
The Evolution of ETFs

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For Institutional Use Only

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30 Years of ETF Industry Growth

Powered by phases of Democratization, Diversification & Acceleration

Democratization

The ETF vehicle democratizes capital market access

1993

Launch of first US ETF democratized breadth and efficiency of investor access to the **S&P 500**.

1998

World's first family of **Sector ETFs** are launched (SPDR Select Sector ETFs), followed by the "**Dow Diamonds**" (DIA)

1999

Influential "Cubes" (QQQ) launched to replicate the **NASDAQ-100**. SPDR & local government established first Asia ex-Japan ETF (**HK Tracker**)

Diversification

Diversifies by asset class, expanding globally

2000

European ETFs are launched on Deutsche Börse, the iShares Stoxx Europe 50 UCITS ETF and the iShares Euro Stoxx 50 UCITS ETF

2002

A new way to trade bonds is introduced, as iShares launch the first **Fixed Income ETF** (LQD) – enhancing liquidity and transparency in Bond markets

2004

The first US listed **gold backed ETF** is launched by SPDR, in partnership with the World Gold Council

Acceleration

While reaching \$10T AUM, driven by a more powerful ETF ecosystem

2019

SEC adopted new "**ETF Rule**" to modernize regulation of the vehicle – facilitating greater competition and innovation

2020

ETFs pass their "**COVID stress test**", with FED utilization in SMCCF one catalyst in accelerating institutional adoption

>>> 1990s

>>> 2000s

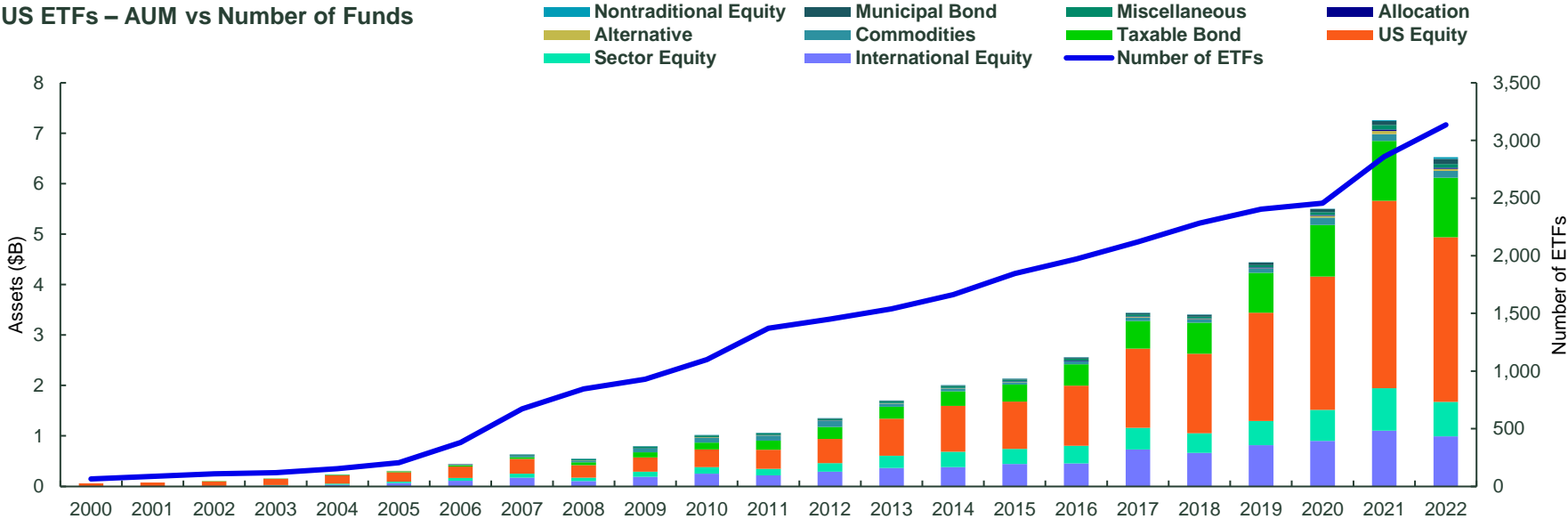
>>> 2010s

Source: SSGA.com as of December 31, 2022. The information contained above is for illustrative purposes only.

ETF Growth Through the Years

US ETFs have continued to grow at an annualized rate of 25% through episodes of both market strength and stress.

US ETFs – AUM vs Number of Funds

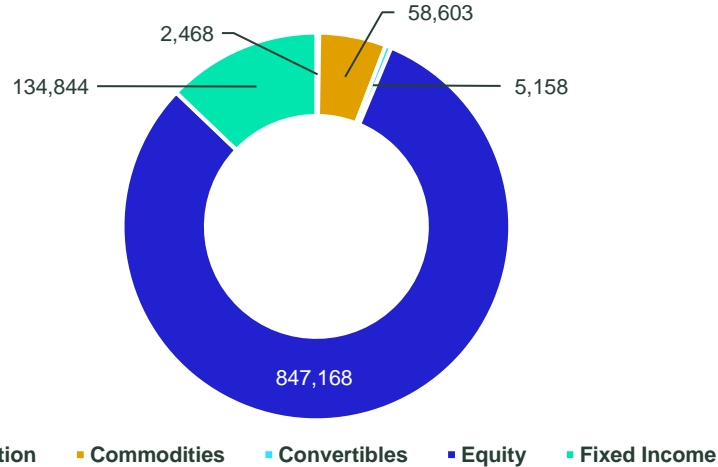


Source: Morningstar, as of December 31, 2022. Past performance is not a reliable indicator of future performance.

Global Family of SPDR® ETFs

State Street Global Advisors is one of the largest global managers of ETFs with approximately \$1.0 trillion in total global ETF assets

Global ETF Assets Under Management
\$ Millions



Region of Domicile	Country of Domicile	Number of ETFs	Assets (\$ Millions)
Americas	United States	141	981,153
EMEA	Ireland	107	56,831
	Australia	17	5,533
APAC	Hong Kong	1	195
	Singapore	2	4,527
Total		268	1,048,241

Source: Morningstar, as of December 31, 2022. The information contained above is for illustrative purposes only.

