



Water Island Capital

ADVISOR TO THE ARBITRAGE FUNDS

Short Volatility & The Illusion of Diversification

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Executive Summary

Many investors were surprised and disappointed to experience drastic losses across their investment holdings during the 2008-2009 market crisis. To their dismay, they found that different asset classes - stocks, bonds, real estate, and alternative investments - all lost value to some degree at the same time. This raises the inevitable question: did diversification fail during the downturn? And more importantly, what type of portfolio will be able to withstand the impact of future volatility and preserve value?

Our analysis indicates that, during periods of volatility, most asset classes and investment strategies lose value. This is commonly referred to as “short volatility”. Given that short volatility can magnify the potential for undesirable outcomes, even in a seemingly diversified portfolio, investors may need to re-assess their portfolio construction models to reflect an investment’s demonstrated resilience in withstanding large drawdowns from the re-pricing of risk. Liquid alternatives or absolute return strategies may need to be a bigger part of the solution. But not all alternative strategies are created equal. Ideally, an alternative strategy should have the ability to deliver strong risk-adjusted returns, exhibit low beta, maintain market neutrality, and remain uncorrelated to other risk assets in the portfolio regardless of the volatility environment. Based on our findings which we will discuss in this paper, we’ve identified those alternative strategies that meet these criteria: merger arbitrage, managed futures, and market neutral strategies.

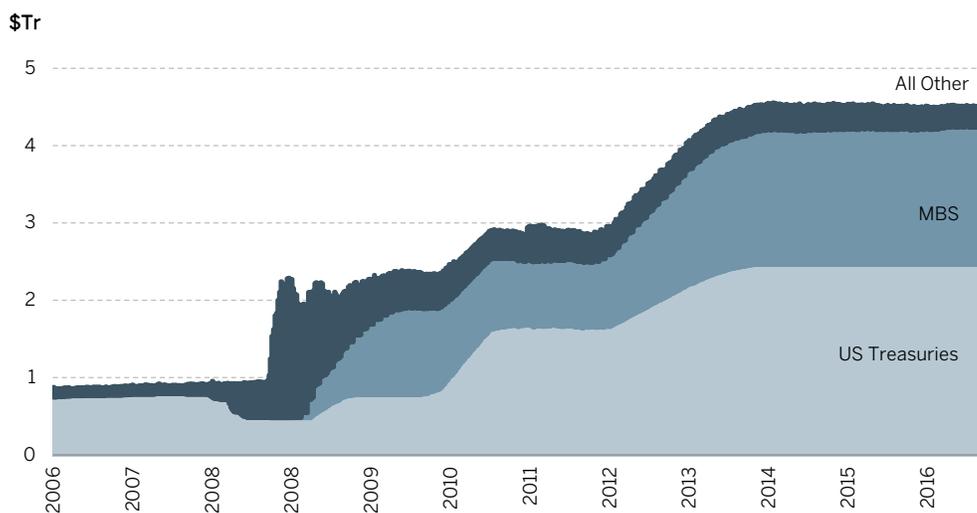
We believe the future market environment will be markedly different than what we have experienced in the recent past

In the aftermath of the 2008 financial crisis, global central bankers have deployed a series of conventional and unconventional monetary policies to stimulate economic activity. Empirical evidence suggests that these easing actions have successfully lowered interest rates and have injected liquidity into the financial system. This liquidity, in turn, has suppressed volatility and bid up the prices for financial assets including stocks, bonds, and real estate. In so doing, central banks have engineered what is currently the second-longest bull market in history. However, this bull market has been borne on the back of significant debt expansion. The Federal Reserve's (Fed) balance sheet has ballooned from \$900 billion in 2008 to \$4.5 trillion in 2017 (**Exhibit 1**). Central bankers have essentially pulled returns from the future into the present by replacing private consumption with government indebtedness. Unfortunately, central bank policy has failed to stimulate real economic growth or instill long-term confidence. This failure is leading central banks to adopt what may be an even more radical move: as of July 2016, central

banks in 23 countries had resorted to negative interest rate policies to stimulate growth. A further seven, including the United States, had policy rates of 1% or less.

