all of the equity upside while being fully exposed to the downside. Their total returns will largely consist of their distribution yields. Lucy eliminates them.

GPIX and ISPY hold the full S&P 500 Index as its underlying. Lucy would prefer to maximize the dividend component using ETFs that pursue some stock selection. Also, ISPY gets its exposure by holding a swap that reflects the returns of selling options with only one day to expiry, which seems too complex and risky to her. These ETFs also do not make the cut.

Exhibit 30. US Large-Cap Equity Income ETFs with Covered Call Writing

Ticker Symbol	ETF Name	Assets ($, Millions)	Expense Ratio (%)	Portfolio Yield (%)	Distribution Yield (%)	No. of Holdings
JEPI	JPMorgan Equity Premium Income ETF	42,025	35	1.80	8.09	110
SPYI	NEOS S&P 500 High Income ETF	6,922	68	1.46	11.64	506
DIVO	Amplify CWP Enhanced Dividend Income ETF	5,829	56	1.96	6.77	28
KNG	FT Vest S&P 500 Dividend Aristocrats Target Income ETF	3,416	75	2.65	8.56	71
XYLD	Global X S&P 500 Covered Call ETF	3,165	60	1.44	13.41	506
GPIX	Goldman Sachs S&P 500 Premium Income ETF	2,690	29	1.44	7.97	495
RDVI	FT Vest Rising Dividend Achievers Target Income ETF	2,636	75	1.45	8.04	73
ISPY	ProShares S&P 500 High Income ETF	1,165	55	1.44	8.51	504

Source: Data from FactSet Research Systems.

This leaves RDVI, KNG, JEPI, and DIVO, all of which write calls on just a portion of the equity exposure, with the resulting US large-cap equity market upside exposure around 80%. This allows for considerable upside participation and provides distribution yields that are significantly above her target of 4%. She attempts to differentiate among these four candidates.

RDVI's dividend yield is a bit lower than those of the other options. DIVO is diversified across sectors and seeks 2%–3% of income from dividends and 2%–4% from option selling, but its concentrated holdings of only 28 stocks seems like a bit too much idiosyncratic risk. Moreover, DIVO's distribution yield is the lowest in the choice set. Lucy eliminates both. KNG and JEPI are still contenders. Both are appealing because they have low levels of concentration; a value-focused, fundamental stock selection process; and low technology sector exposure.

KNG, based on the S&P 500 Dividend Aristocrats index, chooses stocks from the S&P 500 that have a consistent track record of growing dividends over 25 years and that have listed options. It tilts toward lower-risk sectors, such as consumer staples and industrials, and has lower technology exposure. KNG's fee is a bit high, but its 8% target yield with equal weighting across a select group of stocks and its use of single-stock options rather than index options provide a more active tilt that Lucy views favorably. Because foundations have a nonprofit status and are tax exempt, the higher tax burden of stock versus index options is not a factor. She understands she would be trading off some efficiency for fit if she selects this ETF.

JEPI is also actively managed, focusing on value stocks with favorable risk–return characteristics and on generating option income. JEPI's goal is to build a portfolio with comparable returns and lower volatility than the S&P 500 while using covered call writing to increase income. JEPI provides an income yield of around 8%. Like KNG, JEPI is selective in stock holdings but well diversified, and it has a much lower expense ratio. It has 126 holdings; none is weighted more than 2%. It has a higher technology weight (15%) than KNG but still about half that of the S&P 500 and much lower exposure to consumer staples and discretionary.

Lucy thinks both strategies are appealing from a stock selection standpoint and thinks a target 8% income yield on a $100 million allocation could go far toward helping them meet the foundation's distribution goals. The lower fee on JEPI is very attractive, but she likes KNG's targeted income with partial overwriting approach. She also knows that active equity strategies have periods of out- and underperformance relative to their benchmark and believes having two different stock selection strategies would diversify her active risk somewhat. She decides to allocate $50 million to each covered call ETF. Having slightly lower risk than the S&P 500 and much higher income works very well for the investment strategy the foundation should be pursuing.

