The Appeal of ETFs

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Initiated in the U.S. and Canada as an attempt to make index-based mutual funds tradable, the exchange-traded fund concept is being exported and adopted globally, as exchanges around the world rush to introduce products adapted to their regulatory structures. These developments suggest that these products are a valuable addition to securities markets and that further expansion is likely in the future.

In the past year, ETFs have matured substantially as a product, first as a result of an explosion in volume and then a rapid expansion in product coverage. Burgeoning interest in ETFs is reflected in frequent mention in the popular press, coverage of ETFs by mutual fund information services, and a considerable effort by providers and exchanges to get more products to market quickly.

ETFs cover an ever-widening array of U.S. style and sector indexes, as well as international and industry-theme orientations, which afford investors expeditious ways to obtain—or reduce—many types of equity exposure. Currently, all ETFs are based on indexes or static portfolios, but eventually they could be based on managed strategies, with holdings disclosed on a daily basis.

HOLDRs℠ are another type of tradable portfolio that is structured like a depository receipt for a preset share basket. These ADR-like structures pass through all aspects of direct share ownership, including voting rights and dividends, and are taxed as shares rather than as fund products.

Trading Advantages

The opportunity to trade ETFs intraday rather than at closing prices is a benefit to individual investors who have graduated from investing in equities through mutual fund products to also investing via direct stock trading. Like institutions, individuals have grown comfortable transacting on the basis of market prices visible to them on financial news channels, available from their broker, or, increasingly, on Internet investment and brokerage services.

Intraday trading is also the primary means through which institutions adjust their portfolio holdings. Institutional investors have an interest in trading indexes, industries, and sectors intraday but, until ETFs, have not had the ability to do so, except through a derivative product. This ability is increasingly valuable in the presence of volatility, which may affect price differences between the time of the investment decision and the market close, when most fund products accept inflows and outflows.

A process for exchanging ETFs daily for shares from the fund keeps market prices close to the fund's net asset value (NAV). The fungibility of ETFs with baskets of underlying stocks and, where available, futures contracts makes their liquidity equivalent to or better than liquidity available for identical exposures in other marketplaces. Moreover, in many products, natural ETF liquidity—flows in the ETF product itself—can enhance liquidity available in other marketplaces.

ETF trading costs are generally lower than those for the underlying stocks, although the benefit varies from one product to another. In the case of the Nasdaq-100, ETF spreads are quite competitive to Nasdaq-100 futures, partly because of the current trading format differences between stock and futures exchanges.

Investors can sell ETFs short without an uptick. Typically, short sales on stocks can be executed only at a price equal to or higher than the last trade. Therefore, ETFs work well in hedging stock positions, especially those that might be concentrated in a particular sector like technology or health care.

Appeal to Both Institutional and Individual Investors

For institutional investors, ETFs have a number of uses, including:

- Investing idle cash targeted for equity investment or funds for transition to another manager, asset class, or style.
- Managing sector or style exposure.
- Profiting from an industry view.
- Gaining diversified access to international markets.

Furthermore, because market makers at broker-dealers can commit capital and easily hedge long and short ETF inventory, ETFs are often attractive trading vehicles. Individual investors will find ETFs more flexible to trade and more tax-efficient than traditional mutual funds. Additionally, options on ETFs provide an alternative to cash-settled index options.

Hedge funds and long/short investors have been particularly attracted to these products. Hedge funds tend to hold positions for short horizons, have views that are industry-based, or look for the best fit in a short exposure to balance the long side of their stock selections. Technology-oriented hedge funds, in particular, are drawn to the range of offerings representing different slices of the technology sector—from the ETFs based on the Nasdaq-100 and S&P or Dow Technology indexes to the wide range of HOLDR product offerings on different types of Internet stocks.

We first focus on the liquidity and trading aspects of ETFs. We suggest applications of ETFs for institutional investors and address issues unique to the perspective of individual investors.

The appendix discusses the extent to which ETF returns track the underlying index.

MARKET LIQUIDITY: SPREADS, MARKET DEPTH, AND MARKET MAKING

ETFs trade on exchanges. Market making is provided by specialists on the floor, as well as upstairs trading desks to which major broker-dealers have allocated capital.

Exhibits 1A and 1B show quoted bid and offer spreads for selected active ETFs and bid and offer depth during May 2001. Narrow, deep markets exist for both S&P 500 products, and spreads are reasonably tight for the QQQs.

It is common for institutional-size trades to be done at prices inside this spread based on floor quotes. Although SPY spreads are wider than those of S&P 500 futures contracts, QQQ spreads are comparable to Nasdaq-100 futures spreads. Not surprisingly, the more narrow sector-based products have wider bid and offer spreads and less posted liquidity than most size- and style-based ETFs (*see Exhibit 1A*).

Floor-based and upstairs market makers frequently enhance specialists' quotations with substantial additional liquidity. Upstairs ETF market makers can often provide more competitive pricing and greater capital commitment because of their access to hedging vehicles and other flows.

Certain large investors, such as ETF market makers and designated institutional investors, may "create" or "redeem" ETFs in large lot sizes once a day. The creation/redemption process is of central operational importance to ETFs. This facilitates their open-end fund structure.

The amount of outstanding ETF shares is not limited, as with traditional mutual funds. Rather, each day ETF holders have an opportunity to exchange ETF shares for stock or deposit stock to create ETF shares. These transactions are conducted by sending creation/redemption instructions to the trustee of the ETF.

Creations/redemptions typically involve a small conversion fee and require a large minimum order size, such as 25,000 or 50,000 shares. The minimum for HOLDRs is a single round lot (100 shares).

In addition, the visible quoted market, a large factor in the success and liquidity of ETFs, is based on the ability of market makers to facilitate large transactions by hedging risk intraday. This hedging can be done with stocks, futures, options, or other active ETFs and by exchanging

EXHIBIT 1A

Quoted Spread and Depth of Selected ETFs*

ETF Tkr	Product Name	Spread[a] (bp)	Depth[b] (mil $)
	Size- and Style-Based Index ETFs		
IVV	S&P 500 iShares	13	62.5
SPY	S&P 500 SPDR	15	62.5
IVW	S&P 500 Growth iShares	19	16.0
IVE	S&P 500 Value iShares	19	16.0
DIA	DJIA Diamonds	14	11.0
QQQ	Nasdaq-100	20	1.2
MDY	S&P MidCap 400 SPDR	30	10.0
IJH	S&P MidCap 400 iShares	22	11.0
IJR	S&P SmallCap 600 iShares	23	11.0
IWB	Russell 1000 iShares	18	16.5
IWD	Russell 1000 Value iShares	25	15.0
IWF	Russell 1000 Growth iShares	27	14.0
IWM	Russell 2000 iShares	40	5.0
IWV	Russell 3000 iShares	28	7.0
IYY	DJ US Total Market iShares	35	6.0
	Sector-Based Index ETFs		
XLF	Financial SPDR	40	12.0
XLE	Energy SPDR	50	1.5
XLI	Industrial SPDR	55	3.0
XLU	Utilities SPDR	55	3.2
XLV	Consumer Services SPDR	55	3.0
XLK	Technology SPDR	60	2.8
XLY	Cyclical/Trans SPDR	60	2.8
XLB	Basic Industries SPDR	65	2.0
XLP	Consumer Staples SPDR	72	2.5

