

Arbitrage hedge fund primer: venturing into volatility

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In summary

Arbitrage is a widely used term in finance that encompasses a broad range of strategies designed to take advantage of pricing inefficiencies across markets. This primer will concentrate on arbitrage hedge fund strategies that primarily trade volatility instruments, convertible bonds, and other securities across the capital structure. These strategies look to benefit from mispricings of the same or closely related instruments, such as from pricing uncertainties in options and other derivatives. With this focus, some funds aim to generate returns that are largely independent of broader market movements, while others use options as a form of insurance. For each arbitrage sub-strategy grouping presented, a detailed overview is provided, including the strategy description, observed trends, key challenges, historical performance across different market environments, and anticipated risk-return profiles.

These strategies look to benefit from mispricings of the same or closely related instruments, such as from pricing uncertainties in options and other derivatives.

What are arbitrage hedge funds?

Arbitrage hedge funds employ investment strategies that exploit inefficiencies arising from pricing discrepancies in the same or closely related financial instruments. While the core idea is to profit from misalignments in asset prices, successfully executing these strategies often requires sophisticated techniques and a thorough understanding of market dynamics, particularly when dealing with volatility instruments and derivatives.

Trading volatility can be perceived as inherently more complex than trading equities because option pricing is influenced by multiple factors, including movements in the underlying asset's price, shifts in expected volatility, and time decay (the gradual loss in value as the option approaches expiration). These nonlinear sensitivities, reflected in the convex payoffs of options, can make predicting price changes far more challenging than in linear instruments like equities. Additionally, the path dependency of these factors means that the sequence and timing of changes can significantly impact profitability. Managing these interrelated risks adds further layers of complexity to these strategies.

In the hedge fund universe, strategies such as volatility arbitrage, tail protection, convertible bond arbitrage, opportunistic arbitrage, and elements of the risk premia space - such as systematic short volatility - each represent distinct methods of capitalising on market inefficiencies. These strategies leverage the special properties of non-linear instruments to tap into market dynamics that are not ordinarily accessible through traditional linear trading strategies.

By employing advanced techniques and robust risk management practices, arbitrage hedge funds aim to capitalise on market inefficiencies while controlling for unintended risks.

By employing advanced techniques and robust risk management practices, arbitrage hedge funds aim to capitalise on market inefficiencies while controlling for unintended risks. Understanding the nuances of these strategies helps investors align specific approaches with their investment goals, whether seeking defensive positioning to protect against market downturns or aiming for opportunistic gains from identified inefficiencies.

Most common arbitrage strategies trading volatility

Arbitrage strategies can be categorised in various ways; however, we've used Aurum's Hedge Fund Data Engine [sub-strategy classifications](#):

- Volatility arbitrage
- Convertible bond arbitrage
- Arbitrage – opportunistic
- Tail protection

Volatility arbitrage is a strategy designed to profit from differences between implied volatility—what the market anticipates for future volatility—and realised volatility—the actual observed fluctuations in asset prices. Managers use instruments like options, volatility derivatives such as variance swaps, and indices like the VIX to capture these differences, often relying on sophisticated modelling to identify opportunities. Although generally market neutral, these strategies may exhibit a slight long or short volatility bias.

Convertible bond arbitrage focuses on trading convertible bonds, which are hybrid securities combining features of bonds and equity options. Managers seek to identify and profit from misalignments between the pricing of the convertible bond and its underlying components. By hedging against unwanted risks such as equity price movements, credit risk or interest rate changes, they seek to profit from the expected convergence to fair value.

Arbitrage – opportunistic funds have the flexibility to trade across multiple arbitrage areas, often specialising in a mix of volatility trading, convertible bond arbitrage, and capital structure arbitrage; some may also trade more niche areas such as index, ETF, fund, or SPAC arbitrage. These funds dynamically shift capital to what they perceive as the most promising opportunities, adapting to changing market conditions. This opportunistic approach enables them to focus on niche areas and exploit specific pricing anomalies as they arise.

Tail protection strategies are designed to benefit from extreme market movements, particularly during periods of significant stress or spikes in volatility. They aim to generate positive performance from large market shifts, either through long volatility positions or by capitalising on sudden changes in asset prices or correlations. Acting as a form of insurance within a portfolio, these strategies can potentially offset losses from traditional assets during market downturns.

A fifth, related strategy—while not part of the Aurum Hedge Fund Data Engine's arbitrage strategy group—heavily relies on options: short volatility strategies. These are briefly mentioned here for contrast and to round out the discussion. Short volatility strategies generate returns by selling options or volatility derivatives to collect premiums, leveraging implied volatility's historical tendency to exceed realised volatility. These strategies are often combined with other risk premia to build a more diversified portfolio. Their rules-based nature allows them to be implemented using quantitative models; consequently, all such funds have been assigned to the **quant – alternative risk premia sub-strategy**. For more information, see the quant primer [here](#).

Arbitrage hedge fund strategies focusing on volatility instruments or convertible bonds constitute a very modest segment of the hedge fund universe, accounting for approximately 3% of the industry's total assets,

according to Aurum's Hedge Fund Data Engine¹. However, this significantly understates the capital allocated to these strategies, as they are often a component of larger multi-strategy or quantitative hedge funds; in some cases, arbitrage strategies can represent up to a third of the overall risk allocation. Multi-strategy funds are often attracted to arbitrage strategies as they are typically highly diversifying, while arbitrage portfolio managers benefit from the large multi-strategy fund's economies of scale and technology. Additionally, since many of the opportunities can be cyclical in nature, a multi-strategy approach can offer flexibility in timing and capital deployment.