Many investors, ourselves included, are concerned about the potential knock-on effects of the central banks' unprecedented actions. After all, monetary stimulus is an artificial stimulus. The prosperity that investors have experienced in the post-crisis period has largely been engineered by policy actions. The question that looms is what the market environment will look like when central banks bring an end to their stimulus policies. The Great Recession that was being managed by the "great repression" of volatility has started to show cracks and is setting the stage for a marked increase in uncertainty, as we envision a financial system without the exceptional support of the central banks. Already, every prospect of even a 25 basis points (bps) rate hike has been fraught with increased financial volatility. We agree with former Fed chairman, Alan Greenspan, when he says that the Fed cannot end this protracted reliance on extraordinary monetary policy without a "significant market event."

Exhibit 1: Federal Reserve Balance Sheet



Source: Federal Reserve. Date range: 1/1/06-9/30/17.

We are likely entering a more challenging return environment that will be marked by more frequent and higher bouts of volatility

Our view is that we are likely nearing the end of the period where central bank stimulus drives markets higher. Instead, we anticipate a market regime reflective of anemic economic growth, high debt levels, lower returns and elevated volatility. Our analysis indicates that the market is already beginning to reflect this potential new return and volatility environment.

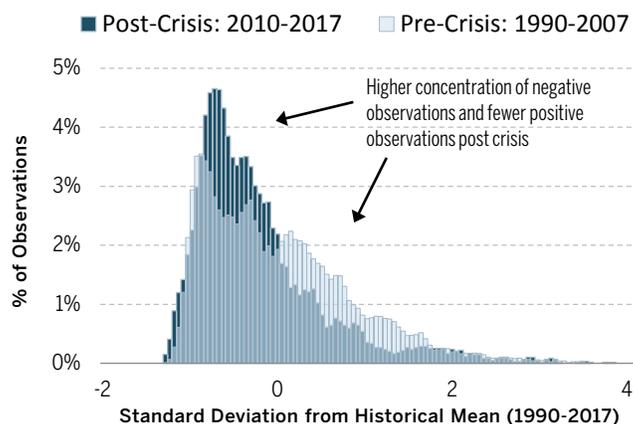
We compared the distribution of VIX levels (volatility) and 30-day realized volatility of VIX (volatility of volatility) during pre-crisis (1990-2007) and post-crisis (2010-2017) periods. Comparing the VIX levels during the pre- and post-crisis periods in **Exhibit 2** shows that post-crisis volatility has been dampened down from the extremes into a more subdued range in the center. However, what is interesting to note is that while volatility has been muted, the volatility of the VIX (which is essentially a gauge of the degree of uncertainty in equity valuations) has increased in the post-crisis period (**Exhibit 3**). Put simply, we are experiencing lower levels of volatility, but we are also experiencing more frequent spikes in volatility - which may be symptomatic of a bull market in perpetual fear that the economy could slip into a recession, should central bank tools cease to be effective.

Traditional risk assets are unlikely to protect capital or appreciate meaningfully in a low return, high volatility environment

An environment of lower returns and higher volatility can have severe consequences for investment portfolios due to the short-volatility nature of most financial assets. A “short volatility” asset is any asset that loses value when volatility rises. For example, most equities may be deemed short volatility in nature, because when volatility rises, equity assets oftentimes sell-off. As Bill Gross recently wrote, “Any investment longer or less creditworthy than a 90-day treasury bill sells volatility whether a portfolio manager realizes it or not.” We tend to agree with him. That is, **the majority of assets lose value when volatility rises.**

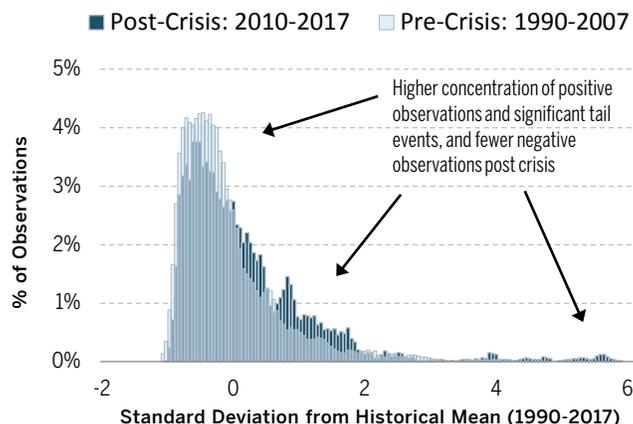
“Lower returns and higher volatility can have severe consequences for investment portfolios due to the **short-volatility** nature of most financial assets.” ”

Exhibit 2: VIX Levels



Source: Bloomberg; Water Island Capital. Date range: 1/1/1990-9/30/17. Past performance does not guarantee future results.

