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Capital market fragmentation and the impact on total cost of ownership for European ETF investors

Exploring differences across European and US ETF markets

- While the ETF market has seen significant growth in the past decade, the efficiency and depth of Europe's capital markets still put European ETF investors at a cost disadvantage relative to US investors.
- The complexity and fragmented structure of the European ETF market stem partly from investors' historical preference and partly from regulation. Having to navigate differences in execution, settlement, currencies, tax treatments and service provider rules adds to the costs facing liquidity providers pricing European ETFs.
- We believe there are steps that could be taken to ensure the continued growth of the European ETF market, such as limiting the impact of fragmentation on ETF trading, establishing consolidated tapes and simplifying post-trade settlement and processing.

Authors:
Sophie Hunter, CFA, ETF Capital Markets, Vanguard, Europe
Jan-Carl Plagge, Ph.D., Investment Strategy Group, Vanguard, Europe
Paul McGhee, European Public Policy, Vanguard, Europe

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Executive summary

Investors have benefitted significantly from the increased availability of exchange-traded funds (ETFs) in recent years, including through the reduced cost of investing, access to investments providing broad diversification opportunities, enhanced liquidity and greater market transparency. By helping ordinary investors participate in the capital markets at a low cost, ETFs are democratising investing for millions of investors.

The European ETF market has experienced substantial growth during the past decade, increasing almost four-fold from just over $450 billion in assets as of 2014 to more than $1.63 trillion at the end of June 2024[1]. Fuelled by evolving investor preferences and product innovations, the European ETF market is predicted to grow at 15% annually for the next five years and reach more than $4.5 trillion of assets by 2030[2]. Looking ahead, we believe the continued growth of Europe's ETF market will depend on three major factors:

- The **product** regime governing ETFs, particularly the European Union's (EU) UCITS framework;
- The rules and incentives for the **distribution** of ETFs to institutional and retail investors; and
- The efficiency and depth of Europe's ETF **capital markets**.

This paper is concerned primarily with the functioning of ETF capital markets, as the efficiency and depth of Europe's capital markets still put European ETF investors at a cost disadvantage relative to US investors. First, we explore the rapid growth of ETFs both in Europe and the US in the context of different market structures, regulatory rules and cost structures.

The main body of the paper introduces and examines the concept of 'total cost of ownership'[3] (TCO) for ETF investors in Europe and the US. We then test three hypotheses around the key factors driving higher overall trading costs for European investors. We find a direct relationship between higher levels of market fragmentation within the European market and higher trading costs in the form of wider bid-ask spreads. Specifically, a higher and more complex settlement fee structure, pre- and post-trade infrastructure fragmentation and a less mature ETF secondary lending market all contribute to higher trading costs for market participants in Europe compared with those in the US.

We conclude with a discussion of the key opportunities for further development and regulatory innovation in Europe's ETF landscape.

1 Source: ETFGI, July 2024.

2 Source: EY Ireland Research, March 2024.

3 The concept of the total cost of ETF ownership is examined in detail in chapter 2 of this paper.

1 – ETF refresher

We start with a brief overview of the basics of ETFs. Any readers with a strong foundation in ETFs may wish to move on to Chapter 2.

An ETF is a type of pooled investment security that is listed and traded on a traditional stock exchange. Like an equity security, ETFs can be bought and sold throughout the trading day but typically aim to return the performance of a diversified basket of stocks and/or bonds.

While an investor can request to trade a mutual fund at any time of the day, the trade will not happen immediately. Instead, it will go through at the next 'trade point' – usually the end of the day or the following day. When an investor requests to buy or sell an ETF, however, they will have the option to trade at that point in time via the secondary market or a later point in time, depending on their investment objectives and preferences.

ETF liquidity

Liquidity here refers to how quickly and seamlessly an investor can execute an ETF trade at a reasonable price. ETFs offer multiple layers of liquidity and investors are not limited to the liquidity of the ETF itself.

The first layer of liquidity is available in the secondary market (i.e., the trading of ETF shares between two market participants, either on- or off-exchange). ETFs can be bought or sold on an exchange, through a 'request for quote' (RFQ) platform or over the counter directly with a broker. These trading venues are all part of an ETF's secondary market. In recent years, we have also seen an increase in the use of trading algorithms, which help to source secondary market liquidity across a range of execution venues, including 'lit' venues, RFQ platforms and dark pools[4].

An additional layer of liquidity comes from the underlying securities held by the ETF, which can be accessed via the primary market. Authorised participants (APs) are the only market participants that can access an ETF's primary market to create or redeem directly with the ETF issuer. The creation/redemption mechanism will directly affect a fund's assets under management (AUM) and is the key to keeping the price of an ETF in a tight range around the value of the portfolio of securities it holds.

There are a number of players in the ETF ecosystem that help facilitate the various layers of liquidity, including the ETF issuer, the AP and the market maker. **Figure 1** shows an ETF creation order, illustrating how these firms work together. In the first example, the firm is providing both AP and market-making services and then creating shares directly with the issuer. In the second example, the firm undertaking ETF market making is using another firm's AP services to create new ETF shares.

4 Lit venues are defined as public stock exchanges that have an open and publicly available order book, displaying live price quotes. Dark pools are defined as private exchanges, where trade information is not visible until after the trade has been executed and reported. RFQ platforms are defined as trade execution platforms that allow market participants to request direct quotes from a series of counterparties based on the security, quantity and execution type.