Risk / return summary

	Vol arb	Convert arb	Arb opportunistic	Tail protection	Short vol (risk premia)
Typical assets traded	Options, futures, vol derivatives, equities	CBs, options, equities, CDSs, credit indices	Options, equities, CBs, corp bonds, CDSs, loans	Options, futures, vol derivatives	Options, futures, vol derivatives
Directional or relative value vol bias	Relative value	Relative value	Relative value	Directional	Directional
Long/short vol bias	Neutral or long vol	Neutral	Flexible; varies	Long vol	Short vol
Complexity of strategy	High	High	High	Moderate	Low to moderate
Systematic vs. discretionary approach	Both	Primarily discretionary	Both	Both	Primarily systematic
Target returns	Moderate	Moderate	Moderate	High during crises	Steady, low returns
Historical volatility vs. other HFs	Low volatility	Low to moderate volatility	Moderate volatility	High volatility during crises	Low vol normally; high during stress
Historical correlation with traditional assets	Low correlation	Moderate to strong positive correlation	Weak to moderate positive correlation	Moderate to strong negative correlation	Moderate to strong positive correlation
Historical beta to traditional assets	Neutral beta	Low beta	Low beta	Moderate negative beta	Low to moderate beta

¹ \$80bn total AUM as of September 2024, retrieved on 21 October 2024. This figure excludes AUM in short volatility/alternative risk premia strategies.

Volatility arbitrage

DESCRIPTION

Volatility arbitrage strategies aim to profit from inefficiencies in the pricing of options and other volatility-related instruments by capturing the difference between implied volatility — the market's expectation of future price swings — and realised volatility — the actual movement of asset prices. Managers typically buy options when they perceive implied volatility as undervalued, anticipating higher actual volatility, and sell options when they believe implied volatility is overvalued. This approach seeks gains regardless of the market's overall direction by hedging out directional (price) risk, focusing instead on fluctuations in implied and realised volatility. By treating volatility as an asset class, these strategies aim for returns uncorrelated with traditional equity and bond investments.

Volatility arbitrage strategies aim to profit from inefficiencies in the pricing of options and other volatility-related instruments

OPPORTUNITY SET

Mispricings in volatility instruments can arise from supply and demand imbalances, market inefficiencies, and behavioural biases among market participants. A few examples include:

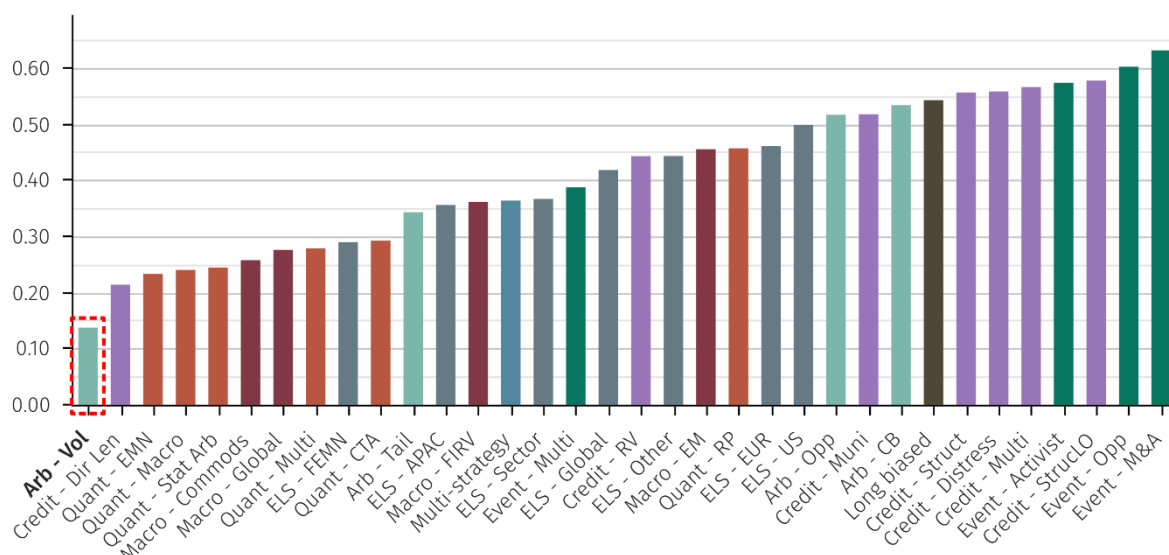
- Different asset classes or geographies can have inherently different market dynamics.
 - In European and Asian equity markets, the issuance of structured products—popular during periods of low interest rates—often involves selling options to generate yield. This selling activity depresses implied volatility levels in instruments like index options or affects the pricing of dividends.
 - The fragmentation of exchanges, particularly in the US options market, leads to discrepancies in pricing and liquidity across venues. This fragmentation can result in misalignments in implied volatility between exchanges, presenting arbitrage opportunities.
 - In the United States, some corporations sell put options on their own stock as a method of share buybacks, which affects the shape of the volatility surface — the pattern of implied volatility across options with different strike prices and expiration dates for the same underlying stock.
 - Globally, participants such as pension funds and insurance companies engage in large overwriting programs by selling call options on their long stock holdings to generate additional yield or by purchasing index protection for their equity portfolios. This imbalance in market activity can affect the volatility surfaces of these underlying assets.
- Market participants vary in their approach to trading options.
 - Some buy options to take a view on the direction of an asset's price, aiming for potential gains if the price moves in the direction predicted, while limiting losses to the cost of the option. Others use a hedging approach to keep their exposure to price changes neutral, focusing instead on benefiting from shifts in volatility and capturing the difference between implied and realised volatility. These differing approaches can affect option prices and if the imbalance is pronounced enough, it can even impact stock price movements.
 - The proliferation of option-selling strategies, such as call overwriting ETFs, has increased the supply of options in the market, suppressing implied volatility levels.