2023 Market Trends

Key themes across the industry



The Rise of Active ETFs

- In 2022, Active ETFs claimed 40% of NMF¹ and represent 59% of launches in US ETF industry²
- Early stages in \$350B US Active ETF industry¹, with rapid growth versus \$11T MF market²

Liquidity Management & ETF Due Diligence



- Different than MFs and SMAs, an ETFs Total Cost of Ownership includes transaction costs
- Institutions have increasingly selected ETFs for liquidity management
- ETF options and lending markets have grown alongside Institutional ETF adoption
- In Q123, ETF options represented 40.3% of total equity option volume compared to 33.4% for calendar year 2019. ⁴



Growing Fixed Income ETF Use Cases

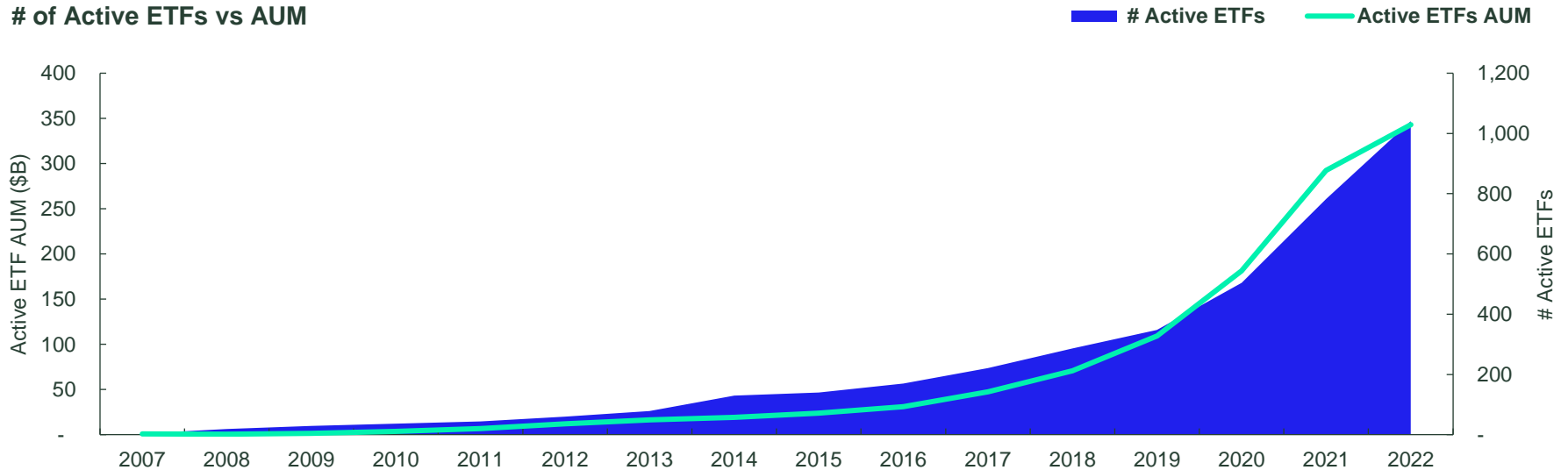
- According to the BBH 2023 Global ETF Investor Survey, 62% of investors say they are extremely or very interested in fixed income, while 40% expect to direct even more of their portfolios toward short duration fixed income allocations.³

Sources: 1 Bloomberg Finance, L.P., as of 12/31/2022, 2 Morningstar as of 12/31/2022, 3 Bloomberg Finance, L.P., as of 5/31/23. 4 [The 10th Annual 2023 Global ETF Investor Survey \(bbh.com\)](#). *The content, information, and analysis included is for discussion and illustrative purposes only.*

The Rise of Active ETFs

Over the last 5 years, the number of Active ETFs in the industry has increased by an average of 36% per year. With an average increase of 51% per year, assets under management are at an all time high of \$343B as investors look towards alpha-generating strategies.

of Active ETFs vs AUM

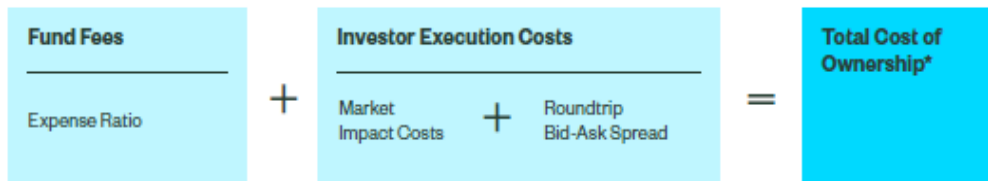


Source: Morningstar, as of 12/31/2022

Liquidity Management & ETF Due Diligence

Enhanced ETF transaction cost analytics for Total Cost of Ownership Comparison and Analysis

Total Cost of Ownership Analysis



Hypothetical Example

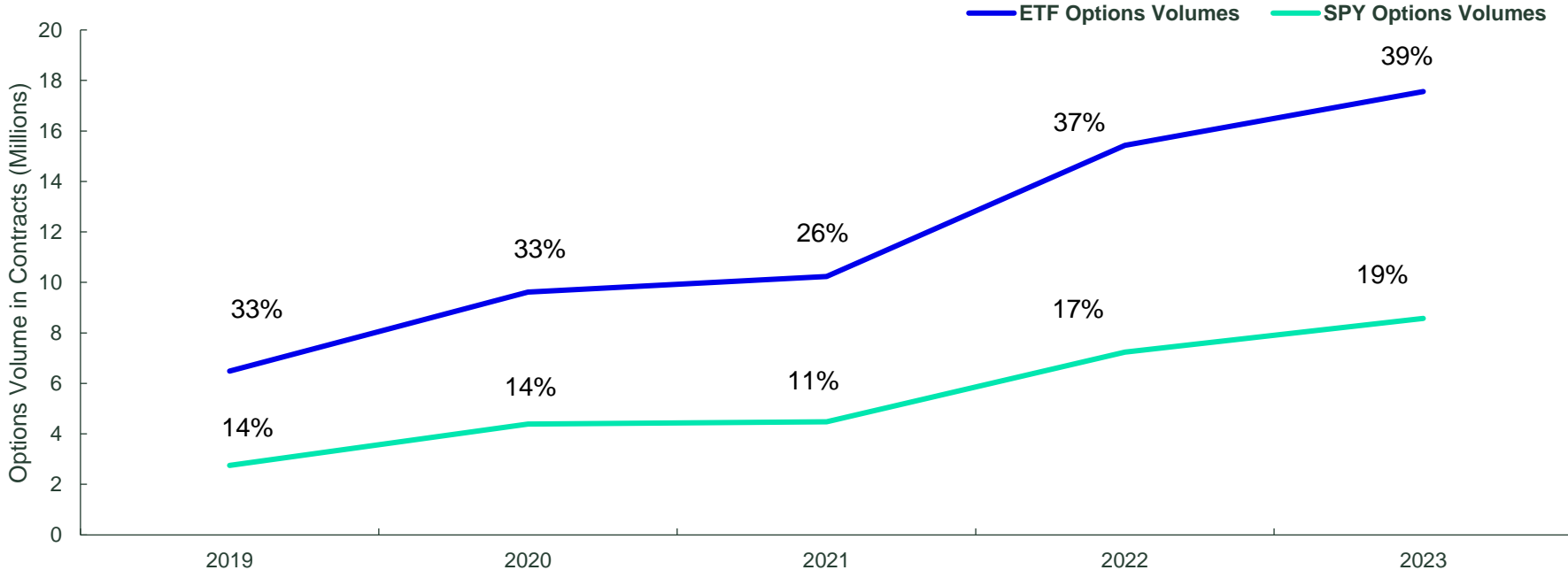
\$25 million dollar order size with a one-year investment horizon

	XLF	VFH
- Net Expense Ratio (bps)	10	10
- Market Impact Costs (bps)	0.90	2.03
- Spread Cost (bps)	0.82	0.72
- ETF Transaction Cost Estimate (bps)	1.72	2.76
- Roundtrip (ETF Transaction Cost Estimate * 2) (bps)	3.44	5.52
Total Cost of Ownership (bps)	13.44	15.52

Source: SPDR SEI Team, Virtu/ITG, as of 3/31/23. The information contained above is for illustrative purposes only.