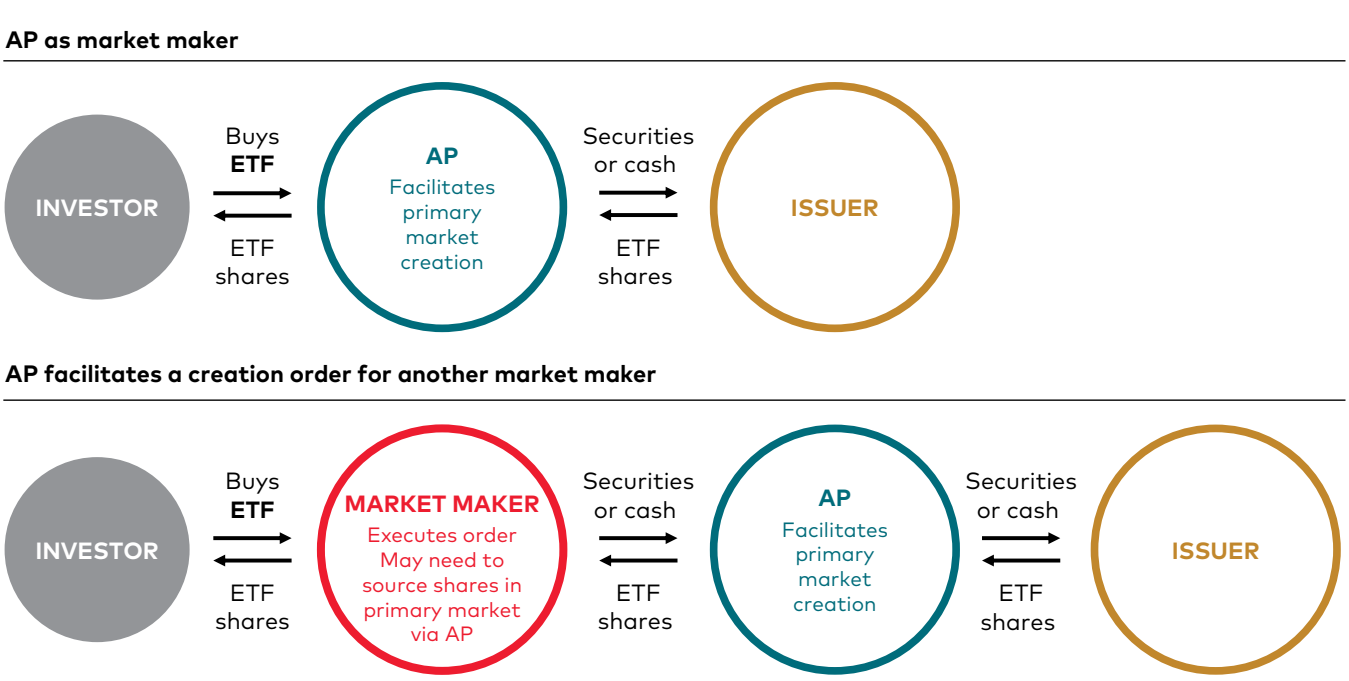
Key participants in ETF trading

ETF market makers: Firms that provide immediate, intra-day liquidity for investors. They provide two-sided bid-ask quotes in the secondary market to enable ETFs to be both bought and sold by market participants. These firms may or may not also be authorised participants with select issuer firms. A market maker does not need an agreement with an issuer to participate in the secondary market pricing ETFs.

Authorised participants (APs): Financial institutions that have contracts in place with ETF issuers, enabling them to create and redeem ETF shares. APs can manage securities settlements, typically across a range of asset classes, and can act on their own behalf, for other firms and for investors. The primary market create/redeem mechanism allows ETF shares to be created or redeemed by APs in exchange for the underlying basket of assets.

Investors: The ultimate owners who benefit from the performance of an ETF and bear the total cost of owning it. There can be important differences in the investment objective, risk appetite and behaviour of individual retail investors and large, sophisticated institutional investors.

FIGURE 1
ETF creation order



Source: Vanguard. Diagram is provided for illustrative purposes only.

2 – Costs of investing in an ETF

When considering ETF costs, investors often first think of expense ratios. However, when comparing two ETFs, even if their expense ratios are the same, different investors may still face very different cost outcomes from buying the ETF. While expense ratios are an important factor, investors should also look at their total cost of ownership (TCO), which encompasses a more complete range of considerations.

Broadly, TCO includes an ETF's direct fund expenses (expense ratio), costs of trading (bid-ask spread and premium/discount volatility) and an uncertainty cost related to any tracking mismatch between the ETF and its benchmark[5]. All these costs can affect an investor's end outcome. Simply put, the less investors pay, the more return they keep. And the more they keep, the more that return can compound over time.

For the purposes of this paper, we will touch on the definitions of each specific cost but the main focus will be on the two primary costs an ETF investor faces: expense ratios and trading costs in the form of bid-ask spreads.

Depending on an investor's time horizon and how frequently they trade, one cost may matter more than the other. For investors who are more active ETF traders, spreads become increasingly important with each roundtrip trade. This relationship is explored in more detail in the empirical results section of this paper, where we look at the relative importance of both spreads and expense ratios for European and US investors.

ETF cost considerations

Expense ratio: An explicit fund expense the ETF investor pays to the ETF issuer. It covers the costs of portfolio management, administration, marketing and distribution, among other expenses.

Bid-ask spread: The difference between the highest price a buyer is willing to pay and the lowest price a seller is willing to accept on the secondary market. It is an implicit trading cost the investor will pay each time they make a roundtrip transaction in an ETF.

Premium/discount volatility: When an ETF fetches a market price above its net asset value (NAV), it is said to be trading at a premium, and when it trades below NAV, it is said to be trading at a discount. The biggest risk arises when an investor buys an ETF when it is trading at a substantial premium and then sells it at a substantial discount. This volatility reflects an uncertainty cost for investors, which can be an important consideration in the TCO.

Tracking error: Measured as the standard deviation of excess returns over time, it is an indicator of how consistently close or wide an index ETF's performance is relative to its benchmark. For investors using index products, any doubt about performance adds an uncertainty cost to the TCO.