Such activities by various market participants affect supply and demand in the options market, creating trading opportunities for volatility specialists.

VARIATIONS IN STRATEGY IMPLEMENTATIONS

Volatility arbitrage strategies can differ greatly in their implementation, influenced by factors such as the specific asset classes and geographies traded, whether the approach is discretionary or systematic, the sophistication of the manager's trading systems, the use of over-the-counter versus listed instruments, the maturities of the instruments used, trade structuring methods, hedging methodology and frequency, and the manager's risk appetite and limits.

These variations lead to a high degree of heterogeneity across volatility arbitrage funds, with intra-strategy correlations the lowest relative to other hedge fund strategies.

AVERAGE INTRA-STRATEGY CORRELATION (5 YR)¹ – SUB-STRATEGY

Source: Aurum Hedge Fund Data Engine, data to 30 June 2024. ¹Equally weighted returns

COMMON STRATEGIES DEPLOYED

Event volatility/directional volatility trading

Event volatility strategies aim to exploit price inefficiencies and mispricings in implied volatility surrounding specific events, such as earnings announcements or economic data releases. These events often lead to significant price movements, with implied volatility typically rising beforehand due to uncertainty and falling after the announcement. Managers take positions ahead of these events, seeking to profit from the market's reaction by anticipating increases or decreases in asset volatility. For instance, a manager might purchase options on a stock in anticipation of heightened volatility due to an upcoming earnings announcement.

Special situations

Special situations focus on corporate events affecting volatility, such as mergers and acquisitions (M&A). In a takeover scenario, the implied volatility of the target company's stock is influenced more by the perceived probability of the deal closing than by historical realised volatility, leading to trading opportunities. Other market participants may use options to buy downside protection if they believe a deal might not close, or sell upside if they predict a higher bidder won't materialise—the supply and demand dynamics impact option pricing along the volatility surface. More information on how certain hedge fund strategies capture alpha from corporate catalysts can be found in the event driven hedge fund primer [here](#).

Relative value

Relative value strategies exploit mispricings along the volatility surface resulting from market flows by trading options with different maturities or strike prices on the same or related instruments. Managers look for relationships expected to revert to historical norms, seeking to profit from mean reversion as determined by proprietary models. They carefully structure their positions to limit exposure to price fluctuations and the impact of time decay, aiming to profit from volatility discrepancies instead.

Volatility spreads

Volatility spreads involve exploiting inefficiencies in volatility pricing between related indices. For example, a manager might identify a mispricing between the implied volatilities of options on the NASDAQ and S&P 500 indices. By taking offsetting positions in options on these indices, the manager aims to profit on the expectation that the volatility spread reverts to its historical average.

VIX trading

VIX trading involves trading derivatives linked to the CBOE Volatility Index ("VIX"), which measures the implied volatility of S&P 500 index options. Traders take positions in VIX futures or options to profit from expected changes in S&P implied volatility. Some managers engage in strategies trading the S&P 500 index against the VIX, capitalising on the historical correlation between the indices, as determined by proprietary models. Others may trade VIX options, known as "vol of vol" instruments, which enable trading second-order volatility movements.

Dispersion trading

Dispersion trading is a relative value strategy that aims to profit from pricing differences between index options and options on individual stocks within the same index. Managers typically sell options on an index and buy options on the individual stocks, an approach referred to as 'long dispersion' or 'short correlation'. This strategy performs well in markets with high idiosyncratic risk among stocks — such as during earnings seasons or significant sector rotations — when individual stock movements are less correlated with the overall market. Differences in returns between managers can be influenced by factors such as:

- **Implementation:** Using volatility swaps or vanilla options; precise replication often requires sophisticated infrastructure and must be considered against the cost.
- **Risk tolerance:** The degree to which a manager leans long or short volatility
- **Experience:** Skill and discretion in hedging strategies.

Dividend arbitrage

Dividend arbitrage strategies seek to capitalise on discrepancies between implied dividends in options and futures prices and actual dividend payouts. Traders may engage in single-stock or index dividend futures or swaps. For example, in the Euro Stoxx index, structured product issuance often depresses implied dividend levels, creating opportunities to buy dividend index futures or options. However, these trades can exhibit strong downside beta during market sell-offs, making implementation, hedging, and sizing choices paramount.

CHALLENGES

Volatility arbitrage strategies can face several challenges. Accurately forecasting future volatility is difficult, as models based on historical data may not hold under varying market conditions. Unexpected market events, structural shifts, or rapid changes in sentiment can quickly render forecasts inaccurate. Additionally, risk managing a portfolio of instruments with non-linear sensitivities to multiple factors and convex payoff structures is inherently challenging.

Data management poses another hurdle; strategies involving single-stock options require access to extensive historical data and the ability to process a vast amount of data in real time, which can be resource intensive.

Execution challenges are also significant. Rapid execution is often required, especially for strategies involving short-dated options or fast-moving markets.

A deep understanding of market flows is essential for certain strategies. Large trades by institutions, corporates, structured product issuances by banks, or hedging activities can significantly impact volatility surfaces. Identifying and anticipating these flows help traders position themselves accordingly.

Liquidity challenges can also arise, particularly when trading less liquid over-the-counter (OTC) instruments or in markets fragmented across multiple exchanges. Price transparency may be limited, making it difficult to execute trades at desired prices. During periods of market stress, liquidity can diminish, increasing trading costs and the risk of slippage.

TRENDS OVER THE YEARS

The volatility arbitrage landscape has evolved due to technological advancements and changes in market dynamics. The rapid adoption of zero days to expiry options in recent years has led to significant trading volumes, influencing market volatility and creating potential mispricings. This has opened opportunities for traders with rapid decision-making and execution capabilities.