The Multi-Strategy Hedge Fund

Multi-strategy hedge funds are a fast-growing segment of the global hedge fund industry. They typically have $500 million to $3 billion in AUMs. As their name suggests, they combine specialty subfunds in a single portfolio.

For them, ETFs are precision tools for expressing tactical market views, hedging positions, and executing relative value trades. Risk models aggregate asset class, factor, or industry exposures of each subfund's holdings. ETFs are tools of choice for modifying these exposures at the portfolio level.

Equity hedge funds tend to use ETFs differently in building their long and short exposures. In their long positions, they favor ETFs that have concentrated positions, such as thematics or discretionary portfolios, but they often use broad, passively managed ETFs on the short side for managing total fund risk exposures. Macro-focused hedge funds extensively use passive ETFs representing asset classes, country exposure, and sectors, including some that embed leverage and shorting. They carefully examine ETF construction methodologies to match their investment view or risk target.

Holding periods range from minutes to months, with position sizes based on return potential balanced against risk features rather than strategic allocation targets. Because of this short-term holding period, ETF efficiency is less relevant than fit, tradability, and availability for shorting.

Hedge funds' trading infrastructure includes direct market access, sophisticated analytics platforms, and relationships with multiple prime brokers to ensure optimal execution. They use "upstairs" market-making services and capital to execute their orders efficiently and to avoid revealing their activity to the market, given that they trade $50 million to $200 million daily.

Scenario

CreekHead Capital is a $1 billion equity hedge fund founded by two former investment bank partners. The fund specializes in small-cap technology stocks that are potential acquisition targets for larger technology and communication sector firms—a strategy that has generated strong returns but carries concentrated sector risk.

The team's concern is straightforward: The exit strategy for the fund's small-cap holdings depends on these acquirers continuing to absorb smaller tech companies. A sharp decline in mega-cap technology stocks would likely freeze M&A activity, leaving CreekHead holding illiquid small-cap positions. To mitigate this risk, CreekHead works with the risk managers at Strat XYZ, the parent multi-strategy fund, to hedge approximately 50% of its $1 billion long equity exposure. The plan is to use an overlay strategy to reduce CreekHead's sector and factor risk exposures using futures, swaps, or ETFs through short positions or inverse exposures.

Tracey is a portfolio risk manager at Strat XYZ, who has been asked to advise CreekHead on the best way to hedge this risk.

Selection of Technology-Focused Index Exposure to Manage Risk

Tracey starts by searching for a fit between CreekHead's list of potential acquirers and indexes that have significant technology exposure. For the short exposure, Tracey can consider initiating a short ETF position or buying an inverse ETF.

Tracey looks for cap-weighted technology sector and Nasdaq-100 ETFs with assets of more than $1 billion and daily volumes of more than $20 million as shorting candidates. The Nasdaq-100 Index has 60% of its weight in technology stocks and fills in much of the balance with tech-adjacent stocks, such as Amazon, Meta, and Netflix.

Exhibit 31 shows the candidate ETFs along with their average spreads and expense ratios.

Tracey decides to look at the top stock holdings of the technology ETFs along with QQQ to get a better feeling for how their portfolios align with the set of potential acquirers. **Exhibit 32** shows the top 10 constituents along with their weights.

Three stocks—Nvidia, Microsoft, and Apple—account for more than 40% of the technology sector indexes, while potential acquirers, such as Amazon, Alphabet, and Meta, are not included. Tracey notes that all six of these stocks are included in the Nasdaq-100. QQQ is also better diversified, with a top 10 holdings weight just below 50%. She concludes that the Nasdaq-100 will be a better fit than the technology sector indexes for replicating the performance of potential acquirers. Tracey now faces a practical question: What's the most efficient way to implement this hedge?