5 Source: Vanguard, *Understanding the total cost of ETF ownership*, 2024.

Trading costs – A deep dive

The bid-ask spread is a key cost for investors to consider alongside expense ratios. It is at the centre of every ETF trade and is an implicit trading cost realised when buying or selling an ETF. Many market forces influence the bid-ask spread. Ultimately, it is set by the liquidity providers pricing the product and will be directly impacted by the costs those providers face to trade the product.

Factors influencing the bid-ask spread

Volatility of the market and the ETF's underlying securities: Broader market volatility often affects spreads. In fast-moving markets, market makers must provide a larger range between the prices at which they are willing to buy and sell a security. This is because if they buy and the market quickly turns against them, they could end up selling for a lower price and taking a loss.

Liquidity of the ETF's underlying securities: Lower liquidity generates wider bid-ask spreads, especially when the ETF's volume is also lower. An S&P 500 ETF, in which all the underlying stocks are readily tradable, would be relatively easy to buy or sell in any market. So, we would expect such an ETF to trade with a tight spread that reflects the underlying basket of securities. But other ETFs, such as those that hold high-yield bonds, might see more frequent liquidity-constrained environments that make it harder to buy and sell the underlying securities at a fair price. This could affect the ETF's spreads more significantly.

An ETF's trading volume, or turnover: Lower volume often signals wider spreads. If an ETF turns over quickly, the market maker carries less market-movement risk and can set the spread tighter. For ETFs with lower volume, the market-movement risk grows, because recycling that risk takes more time, leading to wider spreads. Wider spreads are a way the market maker can recoup the costs of holding securities for longer. An ETF's trading volume can be affected by the maturity of the ETF itself but also the maturity of the market in which the ETF is trading. In less mature markets, liquidity can be harder to source in the secondary market without an authorised participant going to the primary market to access the liquidity of the underlying securities. This in turn increases costs for the market maker and can result in wider spreads for the end investor.

Market structure environment in which the ETF trades: Underlying ETF market structure and fragmentation can impact liquidity and trading costs. Different regulatory backdrops and market regimes can influence both pre- and post-trade costs, all of which need to be factored in by a market maker when setting the bid-ask spread.

3 – European and US market structure

Demand for ETFs in Europe has never been higher. Assets currently stand at $1.63 trillion[1], or more than double the amount of assets at the end of 2018. Despite this impressive growth, the global ETF market is still dominated by the US, where total ETF AUM now stands at $7.46 trillion[1].

TABLE 1:
Comparing the US and European ETF markets

	US	Europe
ETF assets	$7.46 trillion[1]	$1.63 trillion[1]
ETF turnover	$38.06 trillion[6]	$2.43 trillion[3]
Number of ETFs	3,040[1]	2,967[1]
Number of ETF listings	3,040[1]	11,925[1]
Share of household financial wealth in regulated funds	22%[7]	10%[5]

Differences in investor culture and education, distribution channels, retail participation, regulatory environments and market fragmentation are frequently cited as reasons for the slower growth of ETFs in Europe compared with the US.

Europe has a complex patchwork of equity markets, stock exchanges and post-trade infrastructure. Today, the European ETF market is four times smaller than the US in terms of assets and more than 15 times smaller than the US in terms of turnover[3]. However, Europe has four times as many ETF listings, more than 10 times as many exchanges for listings, more than twice as many exchanges for trading and roughly 20 times as many post-trade infrastructure providers[8].

Having to navigate the differences between execution venues, settlement venues, currencies, tax treatments, service provider rules and fees all adds to the complication and costs for liquidity providers pricing European ETFs.

This complexity and fragmented market structure is partly due to European investors' historical preference to trade and settle ETFs in their local market and partly due to regulation.

Divergent regulatory models

Between 2005 and 2007, both the US and Europe implemented reforms in the regulation of stock exchange trading and market structure, primarily focused on increasing transparency, investor protection and market efficiency. In the US, Regulation National Market System (Reg NMS) was implemented, mandating that orders be routed to whichever trading venue offered the best price. This regulation requires exchanges to make publicly available the best available bid and ask prices for each security they trade. These prices are then consolidated in real time to create a national best bid and offer (NBBO), which gives investors confidence that they are getting the best price available at a given time. Importantly, these developments were supported by pre-existing market infrastructure, including a single centralised clearing and settlement function and market competition among exchanges.

In Europe, the EU's Markets in Financial Instruments Directive (MiFID) came into force in 2007, aiming to create a more harmonised market for investment services across Europe and allowing the trading of stocks away from the national exchanges on which they were listed. This led to a proliferation of new platforms, including broker dark pools and multilateral trading facilities. However, the absence of a consolidated tape[9] at the time, together with fragmentation in clearing and settlement, resulted in a lack of pre- and post-

6 Source: Bloomberg, 2023 turnover (in USD terms).

7 Source: Investment Company Institute, 2023.

8 Source: New Financial, *The problem with European Stock Markets*, 2021.

9 Consolidated tape refers to a system that provides real-time data on security prices and volume across exchanges. It consolidates the information from different trading venues into a single, continuous stream, allowing investors and traders to see a comprehensive view of market activities.

trade transparency with investors unable to easily access the full liquidity profile of an ETF across the multiple trading and reporting venues in existence.

Following the original introduction of MiFID, there have been a number of subsequent and impactful regulatory developments implemented across Europe and the UK, aiming to increase transparency, improve investor protection and promote competition in the financial markets. In 2018, both MiFID II and Markets in Financial Instruments Regulation (MiFIR) came into force in the EU, with MiFIR imposing reporting requirements on authorised firms, requiring all trade data to be provided at T+1 intervals[10].

Market impact on ETF trading of recent regulations

In both US and European markets, there has been an increase in off-exchange trading since the introduction of the regulations, with larger institutional investors taking advantage of dark pools' lack of pre-trade transparency to execute large trades without alerting the market to them. However, the difference between on-exchange ETF trading between the US and Europe remains stark.