Varying regulatory regimes around the world have also impacted local markets. For example, in India, support for the growth of the derivatives market has attracted increased retail and institutional participation. This has led to a substantial increase in options trading, with volumes now far exceeding those of cash equities—the highest ratio globally².

More broadly, advancements in technology have enabled more sophisticated, systematic trading strategies. Algorithmic models can process vast amounts of data to identify patterns and execute trades at high speeds.

² <https://www.fia.org/marketvoice/articles/explainer-meteoric-rise-indias-equity-derivatives-volume>
<https://economictimes.indiatimes.com/markets/stocks/news/qamification-of-market-derivatives-to-cash-volumes-ratio-highest-in-india/articleshow/104491694.cms>

The behaviour of market participants has also shifted. The growth of passive investing and the use of options by institutional investors for hedging or yield enhancement have altered supply and demand dynamics in the options market, impacting implied volatility levels.

Markets have also become more interconnected globally. Traders now monitor and analyse a broader set of factors, adapting strategies to account for the influence of events across different regions and asset classes. As markets become more complex and competitive, managers have needed to continually adapt and innovate to identify and capitalise on opportunities.

PERFORMANCE IN DIFFERENT MARKETS

Volatility arbitrage strategies may perform differently across market conditions, influenced by their exposure to volatility. Managers aiming to remain neutral to implied volatility shifts focus on relative mispricings and inefficiencies. In stable or low-volatility markets, they aim to generate consistent returns by capturing option pricing discrepancies without taking a directional view on aggregate volatility.

During turbulent markets or sudden volatility spikes, neutral managers may be less impacted by broad volatility shifts. Those focused on relative value or volatility spreads can find more opportunities as market dislocations create mispricings, potentially boosting returns. By staying neutral to direct volatility movements, they aim to capture gains from other sources, such as changes in asset correlations or relative value opportunities.

Managers with a long volatility bias tend to benefit in periods of rising volatility, as their positions gain from increases in implied volatility and from realised volatility exceeding initial purchase levels. Conversely, those with a short volatility bias may see steady returns in calm markets but face considerable risks during volatility spikes. In sharply declining markets, rising asset correlations can impact strategies like dispersion trading.

All managers—whether neutral, long, or short volatility—must adapt to shifting correlation structures and volatility regimes. Successfully adjusting to these changing environments is essential for sustained performance over time.

RISK / RETURN PROFILE

Volatility arbitrage strategies exhibit a distinctive risk/return profile shaped by market conditions, strategy implementation, and risk management practices. They aim to generate consistent returns by capitalising on volatility mispricings, often resulting in performance uncorrelated with traditional assets.

Risks

Volatility arbitrage funds face several market risks:

- **Volatility movements:** Unexpected shifts in implied volatility can impact hedge effectiveness and option valuations. Sharp volatility movements may not be fully offset by hedging strategies, affecting returns. Managers with long or short volatility biases are more directly impacted, benefiting or suffering accordingly.
- **Price movements of underlying assets:** Large, sudden shifts in asset prices can disrupt hedging positions, exposing the fund to market direction risk. Extreme price movements, particularly around events like earnings announcements, may leave the fund temporarily unhedged.
- **Correlation risks:** Changes in asset correlations can affect hedges and profitability, particularly in dispersion trading and relative value volatility trading between different underlying assets. Increased correlations during market stress can reduce the benefits of strategies relying on low correlations, whilst relative value strategies that look for mean reversion can become potentially exposed to significant losses in the event of a correlation breakdown.
- **Liquidity risks:** Reduced liquidity in derivatives markets can widen bid/ask spreads and complicate trade execution, making it harder to adjust positions promptly and increasing the potential for losses. This risk is especially pronounced during periods of market turbulence, when trading volumes drop, and participants become more risk averse. Notable examples include the 2008 Global Financial Crisis and the market sell-off in March 2020 during the COVID-19 pandemic.

Model risk and data management challenges are further examples of risks inherent in volatility arbitrage strategies. Reliance on quantitative models for pricing and hedging options introduces the possibility that models may not accurately predict market behaviour, especially during atypical conditions. Moreover, managing and processing large volumes of data in real time requires robust technological infrastructure.

Risk management practices

Effective risk management is essential given the complexity of the instruments involved. Managers typically use techniques like dynamic hedging, regularly adjusting positions to remain neutral to key risk factors such as

price movements and volatility. During periods of high volatility or expected significant news, they may re-hedge positions multiple times a day.

Structuring trades to have an upper bound on losses, rather than unlimited exposure, is a key part of some managers' risk mitigation strategy. Others may limit trading in certain instruments—especially when selling volatility—set caps on short portfolio exposure or require additional approvals and oversight for such trades. Most managers also implement strict position limits and stop-loss rules to manage exposures and contain losses.

Lastly, diversification across assets, markets, and strategies reduces idiosyncratic risks, limiting the impact of negative moves in any single position or market segment.

Return characteristics

The return characteristics of volatility arbitrage strategies are influenced by these risks and the managers' ability to navigate them effectively. Volatility arbitrage strategies have historically exhibited low correlation with traditional assets, providing diversification benefits within a broader investment portfolio. The potential for asymmetric returns exists, depending on the strategy's bias towards long or short volatility and the nuances of how the strategy is implemented and risk managed. For instance, a strategy with a short volatility bias may generate steady returns during calm markets but faces the risk of significant or severe losses during volatility spikes.

The impact of different volatility regimes is significant. Strategies that adjust their volatility exposure dynamically may perform better across varying market conditions. Managers who can anticipate changes in volatility and adapt their positions accordingly are better positioned to achieve consistent returns. Effective risk management practices, such as dynamic hedging, diversification, strict position limits, stress testing/scenario analysis, and liquidity management are essential in mitigating risks and enhancing the risk/return profile.