ETF Capital Markets Growth

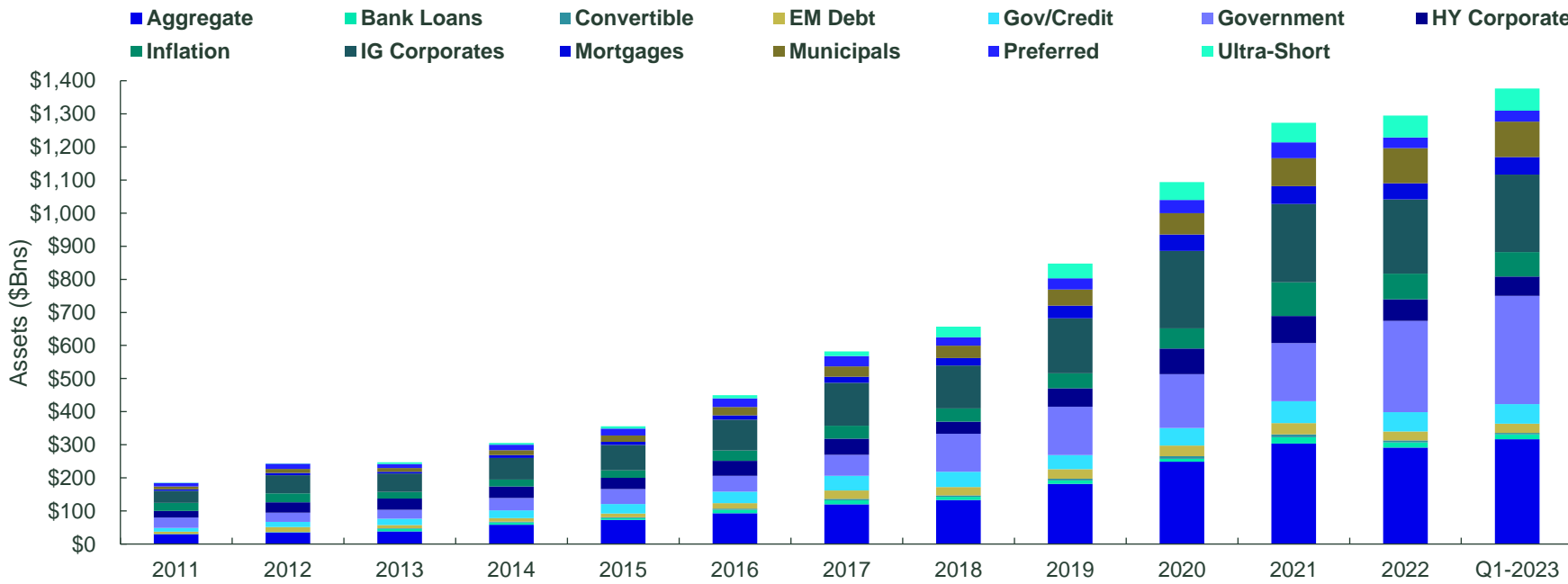
ETFs options trading continues to grow as a percentage of total options trading.



Source: Bloomberg Finance, L.P., as of 3/31/2023

Growing Fixed Income ETF Use Cases

U.S. Fixed Income ETF Assets Have Grown to \$1.38 Trillion in Q1 2023



Source: Bloomberg Finance L.P. as of 3/31/2023

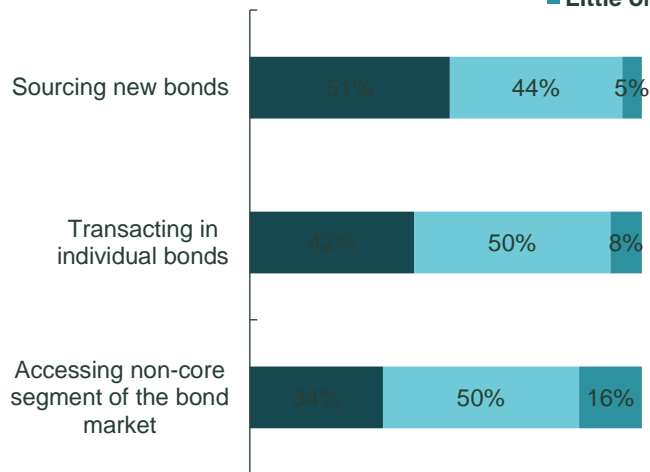
Growing Fixed Income ETF Use Cases

The fragmented fixed income marketplace was particularly evident amidst 2020 pandemic volatility. Fixed Income ETFs provided additive liquidity benefits for investors during this period.

Institutional Investor Survey: To what extent has pandemic-related market volatility affected the following dimensions of your organization's access to the bond market?

Pandemic-Related Volatility Created Difficulty in Sourcing New Bonds

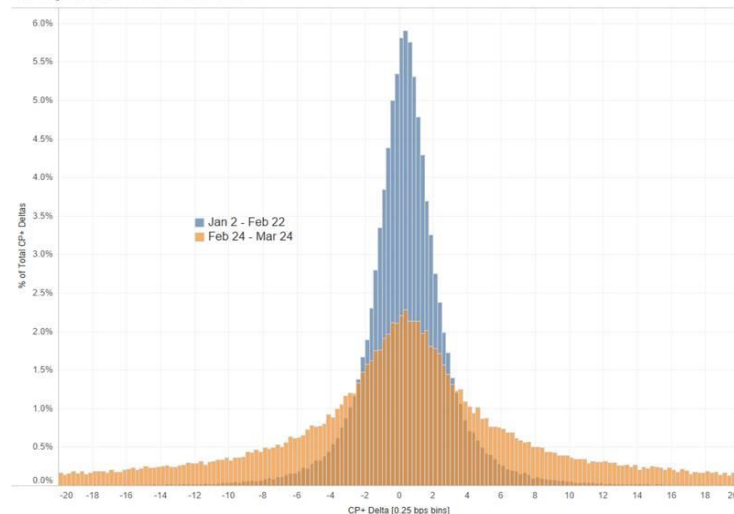
- Great difficulty
- Some difficulty
- Little or no difficulty



Source: Institutional Investor LLC; 'Managing Market Volatility in 2021', January 2021.

Fragmented and Concentrated Liquidity: Composite + or CP+ from MarketAxess is an AI-powered algorithmic corporate bond pricing engine which showcases the high dispersion and volatility of bond pricing beginning in February 2020.