Exhibit 31. Technology-Focused ETFs for Managing Risk

Ticker	ETF Name	AUM ($, Millions)	Expense Ratio (bps)	ADV Notional ($, Millions)	Spread (%)	Gearing
VGT	Vanguard Information Technology ETF	113,852	9	392	0.04	
XLK	State Street Technology Select Sector SPDR ETF	93,412	8	2,078	0.01	
IYW	iShares U.S. Technology ETF	21,198	38	163	0.02	
FTEC	Fidelity MSCI Information Technology Index ETF	16,834	8	59	0.04	
QQQ	Invesco QQQ Trust Series I	410,586	20	31,464	0.00	
QQQM	Invesco NASDAQ 100 ETF	70,652	15	1,168	0.01	
SQQQ	ProShares UltraPro Short QQQ	2,215	95	2,218	0.02	−3
PSQ	ProShares Short QQQ	553	95	275	0.03	−1
QID	ProShares UltraShort QQQ	228	95	439	0.05	−2

Source: Data from FactSet Research Systems.

Choosing the Product or Approach to Reduce Risk

One of the benefits of using the products based on the Nasdaq-100 is that there are several alternative tools for obtaining index exposure: futures, inverse ETFs, or shorting QQQ.

Tracey first considers Nasdaq-100 futures—the most liquid instrument in terms of volumes and spreads for managing this risk exposure. However, the operational complications give her pause. Futures are traded in a separate account through a futures commission merchant (FCM), which adds administrative complexity.[14] More significantly, the daily mark-to-market settlement of futures would generate realized gains and losses each day, complicating performance tracking and requiring careful cash management that her small staff would need to monitor.

ETFs might be a better option. CreekHead can hold ETFs (long or short) in the same account as their small-cap tech stocks without involving an FCM. The combined portfolio performance can be evaluated quite easily. Tracey decides to rule out using futures and instead searches for the best ETF for the task.

[14]FCMs are the equivalent of brokers for investors who trade futures. Futures are regulated by the Commodity Futures Trading Commission and have specific requirements for FCMs.

Exhibit 32. Technology-Focused ETFs, Top Holdings and Weights, 31 December 2025

XLK		VGT		IYW		FTEC		QQQ	
Constituent	Weight (%)	Constituent	Weight (%)	Constituent	Weight (%)	Constituent	Weight (%)	Constituent	Weight (%)
NVDIA	14.93	NVDIA	17.47	NVDIA	16.86	NVDIA	17.51	NVDIA	9.04
APPLE	13.24	APPLE	14.89	APPLE	15.32	APPLE	14.93	APPLE	8.02
MICROSOFT	11.84	MICROSOFT	12.19	MICROSOFT	13.90	MICROSOFT	12.22	MICROSOFT	7.17
BROADCOM	5.39	BROADCOM	4.48	META	3.43	BROADCOM	4.47	AMAZON	4.92
PALANTIR	3.49	PALANTIR	1.95	BROADCOM	3.09	PALANTIR	1.96	TESLS	3.97
AMD	3.00	AMD	1.70	PALANTIR	2.60	AMD	1.71	META	3.87
ORACLE	2.82	ORACLE	1.60	ALPHABET	2.48	MICRON	1.62	ALPHABET	3.63
MICRON	2.75	MICRON	1.60	AMD	2.31	ORACLE	1.62	ALPHABET	3.39
CISCO	2.61	CISCO	1.52	ORACLE	2.20	CISCO	1.53	BROADCOM	3.26
IBM	2.38	IBM	1.38	MICRON	2.14	IBM	1.39	PALANTIR	2.24
Top 10 Holdings	**62.45**		**58.78**		**64.33**		**58.95**		**49.51**
Top 3 Holdings	**40.01**		**44.55**		**46.08**		**44.66**		**24.23**

Source: Data from FactSet Research Systems.

Exhibit 33. ETFs That Track the Nasdaq-100 Index, Volume and Spreads, 2025

Ticker	Median Volume ($, Millions)	Bid–Ask Spread
QQQ	31,464	0.00%
QQQM	1,168	0.01%
SQQQ	2,218	0.02%
PSQ	275	0.03%
QID	439	0.05%

Source: Data from FactSet Research Systems.

Tracey finds the five ETFs that track the Nasdaq-100 from Exhibit 31 and summarizes their volume and bid–ask spread data in **Exhibit 33**.