In summary, the risk/return profile of volatility arbitrage strategies is varied. Success depends on the manager's expertise in understanding and managing the intricacies of options markets, accurately forecasting volatility movements, implementing robust risk management practices, and continuously adapting to changing market conditions.

Convertible arbitrage

DESCRIPTION

Convertible bond arbitrage is an investment strategy that aims to profit from price discrepancies between a convertible bond and its component parts. A convertible bond is a hybrid security combining features of a bond and a stock option, allowing the holder to convert the bond into shares of the issuing company's stock. Managers typically purchase the convertible bond and short sell the underlying equity to hedge the equity risk, focusing on differences between the bond's market price and its theoretical value based on its components.

Convertible bond arbitrage is an investment strategy that aims to profit from price discrepancies between a convertible bond and its component parts.

Key factors in valuing a convertible bond include the issuer's credit quality and the expected volatility of the stock. By analysing these elements, managers identify situations where the convertible bond is undervalued relative to its intrinsic components. The strategy involves hedging unwanted risks such as equity price movements, interest rate changes, and sometimes credit risk, aiming to profit as the pricing discrepancy corrects over time.

This approach requires expertise in both fixed income and equity markets, dealing with the interplay between the bond's credit component and the embedded equity option. Effective execution demands sophisticated modelling and risk management to navigate the complex factors involved.

OPPORTUNITY SET

Mispricings in convertible bonds arise due to the complexity of valuing their hybrid nature. The embedded option and the bond component can be misaligned relative to each other because different market participants may value them differently. For instance, fixed income investors might undervalue the equity option component, while equity investors might misjudge the credit risk of the bond component.

Market inefficiencies can occur due to supply and demand imbalances, especially when new convertible bonds are issued, or during periods of market stress when liquidity is constrained – particularly as convertible bonds are less liquid than their underlying equities or straight bonds.

Another source of opportunity is the misestimation of volatility. Since the value of the embedded call option is sensitive to the expected volatility of the underlying stock, discrepancies between the implied volatility in the convertible bond and the actual or expected volatility of the stock can create profitable trading opportunities. By re-hedging the equity exposure, managers can focus on capturing the difference between implied and realised volatility, like volatility arbitrage strategies discussed earlier.

VARIATIONS IN STRATEGY IMPLEMENTATION

Where a convertible bond trades relative to its conversion price significantly impacts its risk and return profile, shaping the way strategies are implemented. For example, if a company's stock price falls far below the conversion price, the conversion feature becomes essentially worthless, as the holder is unlikely to convert the bond into equity. In this scenario, the bond behaves like a traditional fixed-income instrument, generating returns primarily through interest payments, and is rarely used for arbitrage strategies focusing on volatility, though may be used in capital structure arbitrage. Conversely, if the stock price rises well above the conversion price, the bond's value closely tracks the underlying stock, providing equity-like returns while retaining the bond's downside protection in case of steep price declines. These bonds are also less relevant for volatility arbitrage but may still offer opportunities in other arbitrage approaches. Convertible bonds trading *near* their conversion price are the most appealing for volatility arbitrage, as they retain significant volatility value. By hedging the equity exposure, managers can capitalise on the bond's embedded option, aiming to profit from volatility rather than market direction.

The extent to which managers hedge also varies. Some fully hedge the equity exposure by shorting the underlying stock to achieve a market-neutral position, while others choose partial hedging to retain some market exposure based on their market views. This highlights the wide range of convertible bond trading approaches, from credit-focused strategies to sophisticated option-based techniques, contributing to the field's diversity.

Managers further differentiate themselves by how they manage credit risk. While some managers focus on investment-grade convertible bonds, others target high-yield or distressed securities, accepting higher credit risk for the potential of greater returns. Credit derivatives like credit default swaps (CDS) provide an opportunity for managers to selectively hedge credit exposure when available.

The use of leverage also varies widely. Fully hedged positions often yield low returns, prompting some managers to use leverage to enhance performance, with differing levels of leverage impacting the strategy's overall risk profile. Geographic and sector focus can also shape implementation. For instance, managers may specialise in specific regions or industries where they identify pricing inefficiencies due to unique market dynamics or regulatory differences. In China, for example, companies can reset the conversion price of their convertible bonds if their share price drops significantly—a practice called “re-striking.” This regulatory feature, absent in markets like US and Europe, directly affects the valuation of the bond's component parts, offering unique opportunities for specialist traders.

CHALLENGES

Convertible bond arbitrage trading presents several challenges. The hybrid nature of the convertible instrument and cross-asset nature of the strategy requires expertise in both fixed income and equity derivatives, necessitating sophisticated modelling and risk management. Liquidity is more sparse, as convertible bonds are less liquid than underlying stocks or straight bonds, making it difficult to trade positions without affecting market prices, particularly during periods of market stress.

The strategy is also capital-intensive to finance. Holding long positions in convertible bonds and short positions in equities requires significant funding, and accessing sufficient leverage can be challenging when financing conditions tighten. Additionally, credit and counterparty risks are significant. Changes in the issuer's creditworthiness can impact bond values, and borrowing shares to maintain short positions can become difficult or expensive. Regulatory and operational issues, including short-selling regulations and managing positions across different asset classes, add further complexity that requires careful management.