Comparison of CP+ Deltas: Jan 2 - Feb 22 vs. Feb 24 - Mar 24
US High Grade - Trade Sizes \$100K+



Source: MarketAxess/ITG; Bloomberg Finance L.P. As of 03/31/2020

Growing Fixed Income ETF Use Cases

Shifting Market Structure: ETF Adoption by Asset Class

Asset Class	Market Size (MM), (\$)	ETF AUM (MM), (\$)	ETF AUM as % of Index	Average Daily Volume (3M ADV): Bond Trading (MM), (\$)	Average Daily Volume (3M ADV): ETF Trading (MM), (\$)	ETF ADV as % of Bonds' ADV
US High Yield Corporate Bonds	1,260,168	58,242	4.6	14,741	5,285	35.9
US Investment Grade Corporate Bonds	8,829,132	222,455	2.5	31,385	4,816	15.3
US Investment Grade FRNs	230,539	11,644	5.1	797	172	21.5
US Senior Loans	1,398,319	14,817	1.1	3,412	352	10.3
US Municipal Bonds	4,032,800	107,138	2.7	13,714	938	6.8
EM Bonds	1,934,251	27,414	1.4	21,952	859	3.9
US Government Bonds	23,689,300	326,078	1.4	676,862	7,701	1.1
US MBS	6,931,197	52,706	0.8	251,473	403	0.2
Hybrids						
US Preferreds	287,909	32,971	11.5	729	347	47.6
US Convertibles	269,537	4,939	1.8	2,193	111	5.1

Market Size Data: SIFMA (as of Q3 2022; US IG Corporate Bonds, US Government Bonds, US Municipal Bonds), Bloomberg (as of 3/31/2023. US High Yield Corporate Bonds, US IG FRNs, EM Bonds, US MBS, Convertible Bonds), The Loan Syndications & Trading Association (as of 3/31/2023; US Senior Loans), ICE Data Services (as of 3/31/2023; US Preferred Stocks) ETF AUM: Bloomberg Finance, L.P., (as of 3/31/2023). Average Daily Volume (3M ADV) Bond Trading: Bloomberg Finance, L.P. (as of 3/31/2023), Trading Data: EMTA (as of Q4 2022; EM Bonds), SIFMA (as of 3/31/2023; US Government Bonds, US Municipal Bonds, US MBS), ICE Data Services (as of 3/31/2023; US Preferred Stocks), Market Axess and TRACE (US IG FRNs, as of 3/31/2023), LSTA (as of 3/31/2023 Senior Loans). Average Daily Volume (3M ADV) ETF Trading: Bloomberg Finance, L.P. (as of 3/31/2023).

Institutional Uses of ETFs

How Institutions are Using ETFs

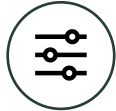
Examples of SPDR ETF Solutions for Institutional Investors

Liquidity Management



- ETFs may offer a wide variety of solutions to efficiently manage cash, tactically position, or rebalance exposures
- SPDR ETFs represent some of the most actively traded industry wide ETFs in times of heightened volatility¹
- The S&P 500 ETF (SPY) provides access to a deep pool of liquidity

Tactical Solutions



- SPDR Select Sector and Industry ETFs provide liquid and flexible exposure management tools.
- SPDR Fixed Income ETFs allow investors low-cost solutions for the entire aggregate bond index or as tools across the underlying fixed income sectors.

Transition Management

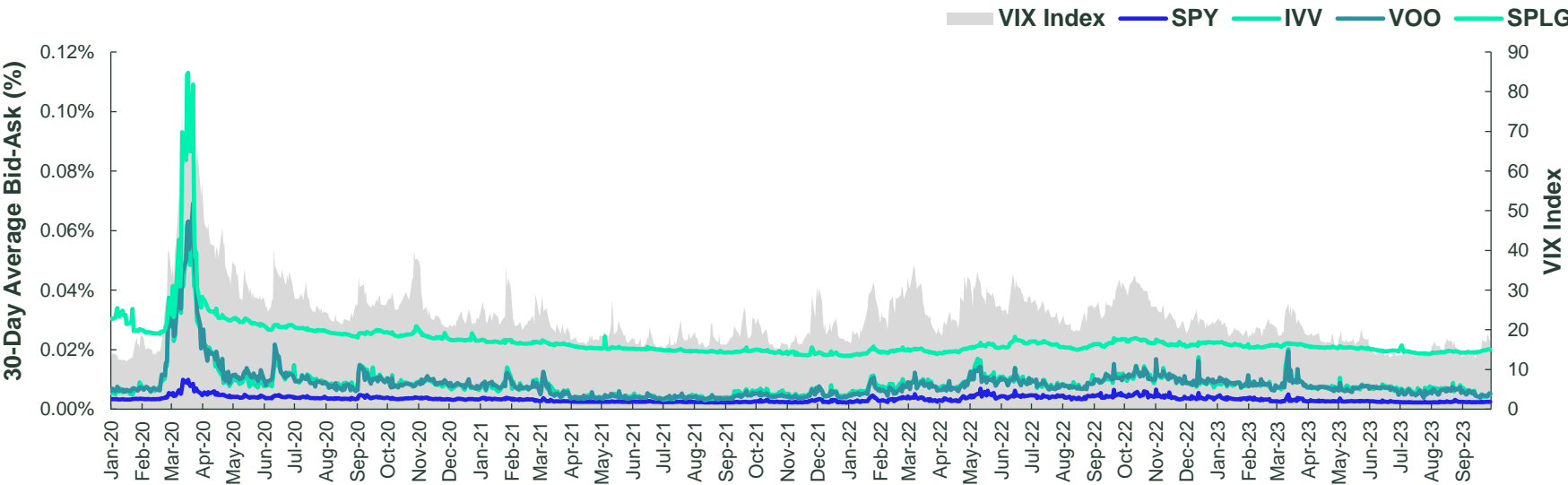


- Investors can utilize the in-kind creation and redemption mechanism to transfer individual bonds to and from an ETF for efficiency throughout the transition management process.

¹ Source: SPDR SEI Team, Bloomberg, L.P., as of 5/31/2023

Spread Consistency: S&P 500 ETFs Case Study

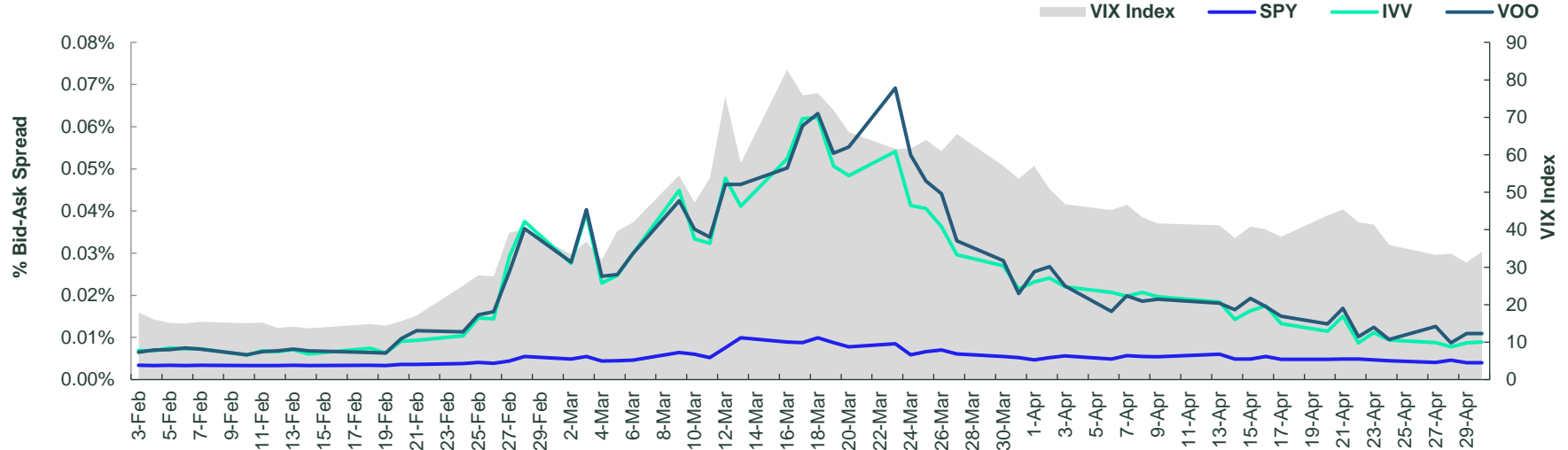
Bid-Ask spread consistency is more important in relatively high volatility environments. SPY remains the most cost-efficient vehicle (<0.01% Bid/Ask Spread over the last 3 years) to trade during times of volatility.