QQQ is by far the most liquid of the non-levered ETFs. From the available levered ETFs, she selects ProShares UltraPro Short QQQ (SQQQ) for consideration. It has a −3× multiplier applied to QQQ's daily returns and has the highest AUM and dollar volume of the inverse (short) ETF offerings. It also requires the smallest capital outlay because of its 3× gearing.

Tracey decides to compare the benefits of shorting QQQ versus taking a position in SQQQ. She notes that SQQQ would allow her to invest just $167 million to achieve the required $500 million targeted short exposure.

Unfortunately, she would need to rebalance the SQQQ position frequently to maintain the correct dollar amount of inverse notional exposure. This inverse ETF targets −3× the returns of the QQQ each day. If the index falls by 2%, her position would be expected to gain 6%, bringing her SQQQ position to $177 million, which would translate to $531 million of short QQQ exposure (3 × 177), which is $31 million too high. Strat XYZ would need to reduce the SQQQ position by $10 million to get the exposure back to $500 million. The same would be true in reverse with an index increase. This feature of daily-objective leveraged and inverse ETFs, called path dependency, makes SQQQ operationally intensive, requiring regular monitoring and frequent trading.

Consequently, Tracey decides to focus on shorting. QQQ is very liquid and therefore cheap to borrow, allowing Tracey to maintain a consistent short exposure.

Tracey needs to evaluate some risks and considerations with shorting:

- *Margin requirements:* She will need to maintain margin in the prime brokerage account, which could be as much 150% of the short position value initially, with ongoing maintenance requirements.
- *Unlimited loss potential:* If QQQ rises quickly and significantly, she will need to add to the position to meet the margin requirement.

- *Cash requirement:* She may need to put up cash for any dividend payments during the time she is shorting the ETF to be paid to the lender of the shares.
- *Short squeeze:* The broker could force her to buy back the position if there is a shortage of shares to borrow and the lender wants his shares back, although this risk is low with an ETF as large as QQQ.

Tracey decides that a short position in QQQ is the best approach, given her expected three-month holding period and the target size of her position ($500 million). She believes this decision is operationally efficient because QQQ is very tradable and has a low fee profile and the approach is much simpler to initiate and maintain than futures and inverse ETFs. She contacts her prime broker relationship manager to ask him to implement a short position on QQQ. He puts her in touch with the firm's ETF specialist desk, which will help price and execute this trade effectively. Fortunately, QQQ has high levels of turnover, so Tracey's broker advises her that this short position should be easily implemented in a short time frame.

The Next-Generation Retail Investor: YOLO

The young, aggressive retail investor has made a significant mark on the ETF industry since the COVID-19 pandemic. Demographically, the typical "you only live once" investor is between 25 and 35 years old, with less than $100,000 in investable assets. According to JPMorganChase, the number of 25-year-olds with investment accounts has risen six-fold since 2015 (to 37%).[15] Newly equipped with commission-free trading by using apps on their phones and tablets, they have a strong belief in their ability to outperform the broad market.

YOLO investors self-report high risk tolerance and ambitious return targets, relying on social media and influencers in their decision making alongside traditional tools. Although much has been written about their generation's risky investing behaviors, embracing risk seems entirely rational to them. This is not uninformed or uneducated risk-taking: They are convinced that conservative strategies are for people who can afford to be conservative, by virtue of accumulated wealth or a high paycheck. For the YOLO investors, housing affordability headwinds reinforce their aggressive approach to risk taking—if they cannot afford a house anyway, why not swing for the fences?

Although professional investors focus on the E-T-F framework, this persona prioritizes narrative, momentum, and asymmetric upside potential. The following scenario reflects the decision-making process and language of this investor type.

Scenario

Marcus is a 26-year-old data analyst in Austin, Texas, who recently received a $35,000 year-end bonus. He has been allocating his 3% 401(k) payroll deduction to take advantage of his employer's generous 3% contribution match: it may be boring, but it's free money. He has it allocated to a target date fund he has never really examined. His rent just increased by 15% (again!), making homeownership feel impossibly out of reach. Marcus decides that rather than abandon saving

[15]See the analysis presented in a report on the shifts in retail investing: C. Wheat and G. Eckard, "A Decade in the Market: How Retail Investing Behavior Has Shifted since 2015," JPMorganChase (27 August 2025), www.jpmorganchase.com/institute/all-topics/financial-health-wealth-creation/a-decade-in-the-market-how-retail-investing-behavior-has-shifted-since-2015.