** Based on floor quotes. Spreads may be tighter in the upstairs market for similar size.*

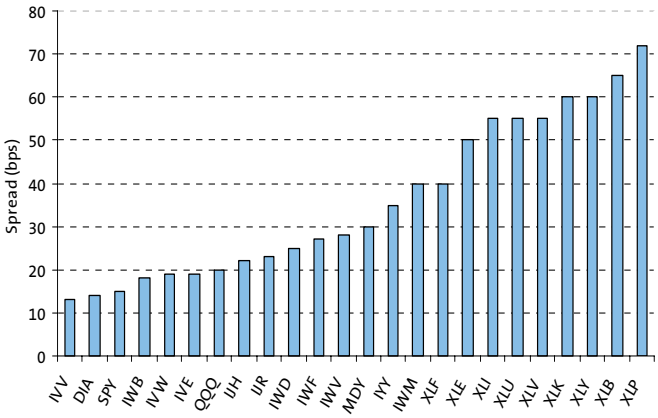
[a] Spread is the time-weighted average of the difference between the bid and offer quotes.

[b] Depth is the average dollar volume for bid and offer floor quotes time-weighted.

Source: Goldman Sachs, May 2001.

EXHIBIT 1B

Quoted Bid and Offer Spreads for Size-, Style- and Sector-Based ETFs*



** Based on floor quotes. Spreads may be tighter in the upstairs market for similar size.*

Source: Goldman Sachs, May 2001.

long and short inventory through the creation/redemption process with the ETF at the end of the day.

Exhibit 2 depicts the trading and hedging function of the ETF market maker for ETFs. As the exhibit shows, ETF market makers have multiple pools of liquidity in which to hedge. This ability to manage market-making risk enhances the liquidity of the ETF shares.

For example, if the market maker shorts stocks as a hedge for a long ETF position, the ETF can be redeemed for stock that can be delivered to close out the stock short; if the market maker is long stock against a short ETF exposure, the stock may be exchanged for a long ETF position to offset the short ETF position on the market maker's book. Alternatively, a market maker may hedge this position with futures or options or with a transaction in the stocks directly. This flexibility means that market makers can commit capital more readily (particularly in the upstairs market off the exchange floor), which can tighten the quoted spreads shown in Exhibit 1A.

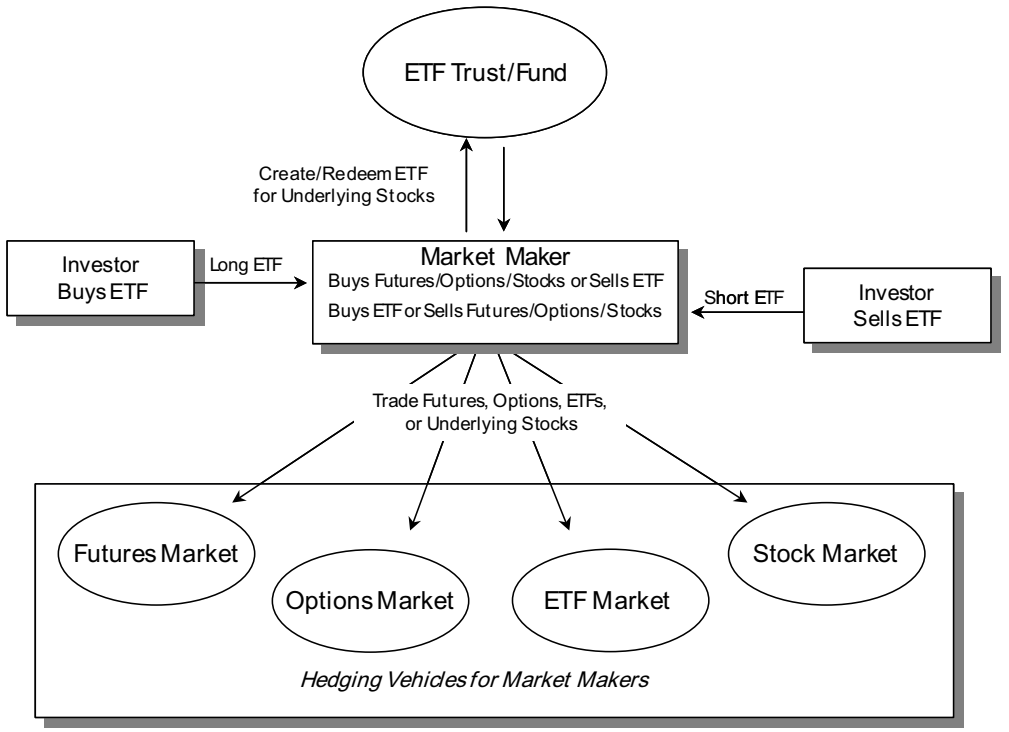
When a futures contract is not available for the index or basket on which the ETF is based, ETF market makers have one fewer trading venue for hedging positions. Without a liquid futures contract, arbitrageurs and hedgers typically use baskets of underlying stock, often optimized to minimize tracking error without high transaction costs. Consequently, arbitrage and hedging can be more costly when futures are unavailable.

Liquid index options may exist on a closely related index, which is primarily the case with sector ETFs. Here, a forward index position can be used for a hedge by combining a put and call at identical strike prices.

In any event, the creation/redemption process typically leads to convergence within a price band around the ETF's net asset value, driven primarily by the cost of transacting in the underlying shares and creation/redemption. The cost of transacting in the underlying stock, therefore, represents the upper bound on the cost of an ETF transaction. For this reason, the

EXHIBIT 2

Role of ETF Market Makers in Providing Liquidity in ETF Transactions



dollar volume of the trading activity in the underlying stocks is more significant in assessing liquidity than the dollar volume of the ETF.

For an in-depth treatment of ETFs and tracking error, see "Spotlight on U.S. Exchange-Traded Funds" [2000]. See also Appendix.

The result of differences in arbitrage and hedging costs across ETFs is twofold:

- Bid-ask spreads will generally be wider when the market maker's hedging costs are relatively high, although natural liquidity in the stocks in the ETF itself may mitigate this effect.
- Mispricing in the ETF relative to its underlying securities may last longer than mispricing in an ETF in which arbitrage costs are lower.

That said, the creation/redemption mechanism provides a structure to assure that, in general, such mispricings are temporary and do not grow without bound. Closed-end funds, which have a static amount of shares outstanding, may by contrast trade at a discount or a premium to fair value for a protracted period of time.

APPLICATIONS OF ETFs

We explore some of the applications and issues that are relevant to institutional and individual investors in designing strategies using ETFs. Some of these are unique to institutions, while others apply to both investor types.