TRENDS OVER THE YEARS

Over the years, the landscape of convertible bond arbitrage has changed markedly. Before the 2008 Global Financial Crisis (GFC), the strategy was quite popular, supported by ample liquidity and favourable financing terms that allowed for high leverage. The GFC, however, brought significant shifts. Credit markets tightened, liquidity diminished, and convertible bond valuations declined. Borrowing and hedging costs rose, and securing financing became more challenging. The sudden introduction of short-sale bans in 2008, coupled with the inability to hedge leveraged long portfolios, triggered a wave of deleveraging in convertible bond funds amid already illiquid market conditions. This led to severe losses for many funds, forcing some to gate or suspend redemptions, while others were unable to recover and shut down entirely.

Due to these challenges, particularly in accessing funding, most convertible bond arbitrage strategies are housed within large multi-strategy hedge funds. These firms leverage their size, relationships, and broader range of strategies to secure better financing. As noted earlier, the opportunity set in the convertible space is highly cyclical, influenced by factors such as new issuance, valuation levels, market volatility, liquidity, market participants, and vintage. Multi-strategy funds, with their broader focus, can dynamically adjust allocations to convertibles based on these conditions.

In recent years, the strategy has experienced periods of strong performance when market volatility increases and pricing discrepancies become more evident. Conversely, during times of low volatility and tight credit spreads, opportunities are fewer, and returns may be lower. The strategy continues to evolve, with managers adapting to changing market conditions and regulatory environments.

PERFORMANCE IN DIFFERENT MARKETS

Convertible bond arbitrage strategies have historically performed best in markets with moderate to high volatility, in which trading opportunities have been abundant. Increased volatility leads to larger discrepancies between the prices of convertible bonds and their underlying components, creating opportunities to profit from mispricings. However, during extreme market downturns or credit crises, these strategies can and have faced significant challenges, as described above.

New issuance of convertible bonds, which often increases during periods of rising interest rates, expands market supply and can create opportunities for funds to buy bonds at a discount. However, high levels of issuance alone do not necessarily lead to mispricing. While more instruments may be available to trade, favourable conditions for arbitrage rely on accompanying market volatility and pricing inefficiencies. Additionally, markets dominated by long-term investors, like institutional asset managers, can create inefficiencies, as these participants often value convertible bonds differently from specialised hedge funds, who focus on price discrepancies between the convertible bond and its components.

RISK / RETURN PROFILE

Convertible bond arbitrage offers the potential for steady, risk-adjusted returns with moderate correlation to traditional asset classes. Unwanted risks are hedged out where possible, in order to focus on capturing the convergence between the convertible bond's market price and its theoretical fair value.

However, several risks are involved. Residual exposure to equity, credit, interest rate, and volatility risks can affect returns if hedges are imperfect. Liquidity risk is significant; difficulty in trading convertible bonds or maintaining short equity positions can lead to losses, especially during stressed markets. Credit risk is also a concern, as deterioration in the issuer's credit quality can impact the bond's value beyond what is hedged. Model risk exists—if valuation models are inaccurate or assumptions about volatility and credit spreads are incorrect, mispricing and losses can result. Structurally, the use of leverage to enhance returns also magnifies potential losses, affecting the overall risk profile.

Extreme market events can significantly impact the strategy. During periods of severe stress, such as the Global Financial Crisis, liquidity can evaporate, credit spreads can widen dramatically, and asset correlations can change unpredictably. These conditions may lead to large losses even for hedged positions, as models may fail and hedges become less effective. Inability to adjust positions due to illiquidity can exacerbate losses. Therefore, managing tail risks and preparing for extreme scenarios are crucial aspects of risk management. In summary, convertible bond arbitrage requires sophisticated expertise and robust risk management to navigate its complexities.

Arbitrage – opportunistic

DESCRIPTION

Arbitrage – opportunistic hedge funds aim to profit from mispricings in the same or closely related instruments. These funds have the flexibility to trade across various arbitrage areas but often focus on a mix of volatility trading, convertible bond arbitrage, and capital structure arbitrage. They might also explore other niche opportunities to capitalise on perceived market anomalies, such as the embedded optionality in rights issues – a method where companies, like banks in 2008, offer existing shareholders the chance to buy additional shares at a discount to raise capital—or in SPACs (special purpose acquisition companies), which surged in popularity in 2020.

These funds have the flexibility to trade across various arbitrage areas but often focus on a mix of volatility trading, convertible bond arbitrage, and capital structure arbitrage.

Unlike broader multi-strategy funds, arbitrage – opportunistic funds concentrate specifically on arbitrage opportunities, allowing them to hone their expertise. Usually managed by a single CIO or PM, they dynamically shift capital to the most promising strategies as market conditions change. Their key trait is the ability to quickly reallocate funds to seize the best opportunities while reducing exposure to less favourable ones.

PERFORMANCE IN DIFFERENT MARKETS

These funds strive for consistent returns across different market environments by actively adjusting their focus among various arbitrage strategies. Their performance depends on the availability and size of mispricing opportunities, which can vary with market conditions. During times of market volatility or disruption, these anomalies often become more noticeable, giving these funds a chance to achieve strong returns.

For instance, when equity volatility spikes, they might zero in on volatility trading to profit from mispriced options. If corporate actions like mergers or restructurings are common, they may focus on capital structure arbitrage to benefit from pricing gaps between a company's debt and equity. Their flexibility lets them adapt to changing markets, potentially outperforming strategies that stick to a single asset class or arbitrage area.

RISK / RETURN PROFILE

Arbitrage – opportunistic hedge funds usually aim for steady, uncorrelated returns with moderate volatility, focusing on market-neutral strategies that target specific price discrepancies. However, concentrating on specific arbitrage strategies can lead to higher risk if expected price corrections don't occur as anticipated. Using leverage to boost returns from small pricing differences can also increase losses if markets move against them. Additionally, holding less liquid instruments may pose liquidity risks, making it tough to adjust or exit positions quickly during market stress. Overall, the risk and return of these funds hinge on their skill in spotting and taking advantage of mispricings while managing the associated risks.