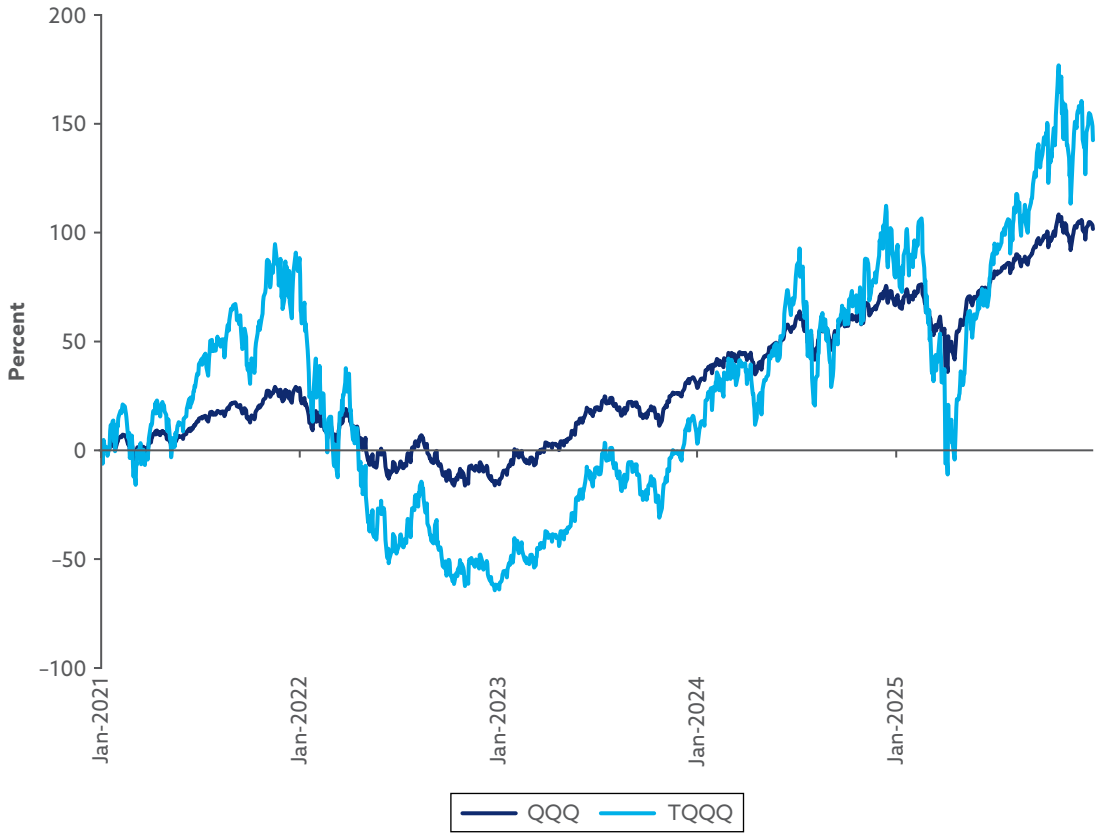
altogether by blowing his bonus on a car, he is going to make his money work aggressively to improve his financial position. He is going to invest this money for real growth—not the 7% his dad always talks about but multiples of that return. He is all about performance.

Consequently, Marcus decides to look for a portfolio of ETFs that could credibly double, triple, or quadruple over the next 5 to 10 years—performance he expects based on chatter about crypto and tech stocks on his Reddit feed. He does not want the "boomer funds" his dad recommends.