Source: Bloomberg Finance, L.P., State Street Global Advisors, as of September 30, 2023. Past performance is not a reliable indicator of future performance.

March-April 2020

- Relative Bid-Ask spreads - and subsequently transaction costs - may vary dramatically during periods of high volatility. S&P 500 ETFs exhibited diverging secondary trading profiles in February, March, & April 2020 (chart below).
- In the 3-month period in which the S&P 500 saw a max drawdown of almost 34% and the VIX spiked over 80, SPY maintained a <0.01% wide bid-ask spread. Comparatively, IVV and VOO spreads widened resulting in materially higher transaction costs incurred during this period.
- SPY remained the most cost-efficient vehicle to trade at a time when many investors were making changes to their portfolio.

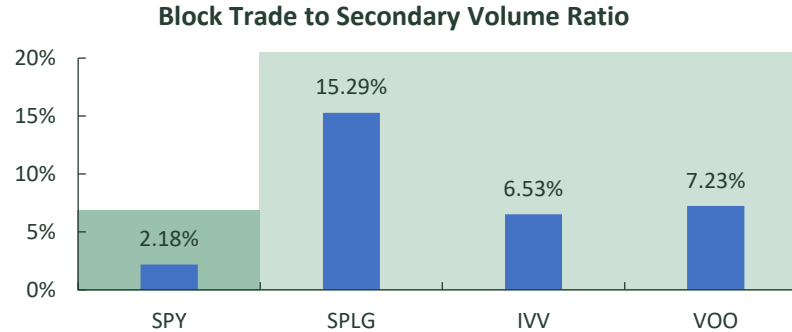


Source: Bloomberg Finance, L.P., State Street Global Advisors, as of April 30, 2020. **Past performance is not a reliable indicator of future performance.**

Trading Behavior of S&P 500 ETFs

SPY trades more than 19x its largest competitors and demonstrates significantly lower block trading as a percentage of total trading.

- In addition to higher volumes, **SPY's** unique liquidity profile demonstrates a higher percentage of trading done electronically relative to peers.
- **SPY's** options and lending markets are examples of unique activity relative to other S&P 500 ETFs.
- **SPY's** liquidity formation deepens in times of volatility as different investors centralize on exchange.



S&P 500 ETF 12-Month Average Daily Notional Trading Volumes (\$M)

SPY	SPLG	IVV	VOO
\$34,162	\$173	\$1,756	\$1,492

- How block trades work: Client receives price for the entire trade at once, and the liquidity provider takes on the risk of managing the resulting position. Liquidity providers can be put in competition for the trade, allowing for a clear measure of best execution.
- Many ETF model managers executing through intermediaries have adopted 'block trading' as it provides a uniform best-execution standard across ETF asset classes and geographies.

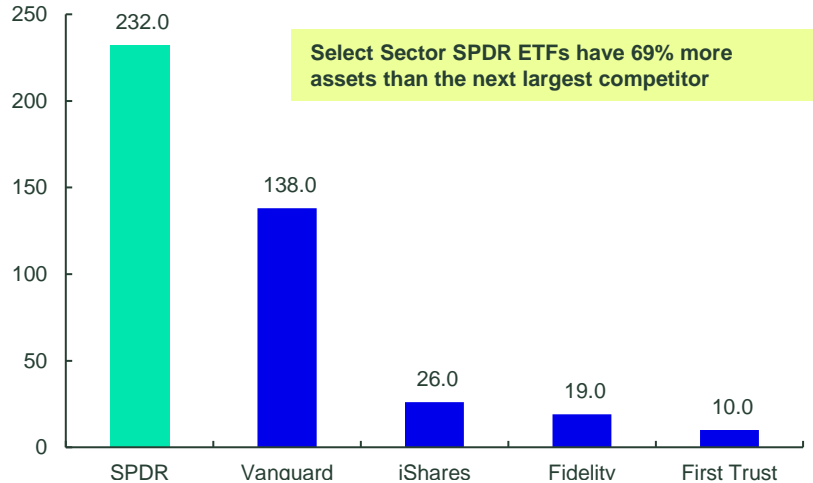
Source: Bloomberg Finance L.P. as of 09/30/2023
Block Trade Universe: \$1M+, 12-Month Lookback

Tactical Solutions

As the largest US sector ETF suite, Select Sector SPDR funds have historically traded with greater volume and tighter bid/ask spreads than other sector ETF suites

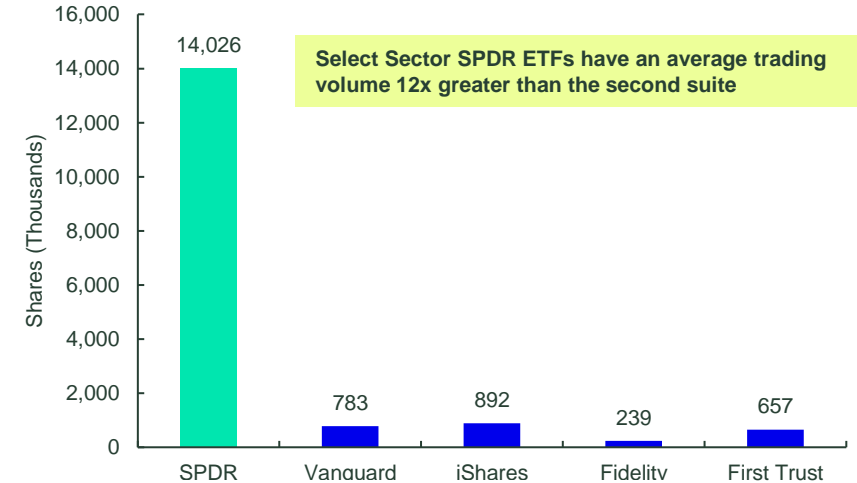
Total Assets of Sector Suites

\$ Millions



3-Month Average Trading Volume

Shares, Thousands



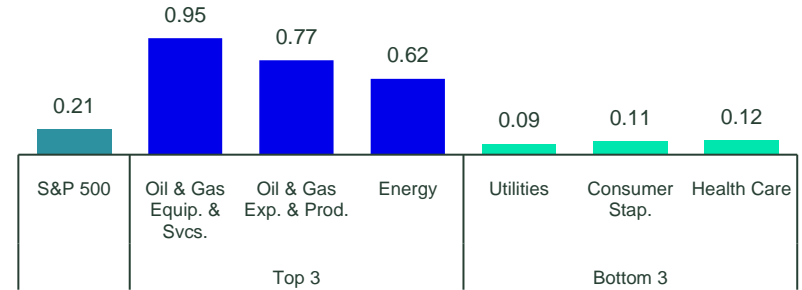
Source: Bloomberg Finance L.P., SPDR Americas Research, as of March 31, 2023. Based on averages of Select Sector SPDR ETFs tracking GICS Sectors. AUMs are as of the date indicated, are subject to change, and should not be relied upon as current thereafter. **Past performance is not a reliable indicator of future performance.**