Efficient Trading

ETFs provide investors with a convenient way to buy or sell exposure to an index or a basket of stocks with a vehicle that trades like a stock. Many large institutions have used index futures for this purpose for several years. Most individual investors and some institutions and pension funds have not used futures but have an interest in or a desire to trade index exposure.

In some cases, investors may prefer to trade ETFs rather than index futures because of the size of the transaction or because of policy restrictions on their ability to trade futures. In other cases, an ETF may provide exposure to a specific index or market segment for which futures do not exist. Operationally, many investors may prefer ETFs to futures because of their simplicity and

their similarity to stocks for bookkeeping, monitoring purposes, and performance measurement.

Key questions in considering potential investor applications include the following:

- When is an ETF index or HOLDR exposure—long or short—useful or desirable?
- When should investors consider trading ETFs instead of futures (and vice versa)?
- What are the other factors that investors should consider (e.g., size of transaction, liquidity, investment horizon, fair value)?

Compared with investing in a single stock, an investment in an ETF index product provides diversified exposure to a market or a market segment. Depending on the index, investors can obtain exposure to certain *country markets* (e.g., U.S. equities, Japanese equities, Canadian equities), certain *market value size or style segments* (e.g., large-cap/growth, mid-cap/value), *specific sectors* (e.g., healthcare, technology), or even *industries or themes* (e.g., biotech, Internet, B2B).

Trading index exposure via ETFs may be appropriate in a variety of applications, summarized in Exhibit 3.

Equitizing cash. Investors with idle cash in their portfolios many want to put their money to work in a product tied to the fund's benchmark or to their favorite sectors. For example, a growth fund using the Russell 1000 or Russell 2000 Growth index as its benchmark could invest cash in the iShares tied to the benchmark.

This could be a temporary investment that minimizes cash drag or benchmark risk while the investor decides which stocks to buy or waits until a stock reaches the price targeted for purchase.

Managing cash flows. Investment managers who see regular inflows and outflows of cash may be attracted to the ETFs because of their liquidity and their ability to represent a "slice" of the portfolio. Investing or raising cash by moving in or out of individual stock positions can leave a fund with tracking risk to the benchmark. An ETF holding correlated with the fund's benchmark is extremely helpful in managing cash flows. Portfolio managers can allow for a small holding in ETFs (under 5%) to manage recent inflows or expected outflows.

Also, ETF trades can be used when cash inflows or outflows occur, but the targeted mix of stock holdings is unchanged. For example, a fund manager with a benchmark of the Goldman Sachs Technology Index (GSTI) could keep 3% of its assets in the Technology SPDR to accommodate withdrawals or quickly invest new cash inflows.

Diversifying sector exposure. If an investor is not sure about which particular stock to buy but likes the overall sector, investing in shares tied to an index or basket of stocks provides diversified exposure to a volatile sector and reduces risk in the event of specific stock news. Typically, the volatility or risk associated with an index or basket is lower than the volatility or risk of an individual index component.

Consider, for example, a holding of the BBH Biotech HOLDRs product as a means of gaining a diversified position in a group of biotech stocks.

Filling gaps or taking active views on sectors. ETFs tied to a sector or industry may be used to fill gaps in a portfolio on a tactical basis. Such strategies could be used to reduce an over- or underweighting relative to a benchmark.

Alternatively, investors may want to take an active view on under- or outperformance in a particular sector or industry, and use an ETF based on an appropriate index to complement or substitute for stock holdings in that sector or industry. An investor underweighted in energy stocks may reduce the risk of this position in the face of rising oil prices by buying Energy SPDRs or iShares.

Modifying style exposure. ETFs can also be used to adjust the style tilt of a portfolio. For example, managers of a portfolio of stocks resulting in a value tilt relative to an S&P 500 benchmark could buy S&P 500 growth iShares to adjust their portfolio exposure.

Shorting or hedging index exposure. Investors who have a negative view on a market segment or specific sector may want to establish a short position to capitalize on that view. ETFs may also be sold short against long stock holdings in a portfolio as a hedge against a decline in the market or specific sector.

The choice between ETFs tied to a broad-based index (e.g., the S&P 500) and a more narrow sector or style index will depend on 1) the risk that the investor is trying to hedge, and 2) the investor's liquidity needs. In general, unless liquidity needs are significant, a better hedge can be obtained by trying to match the characteristics of the index with those of the portfolio being hedged.

Using completion strategies. A pension fund, endowment fund, or an individual may want to use completion strategies as a way to reduce the impact of gaps between a strategic benchmark and the aggregate benchmarks of external and internal managers, while maintaining any

advantages from active strategies. These gaps can be in style, size, or sector tilt weight.

Portfolios are often structured to "complete" the difference between their target benchmark and their manager's benchmark. These completion portfolios may change as relative values of styles, sectors, or industries shift with market conditions, or if the manager mix is modified.

Efficient trading of completion portfolios may involve a combination of stock and ETF positions, with the latter particularly suited to the style and sector exposures of the completion portfolio.

Using long/short (market-neutral) strategies. Some investors employ strategies that seek to generate excess returns or alphas from stocks selected according to their potential to rise or fall in price. Stocks expected to rise make up the long portfolio, with an equivalent dollar amount held in short positions in the stocks most likely to fall in price. ETFs selected from particular sectors can play a role in either the long or short portfolio to reduce the risk associated with a particular style, sector, or industry tilt in the net long/short position.

For example, the long/short combination may leave the investor with an excessive exposure to utilities and energy on the long side compared with a net short position concentrated in technology stocks. To reduce this net short industry position, a portion of the long position can be allocated to a technology-oriented ETF, while an energy- or utility-based ETF can be added to the short side of the strategy. Such allocation retains the benefit derived from stock selection while reducing the implied industry tilt from that selection process.

Managing concentrated portfolios more efficiently. Some investment strategies concentrate holdings in a small number of stocks each held in large size positions. Investors can occasionally find themselves heavily invested in stocks that are coming under selling pressure because these stocks are correlated with other stocks in the industry that have had disappointing earnings or other negative news. Shorting ETFs based on that industry as a temporary hedge can be an alternative to reducing these concentrated stock holdings.

The trading costs from the market impact of selling an ETF may be lower than the cost of liquidating a large holding in a specific name as a result of the greater liquidity and lower volatility of the diversified ETF product.

Gaining diversified exposure to foreign markets. For both U.S. and non-U.S. investors, ETFs tied to a non-U.S. equity index may be an easy way to increase exposure to the international equity markets. Managers of international (non-U.S.) funds may use these products as an alternative to futures for managing cash flows. This strategy can be particularly attractive when the stocks chosen leave the investor under- or overweighted in a particular country relative to the benchmark for the international or global portfolio.

For example, an international portfolio manager with an MSCI EAFE benchmark may want to buy an MSCI Japan iShare to reduce an underweighting created because there are no attractive individual stocks in that country.