Starting with Leveraged Exposure

Marcus has heard about leveraged ETFs from the WallStreetBets subreddit, and he has seen all the ads for QQQ, tracking the Nasdaq-100. Scrolling through funds on his brokerage app, he checks out ProShares UltraPro QQQ (TQQQ), which promises 3× daily Nasdaq-100 returns. A 2023 chart showing +200% makes his pulse quicken. He calculates that $35,000 could become $150,000 in two good years. But something makes him pause: A YouTube video titled "Why TQQQ Will Destroy You" explains volatility decay and how leveraged ETFs really should be used just for short-term trading. He pulls up a five-year chart (**Exhibit 34**) and sees the

Exhibit 34. QQQ and TQQQ Cumulative Total Return, 2021–2025



Source: Data from FactSet Research Systems.

Exhibit 35. Innovation ETF Returns

Ticker	Fund Name	Expense Ratio	AUM	One-Year Return
ARKK	ARK Innovation ETF	0.75%	$7 billion	+35%
QQQJ	Invesco NASDAQ Next Gen 100	0.15%	$800 million	+20%
KOMP	SPDR S&P Kensho New Economies	0.20%	$2.4 billion	+20%
DTEC	ALPS Disruptive Technologies	0.50%	$83 million	+7%

Source: Data from FactSet Research Systems.

problem—in choppy markets, TQQQ bleeds even when QQQ is flat. And he notes the −79% drawdown in 2022.

Seeing this demo of the dark side of risk-taking, Marcus abandons leveraged ETFs and instead searches for "innovation ETFs" using an artificial intelligence (AI) search engine. Surely there is growth potential without the daily rebalancing risk. He finds several options, shown in **Exhibit 35**.

Marcus spends the evening reading about the ARK Innovation ETF on Reddit, which has thousands of posts on the fund and its high-profile manager. ARKK seems to be very volatile. Its short-term performance has occasionally been amazing, but he notes ARKK's history shows periods of stagnation and some big drawdowns. Marcus worries that he could pick the wrong entry point.

He recalibrates. He needs exposure to big tech without the manager risk of concentrated active funds. Marcus decides to try his search bot to look for big tech funds (see **Exhibit 36**).

Exhibit 36. Large Technology ETF Fund Summary

Ticker	Fund Name	Expense Ratio (bps)	AUM ($, Billions)	Yield	Weight of Top Holding (NVDA)	Number of Holdings
VGT	Vanguard Information Technology	9	113.9	0.40%	17.47	323
XLK	Technology Select Sector SPDR	8	93.4	0.54%	14.93	72
FTEC	Fidelity MSCI Information Tech	8	16.8	0.42%	17.51	288
IYW	iShares U.S. Technology	38	21.2	0.14%	16.86	143

Source: Data from FactSet Research Systems.

Exhibit 37. Major Crypto ETFs

Ticker	Fund Name	Expense Ratio (bps)	AUM ($, Billions)	Type
IBIT	iShares Bitcoin Trust	25	67.9	Spot bitcoin
FBTC	Fidelity Wise Origin Bitcoin Fund	25	17.8	Spot bitcoin
GBTC	Grayscale Bitcoin Trust	150	14.5	Spot bitcoin
ARKB	ARK 21Shares Bitcoin ETF	21	3.4	Spot bitcoin
BITB	Bitwise Bitcoin ETF	20	3.4	Spot bitcoin

Source: Data from FactSet Research Systems.

Knowing that he has moved down the risk spectrum into ETFs that have a large number of holdings topped by concentrated positions in very large companies, he now applies some commonsense rubrics, assuming "all these funds are probably the same." He rejects IYW immediately—why pay 0.38% for boring index funds? Among the others, he likes VGT's "pure tech" story even though XLK is 1 bp cheaper. It gets him exposure to all the "big" tech names, without being too complicated.

A Smattering of Crypto

The tech fund gives him solid exposure, but something is still missing. The fund owns almost no crypto, and he knows the best performing asset of his lifetime has been bitcoin, even with all its volatility. Marcus goes back to his AI search engine, enters "bitcoin ETF," and finds plenty of options, shown in **Exhibit 37**.

A quick look at the individual fund pages shows that the iShares fund, IBIT, has become the "easy button" choice for bitcoin exposure, with reasonable fees and massive adoption, as indicated by its large asset size.