Tactical Solutions

Because sectors and industries are closely aligned to specific economic variables, they can help investors harness macro trends or shifts in economic fundamentals

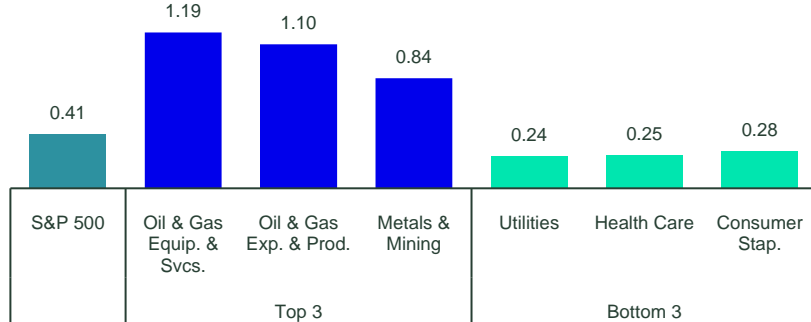
Where are oil prices headed?

Beta Sensitivity to Brent Crude Oil Prices (36M)



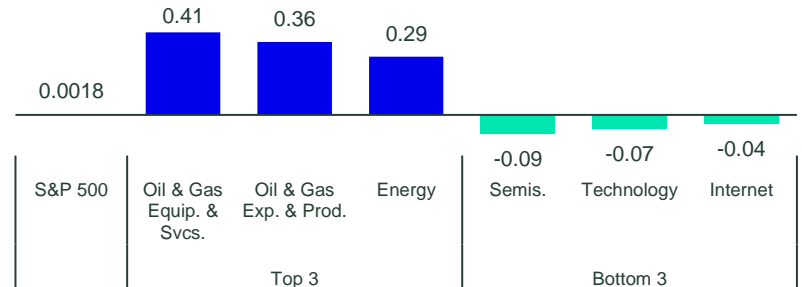
What are the inflation expectations?

Beta Sensitivity to 10 Year Breakeven Inflation Rate (36M)



Where are we in the rate hike cycle?

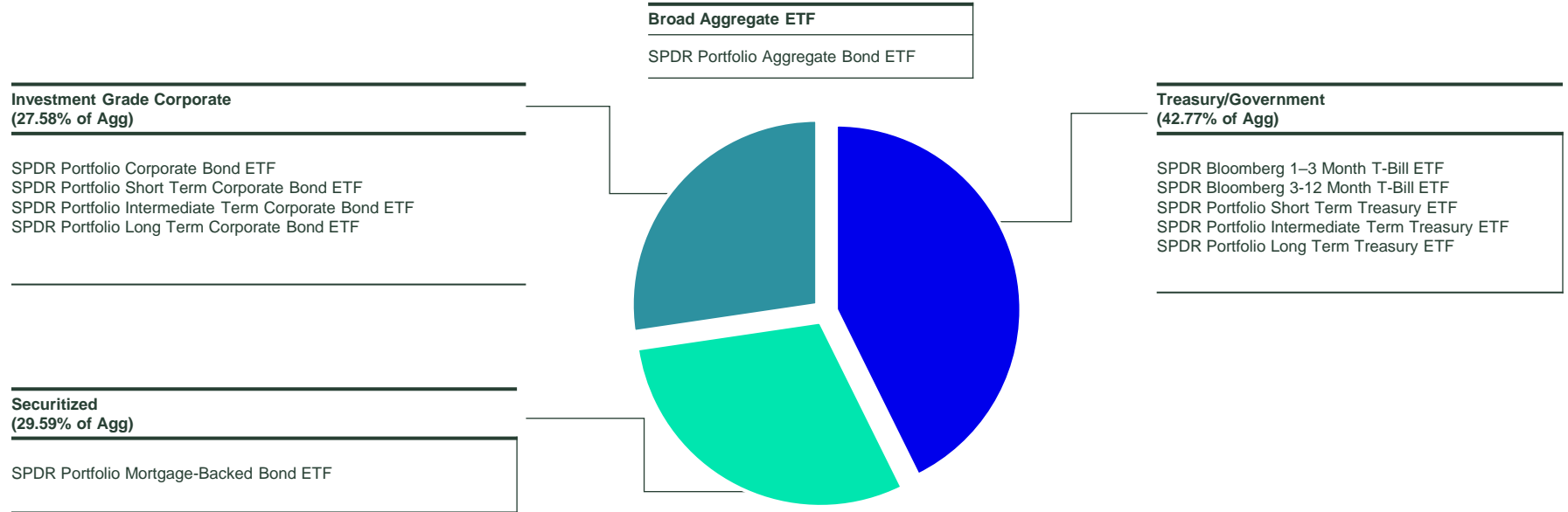
Beta Sensitivity to the US 10 Year Yield (36M)



Source: State Street Global Advisors, Bloomberg Finance, L.P., as of December 31, 2022. Beta sensitivity is calculated using weighted average beta of underlying constituents of Select Sector Indices and S&P Select Industry Indices. **Past performance is not a reliable indicator of future performance.**

Tactical Solutions

SPDR Portfolio ETFs allow investors low-cost solutions for the entire aggregate bond index or as tools across the underlying fixed income sectors.



The Agg = the Bloomberg US Aggregate Bond Index.
Characteristics are as of the date indicated and are subject to change thereafter.

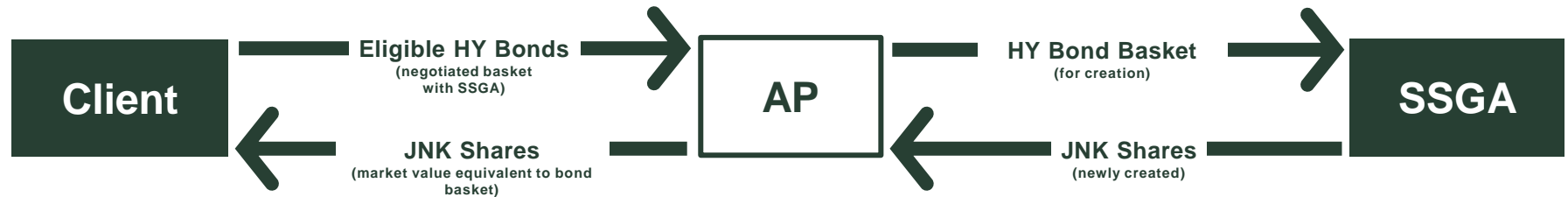
Transition Management

Investors can utilize the in-kind creation and redemption mechanism to transfer individual bonds to and from an ETF for efficiency throughout the transition management process.