ETFs versus Futures Contracts

For some investors, ETFs provide a more accessible means to implement an index- or sector-based view. In addition, ETFs are available on a much more varied range of indexes than futures, especially in the style, sector, and industry categories. The opportunity to source upstairs market-making expertise and capital is particularly valuable for the style, sector, and industry indexes.

Futures markets have been most successful in attracting market-making capital when an opportunity arises to profit from intraday volatility, as prices react to continuous customer order flow. Examples include Eurodollar, Treasury bond, and S&P 500 futures in the U.S., as well as foreign index futures based on primary market indexes, such as the DAX, Nikkei 225, and FTSE 100.

Very few of the style, sector, or industry indexes are characterized by the continuous investor trading interest that provides the underpinning for a liquid futures market. These indexes are frequently based on stocks with high levels of liquidity, which makes ETFs suitable for capital commitment trades in these indexes that can be handled in a stock trading format. Market makers, on or off the floor, can give a customer a price for buying or selling an ETF position and then hedge their exposure with positions in stocks or related trading vehicles.

Additional advantages relative to futures include the following:

- ETFs trade in much smaller investment sizes than futures contracts. For example, the S&P 500 SPDR trades at one-tenth of an index level, while the S&P 500 E-Mini futures contract trades at 50 times the level. Consequently, if we assume an index level of 1,500, 100 SPYs represent a $15,000 investment, and a single E-Mini contract will cost roughly $75,000.
- Some investors prefer the relative operational ease of trading stock as opposed to trading futures, which require that the investor open a futures account that

EXHIBIT 3

Summary of Applications and Benefits of Using ETFs

Application	Sample Situation	Benefit
Equitizing Cash	A growth fund manager using the Russell 1000 or 2000 Growth index as its benchmark could invest cash inflows into the iShares tied to this benchmark.	This could be a temporary investment that minimizes cash drag or benchmark risk while the portfolio manager decides which stocks to buy.
Managing Cash Flows	If a fund needs to raise cash quickly to meet redemptions, the manager can liquidate holdings of ETFs tied to the fund's benchmark.	This buys the manager time to more carefully select which holdings to sell, possibly allowing a more orderly liquidation of those positions.
Diversifying Sector Exposure	Investing in shares tied to an index or base of stocks provides diversified exposure to a volatile sector, reducing risk in the event of a shakeout.	Typically, the volatility of risk associated with an index or basket is lower than the volatility or risk of the individual index components.
Filling Gaps or Taking Active Views on Sectors	A fund manager could buy ETFs based on the energy or technology sector to increase exposure to that sector.	Such strategies could be used to reduce sector or industry misweightings in a portfolio relative to a benchmark or to implement a temporary tilt to a sector.
Modifying Style Exposure	Managers of a portfolio with an S&P 500 value tilt relative to an S&P 500 benchmark could buy S&P 500 Growth iShares to adjust their portfolio exposure.	If a portfolio has a style tilt relative to its benchmark, its style exposure could be adjusted using ETFs based on style indexes.
Shorting or Hedging Index Exposure	Investors may want to profit from the expectation of a short-term correction in the broad market related to negative economic news.	S&P 500 ETFs may be sold short against long stock holdings in a portfolio as a hedge against a decline in large-cap stocks, thereby reducing the broad market risk exposure or beta of the portfolio.
Using Completion Strategies	A pension fund may want to complete the holdings of external managers who, in aggregate, bring a value tilt to the pension fund equity holding.	By including an S&P 500 and Nasdaq-100 ETF in the completion portfolio, the fund has an efficient means of reducing the value tilt and underweighting relative to the strategic benchmark.
Using Long/Short (Market-Neutral) Strategies	An investor has identified attractive stocks for a long portfolio position but cannot identify a sufficient number of stocks to short in the sectors represented.	By selling short a sector ETF, the dollar amount of the longs can be balanced with a diversified short portfolio including many stocks in that sector.
Managing Concentrated Portfolios More Efficiently	A portfolio has a concentrated holding in a stock expected to decline in price, but cannot sell the holding because of potential market impact, undesirable tax consequences, or other restrictions on the position.	Shorting ETFs in related sectors or industries as a temporary hedge can be less costly because of the greater liquidity and lower volatility of the diversified ETF product.
Gaining Diversified Exposure to Foreign Markets	An investor needs to fill a country gap in international holdings or has a positive country view but cannot identify specific stocks to buy.	For non-U.S. investors, ETFs tied to a U.S. equity index may be an easy way to increase exposure to U.S. equities. The same goes for U.S. investors seeking exposure to some of the non-U.S. equity markets.

segregates positions from stock holdings. Futures also must be traded on a different exchange, and positions realize gains or losses daily (are marked to market).
- If the investor wants to implement a longer-term view, futures contracts must be rolled every three months because of expiration, which after a point can lead to higher trading costs (through additional commissions) and tracking error. The investor is also subject to mispricing of the calendar spread.

From the perspective of a more sophisticated investor intent on implementing a medium- or shorter-term view, futures may be preferable to ETFs. Futures markets are highly liquid, and commissions are low; therefore, per trade costs are substantially lower with futures than with ETFs. They also lend themselves to strategies requiring "overlay" investing in index exposure like enhanced index funds and long/short strategies.

Further, futures contracts qualify as Section 1256 instruments, while ETFs do not (see ETFs and Taxes below). Accordingly, capital gains and losses associated with futures trading are treated as 60%/40% long-/short-term for tax purposes, regardless of the actual holding period, and current positions are marked to market and taxed at the end of each year. Hence, although futures are preferable to ETFs for an investor with a short-term view, the opposite is true for longer-term investors interested in deferring tax events.

ETFs AND INDIVIDUAL INVESTORS

ETF-related issues of interest to individual investors include applications, taxes, and options.

Some of the rise in popularity of ETFs has been driven by interest from taxable individual investors. The ease of transacting and diversification benefits, similar to mutual funds, makes ETFs well suited for both long- and short-term holdings in individual investor portfolios.

In addition to the portfolio management applications that apply to both individual and institutional investors alike, we note four reasons that individuals trade ETFs with increasing frequency:

- ETFs offer trading flexibility not available with traditional index mutual funds.
- ETFs are useful tools for single-stock risk management.
- ETFs provide unique tax advantages.
- Options on ETFs provide additional flexibility.

ETFs versus Traditional Mutual Funds

In essence, ETFs trade like stocks and therefore offer a degree of flexibility unavailable with traditional mutual funds. Specifically, investors can trade ETFs intraday, monitor price discovery throughout the trading day, and employ the usual arsenal of order types—such as limit and stop orders—available in single-stock trading.

In a mutual fund, by comparison, investors can purchase traditional mutual funds only at the fund's NAV, which is published at the end of each trading day. (Typically, orders to buy or sell mutual fund shares must be placed at least an hour or two prior to market close.) Investors cannot purchase ETFs specifically at the closing NAV.

This difference gives rise to an important advantage of ETFs over traditional funds: Because they are relatively liquid, *ETFs are immediately tradable*; therefore, the risk of price movement between investment decision and time of trade is substantially less when ETFs are used in lieu of traditional funds.