In Europe, using 2023 data from big xyt (a provider of data analytics solutions), we estimate that just 24% of volume is executed on-exchange, with off-exchange venues such as RFQ platforms dominating the trading landscape. Market makers have cited lack of pre- and post-trade transparency in Europe, lower levels of on-exchange liquidity and the ability to compete with a smaller number of market makers on a per trade basis as reasons for the preference. In the US, it is estimated that 60% of ETF trading occurs on-exchange[11].

Given trading primarily occurs off-exchange in Europe and there is a lower level of pre-trade transparency overall, market makers tend to have less visibility into supply and demand conditions on the secondary market and less connectivity to this supply and demand. This can create the perception of less overall liquidity in the European market, which in turn can lead a market maker to have less confidence in their ability to trade out of any position. As a result, we often observe more reluctance to hold on to inventory, and a greater reliance on the primary market to offset any positions they have entered throughout the day. Using data from Vanguard's UCITS ETF range, we observe that the secondary trading to primary trading turnover ratio is 2.5:1. In the US market, this ratio is closer to 5:1, although it can be much higher for frequently traded ETFs. This difference emphasises how important an efficient primary market is in Europe while also highlighting the importance of continued efforts to increase pre- and post-trade transparency.

Current regulatory developments in Europe

In more recent years, ongoing regulatory developments have continued to shape and develop the ETF market across Europe and the UK. In February 2024, the EU adopted a directive amending MiFID II and MiFIR rules on transparency, consolidated tape and payment for order flow. The proposed consolidated tape would provide real time pre- and post-trade data for equities and ETFs, although it would not attribute data to a specific trading venue. EU member states have until 29 September 2025 to transpose the amending directive.

In the UK, the Financial Conduct Authority (FCA) is focusing first on creating a consolidated tape for bonds as part of its UK Wholesale Markets Reform, with equities and ETFs to follow thereafter. The expectation is that the UK tape would include venue attribution with a bond consolidated tape to commence operation in the second half of 2025. These developments mark an important step in enhancing the competitiveness and transparency of EU and UK capital markets.

Consolidated tape: A system that collects and consolidates market data, such as prices and volumes, across the market and disseminates them in a single, standardised feed.

10 Following the UK's exit from the EU in 2016, MiFID was required to be transposed into UK law, resulting in a near parallel framework. T+1 refers to one day after the transaction date.

11 Source: Vanguard, *ETF trading guidance and best practices*, 2021.

4 – Testing our assumptions and empirical results

Considering our baseline knowledge and understanding of ETF trading costs and market structure differences between Europe and the US, we assume that the liquidity of European-domiciled ETFs is more fragmented. We also assume that this fragmentation, in part, contributes to the wider bid-ask spreads experienced by end investors in Europe.

In order to test this causality chain more formally, we have considered the following hypotheses:

- **Hypothesis 1 (H1):** Investors in European-domiciled ETFs face higher implicit trading costs (in the form of wider bid-ask spreads) compared with investors in US-domiciled ETFs.
- **Hypothesis 2 (H2):** The liquidity of European-domiciled ETFs is more fragmented than the liquidity of US-domiciled ETFs.
- **Hypothesis 3 (H3):** ETF trading costs are driven not only by turnover volumes and underlying liquidity, but also by the degree of fragmentation present in the market.

While the first two hypotheses set our baseline by comparing the European-domiciled market with the US-domiciled market, hypothesis 3 connects bid-ask spreads with turnover and market fragmentation and assumes that it is not only the turnover but, at least in part, also the fragmentation of turnover that drives bid-ask spreads.

Data sample methodology

Our sample consists of a point-in-time cross section of ETFs domiciled in Europe and the US, as sourced from Morningstar, with an inception date of 2022 or earlier. The as-of date of our data is 31 December 2023.

We cleaned the data to remove all ETFs for which Morningstar does not provide a 'global category', which have assets under management of less than $5 million and which have a daily turnover of less than $10,000. Furthermore, any global categories that contained less than five European-domiciled or US-domiciled ETFs were removed. This process ensured not only that we excluded outlier ETFs that were very small (in terms of size or turnover) but also that we had a comprehensive dataset across both European and US markets.

After cleaning the data, 3,318 ETFs remained, distributed across 31 distinct global Morningstar categories. Of that total, 1,891 of the ETFs had a European domicile and 1,427 were domiciled in the US[12].

12 Please refer to Appendix 1 for a full breakdown of the sample methodology and definitions of the variables used in the study and regression analysis.

Regression results

TABLE 2:
Regression results

	(H1) Bid-ask spread (weighted)	(H2) Fragmentation score	(H3) Bid-ask spread (weighted)
Fragmentation score	(–)	(–)	**0.0647*** **
Turnover (aggregated)	(–)	(–)	**-0.0578*** **
Region (Europe/US)	**0.0526***	**0.2185*** **	-0.103***
Asset class (equity/fixed income)	0.1109***	0.0434***	0.0707***
Underlying liquidity score	-0.0035***	0.0000	-0.0028***

Notes: The table provides the regression coefficients of the variables shown in the LHS column. ***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively. **Source:** Vanguard, calculations based on data from Morningstar, big xyt and Bloomberg, as of 31 December 2023.

As the first numerical column from the left shows, we find support for our **first hypothesis**[13]. Investors in European-domiciled ETFs face higher implicit trading costs (in the form of wider bid-ask spreads) compared with investors in US-domiciled ETFs. We would expect bid-ask spreads to be wider for European-domiciled ETFs given the significantly lower trading volumes we see[14] together with the higher levels of market fragmentation and complexity in the European market.

Our **second hypothesis** is also supported by the findings. The fragmentation score of European-domiciled ETFs is higher than that of US-domiciled ETFs by a value of 0.2185. This finding is in line with our expectations, given the multiple execution venues, currencies and post-trade infrastructure providers that investors must navigate in Europe.

We also find a degree of support for our 'relationship-based' **third hypothesis**[15]. When controlling for aggregate turnover, the higher the level of fragmentation, the wider the bid-ask spread appeared to be.