Utilizing an ETF as part of a manager transition can provide:

- **Trading Efficiency:** Improve portfolio tradability by delivering securities that may be too costly or time consuming to sell in the over-the-counter (OTC) market
- **Holdings Consolidation:** Exchange individual bonds in a portfolio for single line item for operational efficiency
- **Reduce Potential Basis Risk:** Access to a wider variety of commercially benchmarked cash products as an alternative to a select few derivatives contracts

Example: Transition via JNK Creation



For illustrative purposes only.

Bonds selected by client must be index eligible and would be negotiated with AP and/or State Street Global Advisors.

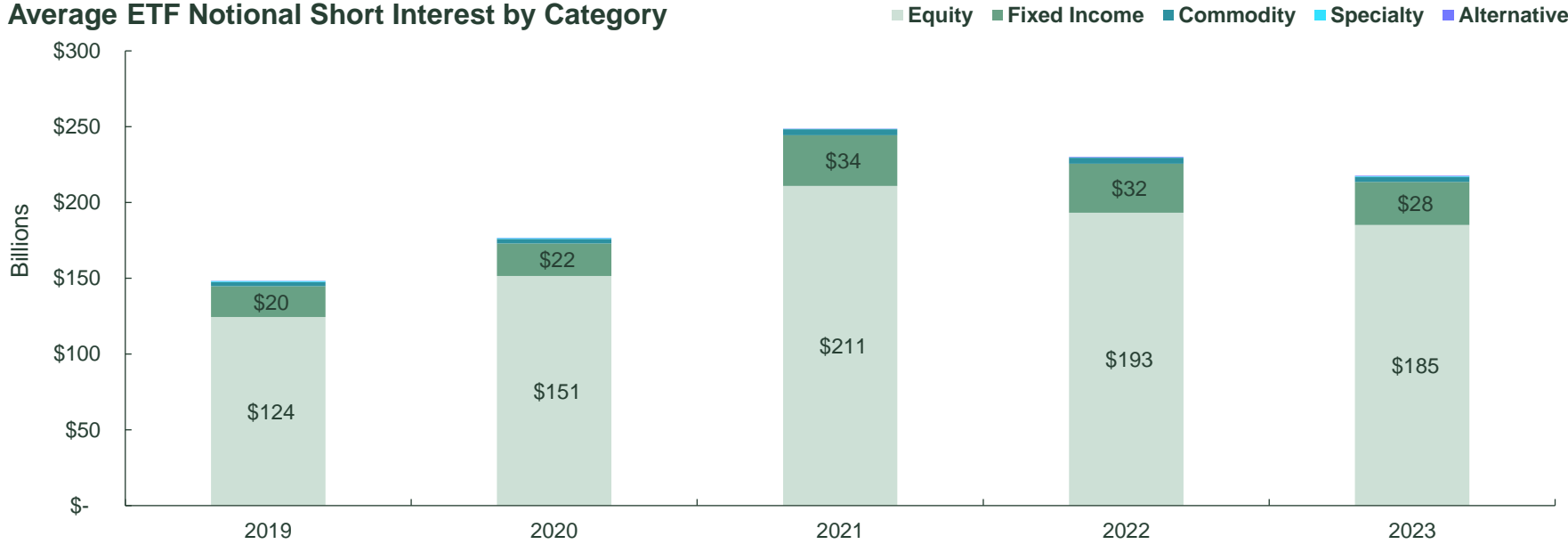
Source: State Street Global Advisor (SSGA), as of 2/22/2022

Advanced ETF Use Cases

External Securities Lending

While ETFs reflect the characteristics of the underlying holdings, the creation and redemption feature of the structure may facilitate higher capacity relative to traditional agency lending practices.

Average ETF Notional Short Interest by Category



Source: Bloomberg Finance L.P., as of November 2023.

Cash and Carry Arbitrage

Since an index futures contract represents an unfunded forward transaction, the futures market price must represent applicable costs incurred while holding the asset over the life of the contract, or the “cost of carry”. ETFs are effective futures funding arbitrage tools as deviations in futures market price and fair value reflect contract ‘mispricing’.

Exchange for Physical (EFP)

EFP transactions allow investors to convert between futures and either ETFs or baskets of the underlying index constituent stocks and are quoted in basis terms.

	Broker	Investor
1. Starting Position	Flat	+1,400,000 XLY
2. EFP is privately negotiated	Broker and investor agree to terms of the EFP: <ul style="list-style-type: none"> Client buys / broker sells 1,400 XAYM5 at 710.56, a -1.10 basis versus prior night's closing index level of 711.66 Client sells / broker buys 1.4 million shares of XLY at prior night's closing NAV of 70.9456 	
3. Broker reports cash trade to ACT	+1,400,000 XLY	← -1,400,000 XLY
4. EFP reported	EFP is reported to CME via CME Direct or CME ClearPort. Agreed futures price of 710.56 accomplished by breaking up the block into two trades, each in standard \$0.10 tick increments: Broker: Account 123 -840 XAYM5 @710.60 -560 XAYM5 @710.50	
	→	Client: Account 456 +840 XAYM5 @710.60 +560 XAYM5 @710.50
5. Final Positions	+1,400,000 XLY -1,400 XAYM5 Flat market exposure	← +1,400 XAYM5 +\$100 million S&P 500 Consumer Discretionary Select Sector

For illustrative purposes only.
CME Group; Bloomberg Finance L.P., as of November 2023.

<FAIR> Monitor

The futures contract price is considered “rich” to fair value when implied financing exceeds the benchmark rate. Conversely, the futures contract price is considered “cheap” when implied financing is below benchmark rate. This cost measure is the frequently cited benchmark evaluation of the market price of an index futures contract.

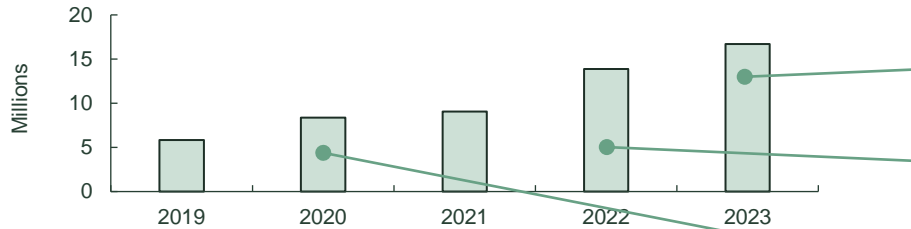
S&P 500 Fast Cash Index		4370.53	+52.75							
Ticker	Exp	Future Price	Chg	Fair Future	Spread	Fair Value	Rich/Cheap	MyBid	MyAsk	
1) ESZ3	Dec23	4386.50	+50.75	4386.51	15.97	15.98	Cheap .01	15.98	15.98	
2) ESH4	Mar24	4433.25	+50.50	4428.16	62.72	57.63	Rich 5.09	57.63	57.63	
3) ESM4	Jun24	4481.25	+49.00	4472.58	110.72	102.05	Rich 8.67	102.05	102.05	
4) ESU4	Sep24	4517.00	+40.75	4510.97	146.47	140.44	Rich 6.03	140.44	140.44	