Tail protection

DESCRIPTION

Tail protection hedge fund strategies aim to profit when traditional assets like stocks and bonds fall sharply, acting as a form of insurance against unexpected market events. Usually, they involve positions that benefit from sudden jumps in volatility or significant shifts in asset prices. This can include long volatility positions, where the fund benefits from increasing market turbulence, strategies that capitalise on major movements in underlying asset prices, or even sudden changes in normally stable relationships between assets, which can widen dramatically during market stress.

Tail protection hedge fund strategies aim to profit when traditional assets like stocks and bonds fall sharply, acting as a form of insurance against unexpected market events.

A key feature of these strategies is their negative correlation to equities and bonds during downturns. By aiming to make gains when conventional assets fall, tail protection funds can help offset losses in an investment portfolio. This negative correlation can be attractive to investors looking for diversification and protection against widespread market risks.

CHALLENGES

Implementing tail protection strategies comes with certain risks and challenges. One big issue is managing the cost of holding positions in options, particularly the time decay—the loss in value over time. Since options lose value as they get closer to expiry, funds need to carefully balance the cost of keeping these positions against the potential benefits.

If extreme market events don't happen over time, the ongoing cost of these hedges can erode returns, making them less attractive on their own. As a result, some investors include these strategies within their larger portfolios as a way to reduce risk.

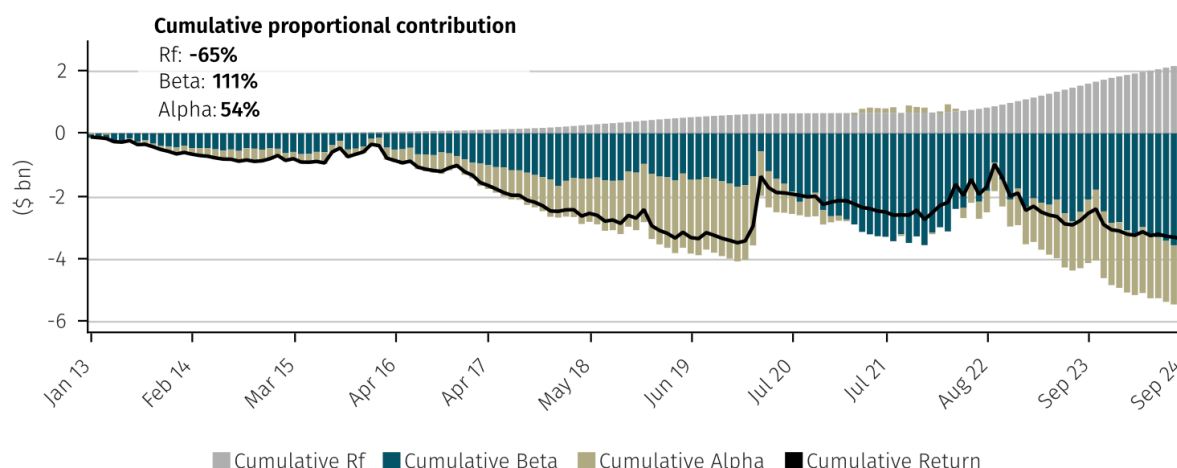
Another challenge lies in determining the optimal time to realise gains from profitable positions. Exiting too early risks missing further upside if market stress intensifies, while holding on for too long can erode returns if conditions stabilise. Allocators must understand the manager's approach to monetising gains after a volatility spike. Funds offering static protection may give back gains if markets quickly revert. In contrast, actively managed tail protection funds may seek to add alpha by timing exits, potentially crystallising gains but leaving investors less protected in a subsequent volatility spike, making their protection harder to predict and model.

PERFORMANCE IN DIFFERENT MARKETS

The performance of tail protection hedge fund strategies depends heavily on market conditions and how the strategy is implemented. In stable or rising markets, the strategy tends to underperform due to the costs of maintaining protective positions, such as options premiums or other hedging expenses. However, during periods of heightened market volatility or significant downturns, these strategies aim to deliver positive returns by capitalising on sharp declines in asset prices or sudden volatility spikes. For example, during major market events like the 2008 financial crisis or the market turbulence in March 2020 (COVID-19 sell-off), tail protection funds saw substantial gains.

The graph below breaks down the cumulative returns of the tail protection sub-strategy into the risk-free rate, beta, and alpha components. It demonstrates how negative returns from both beta and alpha can accumulate over time, particularly during periods without extreme market events.

ARBITRAGE – TAIL PROTECTION – DECOMPOSING DOLLAR PERFORMANCE INTO ALPHA, BETA AND RISK FREE (RF) COMPONENTS



Source: Aurum Hedge Fund Data Engine, Bloomberg. These charts decompose the Hedge Fund Composite dollar returns into Beta, Alpha and Risk free ("Rf") components, as follows: $\text{Alpha} = \text{Actual return} - \text{Rf} - \text{Beta} * (\text{Market return} - \text{Rf})$.

Where Rf is the Risk-free rate as defined by a rolling 3-month LIBOR-SOFR, where market return is that of S&P Global BMI ('the market index') and where Beta has been calculated with respect to each underlying fund observed on a 60m rolling basis to the market index. The monthly Alpha, Beta and Rf components are then applied to each underlying fund's dollar performance for a particular month, and then at a master strategy or industry level the individual fund dollar contributions are aggregated.

RISK / RETURN PROFILE

Tail protection hedge fund strategies often have asymmetric returns—low or negative during stable periods due to costs, and positive during turbulence. This results in a strong negative correlation with traditional assets. Additionally, as market volatility spikes during periods of stress, the return volatility of these strategies increases with large jumps in performance. Absent these market shocks, the ongoing costs without apparent benefits during stable markets can challenge investor patience. Thus, managing expectations and maintaining a long-term view are important.