To summarise, we find support for all three of our hypotheses. The liquidity of European-domiciled ETFs is more fragmented across multiple trading venues. Furthermore, we find a positive relationship between the fragmentation of ETF liquidity and bid-ask spreads: the more fragmented an ETF's turnover is across venues, the higher the bid-ask spread tends to be. These quantitative results are also supported by the qualitative evidence, which we have obtained (and summarised in **Appendix 4**) from a range of ETF market makers that operate across both markets.

Our empirical findings are consistent with several recent studies, which make predictions regarding the impact of venue fragmentation on price and liquidity within the stock market. Our finding of a direct relationship between market fragmentation and bid-ask spreads is consistent with Guo and Jain (2023), who used the launch of the independently owned MEMX (Members Exchange) in the US to investigate the impact of an increase in trading venues on US stock prices. Their findings indicate an increase in market fragmentation level leads to a rise in the price impact of trading on existing US lit exchanges. Guo and Jain estimate that a 1.6% increase in the market fragmentation level for a stock results in approximately a 2.9 basis point increase in the NBBO price impact and more substantial increases in exchange-based price impacts, especially for smaller-capitalisation stocks.

13 Please refer to Appendix 2 for a breakdown of the regression equations used to test each hypothesis.

14 In 2023, we saw 15 times higher volume in US-domiciled ETFs compared to European-domiciled ETFs. Source: Vanguard, calculations based on data from Morningstar, big xyt and Bloomberg, as of 31 December 2023.

15 Please note, we reran the regressions underlying our third hypotheses based on various sub-samples. While we found quite a few cases in which the fragmentation score's coefficient was not statistically significant at the 10% level, it was found to always be positive.

There are instances where the empirical evidence has been mixed, with O'Hara and Ye (2011) and Gresse (2017) finding that increased market fragmentation can increase the competition among trading venues, which in turn can lower trading costs. However, while increasing venue competition may increase cost competition to some extent, investor liquidity search costs need to be considered when there is a lack of transparency in prices across the market. This issue is particularly prevalent in Europe, with Fioravanti and Gentile (2011) finding that fragmentation of trading venues post-MiFID increased liquidity, but reduced market efficiency.

Estimating the total cost of ownership for ETFs

In Chapter 2, we introduced total cost of ownership and how the relative importance of bid-ask spreads and expense ratios can vary depending on the investor's time horizon and how frequently they trade. Using our full data sample, while we find that bid-ask spreads are wider for European-domiciled ETFs compared with US-domiciled ETFs, we observe that expense ratios are on average lower for European-domiciled ETFs compared with US-domiciled ETFs. This finding may be surprising to some, who might expect that a more mature market such as the US would offer lower expense ratios. One possible explanation for this finding is that, with higher bid-ask spreads at an overall level in Europe, issuers now have to compete more fiercely on expense ratios to ensure the European ETF market can remain cost-competitive with the more established mutual fund market.

Using a much smaller, concentrated sample of data, we explore this relationship further. We focus on five ETF exposure groups, which include both a US- and European-domiciled ETF that track the same benchmark[16].

TABLE 3:
ETFs included in data sample

Exposure type	European-domiciled ETF ticker	US-domiciled ETF ticker	Benchmark ticker
S&P 500	CSPX LN	SPY US	SPTR500N/SPX
All-world	ISAC LN	ACWI US	NDUEACWF
Emerging market equity	EMM LN	IEMG US	MIMUEMRN
1-3 year US Treasury	IBTS LN	SHY US	IDCOT1
USD investment-grade corporate bond	LQDE LN	LQD US	IBOXIG

Source: Bloomberg, as of 31 December 2023.

For our analysis, we assume a European and US investor both have $50,000 in total to invest, spreading $10,000 equally across all five exposure groups. In **Figures 3** and **4** we plot how an investor's costs, in the form of expense ratios and bid-ask spreads, vary depending on how many roundtrip transactions take place per annum.

We assume that an ETF investor completing five roundtrip transactions per year will only hold the ETFs for 75% of the year and an investor completing 10 roundtrip transactions per year will only hold the ETFs for 50% of the year, thus reducing the overall expense ratio as the frequency of trading increases.

16 Please refer to Appendix 3 for a more detailed breakdown of the sample methodology.

FIGURE 3:

European investor

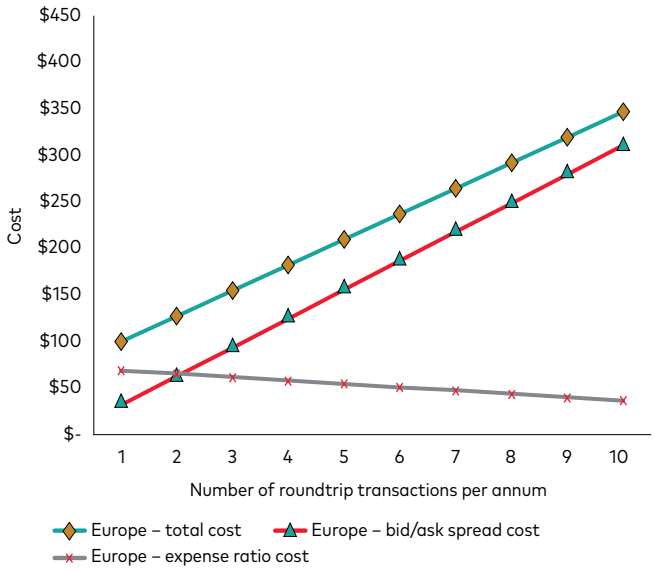
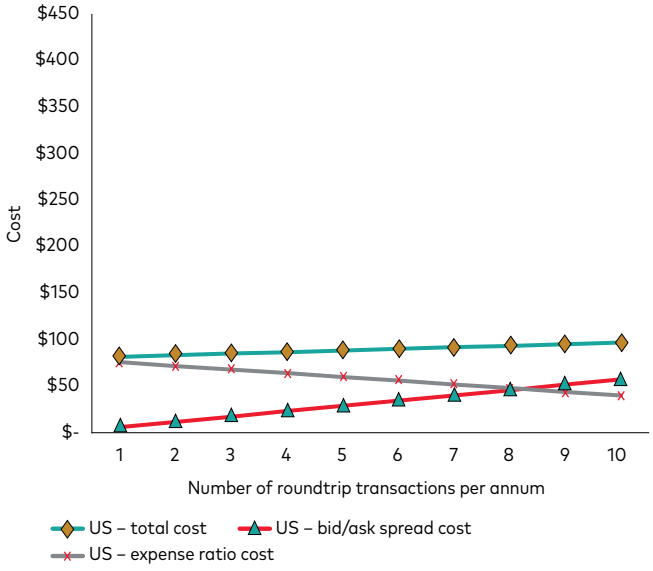