Exhibit 3: VIX Volatility



Source: Bloomberg; Water Island Capital. Date range: 1/1/1990-9/30/17. Past performance does not guarantee future results.

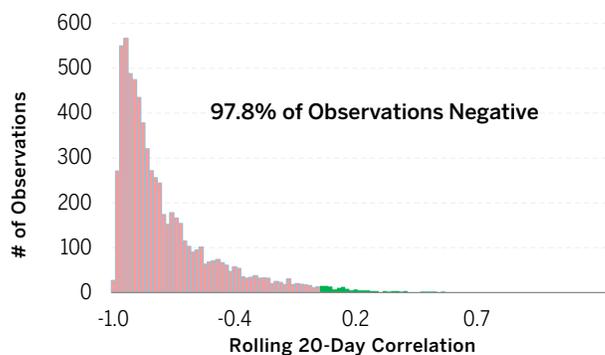
In our research, we analyzed how different asset classes performed when markets experienced stress, which we measured as periods of rising VIX. As you can see from **Exhibit 4**, equity markets show a consistent negative correlation to the VIX over the last 25 years. In other words, there is a strong demonstrated relationship wherein higher volatility corresponds with a declining stock market, and vice versa.

Similarly, credit spreads (CDX), which are often viewed as a proxy for volatility, rise when volatility rises (**Exhibit 5**).

Given that government bonds or “rates” are traditionally thought of as a safe haven asset, most investors rely on treasuries to help them preserve capital and weather periods of extreme market stress. However, our analysis indicates that rates have failed to protect against volatility almost half the time over the last 25 years (**Exhibit 6**). This may come as a surprise to some, but there have been multiple instances of volatility spiking when rates rose - most recently the “Taper Tantrum” of May 2013, when the Barclays U.S. Aggregate Bond Index fell by 4.9% in response to the Fed’s announced plan to taper its bond buying program. This is an important insight. Today, treasury yields have fallen to generational lows (from 14% in 1984 to 1.5% in July 2016), with very little room for rates to fall further. As such, it is highly probable that treasuries may not provide adequate risk protection against a market shock. On the other hand, our analysis does suggest that rates typically show strong performance following a market crisis. This is largely because skittish investors react to market stress by purchasing high quality assets such as treasuries, after the fact. Again, we would highlight that given the extremely low yield environment, the likelihood that government bonds will outperform against a backdrop of volatile conditions is far from assured.

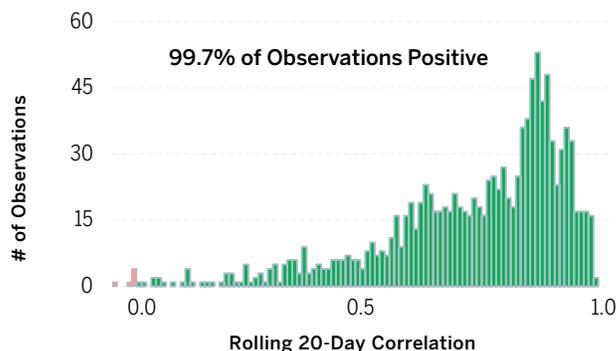
In summary, our analysis suggests that a portfolio comprised of traditional asset classes, however diversified, may lose that presumed diversification when volatility increases. This is how volatility events can exacerbate portfolio losses.

Exhibit 4: S&P 500 Weekly Returns and VIX



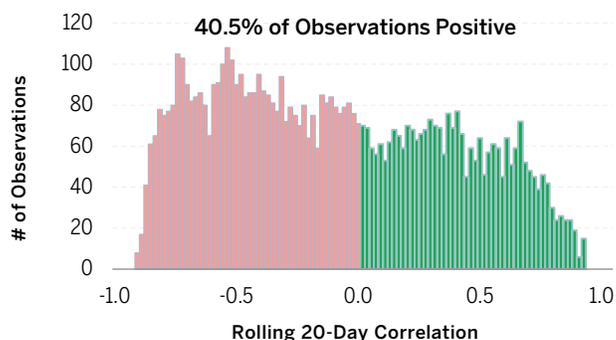
Source: Bloomberg; Water Island Capital. Date range: 1/1/1990-9/30/17. Past performance does not guarantee future results.