Tail protection hedge fund strategies have a distinctive risk/return profile influenced by several key factors:

- **Monetisation timing:** Deciding when to realise gains impacts returns. Monetising early secures profits but may miss out on further gains if stress intensifies. Delaying monetisation might maximise returns during prolonged downturns but risks losing value if markets stabilise sooner.
- **Cost of carry:** Maintaining hedging positions incurs ongoing costs, such as options premiums, which can reduce returns if market stress doesn't materialise. To limit these costs, managers may structure trades more efficiently, using techniques like options spreads, options with lower upfront costs, or complementary strategies that help offset expenses in stable markets.
- **Hedging objectives:** Strategies vary based on whether they aim to hedge against general market downturns or extreme crash scenarios. Those targeting moderate declines may offer smaller but more frequent gains, while strategies focused on severe crashes might generate significant returns during rare events but incur higher cumulative costs during extended calm markets.
- **Asset classes traded:** The types of assets used—equities, bonds, commodities, currencies, or credit derivatives—affect both potential returns during market stress and costs during stable periods.
- **Implementation approach:** Strategies can be *rules-based*, using predefined models for consistent, unbiased decisions, particularly for monetisation, or *discretionary*, relying on manager judgement for added flexibility.
- **Liquidity and execution risk:** The ability to enter and exit positions efficiently, especially in stressed markets, is crucial. Illiquid markets or higher transaction costs can reduce returns.

SHORT VOLATILITY / ALTERNATIVE RISK PREMIA

Short volatility strategies, a type of alternative risk premia, are outside of the scope of this primer and Aurum's definition of arbitrage, but have been included briefly here for the sake of contrast and completeness when exploring the main ways volatility instruments can be traded.

By systematically selling options or volatility derivatives, short volatility strategies collect premiums, taking advantage of the fact that implied volatility often trades at a premium to realised volatility. Ordinarily this creates consistent income opportunities, as investors typically pay extra for options as insurance against market movements. However, because there's a risk of significant losses during extreme market events, these strategies are often combined with other risk premia to build a more diversified portfolio. Their rules-based nature allows them to be implemented using quantitative models, and as such we've classified all such funds within the quant – alternative risk premia sub-strategy. For more detail on alternative risk premia, see Aurum's quant primer, [here](#).

Short volatility strategies often perform well in stable or rising markets with low or declining volatility, generating steady returns from option premiums. However, during periods of market stress or sharp volatility spikes, they can face significant challenges. Sudden downturns may lead to steep losses, exacerbated by reduced liquidity that makes adjusting or closing positions difficult. The risk and return profile is often characterised by small, consistent gains interrupted by occasional large losses during extreme events. Notable examples of extreme losses include the Global Financial Crisis in 2008 and the COVID-19 market turmoil in 2020, both of which saw volatility soar to record highs. Similarly, in February 2018, a sudden volatility spike –known as 'Volmageddon'—caused certain short-volatility exchange-traded products to lose up to 90% of their value in a single day, forcing some to shut down.

Sometimes, short volatility strategies are likened to 'picking up pennies in front of a steamroller' due to their exposure to similar risks as those just described. However, a well-managed short volatility strategy that mitigates tail risk can still provide a potentially uncorrelated position, enhancing a diversified portfolio. These events underscore the importance of understanding the inherent risks in such strategies and how they integrate into broader risk management frameworks.

Glossary

Volatility derivatives

Financial instruments whose value is based on the volatility of an underlying asset rather than its price. Examples include variance swaps, volatility swaps, and options on volatility indices like the VIX, commonly used for hedging or managing volatility exposure.

Volatility surface

A visual representation of implied volatility across options with varying strike prices and expiration dates for the same underlying asset. Used to identify pricing inefficiencies.

Variance swaps

A derivative that allows traders to exchange realised volatility for a fixed level of implied volatility over a specified period. Useful in hedging or arbitraging volatility movements.

Over-the-counter (OTC) Instruments

Financial instruments traded directly between two parties, rather than on a formal exchange. OTC instruments, such as bespoke options, swaps, and certain derivatives, are often customised to meet specific needs but can have less transparency and liquidity compared to exchange-traded instruments.

Slippage

The difference between the expected price of a trade and the actual execution price. Often occurs during periods of low liquidity or high market volatility, impacting returns.

Time decay

The gradual reduction in the value of an option as it approaches its expiration date. Time decay reflects the diminishing likelihood of the option being exercised profitably.

Dynamic hedging

A risk management technique involving frequent adjustments to positions to stay neutral to factors like price or volatility changes. Common in convertible bond and volatility arbitrage.

Capital structure arbitrage

A strategy that takes advantage of pricing inefficiencies among a company's securities, such as bonds, equities, or convertible bonds. Often involves hedging risk between credit and equity markets.

Rights issue

A method where companies raise capital by offering existing shareholders the right to purchase additional shares at a discounted price. Commonly used by banks during financial crises, such as in 2008, to strengthen their balance sheets.

Credit default swaps (CDS)

A financial derivative used to hedge or speculate on a company's credit risk. In convertible bond arbitrage, CDS can offset credit exposure.

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References to Aurum Hedge Fund Data Engine refer to Aurum's proprietary Hedge Fund Data Engine database maintained by Aurum Research Limited ("ARL") containing data on around 3,400 active hedge funds representing around \$3.1 trillion of assets as at December 2024. Information in the database is derived from multiple sources including Aurum's own research, regulatory filings, public registers and other database providers. Performance in the charts using Aurum Hedge Fund Data Engine data are asset weighted unless otherwise stated.

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