FIGURE 4:

US investor



Source: Vanguard, using market data on spreads from big xyt to run the calculations, as of 31 December 2023. See Appendix 3 for a full explanation of the methodology underlying the charts.

While a sample size of 10 ETFs is too small to draw any meaningful conclusions, it does offer us the opportunity to reflect on how the frequency of trading and portfolio turnover can affect the total cost of ownership for an ETF investor.

In both markets, expense ratios make up the highest portion of total costs for the buy-and-hold investor. While the spread cost remains significant, the spread is only paid once, given the investor is only completing one roundtrip transaction per annum. As the number of trades per year grows, we can see the growing importance of the spread cost.

For a more active investor, who is completing 10 roundtrip transactions in each ETF per year, we can see that annual costs for the European investor are now significantly higher than for the US investor.

We can conclude that the more an investor trades, the more important bid-ask spreads become as a function of the total cost of ownership. On the other hand, the longer an ETF position is held, the more important the expense ratio becomes. For European investors, spread costs can quickly outpace expense ratios as the highest cost if the investor trades frequently.

5 – Opportunities for Europe

As noted earlier in this paper, the future growth of Europe's ETF market will depend on three major factors:

- The **product** regime governing ETFs, particularly the EU's UCITS framework;
- The rules and incentives for the **distribution** of ETFs to professional and retail investors; and
- The efficiency and depth of Europe's ETF **markets**.

The empirical and anecdotal evidence in this paper both suggest that the higher levels of market fragmentation and lower transparency within the European market have a direct, negative impact on trading costs and bid-ask spreads for investors in Europe compared with the US. Our key findings, reinforced by the existing literature and current market perspectives, highlight five recommendations as vital for improving the functioning of Europe's ETF markets.

Recommendation 1: Limit the impact of fragmentation for ETF trading

Encouraging improved transparency and trading of ETFs on a limited number of venues would help ensure that the diverse universe of buyers and sellers would converge and liquidity would be more concentrated. In addition, reducing unnecessary fragmentation would mean lower search costs and more intense price competition, to the benefit of end investors. To achieve this, we would support regulatory measures that continue to encourage liquidity to be pooled on markets with greater pre-trade transparency by further levelling the playing field between regulated markets, multilateral trading facilities and systematic internalisers[17].

Challenges can also arise for ETFs as a result of fragmentation in exchange rules. We would encourage European exchanges to harmonise rules through reforms that align with prevailing best practice. This would ensure equal and sequential treatment for all ETFs and that this happens regardless of where the ETF is listed or the investor is based.

Recommendation 2: Establish effective consolidated tapes in European ETF markets

A consolidated tape[18] would improve trade execution and help investment firms to comply with their best execution obligations by providing a comprehensive and trusted data source to monitor transaction cost analysis, including for ETFs. A consolidated tape that shows layered real-time trade data would improve the formation of a 'European best bid and offer' (EBBO) and level the playing field for retail investors who currently rely heavily on exchanges for trading information and execution.

In the near term, we look to the European Securities and Markets Authority (ESMA) and the FCA, respectively, to oversee a robust appointment process and strong governance around provision of EU and UK tapes for bonds, equities/ETFs and derivatives. Looking ahead to the EU-mandated review of the operation of the equity/ETF tape due by June 2026, we hope to see an even greater level of ambition from policymakers for the EU consolidated tape to reach its full potential.

Recommendation 3: Simplify post-trade settlement and processing in Europe

The existing fragmentation of trading venues across Europe has also led to European-domiciled ETFs being cleared and settled in various central securities depositories (CSDs), dependent on the location of the ETF listing. This creates additional complexity for market participants and investors who need to ensure shares are deposited in the correct settlement location to enable timely

17 A systematic internaliser is an investment firm that, on an organised, frequent, systematic and substantial basis, deals on its own account when executing client orders outside a regulated market, a multilateral trading facility or an organised trading facility without operating a multilateral system. Source: ESMA.

18 As defined previously, the consolidated tape is an electronic system that collates real-time exchange-listed data, such as price and volume, and disseminates it to investors.

delivery to their trading counterparty. The ETF market has historically aligned to standard equity settlement processes; however, this does not take into account the multi-exchange listings that a typical European-domiciled ETF has and the fact that ETF shares can be created and redeemed.

The industry has done much to try and mitigate this complexity, with many ETF issuers aligning primary market settlement with an International Central Securities Depository (ICSD). Other initiatives, such as Target 2 Securities (a European securities settlement engine) in the euro area, have further enabled some streamlining in euro-settled securities. However, it is essential that the current review of the EU's Central Securities Depository Regulation–particularly in relation to cash penalties for failed trades–takes proper account of ETF mechanics. This would help reduce the financial and administrative burden of settlement on end investors.

Recommendation 4: Protect the integrity of the UCITS regime

In relation to the product regime for ETFs, Europe already has the highly advanced and internationally recognised UCITS framework. The EU has recently completed a review of UCITS rules, making targeted reforms in areas such as liquidity management, supervisory reporting and management company substance and oversight. Unlike in other markets, Europe has no need for a major evolution of its product rules.