For example, suppose an investor decides to purchase index exposure at 10:00 A.M. via a traditional mutual fund. During the balance of the trading day, the index gains 1%, and the investor purchases the fund after the close at the NAV. Consequently, by choosing a traditional fund over an ETF, the investor may incur a significant opportunity cost.

The ability to reduce the time between the investment decision and the trade has increased advantages as volatility increases or for more volatile indexes like NDX. Delaying a purchase until the next day's closing price when a decision was made the previous evening introduces slippage costs that increase with the range of price moves during the trading day.

Furthermore, ETFs can be readily purchased on margin (margining traditional funds can be complicated), and can be sold short (traditional mutual funds cannot be shorted). Indeed, ETFs are typically exempt from short-selling restrictions, which disallow short selling on a downtick.

ETFs are comparable to traditional index mutual funds in terms of fees. Both ETFs and mutual funds typically charge an expense fee, which includes the expenses of the fund manager or trustee. Generally, index-based traditional funds do not charge a sales load; when transacting an ETF via a broker-dealer, however, investors pay a commission. (Mutual funds also pay a commission that is passed to holders of the fund, but this commission may be lower than that charged to some individual investors.)

Investors also incur market impact costs associated with both products. For ETFs, market impact usually takes the form of a bid-ask spread for ETFs. As we note above, for traditional funds, market impact is the opportunity cost of waiting until after the market close to transact.

As a result of their structure and shorter operating history, many investors view ETFs as more tax-efficient than traditional mutual funds. Specifically, ETFs are redeemed in-kind, as opposed to in cash; therefore, shareholder redemptions do not create tax events for the fund. Mutual fund shares, on the other hand, are redeemed in cash; the fund must sell shares on the open market to meet redemptions, thereby creating tax events.

Moreover, ETFs can redeem fund shares with low cost basis shares to reduce the tax impact of trading (e.g., due to an index rebalancing or a corporate event). Combined with the simple fact that positions held in traditional funds are, in most cases, much older than positions held in ETFs (and therefore associated with a substantially lower cost basis, given the protracted bull market), the redemption-in-kind advantage gives ETFs significant tax advantages over traditional vehicles.

Exhibit 4 summarizes the differences between exchange-traded and traditional mutual funds.

EXHIBIT 4

Comparison of ETFs and Traditional Mutual Funds

Issue	ETFs	Mutual Funds
Intraday Trading	Investors can trade ETFs intraday, monitor price discovery throughout the trading day, and employ the full spectrum of order types. Because they are relatively liquid, ETFs are immediately tradable, so the risk of price movement between investment decision and time of trade is substantially smaller.	Investors can purchase mutual funds only at the fund's NAV, which is calculated at the end of each trading day. Purchases and sales often need to be placed an hour or two before the close.
Use of Margin	ETFs can readily be purchased on margin.	Margining mutual funds can be complicated and, in some instances, is not allowed.
Short-Selling	ETFs can be sold short. ETFs are typically exempt from short-selling restrictions, which disallow short-selling on a downtick.	Mutual funds cannot be shorted.
Fees	ETFs typically have an expense fee, which includes the expenses of the fund manager or trustee. When transacting an ETF via a broker-dealer, investors also pay a commission.	Mutual funds typically charge an expense fee, which includes the expenses of the fund manager. Generally, index-based traditional funds do not charge a sales load.
Turnover Costs	Most ETFs are based on indexes that have lower turnover than an actively managed mutual fund, typically resulting in lower trading costs and tax burden.	Index-based mutual funds offer similar turnover costs to ETFs.
Market Impact	Market impact usually takes the form of bid-ask spreads for ETFs.	For traditional funds, market impact is the opportunity cost of waiting until after the market close to transact.
Redemption	ETFs are redeemed in-kind, as opposed to in cash, so that shareholder redemptions do not create tax events for the fund.	Mutual fund shares are redeemed in cash; the fund must sell shares on the open market to meet redemptions, thereby creating tax events.

ETFs and Single-Stock Risk Management

For investors with substantial holdings in a single stock, risk management is an obvious concern. Although several techniques exist to reduce such exposure, ETFs can provide the means to mitigate marketwide and sector-specific risk.

Suppose an investor has a sizable holding in a single stock and is bullish on the company long-term, but is concerned with near-term systematic risk. To implement this view, the investor could take a short position in a broad-based index ETF (e.g., S&P 500 SPDR) in proportion to the size of the single-stock holding and the correlation between the stock and the index.

Alternatively, the investor may be concerned with sector risk, in which case a narrow-based, sector-oriented ETF product could be used.

ETFs and Taxes

From the perspective of a taxable investor, such as an individual investing in mutual funds, the tax-efficiencies associated with ETFs are frequently cited as a product advantage over traditional index-based funds. This advantage comes from the ability of ETFs to reduce taxable events within the fund through redemption-in-kind.

Through the creation/redemption process, qualified entities such as ETF market makers and institutional investors may redeem shares in ETFs for shares in underlying securities. Such redemptions do not trigger a tax event for the fund. (Depending on the redeeming entity, redemption may create a taxable gain or loss for the redeemer but not the ETF.)

When shares of a traditional index mutual fund are sold, however, the fund must sell underlying shares to provide the redeemer with cash. Such sales create tax events for the fund, which are passed to all shareholders. Given the longevity of the positions held by well-established traditional index mutual funds and the resulting low cost basis for some holdings, redemptions can be problematic from a tax vantage point.

Although the redemption-in-kind advantage of ETFs helps mitigate tax events associated with redemptions, an ETF might still be forced to liquidate positions because of changes in the composition of the index on which the ETF is based. All capital gains or losses from transactions associated with index rebalances are passed on to its investors, for which they are taxed.

For example, if a corporate action results in the deletion of a company from an index, or if a company moves from one benchmark to another, the ETF will in general sell stock. Tax events associated with the latter scenario can be particularly acute, given the nearly certain price appreciation of companies joining large-cap indexes, as with large stocks in the S&P MidCap 400 moving to the S&P 500.

In terms of tax events to the investor, treatment of ETFs is relatively straightforward. Taxes are paid on capital gains or losses when ETF positions are closed, under the usual short-/long-term distinction, and dividends paid by ETFs are taxed as ordinary income. (ETFs that are registered investment companies are required by Internal Revenue Service rules to distribute at least 90% of income, including interest, dividends, and short-term capital gains.) To the extent that an ETF incurs capital gains, it will distribute these on an annual basis.

Unlike broad-based index futures traded on an exchange, ETFs are not deemed to be Section 1256 securities (under the Internal Revenue Code). Section 1256 securities receive 60%/40% long-term/short-term tax treatment, irrespective of the holding period; ETFs do not, therefore, receive such treatment. Accordingly, for taxable investors with holding periods shorter than one year, exchange-traded futures contracts—if available—provide a better short-term index trading tool than ETFs for gaining broad-based exposure. Index futures holdings must be marked to market at the end of each year for tax purposes, however, while taxes on ETFs are paid when the position is liquidated.