Exhibit 5: 5 Year CDX Weekly Returns and VIX



Source: Bloomberg; Water Island Capital. Date range: 9/9/11¹-9/30/17. Past performance does not guarantee future results. ¹Markit CDX North American Investment Grade Index inception date.

Exhibit 6: US 10YR Weekly Spread Change and VIX



Source: Bloomberg; Water Island Capital. Date range: 1/1/1990-9/30/17. Past performance does not guarantee future results.

Many alternative investments will also likely fail to perform when markets become more volatile

We now turn our attention to alternative strategies. Alternatives were embraced by many investors following the 2008 financial crisis as a way to broaden a portfolio's sources of risk and return, and as a way to diversify protection against downside risk. In our analysis below, we chose to look at the potential diversifying impact of various alternative investment strategies on equity risk, using daily HFRX index data as a proxy. As shown in **Exhibit 7**, alternatives are typically successful in achieving lower beta and correlation when regressed against the S&P 500 Index (S&P) over the long term.

Exhibit 7

Strategy	Index	Beta	Correlation
Equity Hedge	HFRXEH	0.25	73.5
Market Directional	HFRXMD	0.23	59.6
Event Driven	HFRXED	0.16	62.6
Merger Arbitrage	HFRXMA	0.12	55.2
Relative Value	HFRXRVA	0.05	23.4
Macro	HFRXM	0.01	4.3
Market Neutral	HFRXEMN	0.01	4.1
CTA ¹	NEIXCTA	0.00	-0.8

Source: Bloomberg; Morningstar; Water Island Capital. Date range: 1/1/2005-9/30/17.

Past performance does not guarantee future results.

¹SG CTA Index. For index definitions, please see page 8.

We then considered whether alternative strategies provide value and diversification during periods of market stress. We focused on the three most recent volatility events: July 2011 to February 2012, August to September 2015, and January to February 2016. These were periods when there was a spike in volatility and when equity markets experienced drawdowns greater than 10%.

We compared the strategies' peak-to-trough and peak-to-recovery performance versus the S&P. As you can see in **Exhibit 8** below, nearly every strategy displayed increased beta during the drawdown period relative to its long-term beta; and in the peak-to-recovery period, most strategies did not make up for their losses even after the S&P fully recovered.

It is worth noting that the beta of a strategy can increase during times of distress, thereby exhibiting short-volatility characteristics. This short-volatility characteristic absolutely dispels the notion that all alternative investments enhance diversification in distressed markets. Further, a strategy's beta during recovery may be muted compared to the beta during the sell-off period, leading to permanent losses in the portfolio.

Exhibit 8: Performance During Periods of Volatility

Strategy	Period 1		Period 2		Period 3		Average	
	Peak to Trough	Peak to Recovery	Peak to Trough	Peak to Recovery	Peak to Trough	Peak to Recovery	Peak to Trough	Peak to Recovery
	12/30/15 - 2/11/16	12/30/15 - 4/1/16	8/17/2015 - 9/28/15	8/17/15 - 11/2/15	7/24/11 - 10/3/11	7/24/11 - 2/3/12		
S&P 500 Index	-11.8%	0.3%	-10.3%	0.5%	-17.9%	1.2%	-13.3%	0.7%
CTA ¹	9.2%	4.7%	-0.7%	-1.8%	1.6%	-1.2%	3.4%	0.5%
Merger Arbitrage	0.7%	1.6%	-0.5%	2.0%	-4.3%	-1.9%	-1.4%	0.5%
Market Neutral	-2.5%	-2.5%	1.6%	2.8%	-6.3%	-5.2%	-2.4%	-1.6%
Event Driven	-7.0%	-1.3%	-4.9%	-2.2%	-7.6%	-2.9%	-6.5%	-2.1%
Macro	0.7%	0.1%	-2.4%	-3.0%	-0.8%	-3.7%	-0.8%	-2.2%
Relative Value	-3.1%	-2.7%	-2.1%	-0.4%	-6.0%	-3.8%	-3.7%	-2.3%
Equity Hedge	-8.7%	-3.2%	-5.0%	-2.4%	-12.1%	-9.6%	-8.6%	-5.1%
Market Directional	-15.9%	-6.9%	-7.0%	-3.0%	-13.7%	-13.7%	-12.2%	-7.9%

Source: Bloomberg; Morningstar; Water Island Capital. Past performance does not guarantee future results.