While we welcome ESMA's recent contribution on the priorities to develop EU capital markets[19], the proposal for a new EU label for basic investment products suitable for retail investors would introduce unhelpful fragmentation and complexity into the UCITS regime. Related work on UCITS is in progress to review the Eligible Assets Directive (EAD), but the commission has correctly emphasised that revisions to the EAD should be limited and consistent with investor protection and the integrity of the UCITS label.

Recommendation 5: Encourage greater retail investor participation in the capital markets

Vanguard strongly supports the Capital Markets Union (CMU) initiative, which aims to integrate capital markets to put European savings to better use, improve the efficiency through which savers and borrowers are matched and raise the performance and competitiveness of the EU economy. As accessible, low-cost and broadly diversified investment products that benefit from investor-centric regulatory protections, UCITS ETFs have a critical role to play in enabling greater retail investor participation in European capital markets.

Keys to widening retail access to the ETF market include:

- Expand tax-efficient investment accounts in the EU and UK that are easy to understand, incentivise people to invest in the capital markets and align with public policy objectives.
- Rethink advice and guidance. Provide full transparency on product and distribution costs, encourage financial advisers to engage in holistic advice service rather than a largely sales-driven model and support EU countries that want to go further on inducement reform.
- Support direct distribution platforms (including 'neo-brokers'[20]), which offer retail investors the opportunity to access low-cost products such as ETFs. At both the EU-level and across Europe, we would encourage policymakers to further strengthen their understanding of the platform market and what drives it in terms of policy and investor behaviour.

Vanguard believes strongly in the benefits that ETFs can offer to European investors and we are excited by the pace of growth and the potential of the European market. We will continue to work with industry partners and policymakers to help the European ETF market achieve its full potential.

19 See ESMA position paper, *Building more effective and attractive capital markets in the EU*, 2024.

20 In July 2024, ESMA published its first survey of the European neo-broker market.

Appendix 1

Below are definitions of the dependent and independent variables referenced within the empirical results section of the paper.

- **Bid-ask spread:** Volume-weighted, three-month on-exchange bid-ask spreads (%) as of 31 December 2023. This variable was calculated using time-weighted spreads that were then volume-weighted across the on-exchange venues on which the ETF trades. Source: big xyt.
- **ETF turnover:** Log of three-month turnover (USD) aggregated across trading venues as of 31 December 2023. Source: big xyt.
- **Liquidity of ETF holdings:** The Bloomberg normalised LQA (Liquidity Assessment) score was used to provide a 0-100 ranking of a security's liquidity based on the average liquidation cost relative to others in the same asset class as of 31 December 2023. This was calculated as an average across each of the ETF's underlying holdings. For the underlying equity asset class, the score compares the expected average liquidation cost for a range of volumes between $10,000 and $1 million. For the underlying fixed income asset class, the score is based upon the probability that the liquidation cost for a fixed position is less than 20 basis points over a one-day horizon. The fixed position is $10 million for US and EMEA sovereign bonds, and $1 million for all other securities. Source: Bloomberg.
- **Fragmentation score:** The Bloomberg fragmentation score was used to provide a 0-1 ranking as measured by the Herfindahl-Hirschman Index (HHI) as of 31 December 2023. The fragmentation score is calculated as 1-normalised HHI for values traded across competing trading venues. A higher score indicates that an ETF's trades are spread across many exchanges and alternate venues. Source: Bloomberg.
- **ETF domicile:** Binary figure for US or European domicile. Source: Morningstar.
- **ETF asset class:** Binary figure for equity or fixed income asset class. Source: Morningstar.
- **Annual report net expense ratio:** The expense ratios used in this report refer to those quoted in Morningstar. Source: Morningstar.

The fragmentation score is computed as follows:

Calculation index H = sum(v^2)/sum(v)^2, where v is the volume on one.

Calculation for the normalised index HN = (n*H - 1). (n - 1)

Normalised index calculation of HN = (n*H - 1) / (n - 1)

Appendix 2

Regression methodology

In order to test our hypotheses, we specify the following regression equations:

Hypothesis 1 (H1): Investors in European-domiciled ETFs face higher implicit trading costs (in the form of wider bid-ask spreads) compared with investors in US-domiciled ETFs.

Hypotheses 2 (H2): The liquidity of European-domiciled ETFs is more fragmented than the liquidity of US-domiciled ETFs.

Hypotheses 3 (H3): ETF trading costs are driven not only by turnover volumes and underlying liquidity, but also by the degree of market fragmentation present in the market.

Appendix 3

Here we describe the methodology used to calculate how an investor's costs, in the form of expense ratios and bid-ask spreads, vary depending on how many roundtrip transactions take place in their portfolio per annum.

Assumptions:

- Each investor has $50,000 to invest, investing $10,000 equally across five different ETFs.
- The full spread is paid on each roundtrip transaction.
- We assume that an ETF investor completing five roundtrip transactions per year will only hold the ETFs for 75% of the year and an investor completing 10 roundtrip transactions per year will only hold the ETF for 50% of the year. We assume the expense ratio is only paid for the percentage of time the ETF was held, thus reducing the overall expense ratio as the frequency of trading increases. Please see **Appendix Table 1** below for a breakdown of our holding time assumptions.

APPENDIX TABLE 1

Number of roundtrip transactions per year	1	2	3	4	5	6	7	8	9	10
% of year ETF is assumed to be held by investor	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%

Appendix Table 2 below shows an example illustrating how the total costs were calculated:

a) A European buy-and-hold investor completing only 1 roundtrip transaction per year in each ETF held.

b) A European investor frequently turning over their portfolio and completing 10 roundtrip transactions per year in each ETF held.