In addition, options on ETFs are physically settled and do not qualify for Section 1256 status. Exchange-traded options on broad-based indexes, however, receive 60%/40% tax treatment. Over-the-counter options on broad-based indexes are not eligible for 60%/40% treatment, whether they are cash-settled or ETF-based. Further, narrow-based index options (and futures) also do not qualify.

Options on ETFs

At present, options on the QQQ and MDY trusts, as well as all nine sector SPDRs, trade on the Amex. Both the Amex and the Chicago Board Options Exchange (CBOE) offer options on all HOLDR products, including Long-term Equity AnticiPation Securities (LEAPS®) on the Internet HOLDRs (HHH); see Exhibit 5. All contracts are American style, meaning that the holder has the right, but not the obligation, to exercise before expiration.

EXHIBIT 5
ETFs with Options

ETF Tkr	Product Name	Options Exchange
Size- and Style-Based Index ETFs		
QQQ	Nasdaq-100	A,C,P,PS
MDY	S&P MidCap 400 SPDR	A
IWB	Russell 1000 iShares	A
IWM	Russell 2000 iShares	A
IWO	Russell 2000 Growth iShares	A
IWN	Russell 2000 Value iShares	A
OEF	S&P 100 iShares	C
FFF	Fortune 500 streetTRACKS	A
Sector-Based Index ETFs		
FEF	Fortune e-50 streetTRACKS	A
XLB	Basic Industries SPDR	A
XLV	Consumer Services SPDR	A
XLP	Consumer Staples SPDR	A
XLY	Cyclical/Trans SPDR	A
XLE	Energy SPDR	A
XLF	Financial SPDR	A
XLI	Industrial SPDR	A
XLK	Technology SPDR	A
XLU	Utilities SPDR	A
HOLDRs		
BHH	B2B Internet	A,C
BBH	Biotech	A,C,PS
BDH	Broadband	A,C
HHH	Internet	A,C,PS
IAH	Internet Architecture	A,C
IIH	Internet Infrastructure	A,C
MKH	Market 2000+	A
OIH	Oil Service	A,PS
PPH	Pharmaceutical	A,C
RKH	Regional Bank	A,C
RTH	Retail	A,C
SMH	Semiconductor	A,C
SWH	Software	A,C
TTH	Telecom	A,C
UTH	Utilities	A,C
WMH	Wireless	A,C

A = American Stock Exchange
C = Chicago Board Options Exchange
PS = Pacific Stock Exchange
P = Philadelphia Stock Exchange
Source: Bloomberg.

ETF options are physically settled; therefore, the option writer must transact the ETF if the option is exercised.

Note that these options should not be confused with the cash-settled index options (e.g., S&P 500, Nasdaq-100 option listed on the CBOE, and S&P MidCap option listed on the Amex) or options on index futures (e.g., Nasdaq-100 futures option listed on the Chicago Mercantile Exchange and DJIA futures option listed on the Chicago Board of Trade). In addition, depending on the divisors for the ETF and that of the index option, there may be considerable difference in the notional amount underlying the two options.

For example, the Nasdaq-100 and Mini-Nasdaq-100 options trade at the index level and one-tenth of the index level, respectively, while QQQ trades around 1/40 of the index. Hence, if the Nasdaq-100 is around 4,000, one Nasdaq 100 option will have a notional value of roughly $400,000; one Mini-Nasdaq-100 will have a notional of roughly $40,000; and one QQQ option will have a notional of about $10,000.

As we note above, cash-settled index options and options on index futures are treated according to Section 1256 under the Internal Revenue Code, unlike options on ETFs. Capital gains and losses in index options and options on futures thus receive 60%/40% long-term/short-term tax treatment, whatever the holding period, while gains and losses from ETF option transactions are determined in the standard fashion.

ETFs and Covered Call Writing or Hedging with Put Options

Unlike investors in traditional mutual funds, ETF holders have access to the same option-based strategies commonly applied to single-stock holdings. One of the more common of these strategies is covered call writing; the holder of an asset writes, or sells, a call option on the asset. (A call option gives the option holder the right, but not the obligation, to purchase the asset at a prespecified strike price.)

Under this strategy, the option position will be profitable if the ETF declines or is unchanged in value through the option expiration because the investor receives a premium for the sale of the option. If the ETF appreciates in price, the option position will result in a loss. Writing covered calls on ETFs is thus well suited to an investor who owns an ETF and does not want to sell but is bearish-to-neutral regarding the fund's prospects over the near term.[1]

Hedges for investor portfolios can be constructed with put options on ETFs representing the index or the set of indexes that closely track the investor's portfolio. Put option hedges set a floor at expiration for a fund invested in the same ETF on which the put is purchased based on the strike price. This floor comes at a cost represented by the put premium. Alternatively, one can finance the cost of the put by selling an ETF call option, exchanging a cap on upside performance for the opportunity to hedge downside risk.

In some cases, the investor uses an ETF put against a stock portfolio that is highly correlated with the ETF. Here, the ETF put is expected to generate a profit if the ETF moves below the put strike price that would offset some of the potential losses on the portfolio. The effectiveness of the hedge in this case depends on the performance of the ETF relative to the investor's stock holdings.

APPENDIX
Tracking Error of ETFs to Fund NAVs and Indexes

Investors in an ETF are buying or selling a security representing shares in the underlying trust or index fund. They expect the price of the ETF to closely track the net asset value (NAV) of the underlying trust or fund. The potential for ETF shares to be redeemed and created by an exchange of those shares for trust units is, in fact, what distinguishes them from closed-end funds, where no mechanism exists to ensure that the funds converge to NAV.

Investors also want a sense of how closely the ETF returns correlate with those of the index, based on closing share and ETF prices.

What is Tracking Error?

Tracking error is a term commonly used to describe the volatility of returns of a portfolio relative to the returns of its benchmark index. It is typically expressed in terms of the standard deviation of the differences between portfolio and index returns over a specific horizon, such as a week, month, or year. It can be interpreted as the range around the index return in which portfolio returns are expected to fall for roughly two of every three years. For example, a tracking error of 1% implies that if the index return is 10%, the portfolio return should be 9%-11% about 68% of the time.[2]

NAV Tracking Error. NAV tracking error is the difference between the two return series, measured over tracking risk. It is the best way to assess the long-term characteristics of ETFs relative to their underlying benchmarks.

This type of tracking error is derived from the difference between the returns of the index or strategy on which the fund is based and those measured from the NAV of the fund or trust. Because investors or market makers can convert blocks of ETF shares at the NAV at the end of the trading day, this measure is relevant for determining how much the ETF deviates from the underlying index based on the ETF structure—dividend reinvestment and timing, payment of fund expenses, handling of corporate actions, or other index replication strategies.