Moonshot Quantum ETFs

He is partly satisfied with the two ETFs he has chosen, but Marcus is still looking for his moon-shot opportunities. As he continues reading online about different tech stocks, the recent performance of some quantum computing companies catches his eye. He starts searching and finds two intriguing options, shown in **Exhibit 38**.

Exhibit 38. Quantum Computing ETFs

Ticker	Fund Name	Expense Ratio	AUM	Top Holding
QTUM	Defiance Quantum ETF	0.40%	$3.2 billion	QNC: 2.2%
WUGI	AXS Esoterica NextG Economy ETF	0.76%	$21.8 million	NVDA: 20.4%

Source: Data from FactSet Research Systems.

WUGI seems expensive and tiny, and he already knows he will end up with a lot of NVDA exposure from his tech ETF. He spends a few minutes on the Defiance website, looking at QTUM's holdings. Although half the names are also in VGT, the other half are unfamiliar names, and each one he researches is doing something weird and cool. He picks QTUM for one-third of his equity allocation, counting on those small names to give him exposure his VGT core will not provide.

Marcus realizes he needs to allocate percentages. He opens a spreadsheet, plays with various allocations for what "feels" right, and ends up with the following:

- 40% VGT (core tech)
- 20% QTUM (quantum moonshot)
- 20% IBIT (bitcoin)
- 20% cash (for the next big thing)

The allocation has a logic to it: a substantial core position, a speculative bet on emerging technology, crypto exposure, and flexibility. It is aggressive but not reckless.

He logs into Robinhood. All three ETFs trade commission free. He places market orders for each allocation during his lunch break, getting instant fills. He leaves the cash balance alone.

Marcus screenshots his positions and posts to r/investing, "26M, built different. VGT/QTUM/IBIT. Betting on bits, qubits, and bitcoin. See you at the real estate auction or behind the Wendy's dumpster. LFG 🚀." The comments are predictable. Half warn about 2022's tech massacre. Half post rocket emojis. Someone mentions tax implications, which Marcus had not thought about. Another suggests he should have checked spreads and volume, but Marcus does not really understand spreads. When he revisits his positions later, he finds he has indeed been the "top trade" on his QTUM position, buying at the intraday high, and files that away as a "lesson learned."

But Marcus is not worried. According to data from Bank of America, alternative investments and crypto constitute 31% of young investors' portfolios but only 6% for older investors.[16] He is being conservative by his generation's standards. His blended expense ratio is nothing compared to potential returns. He will either retire at 40 or work forever—but at least he took his shot.

Conclusion

In this module, we have outlined a framework for the ETF due diligence process, focusing on efficiency (holding costs and risks), tradability (liquidity analysis), and fit (active risk relative to the market segment). We provided several examples of using the E-T-F framework to serve specific investor and portfolio needs.

The range of strategies depicted illustrates the adaptability of the E-T-F framework to different investor types, objectives, and risk preferences. For a conservative foundation looking for high

[16]S. Becker, "Gen Z and Millennial Investors Are Embracing Crypto, Real Estate, and Private Equity Along with Stocks," Fast Company (18 June 2024), www.fastcompany.com/91141379/gen-z-millennial-investors-crypto-real-estate-private-equity-stocks-boa-private-bank.

and stable income, a small investor securing their retirement savings, and a hedge fund looking to manage risk, the selection process and choices are quite different, but all find an approach that has the potential to fit their investment needs. A young investor looking to speculate with his bonus to a family office yields a very different selection compared to the RIA, but the method for evaluating the options is quite similar.

The family office, for example, is pursuing a traditional fixed-income strategy, evaluating ETFs in the corporate bond space. We also consider more complex and higher-risk-profile investors, such as a multi-strategy hedge fund looking to manage the risk of small-cap technology holdings and a next-generation retail investor aiming for high returns with some innovative and more speculative strategies.

By exploring ETF options in a systematic way, investors can make informed trade-offs in terms of cost, liquidity, and performance features and use the abundant data and educational resources available. In addition, professional investment and trading advice often provides the advantage of using experts who have deeper knowledge and experience. As the spectrum of ETF choices expands in terms of breadth and complexity, careful evaluation involves both art and science and is critical for both wealth accumulation and to minimize surprises.

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