APPENDIX TABLE 2

	a. Buy-and-hold Investor	b. Active investor frequently turning over portfolio
Number of ETFs held in portfolio (assuming $10,000 held in each ETF, $50,000 in total)	5	5
Number of trades per year	1 roundtrip	10 roundtrips
Bid/ask spread breakdown per ETF		
1. CSPX LN Equity – Bid-ask spread = 0.0275%	= $10,000 * 0.000275 = $2.75	= $10,000 * 0.000275 * 10 = $27.5
2. ISAC LN Equity – Bid-ask spread = 0.0540%	= $10,000 * 0.000540 = $5.40	= $10,000 * 0.000540 * 10 = $54.0
3. EMIM LN Equity – Bid-ask spread = 0.0543%	= $10,000 * 0.000543 = $5.43	= $10,000 * 0.000543 * 10 = $54.3
4. IBTS LN Equity – Bid-ask spread = 0.0645%	= $10,000 * 0.000645 = $6.45	= $10,000 * 0.000645 * 10 = $64.5
5. LQDE LN Equity – Bid-ask spread = 0.1090%	= $10,000 * 0.001090 = $10.90	= $10,000 * 0.001090 * 10 = $109.0
Bid/ask spread total cost	$30.94	$309.42
Expense ratio breakdown per ETF		
1. CSPX LN Equity – Expense ratio = 0.07%	= $10,000 * 0.0007 * 0.95 = $6.65	= $10,000 * 0.0007 * 0.5 $3.50
2. ISAC LN Equity – Expense ratio = 0.20%	= $10,000 * 0.0020 * 0.95 = $19.00	= $10,000 * 0.0020 * 0.5 = $10.00
3. EMIM LN Equity – Expense ratio = 0.18%	= $10,000 * 0.0018 * 0.95 = $17.10	= $10,000 * 0.0018 * 0.5 = $9.00
4. IBTS LN Equity – Expense ratio = 0.07%	= $10,000 * 0.0007 * 0.95 = $6.65	= $10,000 * 0.0007 * 0.5 = $3.50
5. LQDE LN Equity – Expense ratio = 0.20%	= $10,000 * 0.0020 * 0.95 = $19.00	= $10,000 * 0.0020 * 0.5 = $10.00
Expense ratio total cost	$68.40	$36.00
Total cost	**$99.34**	**$345.42**

Source: Vanguard, using market data on spreads from big xyt to run the calculations, as of 31 December 2023.

Appendix 4: Market-maker perspectives[21] on increased trading cost considerations for European-domiciled ETFs

Supporting the quantitative analysis in this paper, we have obtained qualitative input on market operations from a range of ETF market makers that operate across both US and European markets. The main takeaways from our interviews with two market participants are provided below.

In summary, the market participants we interviewed highlighted the following as driving higher trading costs and wider spreads for investors in European ETFs: higher and more complex settlement fee structure in Europe; high levels of listing, trading venue and post-trade infrastructure fragmentation; lower levels of secondary market transparency and liquidity; and a less mature ETF lending market in Europe.

High levels of market fragmentation in Europe result in increased costs for market participants needing to source liquidity across borders, which is particularly impactful for smaller-sized on-exchange trades.

- In Europe, ETFs are primarily established as UCITS. While UCITS regulation provides clarity on a single product rule-set and simplified passporting of funds across borders, the ETF operational structure provides access via capital markets infrastructure where there is a different set of rules and regulations. National regulations, investor preferences and the lack of harmonisation of each national capital market create an environment where each ETF needs to replicate the listing and trading infrastructure in order to gain access to wider distribution opportunities. This poses a problem for market participants, who need to source liquidity across borders.
- Having to navigate the differences between execution venues, settlement venues, currencies, tax treatments, service provider rules and fees all adds to the complication and costs for liquidity providers pricing European ETFs. To help us explain these increased costs, we consider a hypothetical example.

  We assume a market maker sold the Italian listing of a European equity ETF but, at the same time, they were long the London listing of the same ETF. In this case they would have to pay the associated settlement fees with their depository to close the position. This can become costly if conducting many smaller trades on screen and as a result can disproportionately impact the spreads on retail investor trades.
- The US market is more simplified, without the need to list across multiple jurisdictions. And while there is a certain level of fragmentation, it is mitigated through greater transparency offered by a consolidated tape and the NBBO.

Clearing and settlement in Europe is more complex overall, with anecdotal evidence suggesting settlement can be more expensive in Europe than in the US.

- In the US, all trades are settled centrally with the Depository Trust and Clearing Corporation (DTCC) and regulated by the Securities and Exchange Commission (SEC). In Europe, clearing and settlement is overseen by different national regulators under the ESMA framework. The settlement landscape is more complex in Europe, with settlements occurring through various central securities depositories (CSDs), such as Euroclear and Clearstream. While Euroclear and Clearstream are both international CSDs (ICSDs) and can handle cross-border transactions, ETFs in Europe can also be settled via domestic CSDs in the country of listing, such as Crest or Euroclear Bank. The ETF industry in Europe has migrated toward ICSD as a way of improving cross-border settlement flows to mitigate the impact of the fragmented exchange listing that is required to maximise distribution opportunities. However, anecdotal evidence suggests that settlement in Europe can be much more expensive than in the US.

21 Aggregated commentary input from Susquehanna International Group and Virtu Financial.

The ETF secondary lending market is underdeveloped in Europe, limiting the opportunity for market participants to be able to short-sell ETF shares and contributing to higher relative trading costs.

- The ETF secondary lending or 'borrow' market exists to allow holders of ETF shares to lend out to other market participants, in exchange for a fee or collateral. The borrowers of the ETF shares may participate in the market to help aid short-selling or market-making to help contribute to overall market liquidity.
- The ETF borrow market is still relatively underdeveloped globally. Of the two regions, ETF share lending is much more prominent in the US. The lack of an established borrow market in Europe has been cited by market makers as contributing to higher relative trading costs in Europe, due to the limited opportunity to be able to sell short in this market.

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