Price-to-Index Tracking Error. Price-to-index tracking error is relevant for investors assessing the extent to which returns based on the closing prices of the ETF vary from those of the underlying index at any given point in time.[3]

This type of tracking error is derived from an ETF market price and reflects market supply and demand pressures at a particular time when the index or ETF price is observed. It does capture the price the investor is likely to pay or receive for the ETF at the market close. It incorporates the short-term noise in the market as well as on the sources of liquidity used by traders for hedging.

Sources of liquidity include 1) the ETF market, 2) underlying stocks, and 3) futures (or forwards created by call and put option combinations).

Timing and Flow Factors

Price-to-index tracking error should be based on ETF and index prices observed at the same time. Investors often measure this ETF price-to-index tracking error at the end of the trading day, because these prices are most accessible.

Yet because many of the ETFs traded in the U.S. close at 4:15 P.M., there is a time gap between the determination of the closing prices of the underlying index and ETFs. This factor can result in a significant overstatement of the tracking error if it is based on closing prices for each instrument.[4]

For products based on indexes with futures (such as SPYs, IVVs, MDYs, QQQs, and DIAs), the futures on the underlying indexes represent a significant source of liquidity for hedging the ETF market maker's risk. As a result, factors governing trading activity and mispricing in the futures affect the trading and pricing of the ETF shares. Our research based on the tracking error of index futures, which also experience the same time gap between closing prices of the index, suggests that tracking error based on 4:15 P.M. or closing prices is about double that of tracking error based on simultaneous futures and index prices at 4:00 P.M.[5]

Because ETFs trade as shares on an exchange, their price is influenced by supply and demand and by the process market makers use to ensure orderly markets and provide liquidity. Generally, access to futures helps to narrow the bid-offer spread for ETFs. In a very active market with numerous participants and good two-way flow, ETFs could trade very close to their NAV, with tight bid-offer spreads.

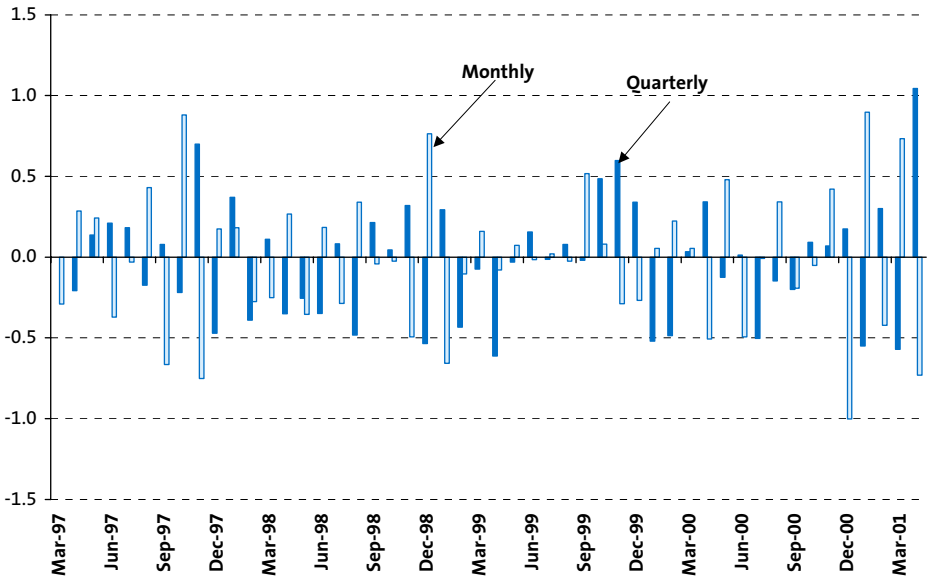
If, however, natural demand far exceeds supply (or supply far exceeds demand), ETF share prices could at times become dislocated relative to fair value. The magnitude of this dislocation (either positive or negative) is closely tied to the ability of the market maker to hedge risk, the method of hedging used, and the price of the hedging instrument.

In short, any factor that makes it more costly or difficult for the market maker to hedge risk can affect the extent to which ETFs trade away from their NAV in the short run. The more relevant factors (most of them discussed already) include:

- The liquidity of the futures of the underlying index.
- The mispricing (richness/cheapness) or any disruption in trading of the futures contract.
- The degree to which the trust or fund tracks the underlying index.
- The degree to which the market maker's hedge (whether futures or stocks) tracks the underlying trust or fund.
- Halts or suspensions in index constituent stocks.
- The volatility of the underlying index.
- The presence of other hedging costs, such as taxation in some foreign markets.

EXHIBIT A-1

Differences in Total Return of S&P 500 SPDR (SPY) versus S&P 500 Index
(monthly and quarterly March 1997–April 2001)



Source: FAME Information Services and Standard & Poor's.

EXHIBIT A-2

Total Returns and Tracking Error Statistics for Most Actively Traded ETFs

	Total Returns (%)					Tracking Error		
							ETF versus Index	
	Index	ETF	NAV	ETF - Index	NAV - Index	NAV versus Index	Mthly	Qtrly
SPY S&P 500 SPDR						0.07	1.46	0.34
2001 (4/30)	-5.01	-4.53	-4.99	0.48	0.01			
2000	-9.10	-9.71	-9.14	-0.61	-0.04			
1999	21.04	20.39	20.84	-0.65	-0.21			
1998	28.58	28.66	28.33	0.08	-0.25			
MDY S&P MidCap SPDR						0.28	2.60	2.30
2001 (4/30)	-1.25	-0.94	-0.96	0.30	0.28			
2000	21.27	21.87	21.85	0.60	0.58			
1999	14.72	15.35	14.01	0.63	-0.71			
1998	19.12	16.88	18.47	-2.24	-0.65			
DIA DJIA Diamonds						0.13	1.31	1.13
2001 (4/30)	-0.10	0.80	0.02	0.90	0.12			
2000	-6.40	-6.51	-6.38	-0.11	0.03			
1999	27.07	27.58	27.00	0.51	-0.07			
1998	17.92	17.33		-0.59				
QQQ Nasdaq 100 Shares						0.04	2.40	2.03
2001 (4/30)	-20.75	-20.94	-20.79	-0.19	-0.04			
2000	-36.82	-36.12	-36.94	0.70	-0.12			
1999*	76.28	74.16	75.83	-2.12	-0.45			

** From April 1999.*

Source: Goldman Sachs Derivatives and Trading Research estimates.

For example, one would expect an ETF based on the S&P MidCap or Russell 2000 index to trade, on average, farther away from fair value than an S&P 500 ETF because of the former's lower futures liquidity, wider underlying stock bid-ask spreads, and higher turnover, resulting in greater tracking error for comparable time periods.

Lower Price-to-Index Tracking Error for Longer Investment Horizons

Another consideration in assessing price-to-index tracking error is the horizon of the investor. Investors who expect to be trading or turning over their positions frequently would be most concerned with price-to-index tracking error measured over short periods, such as days, weeks, or months.