¹SG CTA Index. For index definitions, please see page 8.

We quantified the extent of short-volatility for each alternative strategy by calculating the difference between the beta when the VIX decreased by more than one standard deviation (market recovery) relative to when the VIX increased by more than one standard deviation (market sell-off). The difference between those two betas is the measure of the short-volatility exposure of each strategy (**Exhibit 9**).

Clearly, the short-volatility characteristic of an investment strategy has long-term implications for portfolio performance. If it is likely that every volatility event leads to permanent capital loss in a portfolio, investors need to give great consideration when utilizing strategies designed to mitigate risk in volatile markets.

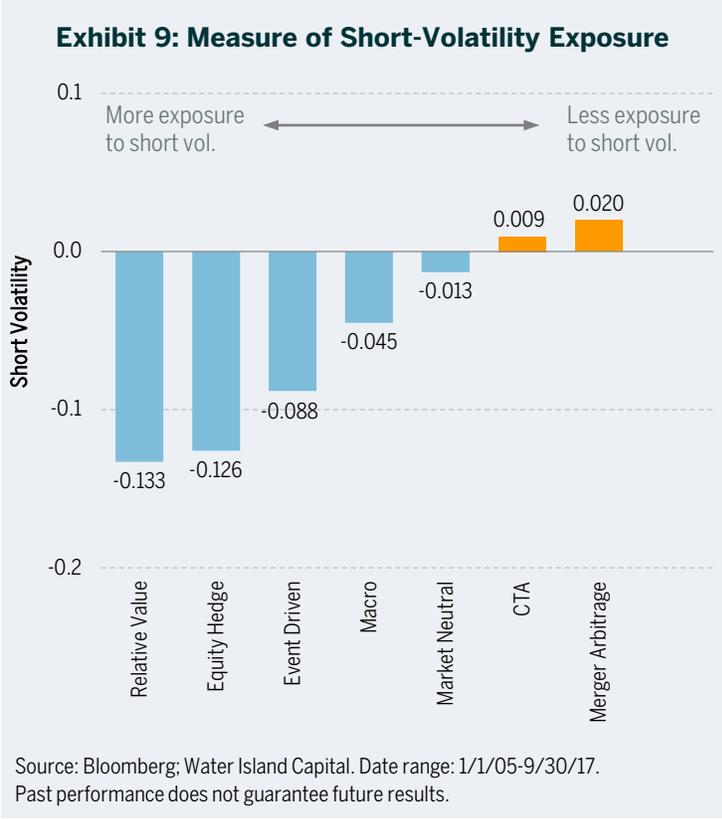
Among the strategies that fared well in our analysis were Merger Arbitrage, CTA, and Market Neutral. Among them, Merger Arbitrage experienced the most favorable relationship between recovery beta and drawdown beta, which led it to recover from losses much faster than other alternative strategies. This is not surprising given the short-duration nature of merger arbitrage investments.

SHORT VOLATILITY = $\beta_U - \beta_D$

Where:

β_U = beta when the VIX decreased by more than one standard deviation (market recovery)

β_D = beta when the VIX increased by more than one standard deviation (market sell-off)



CONCLUSION:

Investors may need to reconsider their approach to portfolio construction given the potential market environment and the risk characteristics of various investment strategies

Whether it is correlations or betas or returns, during times of volatility, the characteristics of most strategies converge. Short volatility magnifies the potential for undesirable outcomes even in an ostensibly diversified portfolio. As part of the portfolio construction process, investors may need to re-assess their allocation models to reflect an investment’s demonstrated resilience to withstanding large drawdowns from the re-pricing of risk. This is particularly relevant in the post-crisis period as markets become increasingly quixotic, with more frequent volatility spikes followed by equally strong risk reversals. To mitigate potential losses from heightened fat-tail risks and to achieve long-term investment targets, liquid alternatives or absolute return strategies may need to be a bigger part of the solution. Ideally, an alternative strategy should have the ability to deliver strong risk-adjusted returns, exhibit low beta, be uncorrelated to other risk assets in the portfolio, and most importantly be volatility neutral.