Roll Analysis		Calculator		From ESH4		From ESM4			
To	Spread	Fair Roll	Rich/Cheap	Spread	Fair Roll	Rich/Cheap	Spread	Fair Roll	Rich/Cheap
ESH4	47.75	41.65	Rich 6.10	49.75	44.42	Rich 5.33			
ESM4	97.30	86.07	Rich 11.23						
ESU4	140.20	124.45	Rich 15.75	93.50	82.81	Rich 10.69	43.00	38.39	Rich 4.61

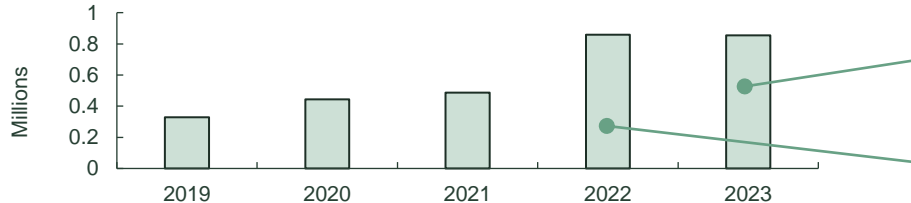
ETF Capital Markets Growth

Options on SPDR ETFs represented 54% of all ETF options volumes and 21.7% of total equity options volumes through the first 10 months of 2023.

Equity ETF Options Volumes



Fixed Income ETF Options Volumes



ETF Options Growth Highlights

ETFs Options as % of Total Market: Through the first ten months of 2023, ETF options represented 39.8% of total equity option volume compared to 33.4% for calendar year 2019.

ODTE: The expansion of available expirations on some ETFs helped propel +50% YoY volume growth.

COVID Volatility: ETF options experienced a +48% spike in volumes YoY driven by investor demand amidst COVID-induced volatility.

Fixed Income ETF Options as % of Total Market : Fixed Income ETF options represent 4-5% of all ETF options volumes.

2022 Rate Volatility: Fixed Income ETFs experienced a +76% spike in options volumes as interest rate volatility became a key focus.

Source: Options Clearing Corporation and Bloomberg Finance, L.P., as of November 1, 2023

Appendix

Important Disclosures

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Important Risk Information

The views expressed in this material are the views of the SPDR ETF Sales Execution & Institutional Strategy Team through the period ended October 31, 2023 and are subject to change based on market and other conditions. This document contains certain statements that may be deemed forward-looking statements. Please note that any such statements are not guarantees of any future performance and actual results or developments may differ materially from those projected.

The information provided does not constitute investment advice and it should not be relied on as such. It should not be considered a solicitation to buy or an offer to sell a security. It does not take into account any investor's particular investment objectives, strategies, tax status or investment horizon. You should consult your tax and financial advisor.

ETFs trade like stocks, are subject to investment risk, fluctuate in market value and may trade at prices above or below the ETFs net asset value. Brokerage commissions and ETF expenses will reduce returns.

Frequent trading of ETFs could significantly increase commissions and other costs such that they may offset any savings from low fees or costs.

There can be no assurance that a liquid market will be maintained for ETF shares.

All the index performance results referred to are provided exclusively for comparison purposes only. It should not be assumed that they represent the performance of any particular investment.

Index returns are unmanaged and do not reflect the deduction of any fees or expenses. Index returns reflect all items of income, gain and loss and the reinvestment of dividends and other income as applicable.

Equity securities may fluctuate in value and can decline significantly in response to the activities of individual companies and general market and economic conditions.

Investing involves risk including the risk of loss of principal.

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All information is from SSGA unless otherwise noted and has been obtained from sources believed to be reliable, but its accuracy is not guaranteed. There is no representation or warranty as to the current accuracy, reliability or completeness of, nor liability for, decisions based on such information and it should not be relied on as such.

In general, ETFs can be expected to move up or down in value with the value of the applicable index. Although ETF shares may be bought and sold on the exchange through any brokerage account, ETF shares are not individually redeemable from the Fund. Investors may acquire ETFs and tender them for redemption through the Fund in Creation Unit Aggregations only. Please see the prospectus for more details.

Securities lending programs and the subsequent reinvestment of the posted collateral are subject to a number of risks, including the risk that the value of the investments held in the collateral may decline in value and may at any point be worth less than the original cost of that investment.

Important Disclosures

Because of their narrow focus, sector investing tends to be more volatile than investments that diversify across many sectors and companies.

Passively managed funds invest by sampling the index, holding a range of securities that, in the aggregate, approximates the full Index in terms of key risk factors and other characteristics. This may cause the fund to experience tracking errors relative to performance of the index.

Investing in high yield fixed income securities, otherwise known as "junk bonds", is considered speculative and involves greater risk of loss of principal and interest than investing in investment grade fixed income securities. These Lower-quality debt securities involve greater risk of default or price changes due to potential changes in the credit quality of the issuer.

The value of the debt securities may increase or decrease as a result of the following: market fluctuations, increases in interest rates, inability of issuers to repay principal and interest or illiquidity in the debt securities markets; the risk of low rates of return due to reinvestment of securities during periods of falling interest rates or repayment by issuers with higher coupon or interest rates; and/or the risk of low income due to falling interest rates. To the extent that interest rates rise, certain underlying obligations may be paid off substantially slower than originally anticipated and the value of those securities may fall sharply. This may result in a reduction in income from debt securities income.

Non-diversified funds that focus on a relatively small number of securities or issuers tend to be more volatile than diversified funds and the market as a whole.

Actively managed funds do not seek to replicate the performance of a specified index. The Fund is actively managed and may underperform its benchmarks. An investment in the Fund is not appropriate for all investors and is not intended to be a complete investment program. Investing in the Fund involves risks, including the risk that investors may receive little or no return on the investment or that investors may lose part or even all of the investment.

Bond funds contain interest rate risk (as interest rates rise bond prices usually fall); There are additional risks for funds that invest in mortgage-backed and asset-backed securities including the risk of issuer default; credit risk and inflation risk.

Investing in foreign domiciled securities may involve risk of capital loss from unfavorable fluctuation in currency values, withholding taxes, from differences in generally accepted accounting principles or from economic or political instability in other nations. Investments in emerging or developing markets may be more volatile and less liquid than investing in developed markets and may involve exposure to economic structures that are generally less diverse and mature and to political systems which have less stability than those of more developed countries.

This communication is not intended to promote or recommend the use of options or options trading strategies and should not be relied upon as such.

Options investing entail a high degree of risk and may not be appropriate for all investors.

Bonds generally present less short-term risk and volatility than stocks, but contain interest rate risk (as interest rates raise, bond prices usually fall); issuer default risk; issuer credit risk; liquidity risk; and inflation risk. These effects are usually pronounced for longer-term securities. Any fixed income security sold or redeemed prior to maturity may be subject to a substantial gain or loss.

Asset Allocation is a method of diversification which positions assets among major investment categories. Asset Allocation may be used in an effort to manage risk and enhance returns. It does not, however, guarantee a profit or protect against loss.

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