For example, investors transacting monthly would find tracking error based on monthly return differences between the ETF and index most relevant. This statistic may understate the tracking error for those trading daily, but overstate it by as much as a factor of two for those transacting quarterly or annually.

To illustrate this distinction, we show in Exhibit A-1 the monthly and quarterly total returns of the SPY minus those of the S&P 500. Note how the quarterly return differences are generally smaller than those observed from month to month, and how they tend to offset one another over time.

The quarterly tracking error based on the standard deviation of this return difference is lower (0.34% versus 1.46%) because quarterly SPY returns have a smaller component of this market noise factor, which tends to diminish in importance when returns are measured over longer periods. Even so, most month-to-month return differences are less than 1% for the SPY, as are the differences in annual returns.

Exhibit A-2 shows the total returns for the most actively traded and oldest ETFs along with those of the indexes for 1998 through April 2001. The ETF returns are generally within 1% of those of the index, even in years of very strong performance (such as the 76% NDX return in 1999, the 29% S&P 500 return in 1998, and the 21% S&P MidCap return in 2000). An exception is a 2% underperformance of the QQQ in 1999, which was related to a cheap year-end price.

These differences are well within the annualized tracking error measured from monthly market prices shown in the next-to-last column of the exhibit.

Components of NAV Tracking Error Between ETF and Underlying Index

The components of NAV tracking error between an ETF and the underlying index it is intended to track can be broken out as follows.

Dividend Reinvestment Policy and Payment. The dividend reinvestment policy used to manage the trust or fund can contribute to tracking error between the ETF and the underlying index. Typically, the total returns of the ETF for a given holding period are compared with the total return index that assumes dividends are reinvested daily (or monthly) into the index on the ex-date of each stock. In the case of UIT ETFs (dividends are not reinvested daily into the trust or fund but rather into a cash-equivalent), the return of the ETF will not perfectly match the total return of the index; rather, it will tend to be slightly lower in rising markets and slightly higher in falling markets. (Many UIT ETFs pay dividends as much as six weeks after the ex-date, delaying the opportunity to reinvest dividends in the fund.)

Regardless of the dividend reinvestment policy, many of the ETFs make quarterly dividend payments to their shareholders. Just as with dividend-paying stocks, the ETF price on the ex-date is negatively affected by the amount of the dividend. Therefore, during the quarter, the ETF may appear to outperform the underlying price return index, which reflects capital appreciation only.

This is not a true source of tracking error, however, because the performance discrepancy largely disappears when dividend returns are properly accounted for over a suitable investment horizon. Similarly, distributions associated with capital gains will cause a deviation but do not represent true tracking error.

Tracking Error Arising from Imperfect Replication of Index. Another source of potential tracking error between the ETF fund and the underlying index arises from the stock holdings of the ETF. If the fund practices full replication, and holds all index components in their correct proportions, tracking errors could be very low and similar in magnitude to those observed for institutionally managed index funds.

In this case, some tracking error may still result from changes to index stocks and the need to manage cash flows. Examples of low tracking error products would be the SPYs and QQQs.

Other ETFs, such as the iShares based on the MSCI country indexes, may vary holdings, using sampling or optimization to favor stocks that have the best liquidity characteristics. To the extent that the basket of securities held by the trust or fund differs from the composition of the index, higher tracking error may result.

Modification of Index to Meet Diversification Requirements. In some cases, the underlying index has been modified so that a fund based on it can comfortably meet restrictions placed on all regulated investment companies (RICs). This has been particularly true for many of the sector indexes for which a modified capitalization weighting method has been introduced to satisfy RIC requirements.

For example, the S&P Select Sector indexes do not correspond to the S&P 500 Sector because 1) the indexes are modified cap-weighted, and 2) stocks are categorized differently. Thus, use of these products in a portfolio benchmarked to the S&P 500 may introduce another source of tracking error that investors may want to consider.

This type of tracking error, however, is due to construction of the ETF versus the underlying index and the way that the product is used in the investor's portfolio, and is not normally considered tracking error of the ETF itself.

Fees. Management fees, called an expense ratio, are deducted from the dividend yield and contribute to differences between the index return and the ETF return. The extent of this impact depends on the fee level, which is quite low for the large-cap indexes, ranging from 9-12 basis points (bps) for ETFs based on the S&P 500 index to 25 bps for the Russell 2000 and S&P 600 ETFs. Annual fees for ETFs for sector indexes range from 25 bps to 60 bps, while those for the MSCI developed country indexes are slightly higher, at 84 bps.

Comparison of NAV-to-Index and Price-to-Index Tracking Error

Exhibit A-2 also compares annualized tracking error based on NAV and month-end prices for the S&P 500 and MidCap SPDR, the DJIA Diamonds, the Nasdaq-100 QQQs, and the sector SPDRs. The return series used are the last three-plus years for the S&P 500, MidCap SPDR, and DJIA Diamonds, and since inception for the QQQs.

The NAV-to-index tracking errors are less than 28 bps for the large-cap indexes and less than 30 bps for the S&P MidCap SPDR. For sector SPDRs, the levels are slightly higher, primarily as a result of more impact from index changes, but these are also much less than 1%. Price-to-index tracking errors from monthly returns calculated from closing prices are close to 1.5% for S&P 500 and DJIA ETFs, but closer to 2% for most sector index ETFs.

Summary

Tracking errors and returns based on fund NAV relative to the index reflect some factors characteristic of the product structure. In addition, price-to-index returns and tracking error reflect ETF prices that are captured at a different time from the underlying index and the short-term supply and demand fac-

tors relevant to the ETF, as well as the hedging instruments used by market makers. NAV tracking error is much lower than price-to-index tracking error and is the most useful measure in assessing the long-term characteristics of an ETF relative to its underlying index.

ENDNOTES

[1]Covered call positions on ETFs have the advantage that the ETF can be delivered if the option is exercised, compared to cash-settled index options, which require the seller to post cash based on the difference between the index and the strike price upon exercise.

[2]Because most investors evaluate their returns at least monthly, tracking error is calculated from monthly differences in returns and then annualized by multiplying by the square root of 12 (months in a year).

[3]In "Spotlight on U.S. Exchange-Traded Funds—Taking Stock *as* Products Expand" [2000], we call this "implementation tracking error." We discuss its components in greater detail for ETFs with futures available on the index, as distinct from those that do not have futures.

[4]The SPDR ETFs covering sectors close at 4:00 P.M. (Eastern time), as do the MSCI country iShares.

[5]In "Synthetic Index Strategies: The Dynamics of Tracking Error" (Goldman Sachs, July 27, 1999), [1999], we show that tracking error based on futures prices at 4:00 P.M. is about half of the tracking error calculated using the 4:15 P.M. data. We expect the same to be true for ETFs.

REFERENCES

"Spotlight on U.S. Exchange-Traded Fund—Taking Stock *as* Products Expand." Goldman Sachs Derivatives and Trading Research, April 2000.

"Synthetic Index Strategies: The Dynamics of Tracking Error." Goldman Sachs Derivatives and Trading Research, July 27, 1999.