About the Author

Aditya Bindal, Ph.D

Chief Risk Officer

Mr. Bindal joined Water Island Capital in 2015 and serves as the firm's Chief Risk Officer. In this capacity, he has firm-wide oversight and responsibility for all areas of risk including investment, liquidity, counterparty, operational, and regulatory. Specific to investment risk, Mr. Bindal works closely with the CIO and PMs to develop more sophisticated monitoring tools in order to better quantify and analyze exposures to various risk factors, and aid in taking appropriate action given specific investment objectives and risk tolerances. He and the risk team have also developed proprietary risk systems better suited to identify and manage the unique risks that arise from event-driven investing.

Prior to joining the firm, Mr. Bindal acted as Senior Risk Manager for Eton Park Capital Management, where he analyzed and assessed risk across various asset classes, led the development of risk systems for all fixed income products, and devised scenario analyses for derivatives. He was responsible for designing, monitoring, and reporting risk both internally and externally, and was an integral part of the portfolio construction process.

Before Eton Park, Mr. Bindal began his career at Bear Stearns & Co., where he served as an Associate Risk Manager, and as a Correlation Trader responsible for devising quantitative strategies.

Mr. Bindal received a Ph.D. in Chemical Engineering from Rutgers University, a Master of Science in Engineering from Purdue University, and a Bachelor of Technology in Chemical Engineering from the Indian Institute of Technology.

GLOSSARY

beta: A measure of the volatility of an investment in relation to a benchmark, indicating the tendency of an investment to respond to swings in the benchmark.

correlation: A measure of how two securities move in relation to each other, ranging from -1 to +1. A correlation of 0 means the relationship between the two securities is completely random, while +1 indicates a perfect positive relationship and -1 a perfect negative relationship.

monetary policy: The actions of a central bank, currency board, or other authority that determines the size and rate of growth of the money supply.

standard deviation: A measure of the degree of variation of returns around the average return.

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The Standard and Poor's 500 Index ("S&P") is a capitalization-weighted index of 500 stocks designed to measure performance of the broad domestic economy. The Barclays U.S. Aggregate Bond Index covers the U.S. investment grade fixed rate bond market. HFRX indices were chosen as a proxy for alternative investment strategies due to the availability of daily data. The HFRX ED: Merger Arbitrage Index ("Merger Arbitrage") includes funds which employ an investment process primarily focused on the opportunities in equity and equity related instruments of companies which are currently engaged in a corporate transaction. The HFRX Equity Market Neutral Index ("Market Neutral") includes funds which typically employ sophisticated quantitative techniques in order to construct portfolios that are neutral to one or multiple variables, such as broader equity markets. The HFRX Equity Hedged Index ("Equity Hedged") includes funds that maintain positions both long and short in primarily equity and equity derivative securities. The HFRX Event-Driven Index ("Event Driven") includes funds which maintain positions in companies currently or prospectively involved in corporate transactions including but not limited to mergers, restructurings, financial distress, tender offers, shareholder buybacks, debt exchanges, security issuance, or other capital structure adjustments. The HFRX Macro/CTA Index ("Macro") includes a broad range of funds employing macro strategies, both discretionary and systematic, where the investment process is predicated on movements in underlying economic variables and the impact they have on equity, fixed income, hard currency, and commodity markets. The HFRX Relative Value Arbitrage Index ("Relative Value") includes funds who maintain positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. The SG CTA Index ("CTA") is designed to track the largest 20 CTA managers (by AUM) and be representative of the managed futures space. This index was chosen since there was no HFRX index comprised exclusively of CTA managers that provided daily data for the periods of analysis. The CBOE Volatility Index ("VIX") represents a measure of expected stock market volatility over the next 30 day period. The Markit CDX North American Investment Grade Index ("CDX") is an index based on a basket of 125 credit default swaps of the most liquid North American entities with investment grade credit ratings. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses. Indexes are unmanaged and one cannot invest directly in an index.

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